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Pacific Northwest
Research Station



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Atmosphere

03-198

Ferguson, S.A.; Rorig, M.L.

2003. Regional pollution potential in the Northwestern United States. Gen. Tech. Rep. PNW-GTR-590. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 26 p.

The potential for air pollution from industrial sources to reach wilderness areas throughout the Northwestern United States is approximated for monthly mean emissions, windspeeds, and directions. A simple index is derived to estimate downwind concentration. Maps of pollution potential were generated for each pollution component, months representing each season (January, April, July, and October), and each of three vertical levels: surface, 850 millibars (mb), and 700 mb. Mixing heights for the last 40 years are used to help determine which trajectory levels best represent each month. Wind frequencies for the same time period help show variability and inherent uncertainty in using mean monthly data for pollution potential estimates.

Keywords: Pollution, pollution trajectory, mixing height, steering wind, Columbia River basin, industrial emissions.

Bibliographies

03-312

Pacific Northwest Research Station

2004. Recent publications of the Pacific Northwest Research Station, fourth quarter 2003. Portland, OR: U.S. Department of Agriculture, Forest Service. 28 p.

Keywords: Bibliographies (forestry).

Botany

03-447

Schuller, R.

2003. Carolyn's Crown/Shافر Creek Research Natural Area: guidebook supplement 28. Gen. Tech. Rep. PNW-GTR-600. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 22 p.

This guidebook describes the Carolyn's Crown/Shافر Creek Research Natural Area, a 323-hectare (789-acre) tract of coniferous forest containing stands of 600- to 900-year-old old-growth Douglas-fir along the transition between the western hemlock zone and the silver fir zone in the Cascade Range of western Oregon.

Keywords: Research natural area, old-growth forest, west-side Cascade Range of Oregon.

Economics

03-214

Stevens, J.A.; Brooks, D.J.

2003. Alaska softwood market price arbitrage. Res. Pap. PNW-RP-556. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 12 p.

This study formally tests the hypothesis that markets for Alaska lumber and logs are integrated with those of similar products from the U.S. Pacific Northwest and Canada. The prices from these three supply regions are tested in a common demand market (Japan). Cointegration tests are run on paired log and lumber data. Our results support the conclusion that western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) and Sitka spruce (*Picea sitchensis* (Bong.) Carr.) logs from Alaska share an integrated market with logs produced in the other two regions. Results are less clear for lumber. Given this evidence that markets are at least imperfectly integrated, Alaska production and exports of forest products will continue to be sensitive to international market conditions, including competition from other North American producing regions.

Keywords: Arbitrage, markets, cointegration, Alaska, softwoods, prices.

Fire

03-010

Boucher, T.V.

2003. Vegetation response to prescribed fire in the Kenai Mountains, Alaska. Res. Pap. PNW-RP-554. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 59 p.

The effect of prescribed burning on winter moose habitat was evaluated at 17 sites in the Kenai Mountains, Alaska. Relations among initial vegetation composition, physical site characteristics, browse species abundance, and competitive herbaceous vegetation were examined to determine controls on browse species

regeneration after prescribed burning. Postburn browse species abundance was inversely related to bluejoint reedgrass (*Calamagrostis canadensis* Michx. Beauv.) abundance prior to burning, and bluejoint abundance was related to specific landscape characteristics. Depositional slopes, such as fluvial valley bottoms and toe slopes, often featured soils with deep, loamy surface horizons. Sites with these characteristics generally showed large increases in bluejoint after prescribed burning. The most important preburn variables for predicting postburn browse species abundance were bluejoint abundance and the type of surficial deposit.

Keywords: Chugach National Forest, prescribed fire, vegetation change, Calamagrostis canadensis, moose habitat, nonmetric multidimensional scaling.

03-400

Rapp, V.

2004. Western forests, fire risk, and climate change. Science Update 6. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p.

Climate warming may show up first in forests as increased growth, the result of higher rates of photosynthesis, and next as changes in disturbance regimes. In six of the seven scenarios run through an advanced computer model, the Western United States gets wetter winters and warmer summers throughout the 21st century (as compared to current climate), with expanded woody growth across the West, and thus increased fire risk. Fire and fuel load issues in Western forests are linked to global carbon balance issues. The MC1 model can now produce 7-month forecasts of possible fire risks for the conterminous United States. The accuracy of 2002 and 2003 forecasts has validated the model's approach, suggesting it can eventually be a useful planning tool.

Keywords: Climate change, woody expansion, MC1, carbon balance, fire risk forecasts.

Forest Management

03-436

Schulz, B.

2003. Changes in downed and dead woody material following a spruce beetle outbreak on the Kenai Peninsula, Alaska. Res. Pap. PNW-RP-559. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 9 p.

The forests of the Kenai Peninsula, Alaska, underwent a major spruce beetle (*Dendroctonus rufipennis* (Kirby)) outbreak in the 1990s. A repeated inventory of forest resources was designed to assess the effects of the resulting widespread mortality of spruce trees, the dominant component of the Kenai forests. Downed woody materials, fuel heights, and moss depths were recorded during each inventory. Changes in downed and dead woody materials are summarized by forest type and harvest activity, compiled by fuel timelag classes. Fuel heights, fine fuels, and sound large fuels increased between 1987 and 2000. Moss depths and rotten large fuels decreased. Harvested white spruce (*Picea glauca* (Moench) Voss) showed the greatest increase of fine fuel classes.

Keywords: Downed woody material, fuels, inventory, Kenai Peninsula, Alaska, spruce beetle outbreak.

Land Use Economics

03-147

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

2003. Land use changes involving forestry in the United States: 1952 to 1997, with projections to 2050. Gen. Tech. Rep. PNW-GTR-587. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 92 p.

Of the 2.263 billion acres in the United States, 33 percent (747 million acres) is forest land and 67 percent (1,516 million acres) is nonforest land. Forest area in the United States has declined by 1 percent, or about 10 million acres, in net since 1952. Urban and other developed

areas are projected to continue to grow substantially, in line with a projected U.S. population increase of more than 120 million people over the next 50 years. Consistent with recent trends, the population growth is fastest in the West and South. Total forest area in the United States is projected to decrease by approximately 23 million acres by 2050. This would be a 3-percent reduction from the 1997 forest area. The projections of forest area are related to those above for urban and developed uses, given projected increases in population and income. Consistent with the projected slow net decline in U.S. forest-land area, private timberland area is likewise projected to decline. Total area of U.S. private timberland is projected to decline by 4 percent by 2050. Industry timberland is projected to drop 2 percent by 2050, whereas timberland area on nonindustrial private lands is projected to be reduced by 2.1 percent.

Keywords: Land use shifts, timberland area, forest-land area.

Landscape ecology

03-313

Gucinski, H.; Miner, C.; Bittner, B., eds.

2004. Proceedings: views from the ridge—considerations for planning at the landscape scale. Gen. Tech. Rep. PNW-GTR-596. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 133 p.

When resource managers, researchers, and policymakers approach landscape management, they bring perspectives that reflect their disciplines, the decisions they make, and their objectives. In working at a landscape level, they need to begin developing some common scales of perspective across the variety of forest ownerships and usages. This proceedings is a compilation of 22 papers presented at a conference that addressed divergent views on landscape management. The conference was a forum for exchanging concepts and knowledge from research and management experiences about

managing landscapes. The program addressed the issues of managing landscapes when everyone has a different perspective; approaching landscape management from aquatic, terrestrial, and socioeconomic viewpoints; and characterizing landscape management.

Keywords: Landscape management, forest policy, forest management, aquatic, terrestrial, socioeconomic.

Resource Inventory

03-442

Barrett, T.M.

2004. Estimation procedures for the combined 1990s periodic forest inventories of California, Oregon, and Washington. Gen. Tech. Rep. PNW-GTR-597. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 19 p.

Potential statistical methods for estimating population totals, means, and associated sampling errors are compared for three periodic inventories conducted during the 1990s: (1) an inventory by the Pacific Northwest Research Station Forest Inventory and Analysis Program of nonfederal land in California, (2) national forests in California, and (3) national forests in Oregon and Washington. Differences in estimates from past methods for periodic inventories compared to proposed methods for a new annual inventory system were generally minor. This document is intended as a resource for researchers using the 1990s inventories of forests in Oregon, Washington, and California. Examples are included for illustration.

Keywords: Statistical estimation, forest inventory, double sampling for stratification, west coast forests.

03-332

van Hees, W.W.S.

2003. Forest resources of southeast Alaska, 2000: results of a single-phase systematic sample. Res. Pap. PNW-RP-557. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 96 p.

A baseline assessment of forest resources in southeast Alaska was made by using a single-phase, unstratified, systematic grid sample, with ground plots established at each grid intersection. Forests cover an estimated 48 percent of the 22.9 million-acre southeast Alaska inventory unit. Dominant forest types are the western hemlock-Sitka spruce, mixed conifer, and western hemlock types. The timberland portion of productive forest land for all owners is estimated to be 4.1 million acres. Net volume on timberland was estimated at 21,040 million cubic feet. Estimated gross growth of timberland forests exceeded estimated mortality by 55.8 million cubic feet.

Keywords: Inventory (Alaska), Alaska (southeast), forest surveys, timber resources.

Rural Communities

02-224

Robertson, G.C.

2003. A test of the economic base hypothesis in the small communities of southeast Alaska. Gen. Tech. Rep. PNW-GTR-592. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 101 p.

Recent harvest declines in the Western United States have focused attention on the question of economic impacts at the community level. The impact of changing timber-related economic activity in a given community on other local activity and the general economic health of the

community at large has been a persistent and often contentious issue in debates surrounding forest policy decisions. The economic base hypothesis, in which changes in local export-related economic activity are assumed to cause changes in economic activity serving local demand, is a common framework for understanding impacts of forest policy decisions and forms the basis of models commonly used to provide estimates of expected local impacts under different policy options.

This study uses community-specific, time series employment data to test the economic base hypothesis in the small, semi-isolated communities of southeast Alaska. Estimates were derived for each of 14 communities. Export-related activity was not found to cause changes in economic activity serving local demand for the average community. However, the results indicated statistically significant differences among communities in their response to shocks in export-related activity. The implications of these results for policy, and for the theory and practice of modeling economic impacts at small spatial scales, are explored in the final sections of this study. Specifically, secondary economic impacts cannot be taken as a foregone conclusion in policy analysis, and the fundamental assumptions of static impact modeling approaches deserve greater scrutiny.

Keywords: Economic impacts, economic base, multipliers, community stability.

Silviculture

03-281

McClellan, M.H.; Biles, F.E.

2003. Performance of the SEAPROG Prognosis Variant of the Forest Vegetation Simulator. Res. Pap. PNW-RP-555. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 15 p.

This paper reports the performance and use of the Forest Vegetation Simulator-SEAPROG growth model in predicting the growth of young even-aged stands. We compared model predictions to observed values from two sets of long-

term permanent plots. We examined six variables: trees per acre, quadratic mean diameter, basal area per acre, height of the largest 40 trees per acre, cubic-foot volume per acre, and board-foot volume per acre. The magnitudes of the differences between observed and predicted values were large enough to have important implications for the interpretation and use of the model's predictions. Of even greater importance was the evidence for considerable bias in several variables. Our results appear to validate concerns expressed by users.

Keywords: Growth and yield, forest management, growth projection, modeling, southeast Alaska.

Social Sciences

03-213

Clausen, D.L.; Schroeder, R.F., comps.

2004. Social acceptability of clearcutting: discussion and literature review with emphasis on southeast Alaska. Gen. Tech. Rep. PNW-GTR-594. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 37 p.

Changing social contexts have necessitated a new approach to forest management. Growing dissatisfaction with clearcutting has made the USDA Forest Service the focus of criticism by various public interest groups. This report provides a comprehensive annotated list of published references that address the subject of socially acceptable alternatives to clearcutting. It also provides a discussion of the subject's scope and complexity. Literature on the subject reveals that social acceptability is a complex synthesis of multiple opinions, held values, and attitudes. The literature also indicates that both qualitative and quantitative social science research will be required to identify socially acceptable alternatives to clearcutting in southeast Alaska.

Keywords: Alaska, clearcutting, alternatives to clearcutting, forest management, public attitudes, social values, Tongass National Forest.

Special Forest Products

03-138

Lynch, K.A.; McLain, R.J.

2003. Access, labor, and wild floral greens management in western Washington's forests. Gen. Tech. Rep. PNW-GTR-585. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 61 p.

This report compares the changes that took place between 1994 and 2002 in the nontimber forest product (NTFP) management regime that governed access to floral greens and other NTFPs in western coastal Washington. The study has several key implications for forest managers, including the need for managers and policymakers to recognize the heterogeneity of the harvester and buyer populations and to consider the possibility that interventions in domains seemingly unrelated to forest management, such as labor policy, might constitute key elements of a sustainable forest management strategy. The report ends with a list of steps managers and researchers can take to support sustainable floral greens management.

Keywords: Nontimber forest products, forest policy, labor policy, resource tenure, sustainability, floral greens, salal, Olympic Peninsula.

Wildlife

03-069

Gaines, W.L.; Singleton, P.H.; Ross, R.C.

2003. Assessing the cumulative effects of linear recreation routes on wildlife habitats on the Okanogan and Wenatchee National Forests. Gen. Tech. Rep. PNW-GTR-586. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 79 p.

We conducted a literature review to document the effects of linear recreation routes on focal wildlife species. We identified a variety of interactions between focal species and roads, motorized trails, and nonmotorized trails. We used the available science to develop simple geographic information system-based models to evaluate the cumulative effects of recreational

routes on habitats for focal wildlife species for a portion of the Okanogan and Wenatchee National Forests in the state of Washington. This process yielded a basis for the consistent evaluation of the cumulative effects of roads and recreation trails on wildlife habitats, and identified information gaps for future research and monitoring. We suggest that managers use an adaptive management approach to address wildlife and recreation interactions because of the complexity and uncertainty of these issues.

Keywords: Okanogan and Wenatchee National Forests, linear recreation routes, focal wildlife species, cumulative effects.

03-199

Marcot, B.G.; Wales, B.C.; Demmer, R.

2003. Range maps of terrestrial species in the interior Columbia River basin and the northern portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-583. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 304 p.

Current range distribution maps are presented for 14 invertebrate, 26 amphibian, 26 reptile, 339 bird, and 125 mammal species and selected subspecies (530 total taxa) of the interior Columbia River basin and northern portions of the Klamath and Great Basins in the United States. Also presented are maps of historical ranges of 3 bird and 10 mammal species and 9 maps of natural areas designated by federal agencies and other organizations. The species range maps were derived from a variety of publications and from expert review and unpublished data, and thus differ in degree of accuracy and resolution. The species maps are available in computer versions and are indexed herein by common and scientific names.

Keywords: Maps, species range, species distribution, wildlife, invertebrates, arthropods, amphibians, reptiles, birds, mammals, bats, biodiversity, endemism, natural areas, interior Columbia River basin, Klamath Basin, Great Basin.

Wood Utilization

03-095

Barbour, R.J.; Parry, D.L.; Punches, J.
[and others]

2003. AUTOSAW simulations of lumber recovery for small-diameter Douglas-fir and ponderosa pine from southwestern Oregon. Res. Note PNW-RN-543. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p.

The AUTOSAW sawing simulator consistently underestimated the lumber tally by about 10 to 15 percent. This difference between simulated and empirical results could easily be adjusted for during analyses. For both Douglas-fir and ponderosa pine the lumber grade yield results suggest that one-to-one correspondence between empirical and simulated results is not possible when diagramming of surface knots is used without evaluation of internal defects. Simulation of alternative sawing patterns suggested that production of Common and Factory lumber, as opposed to dimension lumber, could result in higher value recoveries, but additional empirical studies will be needed to confirm this result.

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

03-236

Donovan, G.H.; Nicholls, D.L.

2003. Estimating consumer willingness to pay a price premium for Alaska secondary wood products. Res. Pap. PNW-RP-553. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 7 p.

Dichotomous choices contingent valuation survey techniques were used to estimate mean willingness to pay (WTP) a price premium for made-in-Alaska secondary wood products. Respondents were asked to compare two superficially identical end tables, one made in China and one made in Alaska. The surveys were administered at home shows in Anchorage, Fairbanks, and Sitka in March and April 2002. Results indicated that, on average, respondents

were willing to pay an additional \$82 for the Alaska-made table, above a base price of \$50. The 95 percent confidence bounds on this estimate of mean WTP are \$68.10 and \$96.10. Survey design and sample demographics are discussed as possible upward biases on the mean WTP for the Alaska-made table. Despite these possible biases, we concluded that place of manufacture is a significant competitive advantage for Alaska secondary wood product manufacturers marketing their products in Alaska.

Keywords: Secondary manufacturing, furniture, willingness to pay, contingent valuation, marketing, Alaska.

03-251

Donovan, G.H.; Nicholls, D.L.; Roos, J.

2003. Marketing recommendations for wood products from Alaska birch, red alder, and Alaska yellow-cedar. Gen. Tech. Rep. PNW-GTR-589. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 13 p.

Several factors have contributed to a recent decline in Alaska's wood products industry, including reduced exports to Japan and the closure of two pulp mills in southeast Alaska. Higher value niche markets, however, are a potential growth area for the industry. In this paper, we consider niche markets for three species that have historically been harvested in low volumes—red alder, birch, and Alaska yellow-cedar. The extent of the resource, current use, and an overview of recent research efforts are examined. Specific marketing recommendations are then provided for each species, based on these evaluations. Wide-ranging opportunities for a variety of primary and secondary wood products exist that use character-marked lumber, lower grades of lumber, and material from standing-dead sources. This report concludes with a framework for future research, identifying key opportunities to differentiate Alaska wood products in the marketplace.

Keywords: Secondary manufacturing, consumer preferences, red alder, Alaska yellow-cedar, birch, marketing, Alaska.

Science Findings

In 2003 the PNW Research Station continued its series that presents science findings for people who make and influence decisions about managing lands. These 2003 issues may be ordered by using the order form on the last page of this publication. These publications also are available in electronic format at <http://www.fs.fed.us/pnw>.

- January** Nan C. Vance—Managing the “other” forest: collecting and protecting nontimber forest products
- February** Todd Wilson—Sex and the single squirrel: a genetic view of forest management in the Pacific Northwest
- April** Brad St. Clair and Randy Johnson—Conserving and managing the trees of the future: genetic resources for Pacific Northwest forests
- May** Martin Raphael and Pete Bisson—Arise, amphibians: stream buffers affect more than fish
- July** Andrew B. Carey—The trouble with connectedness: disturbance and ecosystem crashes
- August** Ralph Alig—Biology, ecology, and economics at play: land use and land cover changes in the 21st century
- September** Janet Ohmann—Seeing the trees for the forest: mapping vegetation biodiversity in coastal Oregon forests
- October** Keith Aubry and Catherine Raley—Coming home to roost: the pileated woodpecker as ecosystem engineer
- November** Randy Johnson—The scourge of the yellow trees: tackling Swiss needle cast in the Coast Range
- December** Gordon Grant—Clarifying muddy water: probing the linkages to municipal water quality

Publications Available Elsewhere

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

Aquatic and Riparian Systems

Hibbs, D.E.; Chan, S.

2001. Developing management strategies for riparian areas. In: Cooper, S.L., comp. Proceedings of the 22nd annual forest vegetation management conference. Redding, CA: University of California, Shasta County Cooperative Extension: 84-91.

Four principles are critical to successful management of a riparian area. First, given problems both with defining historical conditions and with returning to them, attaining management goals based on restoration of ecological processes and functions will be far more successful. Second, the management goals for any stream reach must be placed in a watershed context. Ecological and hydrologic processes that occur above a target stream reach can determine whether many stream-reach-specific goals can be met. Third, riparian systems are dynamic, and disturbance is normal and expected. Microsite conditions are highly variable. Management plans should consider these dynamics. Fourth, riparian areas are generally fully occupied by plants and so can be very difficult places for new or desired plants to get a start. Thus, a hands-off approach may not achieve the desired long-term goals.

Keywords: Vegetation management, coastal riparian areas.

(See Corvallis order form.)

Skaugset, A.E.; Reeves, G.H.; Keim, R.F.

2002. Landslides, surface erosion, and forest operations in the Oregon Coast Range. In: Hobbs, S.D.; Hayes, J.P.; Johnson, R.L. [and others], eds. Forest and stream management in the Oregon Coast Range. Corvallis, OR: Oregon State University: 213-241. Chapter 9.

Forest management can affect aquatic habitats by changing the timing and composition of debris flows. Timber harvest changes the disturbance patterns of a forested landscape by introducing rotation ages that are shorter than the interval between naturally occurring wildfires and by spreading timber harvest out in space and time. Furthermore, timber harvest removes large wood and leaves less standing and down large wood than wildfires. It is possible to develop best management practices (BMP) that will ultimately result in debris-flow paths retaining sufficient large wood. Landscape management, not BMPs, however, is needed to provide a more natural timing of the occurrence of debris flows.

Keywords: Landslides, debris flows, riparian zones.

(Available in bookstores and libraries.)

Atmosphere

Lee, E.H.; Tingey, D.T.; Hogsett, W.E.; Laurence, J.A.

2003. History of tropospheric ozone for the San Bernardino Mountains of southern California, 1963-1999. *Atmospheric Environment*. 37: 2705-2717.

A historical database of hourly O₃ concentrations for Crestline, California, in 1963 to 1999 has been developed based on all relevant oxidant/ozone monitoring data taken since 1963. All data were obtained from the state and from the USDA Forest Service and have been standardized to be comparable to current ultraviolet photometry calibration basis. A rigorous statistical analysis was performed to integrate these data into a temporally consistent, research-quality data set for Crestline, California. The database provides valuable information on the changing ambient air quality conditions in the San Bernardino Mountains of California from the implementation of more effective emission control strategies beginning in the late 1970s.

Keywords: Ozone, air pollution, forests, control strategies.

(See Corvallis order form.)

Ecosystem Structure and Function

Carrillo, A.E.; Li, C.Y.; Bashan, Y.

2002. Increased acidification in the rhizosphere of cactus seedlings induced by *Azospirillum brasilense*. *Naturwissenschaften*. 89: 428-432.

Inoculation with *Azospirillum brasilense*, a plant growth-promoting bacterium, increased acidification of rhizosphere of giant cardon seedlings (*Pachycereus pringlei*) growing in the poor desert soils. With added ammonium or nitrate nitrogen, the bacterium enhanced acidification

of rhizosphere. Bacterial inoculation with ammonium nitrogen also increased plant growth. Enhanced acidification increased solubilization of insoluble phosphate, thus making phosphate available for plant growth.

Keywords: Azospirillum brasilense, rhizosphere acidification, giant cardon.

(See Corvallis order form.)

Henshaw, D.L.; Spycher, G.; Remillard, S.M.

2002. Transition from a legacy databank to an integrated ecological information system. In: Callaos, N.; Porter, J.; Rishe, N., eds. The 6th world multicongress on systemics, cybernetics, and informatics. Orlando, FL: International Institute of Informatics and Systemics: 373-378.

Many tasks and issues are encountered in the process of converting a scientific databank containing multiple legacy and long-term study databases into an integrated data production and distribution system. Metadata issues include questions of structure, translation from legacy to new content standards, and connecting spatial and nonspatial metadata. The authors review the history of the Forest Science Data Bank and examine many aspects related to this latest transition to a more comprehensive and better integrated information management system. The system is designed to accommodate new and legacy study databases, comply with emerging standards for ecological information, and enable dynamic discovery and access to multiple information packets over the Internet.

Keywords: Information management systems, ecological metadata, information access, data archive, ecoinformatics, long-term ecological research.

(See Corvallis order form.)

Hummel, S.; Agee, J.K.

2003. Western spruce budworm defoliation effects on forest structure and potential fire behavior. *Northwest Science*. 77(2): 159-169.

Forest structure and composition on the eastern slope of the Cascade Mountains have been influenced by decades of fire exclusion. An increased density of shade-tolerant conifers (e.g., *Abies grandis*) affects both northern spotted owl (*Strix occidentalis caurina*) habitat and the population dynamics of western spruce budworm (*Choristoneura occidentalis*). How are key owl habitat elements changing in association with an ongoing budworm outbreak? How do these changes influence fire behavior and effects? What are the implications for future owl habitat? To answer these questions, we compared measurements from 1992 and 2000 from 21 permanent plots near an owl nest site south of Mount Adams in Washington state. Canopy closure decreased significantly, from an average of 78 percent in 1992 to 43 percent in 2000, and the coarse woody debris load doubled in the same period, from about 40 Megagrams per hectare (Mg/ha) to 80 Mg/ha. This woody debris significantly increased potential surface fire flame lengths from 1.4 meters (m) in 1992 to 1.9 m in 2000, but changes in torching potential and independent crown fire behavior were not significant. Our results suggest that a wildfire in conditions similar to those in 2000 would leave residual stands with 148 trees per hectare and more than 34 square meters per hectare of basal area. The large, early-seral, fire-resistant trees likely to survive a wildfire provide an important element of future owl habitat. Forest stands composed of such trees are a minority on the east side of the Washington Cascades. Our results indicate that within these remnant stands, fire behavior may not result in as much stand-replacement fire severity as appearances suggest.

Keywords: Spruce budworm, fire behavior, owl habitat.

(See Portland order form.)

Turner, M.G.; Collins, S.L.; Lugo, A.E. [and others]

2003. Disturbance dynamics and ecological response: the contribution of long-term ecological research. *BioScience*. 53(1): 46-56.

Studies of ecosystem disturbance have been an integral part of the National Science Foundation's Long-Term Ecological Research (LTER) program since its inception in 1980. Disturbance effects and ecological responses have been examined through LTER studies by using direct observation of processes such as hurricanes, fire, and introduction of exotic species; retrospective studies; simulation modeling; and experimentation. The LTER research approach, which includes a combination of approaches used over a sustained period of study, is well suited to the study of disturbance ecology. Collectively this work reveals the great resiliency of ecosystems to native processes, but vulnerability to exotic influences, such as species invasions.

Keywords: Disturbance, ecosystem processes, ecosystem management, LTER intersite studies.

(See Corvallis order form.)

Waring, R.H.; Coops, N.C.; Ohmann, J.L.; Saar, D.A.

2002. Interpreting woody plant richness from seasonal ratios of photosynthesis. *Ecology*. 83(11): 2964-2970.

In Oregon forests, woody plant species richness on plots 400 to 500 square meters ranged from 1 to 20. We investigated this variation by using a satellite-driven process model that predicts gross photosynthesis and establishes the most constraining environmental variable. Independent satellite and plot data confirmed that highest richness occurs on sites of intermediate productivity, where 60 to 70 percent of the light is intercepted by vegetation. We demonstrated that most photosynthesis takes place during spring and summer for both evergreen and deciduous species. Spring to summer ratio of

gross photosynthesis varied from less than 1 to greater than 5. Both the most productive coastal rain forests and least productive arid woodlands exhibited lowest values for ratio of gross photosynthesis, near 1, and had lowest richness. Plots with highest species richness were in areas with mild, moist springs and summer drought, with ratios averaging above 3.

Keywords: Species richness, environmental gradients, productivity, ecosystem function, ecosystem modeling, photosynthesis, remote sensing.

(See Corvallis order form.)

Fire

Ferguson, S.A.; Ruthford, J.E.; McKay, S.J. [and others]

2002. Measuring moisture dynamics to predict fire severity in longleaf pine forests. *International Journal of Wildland Fire*. 11: 267-279.

To understand the combustion limit of biomass fuels in a longleaf pine (*Pinus palustris*) forest, an experiment was conducted to monitor the moisture content of potentially flammable forest floor materials (litter and duff) at Eglin Air Force Base in Florida. Although longleaf pine forests are fire-dependent ecosystems, a long history of fire exclusion has allowed large amounts of pine litter and duff to accumulate. The study site was divided into four blocks that were burned under litter and duff moisture conditions of wet, moist, dry, and very dry. Throughout the 4-month experiment, portable weather stations continuously collected meteorological data. Meteorological variables from the weather stations compared with trends in fuel moisture showed the influence of relative humidity and precipitation on the drying and wetting rates of the litter and duff.

Fuel moisture conditions showed significant influence on patterns of fuel consumption and could lead to an understanding of processes that govern longleaf pine mortality.

Keywords: Combustion limit, fuel moisture, flammability, Florida, longleaf pine, meteorology, litter, duff.

(See Seattle order form.)

Ottmar, R.D.; Vihnanek, R.E.

2002. Stereo photo series for quantifying natural fuels. Volume IIa: hardwoods with spruce in Alaska. PMS 836. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 41 p.

A series of single and stereo photographs display a range of natural conditions and fuel loadings in hardwood ecosystems undergoing succession to spruce in Alaska. Each group of photos includes inventory information summarizing vegetation composition, structure and loading, woody material loading and density by size class, forest floor depth and loading, and various site characteristics. The natural fuels photo series is designed to help land managers appraise fuel and vegetation conditions in natural settings.

Keywords: Woody material, biomass, fuel loading, natural fuels, Alaska hardwoods, quaking aspen, Populus tremuloides, paper birch, Betula papyrifera, balsam poplar, Populus balsamifera, white spruce, Picea glauca, black spruce, Picea mariana.

(This publication can be purchased for \$33.57 by writing the National Interagency Fire Center, 3833 S Development Avenue, Boise, ID 83702. Their Web site for more information is at www.fire.blm.gov/gbk.)

Ottmar, R.D.; Vihnanek, R.E.;
Wright, C.S.

2002. Stereo photo series for quantifying natural fuels. Volume Va: jack pine in the Lake States. PMS 837. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 49 p.

A series of single and stereo photographs display a range of natural conditions and fuel loadings in jack pine (*Pinus banksiana* Lamb.) ecosystems in the Lake States. Each group of photos includes inventory information summarizing vegetation composition, structure and loading, woody material loading and density by size class, forest floor depth and loading, and various site characteristics. The natural fuel photo series is designed to help land managers appraise fuel and vegetation conditions in natural settings.

Keywords: Woody material, biomass, fuel loading, natural fuels, jack pine, Pinus banksiana.

(This publication can be purchased for \$36.84 by writing the National Interagency Fire Center, 3833 S Development Avenue, Boise, ID 83702. Their Web site for more information is at www.fire.blm.gov/gbk.)

Forest Management

Fried, J.S.

2003. Evaluating landscape-scale fuel treatment policies with FIA data. *Western Forester*. 48(1): 6-7.

Scientists at the USDA Forest Service Pacific Northwest Research Station have developed a modeling framework, grounded in forest inventory and analysis plots, for estimating biomass availability, financial returns, and fuel treatment efficacy associated with a range of silvicultural prescriptions and price assumptions. When applied to the Klamath ecoregion in southwestern Oregon, results differed widely depending on the assumptions and objectives specified. If revenues generated by fuel treatments were reinvested to treat additional acres, 2.7 million

tons of submerchantable-sized woody biomass suitable as power plant feedstock could be generated, and 636,000 of the 1.6 million treatable acres could be treated at no net cost.

Keywords: Thinning, biomass assessment, fire hazard reduction.

(See Portland order form.)

Land Use

Alig, R.J.; Adams, D.M.; Mills, J.R. [and others]
2003. Private forest management and investment in the US South: alternative future scenarios. In: Teeter, L.; Cashore, B.; Zhang, D., eds. *Forest policy for private forestry: global and regional challenges*. [Location of publisher unknown]: CAB International: 149-163. Chapter 15.

Model simulations indicate the consequences of assumptions regarding future forest investment in the South. Historically, the United States has relied primarily on its natural endowment of forests to supply its ever-growing demands for wood and wood products. Planting of trees has emerged as a major activity in recent decades, and private forest investment is a critical variable in the long-term modeling of U.S. forest resources. Nonindustrial private forest owners are a crucial part of the future timber supply outlook, and historically have provided a disproportionately large timber harvest amount relative to amount of timberland owned. We present findings from the draft timber assessment that is conducted as part of the Resources Planning Act. Our alternative scenarios indicate that, in general, private timberlands are likely to become increasingly important in the Nation's timber supply. There will be some incentive to expand long-term growth and harvest from these lands as more capital is substituted for land.

Keywords: Parcelization, land use conversions, population growth.

(Available in bookstores and libraries.)

Alig, R.J.; Haynes, R.W.

2001. Findings from the 2000 Resources Planning Act assessment: land use, forest cover changes, and sustainability analyses. In: *Forestry at the great divide: Proceedings, Society of American Foresters 2001 national convention*. Bethesda, MD: Society of American Foresters: 116-126.

The 2000 RPA assessment provides a broad array of information about the Nation's forests and rangelands, including the current situation and prospective changes over the next 50 years. International concerns have prompted the pursuit of universal "criteria" by the forestry community that establish a standard framework for the definition and evaluation of sustainable forest management. Data summarized from the timber assessments prepared by the USDA Forest Service for selected indicators help shape perceptions about whether we can sustain both increasing consumption of forest products and forest resource conditions. These data illustrate the dynamics of our Nation's land base and how adjustments are likely to continue in the future. The projections of land use and forest cover changes provide inputs into a larger system of models that project a higher level of timber harvests and improving resource conditions. This could be interpreted as a success story for forest management in the United States. This suggests that the current debate about sustainability is less about the physical notions of sustainability but rather a debate among competing goals for public and private land management. The land base changes also indicate the importance of viewing "sustainability" across the entire land base and across sectors, in contrast to the current typical sector approach as in examining "sustainable forest management."

Keywords: Land use change, RPA assessment, sustainable forest management.

(See Corvallis order form.)

Forman, R.T.T.; Sperling, D.; Bissonette, J.A. [and others]

2003. *Road ecology: science and solutions*. Washington, DC: Island Press. 481 p.

Road networks and vehicles using them have many ecological and hydrological effects. In turn, river networks, wildlife in road-adjacent areas, and other ecosystem components affect roads and vehicular traffic. This book reviews the state of science on these topics.

Keywords: Roads, landscape ecology, hydrology, wildlife, biodiversity.

(Available in bookstores and libraries.)

Hansen, A.J.; Rasker, R.; Maxwell, B. [and others]

2002. Ecological causes and consequences of demographic change in the New West. *BioScience*. 52(2): 151-162.

In recent decades, parts of the Wild West have given way to the "New" West. This study focuses on the Greater Yellowstone Ecosystem in examining the ecological causes and consequences of demographic change in the New West. Three questions are addressed: (1) How fast are humans expanding into seminatural landscapes in the rural West? (2) To what extent is this immigration related to ecosystem qualities rather than socioeconomic factors? and (3) How is human development in rural areas of the West influencing biodiversity in and around natural reserves?

Keywords: Biological diversity, resource management

(See Corvallis order form.)

Landscape Ecology

Cablk, M.; White, D.; Kiester, A.R.

2002. Assessment of spatial autocorrelation in empirical models in ecology. In: Scott, J.M.; Heglund, P.J.; Morrison, M.L. [and others], eds. Predicting species occurrences: issues of accuracy and scale. Washington, DC: Island Press: 429-440. Chapter 37.

This study not only showed some general trends that support findings of previous work, but it also added new insight because of the methods used to assess suitability of the regression trees for predicting vertebrate richness. The development of spatial statistics has created tremendous opportunity for researchers to quantify and explain patterns in nature, but these new tools must be used with caution and thoughtfulness. With these new methods, researchers must question more than just the ecological or statistical significance of results. When expert judgment is required to select "the best" result, subjective interpretation plays an increasingly important role. Ecological interpretation of two closely fitting "best" models may be very different. We must have faith in our own knowledge to choose the model that is closest to the "truth." The use of parametric measures as a substitute for classified land-cover data for modeling vertebrate species richness may allow us to better relate patterns of diversity with correlated processes. In this manner, we have minimized subjective interpretation in terms of landscape function and habitat distribution.

Keywords: Ecology, spatial autocorrelation.

(Available in bookstores and libraries.)

Mensuration

Azuma, D.L.; Bednar, L.

2002. A method for evaluating fixed-radius plot size when sampling western juniper seedlings and saplings. *Western Journal of Applied Forestry*. 17(4): 207-208.

This note outlines a method for evaluating plot size selection for an inventory of western juniper woodlands in eastern Oregon. The Forest

Inventory and Analysis Program of the USDA Forest Service in Portland, Oregon, used this method to evaluate several plot sizes to measure seedlings and saplings in the 1998 inventory of eastern Oregon. By choosing a 5-meter radius plot, the probability of tallying no seedlings or saplings on four subplots is less than 10 percent for the three sample densities (0.01, 0.02, and 0.03 trees per square meter) used.

Keywords: Western juniper, sampling, seedling, sapling, forest inventory.

(See Portland order form.)

Monitoring

Campbell, S.; Conkling, B.; Coulston, J. [and others]

2003. Forest health monitoring in the U.S.: a west coast perspective. In: Rapport, D.J.; Lasley, W.L.; Rolston, D.E. [and others], eds. *Managing for healthy ecosystems*. Boca Raton, FL: Lewis Publishers: 963-975. Chapter 94.

Forest health monitoring (FHM) is a cooperative, multiagency program in the United States. The goals of this program are to monitor, assess, and report on the long-term status, changes, and trends in the health of the Nation's forested ecosystems. The FHM program is composed of four interrelated activities: detection, evaluation, intensive site ecosystem monitoring, and research on monitoring techniques. Some highlights of the west coast FHM program are presented, including 1998 lichen monitoring results in Oregon, Washington, and California; evaluation of the impact of an introduced insect, the baslam woolly adelgid, in Oregon and Washington; and a method for coanalysis of aerial survey data and plot data from the forest inventory and analysis program. Also present are changes in net carbon sequestration determined by using FHM data from 12 states, including California.

Keywords: Forest health, monitoring, insects, lichens, pollution.

(Available at bookstores and libraries.)

Natural Resource Policy

Hobbs, S.D.; Hayes, J.P. Johnson, R.L.
[and others]

2002. Moving toward sustainability. In:
Hobbs, S.D.; Hayes, J.P.; Johnson, R.L.
[and others]. Forest and stream
management in the Oregon Coast Range.
Corvallis, OR: Oregon State University
Press: 242-259.

The ability to achieve sustainability of forest and stream resources in the Oregon Coast Range will be influenced by many factors, some of which are beyond the control of local communities. Nonetheless, there has been significant progress toward achieving sustainability. A key to success will be continued improvement in the ability to integrate, evaluate, and communicate the interplay of biophysical, socioeconomic, and policy factors as they affect the quality of life for current and future generations.

Keywords: Sustainability, biodiversity.

(Available from bookstores and libraries.)

Plant Ecology

Brooks, J.R.; Meinzer, F.C.; Coulombe, R.;
Gregg, J.

2002. Hydraulic redistribution of soil water during summer drought in two contrasting Pacific Northwest coniferous forests. *Tree Physiology*. 22: 1107-1117.

The magnitude of hydraulic redistribution of soil water by roots and its impact on soil water balance were estimated by monitoring time courses of soil water status at multiple depths and root sap flow under droughted conditions in a dry ponderosa pine ecosystem and a moist Douglas-fir ecosystem. The fate of deuterated water applied to small plots to create a horizontal soil water potential gradient was also monitored to assess the potential for horizontal redistribution of water and use of redistributed water by co-occurring shallow-rooted plants. In a 20-year-old Douglas-fir stand, about 28 percent of the water removed daily from the upper 2

meters of soil was supplied by nocturnal hydraulic redistribution during late August. In an old-growth ponderosa pine stand, about 35 percent of the total daily water use from the upper 2 meters of soil appeared to be attributable to hydraulic redistribution during July and August. Based on these results, hydraulic redistribution would allow the equivalent of 21 and 16 additional days of stored water to remain in the upper soil horizons in the ponderosa pine and Douglas-fir stand, respectively, after a 60-day drought. At both sites, localized applications of deuterated water induced strong reversal of root sap flow and caused soil water content to cease declining or even temporarily increase at locations too distant from the site of water application to have been influenced by movement of water through the soil without facilitation by roots. Xylem D values of ponderosa pine seedlings suggested use of redistributed water.

Keywords: Douglas-fir, hydrogen isotope ratio, ponderosa pine, root sap flow, soil volumetric water content, soil water potential.

(See Corvallis order form.)

Hemstrom, M.A.; Wisdom, M.J.; Hann, W.J.
[and others]

2002. Sagebrush-steppe vegetation dynamics and restoration potential in the interior Columbia basin, U.S.A. *Conservation Biology*. 16(5): 1243-1255.

Amount and quality of sagebrush-steppe have declined across vast areas of North America. Declines are associated with a variety of anthropomorphic causes, many of which pose significant barriers to restoration. We modeled the vegetation dynamics of sagebrush-steppe and explored the potential for its restoration in the interior Columbia basin. We focused on restoration of habitats for greater sage-grouse. This species is of conservation focus on over 13 million hectares of sagebrush-steppe in the basin, much of which is managed by the USDA Forest Service (FS) and USDI Bureau of Land Management (BLM). We evaluated changes in

sage-grouse habitat on FS-BLM lands from historical to current conditions, and from current conditions to those projected 100 years in the future under proposed management and under two restoration scenarios. The two restoration scenarios were designed to improve long-term (100-year) projections of sage-grouse habitat. Scenario 1 assumed a 50-percent reduction in detrimental grazing effects by livestock and a sixfold increase in areas treated with active restoration relative to proposed management. Scenario 2 assumed a 100-percent reduction in detrimental grazing effects and the same level of active restoration as scenario 1. Under the two scenarios, amount of habitat declined by 17 to 19 percent 100 years in the future compared to the current period, but was 10 to 14 percent higher than the 100-year projection under proposed management. Habitat quality under both scenarios was substantially improved compared to the current period and proposed management. Our results suggest that aggressive restoration could slow the rate of sagebrush loss and improve the quality of remaining habitat.

Keywords: Greater sage-grouse, restoration, broad-scale models, model validation, sagebrush-steppe, exotic plants, cheatgrass.

(See Portland order form.)

James, S.A.; Meinzer, F.C.; Goldstein, G. [and others]

2003. Axial and radial water transport and internal water storage in tropical forest canopy trees. *Oecologia*. 134: 37-45.

Heat and stable isotope tracers were used to study axial and radial water transport in relation to sapwood anatomical characteristics and internal water storage in four canopy tree species of a seasonally dry tropical forest in Panama. Anatomical characteristics of the wood and sap flow were measured at the base, upper trunk, and crown during two consecutive dry seasons. Radial profiles of sap flux density near the base of the crown were highly correlated with radial profiles of specific hydraulic conductivity (k_s) calculated from xylem anatomical characteristics.

The relation between sap flux density and k_s was species independent. Deuterium oxide (D_2O) injected into the base of the trunk was detected in the water transpired from the upper crown after only 1 day in a 26-meter-tall *Cordia alliodora* tree, 2 days in a 28-meter-tall *Ficus insipida* tree, 3 days in a 38-meter-tall *Anacardium excelsum* tree, and 5 days in a 22-meter-tall *Schefflera morototoni* tree. Capacitive exchange of water between stem storage compartments and the transpiration stream had a profound influence on apparent rates of axial water transport, the magnitude of radial water movement, and the retention time in the tree of water taken up by the roots.

Keywords: Capacitance, deuterium, hydraulic architecture, sap flow, wood anatomy.

(See Corvallis order form.)

Meinzer, F.C.

2003. Functional convergence in plant responses to the environment. *Oecologia*. 134: 1-11.

Much comparative ecophysiological research has focused on contrasting species-specific behaviors or ecological strategies with regard to regulation of basic physiological processes such as transpiration, photosynthesis, and growth, leading to an emphasis on divergence rather than convergence in plant functioning. This review highlights selected examples in which substantial functional convergence among taxonomically, phylogenetically, and architecturally diverse species has been revealed by applying appropriate scaling factors and identifying universal constraints or tradeoffs. Recent empirical and theoretical scaling models emphasize the strong role that plant size, architecture, allometry, and chemistry play in constraining functional traits related to water and carbon economy and growth. Taken together, the findings summarized here strongly suggest that there are a limited number of physiological solutions to a given problem of plant adaptation to the environment. Comparative ecophysiological

studies will therefore benefit from consideration of the constraints that plant anatomical, structural, and chemical attributes place on physiological functioning.

Keywords: Carbon balance, plant allometry, plant growth, plant-water relations, scaling models.

(See Corvallis order form.)

Monleon, V.J.; Gitelman, A.I.; Gray, A.N.
2002. Multi-scale relationships between coarse woody debris and presence/absence of western hemlock in the Oregon Coast Range. In: Gatsonis, C.; Kass, R.E.; Carriquiry, A. [and others], eds. Case studies in Bayesian statistics. New York: Springer-Verlag: 311-318. Vol. VI.

Western hemlock (*Tsuga heterophylla*) is a key structural component of old-growth forests in the Pacific Northwest, typically providing a multi-layered canopy and contributing to the diversity of tree ages. Forest managers are looking for ways to promote the establishment of hemlock in the hope of accelerating the development of old-growth characteristics. This study examines the relation between the abundance of coarse woody debris (CWD) and the establishment of western hemlock at two different scales: microsite level and stand level within the Oregon Coast Range. We used hierarchical logistic regression models to explore this relation at the microsite level, and further, to explore whether this relation depends upon the overall amount of CWD available in the stand. We find a significant association between the amount of CWD and hemlock establishment at the microsite level, but the association does not seem to depend on the total amount of CWD available in the stand. This suggests that hemlock is not

able to use alternative substrates for recruitment when CWD is not available. In turn, these results suggest that CWD can be used to help predict the presence of hemlock saplings in a stand, and that management practices that increase the amount of CWD in forest stands should be considered as potentially beneficial for hemlock establishment.

Keywords: Bayesian hierarchical models, logistic regression, retrospective sampling, hemlock establishment, coarse woody debris, Oregon Coast Range.

(Available in bookstores and libraries.)

Plant Pathology

Manter, D.K.

2002. Energy dissipation and photoinhibition in Douglas-fir needles with a fungal-mediated reduction in photosynthetic rates. *Journal of Phytopathology*. 150: 674-679.

I explored the dissipation of absorbed light and potential for photo-oxidative damage in Douglas-fir (*Pseudotsuga menziesii*) seedlings with and without *Phaeocryptopus gaeumannii* infection. The presence of *P. gaeumannii* had no effect on chloroplast pigments but caused a significant decline in photosynthesis. As a result, greater amounts of thermal dissipation were induced in infected foliage; a limit on thermal dissipation, however, resulted in photo-oxidative conditions. The implications of photo-oxidative damage on observed photosynthetic rates and on *P. gaeumannii* pathogenicity also are discussed

Keywords: Chlorophyll fluorescence, nonphotochemical quenching, photoinhibition, photosynthesis, Phaeocryptopus gaeumannii, foliar disease.

(See Corvallis order form.)

Thies, W.G.; Goheen, E.M.
2002. Major forest diseases of the Oregon Coast Range and their management. In: Hobbs, S.D.; Hayes, J.P.; Johnson, R.L. [and other], eds. Forest and stream management in the Oregon Coast Range. Corvallis, OR: Oregon State University Press: 191-212. Chapter 8.

This chapter addresses the role of 15 major forest diseases found in the Oregon Coast Range. The authors briefly review pathogen biologies and ecological roles, address management strategies, and identify the gaps in knowledge that must be filled to support the implementation of ecosystem management in coastal forests in Oregon. Many pathogens are present in coastal forests, but only a few play what appear to be critical roles. Although the root diseases are the most important, a dwarf mistletoe, a canker disease, a foliar disease, and several stem decays are important to land managers in the Coast Range.

Keywords: Tree diseases, forest management.

(Available in bookstores and libraries.)

Remote Sensing

Anderson, H-E.; Reutebuch, S.E.; Schreuder, G.F.
2002. Bayesian object recognition for the analysis of complex forest scenes in airborne laser scanner data. In: Kalliany, R.; Lebert, F., eds. Proceedings of the ISPRS commission III symposium: photogrammetric computer vision. [Location of publisher unknown]: International Society for Photogrammetry and Remote Sensing: A-35-A-41. Vol. 34, Part 3A.

Bayesian object recognition is applied to the analysis of high-density airborne laser scanning (LIDAR) data from a mature Douglas-fir stand. The Bayesian approach incorporates a probabilistic model of the laser scanning process and places a prior probability model on object configurations. The LIDAR-sensing geometry is explicitly modeled in the domain of scan space, a three-dimensional analogue to two-dimensional

image space, and stochastic components of the laser-foilage interaction are modeled through an attenuation function. Algorithm-based estimates are compared to photogrammetric crown measurements and field inventory data.

Keywords: Forestry, laser scanning, LIDAR, object, recognition, remote sensing, statistics.

(See Seattle order form.)

Carson, W.W.; Akay, A.E.; Weyermann, D.
2001. An inventory of juniper through the automated interpretation of aerial digital imagery. In: Precision forestry: Proceedings of the first international precision forestry cooperative symposium. Seattle: University of Washington, College of Forest Resources: 23-33. Chapter 2. <http://www.cfr.washington.edu/research.pfc/publications>. (05 January 2004).

In summer 1999, the USDA Forest Service Forest Inventory and Analysis Program captured infrared images over test plots in eastern Oregon where juniper (*Juniperus occidentalis*) was known to be present. This study examined those images and attempted to extract juniper density, juniper tree distribution, and juniper crown size information from them automatically through a combination of image preprocessing and rule-based, crown-delineation techniques. Then rule-based techniques were developed and applied to each pattern to specifically delineate the shadows and crowns, and determine associated parameters such as the size and centroid of pixel groups. Finally, the requirement that shadows be associated with the larger junipers was used to select trees and discriminate against purely terrain-related shadows and smaller trees or vegetation closer to the ground.

Keywords: Remote sensing, juniper, forest inventory, image delineation, rule-based.

(This entire proceedings can be found online at the URL cited above. For a copy of the individual paper, see Portland order form.)

Cohen, W.B.; Gower, S.T.; Turner, D.P.; Running, S.W.

2002. Initial BigFoot project assessment of MODIS-derived surfaces related to the global carbon cycle [CD-ROM]. In: 29th international symposium on remote sensing of environment: information for sustainability and development. [Place of publication unknown]: International Society for Photogrammetry and Remote Sensing: [Not paged].

This paper briefly describes the validation efforts of a project called BigFoot, an organized effort across nine biomes to assess the quality of the aforementioned surfaces.

Keywords: Accuracy assessment.

(This may be purchased as a book or as a CD-Rom from the ISPRS Web site at <http://www.symposia.org/archive/orderform.doc>.)

Hudak, A.T.; Lefsky, M.A.; Cohen, W.B.; Berterretche, M.

2001. Integration of LIDAR and Landsat ETM+ data. In: Hofton, M.A., ed. Land surface mapping and characterization using laser altimetry: ISPRS workshop. [Place of publication unknown]: International Society for Photogrammetry and Remote Sensing: 95-103. Vol. 34.

In this study, the first objective was to estimate canopy height at locations unsampled by LIDAR, based on the statistical and geostatistical relations between the LIDAR and Landsat ETM+ data at the LIDAR sample locations. We used the most basic data from LIDAR (maximum canopy height) and Landsat ETM+ (raw band values) and tested widely used, straightforward empirical estimation methods; ordinary least squares regression, ordinary kriging, and ordinary cokriging. The second objective was to determine what spatial sampling design would optimize the integration of LIDAR and Landsat ETM+ data for accurate mapping.

Keywords: Remote sensing, kriging, spatial model, geostatistics, cokriging.

(See Corvallis order form.)

Turner, D.P.; Gower, S.T.; Cohen, W.B. [and others]

2002. Effects of spatial variability in light use efficiency on satellite-based NPP monitoring. *Remote Sensing of Environment*. 80: 397-405.

In this study, we used measurements of net primary production (NPP), incident photosynthetically active radiation, and leaf area index to evaluate ϵ_n in adjacent corn and soybean fields in central Illinois. Fine-resolution satellite imagery was also employed to assess spatial heterogeneity in crop cover type over a 25-square-kilometer area and develop a reference NPP data layer. Potential effects of implementing a coarse resolution light use efficiency algorithm on NPP estimates in the area were then assessed by using imagery from the Advance Very High Resolution Radiometer sensor.

Keywords: Carbon cycling, remote sensing.

(See Corvallis order form.)

Silviculture

Deal, R.L.; Orlikowska, E.H.; Hennon, P.E. [and others]

2002. Red alder as a tool for restoring forest ecosystems in young-growth western hemlock-Sitka spruce stands of southeast Alaska. In: *Forests at work: Proceedings, Society of American Foresters 2002 national convention*. [Bethesda, MD]: [Society of American Foresters]: 159-169.

Red alder seems to influence the productivity of young-growth conifer forests and to affect the major resources (timber, wildlife, and fisheries) of forested ecosystems in southeast Alaska. Red alder may serve as a useful "tool" for restoring important ecosystem functions in regenerating forests. In this study, overstory stand structure and growth, and understory plant diversity and abundance were assessed in nine 38- to 42-year-old mixed red alder-conifer stands on Prince of Wales Island, Alaska. Tree species composition ranged from 100 percent conifer to 86 percent alder as a proportion of stand basal area. Height growth of alder was

initially much greater than that of conifers, but overstory conifers emerged from alder overstory after 20 to 30 years and are now 4 to 9 meters above the alder canopy. Total understory plant cover and herbaceous cover increased with increasing proportions of red alder. Understory plant communities appeared to be more diverse and abundant in mixed alder-conifer stands than in pure stands. Results suggest that mixed red alder-conifer stands may increase understory plant production and availability for deer forage and improve terrestrial and aquatic habitat for wildlife and aquatic resources.

Keywords: Silviculture, red alder, understory plants, overstory-understory interactions, southeast Alaska.

(See Portland order form.)

Ottmar, R.D.; Wright, C.S.

2002. Characterizing fuels in treated areas. In: Baumgartner, D.M.; Johnson, L.R.; DePuit, E.J., comps., eds. Small diameter timber: resource management, manufacturing, and markets—symposium proceedings. MISC0509. Pullman, WA: Washington State University, Cooperative Extension: 63-73.

We are developing a national system of fuel characteristic classification (FCC) for fuel identification and assessment that accurately depicts the structural complexity and geographical diversity of all fuelbeds including those manipulated by humans. A large data library will feed the FCC system and be populated with values acquired from the literature, photo series, fuels inventory reports, and expert knowledge. The Fritz demonstration units and the Hungry Bob Fire and Fire Surrogate study provided critical fuels information for change agent features of

small-log use, thinning, and prescribed fire. Mechanical treatment (that is, small-log use or thinning) caused a significant increase in small woody fuels. Application of prescribed fire following thinning reduced small woody fuel amounts to approximately preharvest levels.

Keywords: Fuel characteristics, fuel loading, fire management, fire modeling, prescribed fire, small-log use, thinning.

(See Seattle order form.)

Peter, D.; Harrington, C.

2002. Site and tree factors in Oregon white oak acorn production in western Washington and Oregon. *Northwest Science*. 76(3): 189-201.

Acorn production in Oregon white oak is variable and not well understood. To determine tree, stand, and environmental characteristics influencing acorn production, 284 trees were surveyed in September and October 1999. Survey trees extended from Whidbey Island, Washington, to Roseburg, Oregon, and ranged in age from 11 to over 300 years breast-high. Acorn production was ranked on a 1 to 4 scale (nonproducing to heavily producing); tree size, condition, site, stand, and vegetation characteristics were recorded. All acorns were counted on a subsample of trees. Results indicated that production starts at around 20 years and plateaus around 80 years breast-high age. Trees with inverted vase-shaped crowns typical of dense forest stands produced fewer acorns than those with columnar- or mushroom-shaped crowns typical of more open areas. Open-grown trees, growing in well-drained, loamy soils, produced best for natural settings. Trees in urban parks with fertilization or irrigation also produced well. Trees underburned 6 to 10 years before the survey produced better than trees not underburned or trees underburned more recently. Trees growing in slough-sedge wetlands,

steep, south-facing rocky balds, or with unhealthy or recently scorched crowns produced the least. Understanding the factors underlying acorn productivity may help managers better understand and manage Oregon white oak ecosystems.

Keywords: Oregon white oak, Quercus garryana, acorns, seed production.

(See Olympia order form.)

Social Science

Cheng, A.S.; Kruger, L.E.; Daniels, S.E.
2003. "Place" as an integrating concept in natural resource politics: propositions for a social science research agenda. *Society and Natural Resources*. 16: 87-104.

This article lays out six propositions centering on a relationship between people-place connections and strategic behavior in natural resource politics. The first two propositions suggest a strong and direct connection between self-identity, place, and how individuals perceive and value the environment. The third, fourth, and fifth propositions tie together social group identity and place, particularly emphasizing the influence of social group identity on strategic behavior in natural resource politics. The sixth proposition relates to the geographic scale of place as a strategic choice in natural resource decisionmaking. Taken together, the propositions suggest that natural resource politics are as much a contest over place meanings as a competition among interest groups over scarce resources. The place perspective suggests an expanded role for natural resource social scientists as giving voice to meanings and values that may not otherwise be expressed in natural resource decisionmaking processes.

Keywords: Group identity, natural resource conflict, natural resource decisionmaking, natural resource policy analysis, place, sense of place.

(This publication is available in electronic format [86k] at <http://www.fs.fed.us/pnw/pubs/journals/cheng-place.pdf>.)

Wildlife

Aukema, J.E.; Martínez Del Rio, C.
2002. Where does a fruit-eating bird deposit mistletoe seeds? Seed deposition patterns and an experiment. *Ecology*. 83(12): 3489-3496.

The distribution of desert mistletoes (*Phoradendron californicum*) among mesquite (*Prosopis velutina*) hosts is significantly aggregated. We hypothesized that the aggregation of mistletoes among hosts is produced by the pattern of seed rain generated by seed dispersers. We tested whether frugivorous Phainopeplas (*Phainopepla nitens*) foraged preferentially, and hence deposited mistletoe seeds disproportionately on trees with these characteristics. To assess experimentally the effect of the presence of mistletoe on seed deposition, we removed mistletoes from host trees. Before mistletoe removal, seed deposition was equivalent and temporally correlated in pairs of control and removal trees. After removal, deposition was lower into removal trees than into unmanipulated trees. Although mistletoe removal resulted in lower seed deposition, it did not eliminate it. We inferred that seed deposition into parasitized hosts can result from deposition of seeds originating from within a host and from other infected hosts. We conclude that the response of seed-dispersing birds to mistletoe leads to disproportionate seed deposition into already parasitized trees and that the heterogeneous distribution of seeds created by birds contributes to the clumped distribution of mistletoes among hosts.

Keywords: Desert mistletoes, directed dispersal, foraging, frugivory, habitat use, parasitism, Phainopepla, seed dispersal.

(See Olympia order form.)

Bull, E.L.; Marx, D.B.

2002. Influence of fish and habitat on amphibian communities in high elevation lakes in northeastern Oregon. *Northwest Science*. 76(3): 240-248

Declines in pond-breeding amphibians in the Western United States, particularly in relatively pristine areas, emphasize the need for information on the distribution, abundance, and ecology of these species. We conducted surveys in 43 high-elevation lakes in 2000 and 2001 in northeastern Oregon to determine the influence of introduced trout and of habitat characteristics on the reproduction of native amphibians occurring there. Pacific treefrogs (*Pseudacris regilla*) and long-toed salamanders (*Ambystoma macrodactylum*) were negatively affected by introduced trout. Habitat characteristics exerted more influence on the abundance of eggs and larvae of Columbia spotted frogs (*Rana luteiventris*) and western toads (*Bufo boreas*) than the presence of trout.

Keywords: Amphibians, trout, northeastern Oregon, western toad, Bufo boreas, Columbia spotted frog, Rana luteiventris, long-toed salamander, Ambystoma macrodactylum, Pacific treefrog, Pseudacris regilla.

(See La Grande order form.)

Carey, A.B.

2002. North American tree squirrels. [Book review]. *The Quarterly Review of Biology*. 77: 342.

This is a review of a book written by Michael A. Steele and John L. Koprowski and published by the Smithsonian Institution Press.

Keywords: Tree squirrel, Sciurus, reproduction, habitat, population ecology.

(See Olympia order form.)

Carey, A.B.

2002. Priorities for the conservation of mammalian diversity: Has the panda had its day? [Book review]. *The Quarterly Review of Biology*. 77: 472-473.

Almost 30 percent of extant mammal species are vulnerable to extinction. This book by 41 authors from 4 continents has 21 chapters in 3 sections: justifications, setting priorities, and conservation approaches. They explore relations between species conservation and conservation of biodiversity. Several discuss the importance of flagship species to conservation.

Keywords: Mammals, conservation, biodiversity.

(See Olympia order form.)

Marcot, B.G.; Kumar, A.; Roy, P.S. [and others]

2002. Towards a landscape conservation strategy: analysis of jhum landscape and proposed corridors for managing elephants in South Garo Hills District and Norkrek area, Meghalaya. *Indian Forester*. February: 207-216.

In the South Garo Hills District and Norkrek area of western Meghalaya, statistical analyses suggest very low elephant densities and greatest declines of elephants in areas with more than 10 percent bamboo and secondary forest (6 to 10 years old) and more than 10 percent scrub and abandoned jhum fields (old fallow jhum 3 to 6 years old). Elephant densities are highest, and declines are the least in areas with more than 25 percent semievergreen forest (old secondary forests 15 to 30+ years). Data on elephant sign (use) in the field generally support these findings, with selection by elephants (i.e., use significantly exceeding availability) for native semievergreen forest, and lack of selection (use significantly less than availability) for deciduous forests (including sal forest, teak, and cashew plantations) and for scrub and abandoned jhum fields. To maintain elephant populations in the South Garo Hills District and Norkrek area, we suggest official delineation of seven elephant habitat corridors that we mapped as having low

degree of fragmentation of forest cover and a high proportion of contiguous, semievergreen and evergreen forest cover.

Keywords: Forest mammals, elephants, India.

(See Portland order form.)

Wisdom, M.J.; Rowland, M.M.; Wales, B.C. [and others]

2002. Modeled effects of sagebrush-steppe restoration on greater sage-grouse in the interior Columbia basin, U.S.A.

Conservation Biology. 16(5): 1223-1231.

Habitats of greater sage-grouse have declined across western North America. Consequently, managers of rangelands administered by the USDA Forest Service (FS) and USDA Bureau of Land Management (BLM) need effective strategies to recover sagebrush-steppe habitats on which this species depends. We compared environmental and population outcomes projected for the species 100 years in the future under two restoration scenarios in relation to projections for historical (circa 1850 to 1890), current, and proposed (100-year) FS-BLM management. Environmental outcome on FS-BLM lands was projected as five classes that represent a gradient from continuous, well-distributed environments to sparse, highly isolated environments. Population outcome was projected as a similar set of five outcome classes that index population status on all lands. Our results suggest that an aggressive restoration can maintain or improve desired habitat for greater sage-grouse in western North America.

Keywords: Restoration, greater sage-grouse, broad-scale models, model validation, sagebrush-steppe, exotic plants, cheatgrass, population viability.

(See La Grande order form.)

Wisdom, M.J.; Wales, B.C.; Rowland, M.M. [and others]

2002. Performance of greater sage-grouse models for conservation assessment in the interior Columbia basin, U.S.A. *Conservation Biology*. 16(5): 1232-1242.

Valid modeling of habitats and populations of greater sage-grouse is a critical management need because of increasing concern about population viability. Consequently, we evaluated performance of two models designed to assess landscape conditions for greater sage-grouse in the interior Columbia basin. The first model (environmental index model) predicted conditions at the scale of the subwatershed (mean size of 7800 hectares); predictions ranged on a continuous scale from 0 to 2, reflecting an environmental gradient of worst to best conditions. The second model (population outcome model) predicted the composite, range-wide conditions for sage-grouse, based on the contribution of environmental index values from all subwatersheds and measures of range extent and connectivity. Population outcomes were expressed as five classes (A through E) that represented a gradient from continuous, well-distributed populations (outcome A) to sparse, highly isolated populations (outcome E). To evaluate performance, we made model predictions in areas currently occupied by sage-grouse versus areas where extirpation has occurred. Our a priori expectations were that models should predict substantially lower environmental index, and a substantially higher probability of extirpation (lower population outcome class), in extirpated areas. Results from both models met these expectations. These results are important for conservation planning in the basin, where the models were used to evaluate effects of management of federal lands on greater sage-grouse.

Keywords: Greater sage-grouse, broad-scale models, model validation, sagebrush-steppe, habitat.

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