



Wood recovery could be improved at nearly every sawmill in Alaska.

opportunities for the wood products industry in Alaska. Consumers are willing to pay significant price premiums for made-in-Alaska and character-marked birch products. Birch products with commercial potential include kitchen cabinets, utensils, bowls, baskets, and high-grade birch lumber. Scientists found that for birch lumber to be commercially successful, log supplies must be dependable, and moisture content must be controlled consistently. For birch lumber, a specialty product, appearance variations from small knots and heartwood-sapwood color variations are desirable.

Research results released in 2002 found that wood recovery could be improved at nearly every sawmill in Alaska. The two best ways to improve recovery of wood products per unit of log volume are (1) reduce target thickness to eliminate oversizing, and (2) reduce sawing variation, with bandsaws found to be more effective than circular saws. Finally, in another project, scientists are developing ways to compost wood and fish wastes together. Currently they are examining the effects of moisture conditions, wood size, and wood porosity on the composting process.

Contacts for Alaska wood products projects: Ken Kilborn, kakilborn@fs.fed.us, Human and Natural Resources Interactions Program
Partners: University of Alaska Southeast, Iowa State University, University of Washington/CINTRAFOR, Oregon State University

Report summarizes science about the environmental effects of postfire logging

A new report summarized many studies on the environmental effects of postfire logging. The immediate effects of postfire logging depend on the severity of the burn, slope, soil texture and composition, the presence of roads or road construction done, type of log retrieval system used, and postfire weather conditions.

Postfire logging can cause a number of ecological effects. These effects include significant changes in the abundance and nest

density of cavity-nesting birds, particularly those that are attracted to recently burned forests. Also, postfire logging may reduce the probability that insects such as bark beetles will have population explosions and infest nearby green trees, killing them and potentially creating new fire hazards.

Contact: Jane Hayes, jlhayes@fs.fed.us, Managing Disturbance Regimes Program
More information: Science Findings 47, October 2002. *Postfire Logging: Is It Beneficial to a Forest?* www.fs.fed.us/pnw/science/scifi47.pdf.

Models helped develop chronologies of the historical range and variation of landscape patterns and dynamics

In the interior Pacific Northwest, landscape patterns mostly are shaped by the interactions of fire and vegetation succession. Vegetation patterns, in turn, influence fire dynamics and plant colonization after fires.

Scientists used computer models to simulate chronologies of landscape vegetation and disturbance over four landscapes in the Northwestern United States: Blue Mountains of northeast Oregon, Selway-Bitterroot Wilderness in central Idaho, east-central Idaho, and northwest Montana. The chronologies described the historical (ca. 1800-1900) range and variability of landscape patterns. Results indicated that to account for fire immigration, simulation landscapes should be 8 to 10 times the area of the analysis landscape and landscapes should be simulated for long periods (1,000 years).

The maps produced can be used to (1) describe variation in patterns over time, (2) develop limits of acceptable landscape change, and (3) design landscape treatment guidelines for ecosystem management. Forest managers can use knowledge of historical landscape pattern dynamics to assess current landscape conditions and to develop future landscape pattern scenarios.

Contact: Paul Hessburg, phessburg@fs.fed.us, Managing Disturbance Regimes Program

Sagebrush-steppe restoration is fundamental to improving landscape conditions for sage grouse

Livestock grazing, invasive species, and changed fire regimes, among other factors, have changed rangeland ecosystems in the interior Columbia basin. The magnitude of change is sufficient to have altered ecosystem processes such as natural succession and disturbance regimes. These altered regimes have created a momentum of uncharacteristic events that makes it difficult to restore rangeland conditions. Of 17 potential rangeland types, the most seriously affected are salt desert shrub, wheatgrass grassland, and four big sagebrush types.

Substantial investment will be required just to slow down or reverse the decline of conditions in sagebrush-steppe ecosystems. Restoration is likely to require integrated wildfire policies, prescribed fire, chemical and mechanical treatments, and reduced livestock grazing to restore native plant communities, stabilize ecosystem processes, reduce the spread of invasive species, and conserve native species.

Restoration of sagebrush steppe over vast areas is fundamental to improving landscape conditions for species such as the sage grouse and Columbian



Evelyn L. Bull

Snowshoe hare in northeast Oregon.

sharp-tailed grouse, which were widespread historically and are declining now. Of the four sagebrush types, Wyoming and basin big sagebrush types offer the greatest restoration challenge, but their restoration may be the best way to ensure the viability of greater sage grouse in the region.

The feasibility was high for restoring the mountain big sagebrush-mesic west with juniper type where juniper was in the early stages of woodland development, but less feasible for sites that had advanced to later woodland stages. In general, obstacles for rangeland restoration include the availability of native seed sources, ability to suppress wildfire, limited availability of rangeland expertise, conflicting management priorities relative to other ecosystems, and funding for restoration work.

Contact for rangeland restoration: Becky Gravenmier, bgravenmier@fs.fed.us, Focused Science Delivery Program; Miles Hemstrom, mhemstrom@fs.fed.us, Managing Disturbance Regimes Program
Partner: University of Idaho

Of several thinning treatments, small patch cuts provide the best snowshoe hare habitat

In the Blue Mountains of northeastern Oregon, small patch cuts appeared to be the best of several experimental thinning treatments in providing snowshoe hare habitat. The patch cuts were only 32 feet across and were surrounded by unthinned patches of trees. Dense hiding cover from overstory trees was close to the small openings, which served as vantage points where hares could watch for predators in winter. The openings were small enough that raptors could not fly through, and bobcats and coyotes could not see from one opening to the next.

Snowshoe hare density increased in areas where stands were thinned in the small patch cuts but decreased in areas where stands were thinned in corridors. Coarse down wood was also an important habitat feature, providing hiding cover in summer and sheltered spaces under the snow in winter. Overall, snowshoe hare survival was only 13 percent after 18 months, with the majority of mortality attributed to bobcats and coyotes in the fall.

Contact: Evelyn L. Bull, ebull@fs.fed.us, Managing Disturbance Regimes Program



Since the 1995 and 1996 floods, scientists have worked with managers to focus on ways to maximize the benefits of natural events such as landslides for streams, and at the same time to storm-proof roads and other vulnerable spots.

Silvicultural approaches were developed from principles of disturbance ecology

For the Douglas-fir-western hemlock forests of the Pacific Northwest, new models of stand development incorporate knowledge about disturbance regimes and their biological legacies such as live trees, snags, and logs; the complexity of stand structures and forest development; and the development of later stages in long-lived forests. Scientists are using the principles of disturbance ecology and natural stand development to create silvicultural approaches designed to be aligned with natural processes. Such approaches provide for abundant standing dead and down wood and large old trees. This may reduce short-term commercial productivity but ultimately enhances wildlife habitat, biodiversity, and ecosystem function, including soil protection and nutrient retention.

Contact: Thomas Spies, tspies@fs.fed.us, Ecosystem Processes Program
Partner: Oregon State University

Variable-density thinning increases the diversity of native plants in the understory

Most reforested areas in the Pacific Northwest are even-aged stands dominated by a single species and lack the structural complexity of older forests. Scientists are examining how variable-density thinning changes these stands. The immediate effect is obvious—variable-density thinning changes stand structure dramatically, introducing spatial heterogeneity. Less obvious are the effects on understory plants. Studies show that native plant diversity increased by 50 percent over the original level under the more complex canopy of the variable-density stands, compared to evenly-spaced thinning. Exotic plant species did not increase in the variable-density stands, but they did increase in the evenly-spaced

stands. The diversity and abundance of small mammals also increased in the variable-density stands.

Variable-density thinning shows promise as a technique to restore vegetative complexity to closed-canopy second-growth forests. When combined with long rotations, legacy retention, and management for snags and down wood, variable-density thinning is a promising technique for enhancing biodiversity in managed Douglas-fir forests across the Pacific Northwest.

Contact: Andrew Carey, acarey@fs.fed.us, Ecosystem Processes Program
More information: Science Findings 38, October 2001. *Invasion of the Exotics: The Siege of Western Washington*. www.fs.fed.us/pnw/science/scifi38.pdf.

Techniques are being developed to favor native plants over invasive plants after prescribed burning

Invasive plants are becoming more dominant on both disturbed and undisturbed sites in the Pacific Northwest, causing native plant communities to lose biodiversity, ecosystem functions to change, and plant succession patterns to change. Little is known about how overstory removal and fire, both wild and prescribed, influence the establishment and persistence of invasive plant species.

Scientists are studying two ecosystems that historically had frequent fires and are in transition zones between forests and grasslands, two factors making them highly weed-prone. In wilderness



Variable-density thinning increases native plant diversity in second-growth forests, encouraging species such as this red huckleberry in western Washington.

Joe Kraft



Nan Vance

Researchers measure density of two invasive plants, sulfur cinquefoil and cheatgrass, near the Salmon River in Idaho.

areas of the Salmon River weed management project in Idaho, scientists are examining the effects of wild and prescribed fires on the ecological dynamics of invasive and native plant species.

At Fort Hoskins Historical Park in the Willamette Valley, scientists are studying native and invasive weed dynamics after overstory removal and prescribed fire. They also are developing techniques to favor native grasses and forbs over invasive plants, by seeding the native plants after the prescribed burn. The project aims to restore the oak savanna that existed in the 1850s, with a focus on native plant species of historical importance to Native American peoples of the Willamette Valley. Results are being shared with park managers, tribal representatives, and other partners in this community project.

Contact: Nan Vance, nvance@fs.fed.us, Resource Management and Productivity Program
Partner: Joint Fire Science Program

Scientists are developing tools to monitor sustainable management strategies

Large-scale plans, such as the Northwest Forest Plan and interior Columbia basin planning, have aimed at sustainable management for federal lands in the Pacific Northwest. Scientists are developing tools to monitor how effective plan strategies are, improve the success of adaptive management, and provide methods for multiscale assessments. Managers can use these tools to define sustainability for various resources and areas, measure resource trends, and develop new strategies as needed.

For sustainable management research in support of the Northwest Forest Plan, 5 projects were completed in 2002 and 15 projects are continuing through 2003. Sustainable management research also is being completed for the interior Columbia basin.

Contact: Becky Gravenmier, bgravenmier@fs.fed.us, Focused Science Delivery Program

Watershed restoration focuses on maximizing positive effects of landslides and minimizing the downside, in western Oregon and Washington

The Northwest Forest Plan guidelines for stream buffers can result in 40 to 90 percent of a watershed being in riparian reserves, with much of this area in intermittent stream buffers. Further research confirms that intermittent streams are indeed important sources for wood, boulders, and gravel that build habitat in fish-bearing streams and that the materials are generally transported by landslides. However, the research indicates that about one-third or less of the intermittent streams have a high potential to initiate a landslide, and even fewer are located where slides will reach larger streams. Scientists learned a tremendous amount quickly from the floods and landslides of late 1995 and early 1996. Since the floods, scientists have worked with managers to focus on ways to maximize the benefits of natural events such as landslides for streams, and at the same time to storm-proof roads and other vulnerable spots, where any landslides generally had negative effects on soils and streams.

Contact: Gordon H. Reeves, greeves@fs.fed.us, Aquatic and Land Interactions Program;
 Fred Swanson, fswanson@fs.fed.us, Ecosystem Processes Program



The Station took the lead in establishing a regional program of research for sustainable forestry, Agenda 2020.



Daniel Powell

This coral fungus is a survey-and-manage species.

Improved survey techniques are available for some survey-and-manage species 

The survey-and-manage program assesses the distribution and habitat requirements of rare and little-known species of animals, plants, fungi, lichens, and invertebrates in the range of the northern spotted owl. The success of the program depends on robust survey techniques and a rigorous analytical framework, in order to comply with the requirements of the Northwest Forest Plan.

However, most species covered under the program are difficult to survey. Scientists have found that some of the covered fungi produce mushrooms, by which they are identified, only at irregular intervals. Research indicates that surveys for these fungi must occur for several years as well as over a large area to get reliable data on the fungi. Scientists also developed a tool that forest managers can use to analyze the field data, to determine if the species are indeed rare. The analysis tool is based on a Bayesian belief network, a structured framework that considers both biology with its associated uncertainties, and criteria from the legally binding record

of decision for the Northwest Forest Plan. This new tool will speed the analysis of survey-and-manage field data and should lead to consistent, objective decisions.

Contacts for survey-and-manage techniques: Jane Smith, jsmith01@fs.fed.us, Tina Dreisbach, tdreisbach@fs.fed.us, and Bruce Marcot, bmarcot@fs.fed.us, Ecosystem Processes Program

Partners: USDA Forest Service Pacific Northwest Region, USDI Bureau of Land Management

Research information helps in managing rare clustered lady’s slipper orchid and Siskiyou Mountains salamander

The clustered lady’s slipper is a rare orchid that grows under forest shrubs and other protective cover. Although small populations are found in eight Western states, the orchid’s main populations are in the Siskiyou-Klamath region of southern Oregon, the southern Cascade Range, and the east Cascade Range in Washington. The flower is listed as a species of concern by the U.S. Fish and Wildlife Service, indicating that it may warrant listing under the Threatened and Endangered Species Act, but more information is needed.

The orchid is listed as a survey-and-manage species under the Northwest Forest Plan. Scientists have learned that the clustered lady’s slipper does not reward its pollinators with either pollen or nectar. Instead, the orchid tricks the pollinators into visiting it, possibly through mimicry. Success of its “trickery” affords the orchid a high rate of seed production. The flower can recover from low-intensity fires, and the scattered populations do show genetic variation. This information has been used in the 2002 annual review of species and to update management recommendations.

The Siskiyou Mountains salamander is listed as a survey-and-manage species under the Northwest Forest Plan and is listed as a state threatened species in Oregon and California. It is found south of Ashland, Oregon, and in northern California, in rock talus habitat

in old-growth forests with a high level of canopy closure. Scientists have assisted with the development of a conservation plan for the salamander, an uncommon species endemic to a specific area.

The conservation plan for the Siskiyou Mountains salamander builds on existing reserves, including late-successional reserves, riparian reserves, and core habitat areas for spotted owls. Scientists have helped to identify additional habitat areas. The conservation plan is expected to result in a high likelihood of species persistence, and at the same time allow areas within the range of the species to be managed for other objectives, including fireproofing communities and commodity output. Thus scientific information on salamander ecology is contributing to an effective conservation approach that includes habitat-based reserves within a managed forest landscape.

Contact for clustered lady's slipper orchid: Nan Vance, nvance@fs.fed.us, Resource Management and Productivity Program

Contact for Siskiyou Mountains salamander: Deanna Olson, dedeolson@fs.fed.us, Aquatic and Land Interactions Program

Genetic evidence shows Oregon population of rare grass may be a separate species

Brewer's shorthair reedgrass is an alpine grass found mostly in central to northern California, with two isolated, disjunct populations in Oregon at Mount Jefferson and Mount Hood. Because the shorthair reedgrass is rare, it has been designated a sensitive plant in the USDA Forest Service Pacific Northwest Region. Genetic research has shown that northern populations of this grass have a chloroplast DNA variation that is distinctly different from that found in the southern populations.

Along with other evidence, this finding supports the classification of the plant into two species, with one a rare species found in only a few locations in Oregon and the Trinity region of California, the other a widespread species native to the central Sierra Nevada Range south of Lake Tahoe. Genetic testing shows the two Oregon populations to be genetically similar, which is evidence that they share a recent common origin and may be considered a single population for

management purposes. The genetic findings will be used in the development of a conservation plan for Brewer's shorthair reedgrass.

Contact: Rich Cronn, rcronn@fs.fed.us, Resource Management and Productivity Program

Agenda 2020 strengthens the program for sustainable forestry research

The Station took the lead in establishing a regional program of research for sustainable forestry, as part of a timber industry initiative, Agenda 2020. The research aims to ensure substantial forest resources and sustainable forest management.

The Station initiated four new 3-year studies in 2002 as Agenda 2020 research. Two studies look at ecological processes. They are (1) the effects of soil and climatic factors on long-term productivity of Douglas-fir (see page 47), and (2) timber harvest influence on headwater streams in western Oregon, including riparian vegetation dynamics, shade, aquatic communities, and water quality (see page 48). The other two studies funded under Agenda 2020 focus on specific management challenges. One study continues work on strategies to control laminated root rot in Douglas-fir (see following story).

The fourth study examines how Swiss needle cast, a foliage disease that affects Douglas-fir, affects wood formation and wood quality. The disease slows tree growth and changes wood properties. However, it is not clear how these changes affect suitability of the wood for different end products. Scientists are learning how growth ring width affects wood strength, not just density. Called GRINCH (**g**rowth **r**ings per **i**nch), the study also will compare wood quality from trees with Swiss needle cast and trees from Swiss needle cast-tolerant families. Eventually the research will produce a model of the relations between growth rings per inch and the properties of structural timber and veneer.

Contact for Agenda 2020 program: Charley Peterson, cepeter@fs.fed.us, Resource Management and Productivity Program

Contact for GRINCH: Randy Johnson, randyjohnson@fs.fed.us, Resource Management and Productivity Program

Partners for GRINCH: Swiss Needle Cast Cooperative, Northwest Tree Improvement Cooperative, Willamette Valley Ponderosa Pine Conservation Association, Oregon State University



Potassium fertilizer may not protect seedlings from laminated root rot

Laminated root rot is widespread throughout the range of Douglas-fir. When infected trees are cut, the fungus continues to live in the stumps and old roots and then infects tree roots in the new stand.

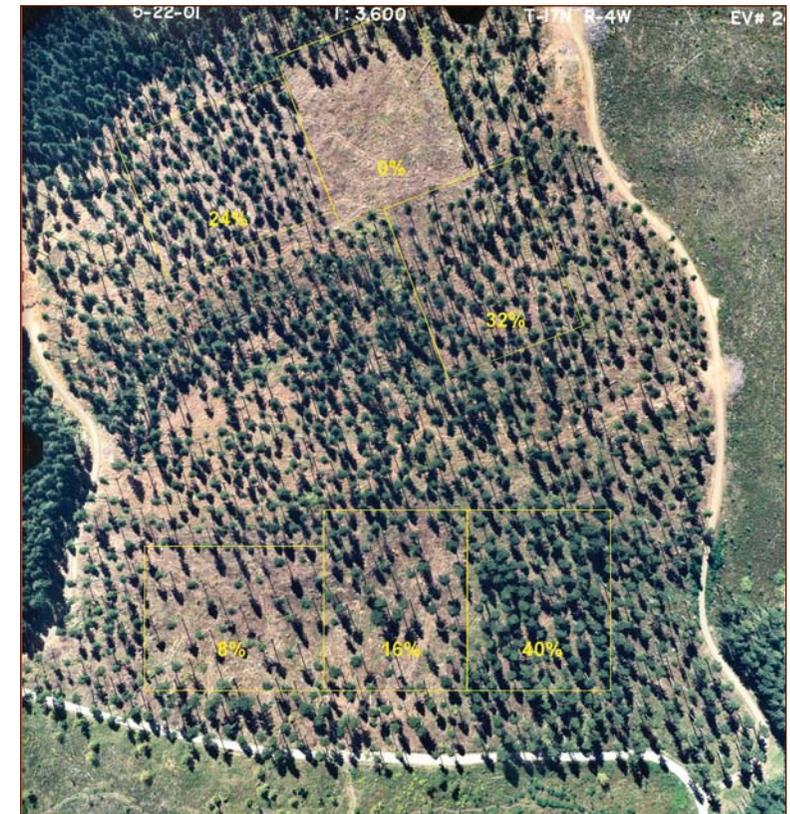
Potassium fertilizer is known to increase tree resistance to *Armillaria*, another type of root rot. Scientists experimented with this technique as a strategy to protect Douglas-fir seedlings from laminated root rot. After four growing seasons, more seedlings died from laminated root rot in the potassium fertilizer-treated plots than in the untreated plots. Mortality was low in all plots, but the early results certainly do not indicate that potassium fertilizer protects Douglas-fir seedlings from laminated root rot.

Contact: Rick Kelsey, rkelsey@fs.fed.us, Managing Disturbance Regimes Program

Alternative silviculture studies test how well Douglas-fir grows in small openings and in partial shade

Forest managers are using silvicultural systems other than clear-cutting, yet much is unknown about how Douglas-fir, western red cedar, and western hemlock regenerate and develop under these alternative systems. Two studies address these questions.

The silvicultural options for managing young-growth production forests study is a large, long-term study, with replications in western Washington and British Columbia. This study will examine how Douglas-fir grows in a range of opening sizes and stand structures, how birds use young forests of different structures, how the public perceives different forest treatments, and how soils are affected. Study treatments test a range of canopy cover options and varying levels of disturbance intensity and frequency.



Douglas-fir growth is being tested under overstory density levels ranging from 0 to 40 percent, at Capitol State Forest, Washington.

On Capitol State Forest near Olympia, Washington, the overstory retention levels study shown in the photo, is examining how western hemlock, western red cedar, and 25 genetic varieties of Douglas-fir seedlings grow under different densities of overstory retention. Past tree genetics programs assumed that seedlings would be planted in an open-light environment. In this study, scientists will examine

how the planted seedlings grow in the varying levels of shade and different environmental conditions (soil temperature, moisture, and light) created by the range of overstory densities.

Contact for silvicultural options for young-growth production forests:

Dave Marshall, dmarshall@fs.fed.us, Resource Management and Productivity Program

Partners: Washington Department of Natural Resources, University of Washington, University of Idaho, Southern Research Station.

Contacts for overstory retention levels study: Brad St. Clair, bstclair@fs.fed.us; Leslie Brodie, lbrodie@fs.fed.us, Resource Management and Productivity Program

Partner: Washington State Department of Natural Resources

New studies on invertebrates were added to DEMO research

Scientists are learning how effective different green-tree-retention levels are for retaining or accelerating the recovery of species and characteristics of mature and old-growth forests in western Oregon and Washington. The first posttreatment results will be available soon from the demonstration of ecosystem management options (DEMO) study.

DEMO research was expanded in 2002 to include a new study on forest-floor invertebrates. Scientists will evaluate how forest-floor invertebrates such as millipedes, mollusks, and carabid beetles respond under the six treatments and the corresponding changes in sunlight, temperature, and moisture. The study will evaluate the effects on the abundances and community structure of these forest-floor invertebrates. In turn, the forest-floor invertebrate study will be the basis for a new integrated study of DEMO treatment effects on the interrelations of birds and forest-floor invertebrates.

A major international symposium is planned in the Pacific Northwest for 2004 on large-scale silvicultural experiments, including DEMO, the silvicultural options study on Capitol State Forest, and the alternatives-to-clearcutting study, among others.

Contact for DEMO and 2004 symposium: Charley Peterson, cepeterson@fs.fed.us, Resource Management and Productivity Program

Contact for forest-floor invertebrate study: Keith Aubry, kaubry@fs.fed.us, Resource Management and Productivity Program

Partners: Washington State Department of Natural Resources, University of Washington, Oregon State University, University of Oregon

The Fall River long-term study produces early results on tree growth

The Fall River long-term site productivity study, in western Washington, is producing early results. Scientists are investigating the long-term effects of organic matter levels, site disturbance, and postplanting management activities on Douglas-fir seedling growth, other plant growth, and soil properties. Research topics include relations between soil and air microclimate and seedling water uptake and growth, soil physical characteristics, soil mineralization rates, nutrient movement in soil water, soil and plant nutrient budgets, and comparison of seedling growth for different treatments and forest floor conditions.

Second-year results indicate that Douglas-fir seedlings had greater growth when competing vegetation was controlled or when the level of woody material left on the site was reduced. Also, no detrimental effects are evident yet from soil compaction.

In an additional study, scientists from the Rocky Mountain Research Station and Michigan Technological University are studying decomposition of wooden stakes at this and several other locations, as a possible index for decomposition of roots and buried wood.

The long-term productivity research is being expanded under the Agenda 202 program to new study sites on forest industry land in western Washington and western Oregon.

Contact for Fall River long-term productivity study: Connie Harrington, charrington@fs.fed.us, Resource Management and Productivity Program

Contact for long-term productivity studies on other sites: Tim Harrington, tharrington@fs.fed.us, Resource Management and Productivity Program

Contact for Agenda 2020 program: Charley Peterson, cepeterson@fs.fed.us, Resource Management and Productivity Program

Partners: Boise Cascade Corporation, Port Blakely Tree Farms, Rayonier Simpson Timber Company, Weyerhaeuser Company, Oregon State University, University of Washington



*Most
microclimate
changes associated
with riparian
areas occurred
within the first
100 feet from
the stream.*

Effects of thinning were measured for riparian and forest floor habitats

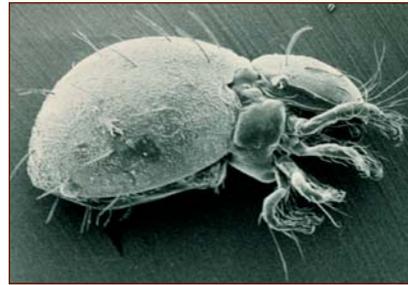
Scientists are studying the effects of thinning in 40- to 70-year-old stands in riparian buffers of western Oregon. In 2002, posttreatment data on microclimate was available for the first time. For both the thinned and unthinned forests, the greatest changes in temperature and relative humidity occurred within the first 45 feet from the streamsides into the forest. Most microclimate changes associated with riparian areas occurred within the first 100 feet from the stream.

Thinning can have profound immediate effects on soil and litter microarthropod communities, but these communities would likely change as the thinned stands develop into successive forest structures. Scientists studied the mite and springtail faunas in thinned stands and compared them to the faunas found in old-growth forests.

In the litter layer of the forest floor, the total abundances of oribatid mites, mesostigmatid mites, and to a marginal extent, prostigmatid mites, were reduced in thinned stands compared to unthinned stands. No differences were found for total springtails in the litter, or for any major group within the top 2 inches of mineral soil. Forest thinning had little influence on the composition or relative abundance of these microarthropod communities.

Contact for thinning and microclimate in riparian buffers: Sam Chan, schan@fs.fed.us, Resource Management and Productivity Program

Contacts for microarthropod studies: Rick Kelsey, rkelsey@fs.fed.us, Chris Niwa, scientist, cniwa@fs.fed.us, Managing Disturbance Regimes Program



Turtle oribatid mite, a forest floor microarthropod. Actual size is about 1 millimeter.

Andy Moldenke

Approaches that explore the meanings of places have potential to resolve resource conflicts

A landscape becomes a place through the meanings it is given by people who know it over time. People grow to love familiar places and develop norms for appropriate behavior for that place—but different people have different norms about what is appropriate.

Conflicts about natural resources can be considered struggles over place meanings. Resource managers may want to consider public involvement approaches that give people a chance to explore the meanings of places, learn what other people value in places, and negotiate the range of meanings assigned to particular places. These place-based approaches include field trips, meetings with discussions (not just hearings or listening posts), and opportunities



Tom Iraci

Much of what people value about a place is invisible to the eye.

for dialogue and mutual learning. Methods of gathering information might include oral histories and ethnographic interviews, and also conventional surveys.

Place-based approaches require managers to use social processes such as multi-party negotiation and collaboration, to give people the chance to express, negotiate, and transform meanings about places. These approaches take considerable time and energy, but the reward can be the resolution of conflicts over resource management.

Contact: Linda Kruger, lkruger@fs.fed.us, Human and Natural Resources Interactions Program
Partners: Colorado State University, Utah State University

Knowledge-base models offer a framework for integrating social, biological, and economic factors

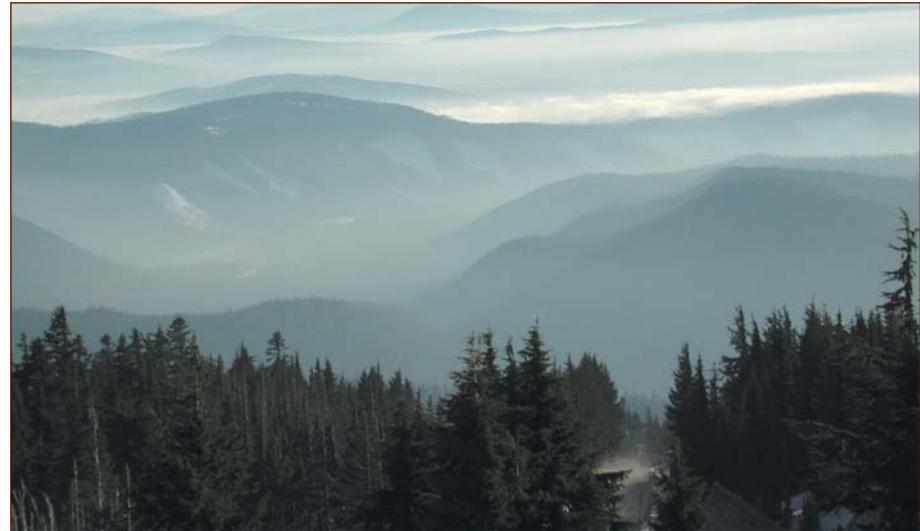
Natural resource managers are faced with making decisions that are not only biologically possible and economically feasible, but also socially acceptable. Knowledge-base models offer considerable potential for integrating social, biological, and economic factors. A knowledge base can be considered a mental map for problem solving. Many diverse topics can be combined in one analysis, and the analysis can include uncertainties about the probability of events.

The knowledge-base models can be used to analyze the factors that shape, alter, and sustain people's judgments about forest management, and facilitate discussion about the links among social, biological, and economic factors.

Contact for knowledge-base models: Keith Reynolds, kreynolds@fs.fed.us, Human and Natural Resources Interactions Program
Partner: Oregon State University

Decision-support software helps answer questions posed by ecosystem management

The Natural Resource Information System, a group within the Forest Service, develops and manages large, agency-wide databases to support the Forest Service's resource management needs. The large databases are beginning to



come online, but until recently, no analytical systems have been available to integrate the data with landscape evaluation and planning protocols, for the large, complex questions now typically posed by ecosystem management.

The new ecosystem management decision support system (EMDS 3.0) is supported by the Natural Resource Information System as a primary tool for nationwide application. EMDS 3.0 provides integrated, multiscale decision support for landscape evaluation and planning. For example, EMDS 3.0 has been used for evaluations of habitat suitability, classification of sites for most suitable tree species, and designation of biodiversity reserves. In a watershed analysis, EMDS can help answer questions such as: Does current watershed condition provide adequate fish habitat? Which watersheds need protection or restoration? What kinds of management activities would be most beneficial?

Contact: Keith M. Reynolds, kreynolds@fs.fed.us, Human and Natural Resources Interactions Program
Partners: Environmental Systems Research Institute, Natural Resource Information System Tools Group, InfoHarvest, Inc., Rules of Thumb, Inc.



Tom Iraci

More and more people are going to national forests for recreation, such as this group on the Skagit River, Washington.

Scientists are working to improve management tools available to private landowners

Private landowners want to sustain the productivity of their forest lands, and often these landowners do not have access to the information and resources available to federal and state agencies that manage forests.

In a first step to change this, scientists will improve the tools available to private landowners for estimating stand growth and structural conditions. Scientists evaluated six groups of forest growth models for their usefulness in answering forest sustainability questions. Structural shortcomings were identified in several classes of models, especially traditional yield models. Hybrid models merge

the growth yield models with process-based models that measure environmental changes, and these hybrids hold the greatest promise, because they are designed to yield operational results for managers.

Contact: Jamie Barbour, jbarbour01@fs.fed.us, Focused Science Delivery Program
Partner: Human and Natural Resources Interactions Program

Scientists are developing ways to help manage recreation and tourism

More and more people are going to national forests for recreation. Scientists are investigating the values of national forests for recreation and tourism, and the effects these uses can have on ecosystems and communities. They plan to produce a synthesis of management experience and scientific research on the concepts and techniques for managing recreation and tourism. Results will include programs designed to enhance the agency's capacity to manage recreation and tourism, and to integrate recreation with other resource management programs.

Researchers are developing ways to help recreation managers access research information more easily. Scientists also are asking managers what problems need additional research. A workshop was held, attended by representatives from recreation and tourism organizations, staff from state and federal agencies, and other interested people. For recreation and tourism in the Pacific Northwest, the participants identified the top two research needs as (1) understanding social, recreational, and traditional values of public lands (social mapping), and (2) finding alternative ways to involve the public in collaborative planning.

Contact: Sue Alexander, salexander@fs.fed.us, Human and Natural Resources Interactions Program
Partner: Focused Science Delivery Program



Bob Szaro

Scientists are studying the interactions of stream communities and silvicultural actions in southeast Alaska forests.

Synthesis of southeast Alaska silvicultural research was presented at symposium

In the past few years, Station scientists began a group of studies on silvicultural options for young-growth and old-growth forests in southeast Alaska. The studies, designed to support planning needs, included alternatives to clearcutting, the effects of silvicultural treatments on young-growth wood quality and wildlife habitat, and evaluation of a stand-growth model. Many studies will continue for some years yet.

In 2002, scientists prepared a synthesis of research results to date and presented the results at a symposium in Ketchikan, Alaska. The research synthesis also will be published in a special issue of *Landscape and Urban Planning*. The synthesis will provide scientific information for future forest planning in southeast Alaska and should be helpful for project-level planning as well.

The alternatives-to-clearcutting research is a long-term study that began in the old-growth forests of southeast Alaska. Earlier forest assessments were done before treatments yielded insights into the structure and disturbance regimes of old-growth rain forests of southeast Alaska. Scientists found that wind did not kill as many trees in these forests as had been thought. Most trees died standing, and wind broke or toppled the trees after they died. The reconstructed annual mortality rates had been fairly stable through the past century, averaging 0.3 to 0.5 percent per year for overstory trees. Also, the number of dead trees, basal area of dead trees, annual mortality rates, and percentage of uprooted trees did not differ significantly among areas in different classes of wind exposure, as determined by a recently developed wind model.

The alternatives-to-clearcutting study includes both even- and uneven-age silvicultural systems. It also has a major focus on the interaction of aquatic communities and silvicultural actions, an aspect missing in some silvicultural studies. Comprehensive postharvest sampling, scheduled for 5 years after treatment on each block, was done in 2002 for the first block, which was harvested in 1997.

Contact: Mike McClellan, mmcclellan@fs.fed.us, Resource Management and Productivity Program

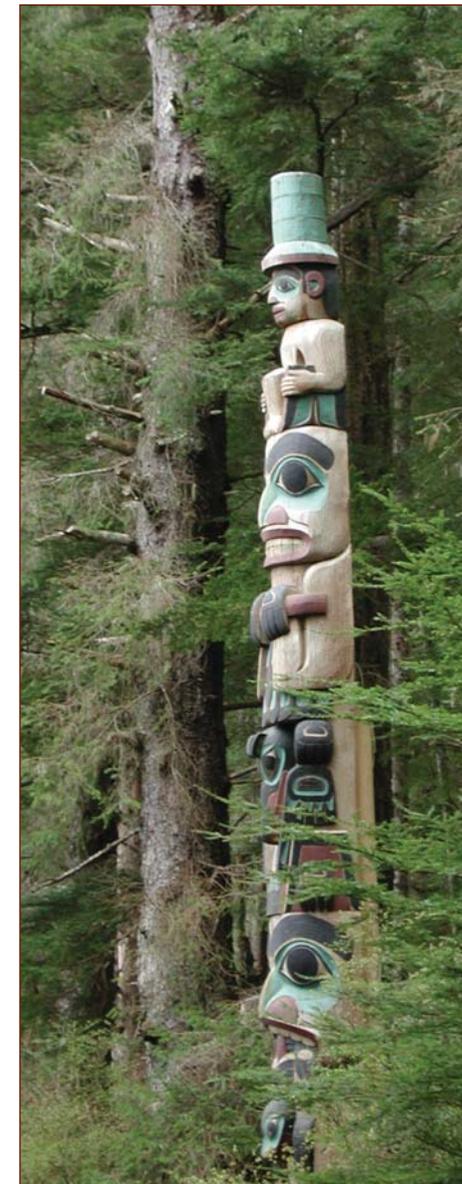


*Single-species
focus alone is
not enough
to ensure
ecosystem
sustainability.*

Goal 4: Communicate Science Findings and Enhance Their Application

Key Products:

- A synthesis of findings was published on the wood compatibility research program. The report describes the extent to which timber harvest can be compatible with sustainably managing other forest values and discusses compatibility at four geographic scales.
- A synthesis was published of research done in support of implementing the Northwest Forest Plan. Research addressed conservation and management strategies, ecosystem sustainability, and adaptive management in the Northwest Forest Plan area.
- A new publication series, *PNW Science Update*, was launched. Each issue of the 12-page, color, quarterly publication deals with a topic describing scientific information that contributes to pressing decisions about natural resource and environmental issues.
- Interior Columbia basin science findings are available on a set of five compact disks (CD-ROM set). The set includes all maps, databases, and metadata compiled during the Columbia basin research.
- Over 800 references have been compiled in a bibliography on the ecology and management of Oregon white oak and other closely related oak species. Much of the information was difficult to find before.
- The Sitka Wood Utilization Center is getting research results to the forest products industry in Alaska through a newsletter, expanded Web site, and briefing papers.
- The Station's fire research received extensive media coverage during the severe fire season of 2002. Media stories covered changes from historical fire conditions in fire regimes and ecosystems, fire management, climate change factors, and the costs of reducing fire hazard in forests.





Tom Iraci

Scientists found that timber harvest can be compatible with managing other forest values sustainably.

Accomplishments

Synthesis was published on producing wood commodities and other forest values sustainably

The relations between the environment and society are constantly evolving, but in the last decade they have often been seen in stark black-and-white terms. Some people see technological development and economic growth as the enemy of a healthy environment, and other people see economic development as the best way to solve the ecological crisis of the developed world. These divergent views were the context for the wood compatibility initiative, a short-term research program that examined the central question: Can we as a society produce wood commodities and other forest values in an environmentally acceptable and sustainable manner?

The research findings were summarized in “A Basis for Understanding Compatibility Among Wood Production and Other Forest Values” (PNW-GTR-529) and will reach an international audience in a book published by Kluwer Academic Publishers in 2003. In the general technical report, the authors show

the extent to which compatibility can be judged at four geographic scales in the Pacific Northwest. They also summarize the progress toward understanding compatibility around four questions: (1) To what degree can wood production occur? (2) How can the links between management actions and stand-level outputs of goods and services be developed? (3) What are the methodological problems in developing broad-scale measures of ecosystem condition and performance? (4) Can broad-scale measures be developed to illustrate compatibility or trade-offs between biophysical and socioeconomic systems at the ecoregion and national scales?

Contacts: Richard Haynes, rhaynes@fs.fed.us, Human and Natural Resources Interactions Program

Partners: University of Washington, Campbell Group

Synthesis of Northwest Forest Plan research suggests a broader focus on species groups and ecosystem dynamics is desirable

Station scientists completed a synthesis of research done in support of implementing the Northwest Forest Plan (PNW-GTR-498). Although the Northwest Forest Plan was developed to address old-growth-related species such as the northern spotted owl and marbled murrelet, scientists found that single-species focus alone was not enough to ensure ecosystem sustainability. The functional roles of certain plants, vertebrates, invertebrates, and fungi influence the diversity, productivity, and sustainability of ecosystems. These roles are not fully addressed by focusing on rare or threatened terrestrial vertebrates. A single conservation strategy for the Northwest Forest Plan area is not likely to succeed.

Contact: Richard Haynes, rhaynes@fs.fed.us, Human and Natural Resources Interactions and Becky Gravenmier, bgravenmier@fs.fed.us, Focused Science Delivery Programs



Daniel Powell

The cauliflower mushroom is a survey-and-manage fungus under the Northwest Forest Plan.



PNW Station launches a new publication series, the *PNW Science Update*

The Station launched a new publication this year, the *PNW Science Update*. Each issue of this 12-page, color, quarterly publication deals with a topic likely to be in the news and where the Station has scientific information to contribute. The first issue, on restoring complexity and habitat diversity in second-growth forests, was used by scientists as a teaching tool in workshops. The second issue, on fire risk in east-side forests, brought objective scientific information into the debates about what caused the devastating fire season in Oregon and other Western states in 2002.

The Station's popular publication, *PNW Science Findings*, continued with 10 issues during fiscal year 2002. Each issue of this six-page, newsletter-style publication focuses on a particular research topic of interest to the general public. This past year, issues included the ecological roles of canopy gaps and dead wood in forests, computer models of Oregon Coast Range forests, and climate change research, among others. The two publication series, *PNW Science Update* and *PNW Science Findings*, reached thousands of people.

Individual publications or free subscriptions to *PNW Science Findings* or *PNW Science Update* can be requested by calling (503) 808-2138 or e-mailing pnw_pnwpubs@fs.fed.us.

Contact: Valerie Rapp, vrapp@fs.fed.us, Communications Group

Research products on interior Columbia basin are now available for managers and scientists in a CD-ROM set and on the Internet

Interior Columbia basin science findings were pulled together in some final products. One product is a set of five compact disks (CD-ROM set) for computers that include all the maps, databases,



Tom Iraci

John Day River and Sheep Rock, eastern Oregon.

and metadata compiled for the Columbia basin research. The CD-ROM set includes over 300 geographic information system (GIS) data layers and databases. It is available to the public; databases are also available on the Internet at www.icbemp.gov. The data can be used for regional analyses, new research studies, and midscale land-use planning projects.

A comprehensive bibliography of all the interior Columbia basin publications is also available on the Internet at www.icbemp.gov/science. The bibliography will be updated as the final publications are completed.

Contact: Becky Gravenmier, bgravenmier@fs.fed.us, Focused Science Delivery Program

Special issue of *Northwest Science* focused on forest health and productivity in eastern Oregon and Washington

The Station's forest health and productivity initiative was a project to assess the combined effects of human and ecological factors over the past century on disturbance regimes and, consequently, the ecological integrity of forests in eastern Oregon and Washington. In eastern Oregon and Washington, the forests and rangelands evolved with disturbance events such as wildfire and insect and disease outbreaks. Ecological and human factors have combined to change the historical disturbance regimes and ecosystem structures, and the result has been declining health and productivity in many ecosystems.

The initiative work culminated in 2002 with the publication of a special issue of *Northwest Science*. The 25 chapters describe the key issues, disturbance regimes, and a conceptual framework of the relationships, ecological processes, and outcomes of management options for east-side ecosystems. This framework is the basis for the interior Northwest landscape analysis system currently under development.

Contact for special journal issue on east-side forest health: Jane Hayes, jlhayes@fs.fed.us, Managing Disturbance Regimes Program

Scientific information on Oregon white oak was compiled in a bibliography

Oregon white oak, also known as Garry oak, was once common in oak woodlands, savannas, and prairies in western Washington and Oregon. However, the fire-dependent species has been shaded out by conifers owing to fire suppression, or woodland areas have been converted to other tree species or nonforest uses. In the past, researchers and managers interested in Oregon white oak have had difficulty locating information on the species, as many references were not available in computerized databases owing to their age or publication as a university thesis or technical work.

Now a comprehensive bibliography is available of all work on the biology and management of Oregon white oak. The bibliography of over 800 references is

available both in print and as a searchable database on the Internet. Along with Oregon white oak references, the bibliography includes references on other oak species growing within its range; eastern white oak, a closely related species; and general references on the genus. The electronic bibliography can be searched by almost any part of the citation, including author, year of publication, journal, title words, or keywords. This reference database pulls together information that was difficult to find before and should be a valuable resource for everyone working on oak restoration.

Contact for Oregon white oak: Connie Harrington, charrington@fs.fed.us, Resource Management and Productivity Program

New approach to writing environmental analysis documents was developed in the Five Rivers landscape project

Station scientists worked with managers from the Siuslaw National Forest to release a final environmental impact statement and record of decision implementing the largest replicated management experiment in the Pacific Northwest (16,000 acres). In the course of the project, a new approach was developed for writing environmental analysis documents to meet the requirements of the National Environmental Policy Act.

The management experiment will compare three pathways (with four replications of each): passive management, continuous management (thinning stands lightly and repeatedly), and pulsed management (thinning stands heavily at 30-year intervals).

A streamlined approach was used for the environmental analysis that reduced the analysis time dramatically. This approach replaced the traditional practice—often criticized as “analysis paralysis”—that would have included up to eight environmental assessments over the next 10 years. The new approach made clear connections between resource knowledge and the decision, acknowledged the uncertainties for all management approaches, and included a rigorous adaptive-management approach.

Contact: Bernard Bormann, bbormann@fs.fed.us, Ecosystem Processes Program

The Station developed the Focused Science Delivery Program in 2002 to work intensively on several issues of focus.

Testimony was provided on scientific information concerning fish passage at road crossings in the Pacific Northwest

Station scientist Peter Bisson testified at a House Interior Appropriations Subcommittee hearing on a General Accounting Office (GAO) report that identified 3,000 fish passage blockages on Forest Service roads in the Pacific Northwest. The GAO report estimated that correcting these culverts would cost about \$375 million. Bisson placed fish passage problems in context with other environmental challenges faced by threatened or endangered Pacific salmon. Restoring fish passage at road crossings may be an effective recovery strategy, but only if blockages elsewhere in the river system are adequately addressed.

Thus, fixing culverts is most effective when integrated into a comprehensive fish restoration program that protects all habitats needed by salmon, during their life-cycle migration from freshwater streams to oceans and back. The Appropriations Committee will use the scientific testimony to make decisions about allocating supplemental funds for culvert replacement to correct fish passage problems.

Contact: Peter A. Bisson, pbisson@fs.fed.us, Aquatic and Land Interactions Program

Information on Alaska wood products gets to people faster

The Sitka Wood Utilization Center finds ways to make the forest products industry in Alaska more viable. This past year the center started a newsletter, expanded their Web site, and developed a series of one-page briefings, all to speed the research results to people who can use them. Currently, research projects are underway on birch resources of interior Alaska, birch craft marketing, made-in-Alaska red alder furniture, wood and fish waste composting,

wood waste energy generation, lumber recovery in sawmills, and lumber drying methods. Responses have been overwhelmingly positive to the new communications. The center's Web site is www.fs.fed.us/pnw/sitka. It is also linked to the Station's Web site.

Contacts: Bridget Kauffman, bridgetkauffman@fs.fed.us, Human and Natural Resources Interactions Program

Partners: University of Alaska Southeast, Iowa State University, University of Washington/CINTRAFOR, Oregon State University



Dave Nicholls

Alaska birch craft products. Counter-clockwise: birch bowl, salad utensil, birch bark basket, kitchen cabinet made from character-marked birch lumber.

Enhanced EnVision software now shows effects on forest fuels and fire severity

The Station's stand visualization system and EnVision software packages depict present and future stand conditions. Forest managers use the visualization software to see what would happen to forests under different alternatives. Recent enhancements to EnVision allow users to portray down-fuel conditions and fire-induced mortality, through the fire and fuel effects extension to the software. The images show the effects that management activities would have on standing trees and down fuels, and the effects of prescribed and wild fires. Images have sufficient detail to represent fuels from fine branches to large trees. Changes in forests and fuels can be linked to changes in expected fire severity and behavior.

EnVision uses special tree models to portray fire-killed trees so they can be distinguished from natural mortality. The resulting simulations show stands that appear to have been burned, including effects on standing trees, consumed down fuels, and scorched

ground. These visualizations give managers a better way to communicate to the public the need for fuels treatments. Additional information about this research is available at: www.fs.fed.us/pnw/envision.

Contact for stand- and landscape-scale visualization: Robert J. McGaughey, bmcgaughey@fs.fed.us, Resource Management and Productivity Program

Historical fisheries data for Alaska streams are now available in a database

Decades of research have produced large amounts of data on fish ecology and management. The data were not readily accessible, however, because of the varied formats and storage locations. Access to this historical data is essential for scientists working to understand long-term changes that affect fish. Scientists formed a partnership with the Alaska Region of the Forest Service to develop a user-friendly database accessible within the region.

The new database includes fish data from more than 140 Alaska streams collected over the past 21 years. Available on CD-ROM, the database provides information on fish species, length, and number caught. Some data sets include weight measurements or age data derived from scales, and many data sets have related habitat data available. Information is also included on who collected which data, and where, when, and how the data were collected. The data can be used in the corporate databases maintained by the Natural Resource Information System. An annotated bibliography is included of various publications where the data have been used. Forest managers could use the database to discover long-term trends in fish abundance and distribution.

Contact: Brenda Wright, bwright01@fs.fed.us, Aquatic and Land Interactions Program

New program was initiated to deliver policy-related findings

The PNW Research Station has short-term efforts that integrate research and development to address specific policy issues. These issues of focus produce findings related to the policy questions rather than fundamental research. The Station developed the Focused Science Delivery Program in 2002 to work on

several issues of focus. Accomplishments for these issues are described under Goals 1, 2, and 3. The new program will work intensively on five issues of focus during the next several years. These are listed below.

- Reducing fire risk to people and resources (see pages 37-38).
- Recreation and tourism (see page 50).
- Sustainable wood production (see page 50).
- Planning, assessment, and science delivery methods (see interior Columbia basin (ICB) increased wildfire risk on page 35, ICB rangeland restoration on page 41, Northwest Forest Plan research synthesis on page 53, and ICB CD-ROM set on page 54).
- Biodiversity

Contact: Jamie Barbour, jbarbour01@fs.fed.us, Focused Science Delivery Program

Media coverage gets science information related to fire into the news

The Station's research activities were covered by national and international media in fiscal year 2002, and the coverage helped to get solid, relevant scientific information into the news.

In particular, our fire research was highlighted during the severe fire season of 2002. *The Oregonian*, the major newspaper for Oregon and southwest Washington, featured the Station's fire research in front-page stories on July 24 and August 4. The stories covered changes from historical conditions, fire management, policy, and the costs of thinning forests to reduce fire hazard.

Other newspaper articles included the *Tacoma News-Tribune* on wildland-urban interface fire safety, and the *Eugene Register-Guard* on fuel loads in forests, prescribed fire research, and its implications. The Associated Press released a story about Ron Neilson's global climate change research and his statistics surrounding increased forest undergrowth and wildfires in the West. Neilson also was interviewed by radio show host Tatiana Martushev for "The Round House Show" on COHO-Radio in Leavenworth, Washington. Jeremy Fried discussed



*The Station's
fire research
received national
media coverage
during the severe
fire season
of 2002.*



Tom Iraci

Station scientists were front-page news in The Oregonian in July 2002, when people were curious about the story behind the West's record-breaking fire season.

his research on thinning costs and the feasibility of biomass plants on "Oregon Considered," the state-wide radio evening news show of Oregon Public Broadcasting.

Several TV reporters also turned to Station scientists for their fire science expertise. The national TV program "Nova" included interviews with scientists Sam Sandberg and Roger Ottmar in their 2-hour special, "Fire Wars," which aired in late July. MSNBC, the online news magazine produced by Microsoft and NBC-TV, created an interactive video story about the politics, ecology, and economics of wildland fire policy. Produced by Jon Bonne, the story included interviews with John Lehmkuhl and Paul Hessburg at a fire research site in eastern Washington. In MSNBC's online story, videos and fact files could be clicked and opened for additional information on the subject.

The media also covered other Station research in fiscal year 2002. A number of local and national news outlets produced stories on the current status of spotted owls, barred owls, red tree voles, and forest management. National Geographic Television filmed a segment on "Revisiting Mount St. Helens" and included Station research on the recovery of small mammal populations in the blast zone. The History Channel produced a segment on the 250-foot-tall Wind River canopy crane for their "Modern Marvels" show. Also, the *Los Angeles Times* had an article on lynx research and another article on how marine nutrients that salmon bring into freshwater ecosystems fuel freshwater and riparian food web productivity.

Contact: Sherri Richardson-Dodge, srichardsondodge@fs.fed.us, Communications Group



Tom Iract

The PNW Research Station Web site allows people to search for scientists by their field of expertise. A search for a “research botanist” will list Randy Molina and other experts.

The PNW Research Station Web site improves search capabilities

The Station redesigned its Web site during 2002. Search capabilities are significantly improved, allowing users a number of options. Users can search a database that has nearly 6,000 publications from seven research stations, or they can search only the PNW publications. Searches can be simple or can use advanced filters. Many PNW publications are available online at: <http://www.fs.fed.us/pnw>.

The Web site also offers directories of people, with listings of scientists by their field of expertise and listings of employees and contact information. Also, the Station Web site has links to sites for individual research teams, laboratories, and experimental forests. The wealth of scientific information now available through the Web site would total up to many thousands of pages, if all printed.

Over 25,000 visits were made to the Station Web site during fiscal year 2002. The Station does not track visitors at all, other than the number of “hits” on the Web site, but some visitors follow up by calling us. These visitors included a college professor looking for additional course material, people from citizens’ groups looking for information, and newspaper reporters researching articles.

Contact: Diane Smith, desmith@fs.fed.us, Communications Group

Presentation on “nonnative invasive plants of eastern Oregon: an economic and ecological call to action” is viewed widely

This PowerPoint presentation, developed as an educational tool, explains the ecological and economic problems caused by invasive plants. Federal and state agency staff have used it in presentations to over 1,000 people throughout Oregon, Washington, and Idaho, including cattlemen’s associations, university classes, and residents of weed management areas. The presentation focuses on the dozen weed species that are causing the most damage to rangelands and forest lands, including yellow starthistle, spotted knapweed, rush skeletonweed, and whitetop.

Contact: Catherine Parks, cparks01@fs.fed.us, Managing Disturbance Regimes Program

Symposia, Workshops, and Tours

Station scientists participate in many forums. Highlights from 2002 are listed below.

American Fisheries Society, Oregon Chapter, and USDA Forest Service fish passage workshop. PNW Research Station was a cosponsor of the American Fisheries Society watershed restoration workshop, attended by about 250 people, and the USDA Forest Service fish passage workshop, attended by about 100 people, both held in Eugene, Oregon. Station scientists did presentations on lessons learned from past instream fish habitat projects, design of invisible stream crossings, design of road-stream crossings, and aquatic ecology.

Annual Levels-of-Growing-Stock (LOGS) tour. The LOGS tour was attended by about 35 people in July 2002. People visited current and historical silvicultural research sites on the Wind River Experimental Forest, near Stevenson, Washington.

Capitol Forest tours. Over the year scientists hosted over 120 people on eight tours of the silvicultural options and overstory density studies on the Capitol Forest near Chehalis, Washington.

Changing the Scale of Our Thinking. This symposium presented the initial results from the coastal landscape analysis and modeling study (CLAMS) on broad-scale assessments of Oregon Coast Range ecosystems. Over 200 people attended the June 10, 2002, symposium at Oregon State University. The next day 80 people attended a workshop on using, improving, and evaluating CLAMS.

Cutthroat trout presence/absence pilot study. About 50 people from Mary's River Watershed Council and natural resource managers attended this seminar in Corvallis, Oregon.

Density management studies field tours. Eighty people attended two field trips in the Oregon Cascade Range on alternative silvicultural treatments and riparian buffer widths in managed forest stands 30 to 50 years old, and riparian thinning.



Mike McClellan

Soil scientist Dave D'Amore examines a soil pit at the Fall River study site near Olympia, Washington.

Fall River long-term site productivity study tours. Scientists led three tours with a total of 60 people to the Fall River study site, near Olympia, Washington.

Fire and aquatic ecosystems symposium. Station scientists presented work on experiences, emerging theories, and issues related to fire management and aquatic ecosystems. PNW Research Station, Rocky Mountain Research Station, and the American Fisheries Society were sponsors of the workshop, attended by about 110 people in Boise, Idaho.



Tom Iraci

People learn about airshed and plant respiration research at the H.J. Andrews Experimental Forest.

Forest Inventory and Analysis results and strategies. Scientists from the Forest Inventory and Analysis (FIA) Program met with clients from Washington, Oregon, and California to share status and results of the program's work. The clients presented results from research they had done with the inventory data. The FIA scientists also met with representatives from the five states where the Station does inventories, tribal representatives, national forest representatives, and other interested people to review results and plan next year's program. A total of 50 people attended the three meetings.

Fort Lewis oak release study tour. A total of 30 people attended two tours of the oak habitat restoration study at Fort Lewis, Washington.

H.J. Andrews Experimental Forest. More than 30 tours and workshops were conducted at the H.J. Andrews Experimental Forest in the Oregon Cascade Range, attended by over 1,000 people from many countries. Topics included watershed and airshed research, development of old-growth Douglas-fir forests along the Pacific coast, long-term changes in landscape structures, and dynamic landscape management.

Hidden Forest Values: Alaskan nontimber forest products conference. About 175 people attended this conference and field trips, cosponsored by PNW Research Station, in Anchorage and Talkeetna, Alaska.

International visitors to PNW Research Station. Scientists from other countries visited Station scientists and went on field trips to research sites. The International Union of Forestry Research Organizations executive board toured the Capitol Forest silvicultural options study. Chinese forest geneticists visited tree improvement sites in the Pacific Northwest, and also scientists and managers from both China and Taiwan visited sites for research on stand management for structural diversity.

National fire plan symposia and workshops. Station scientists gave presentations related to national fire plan research at several meetings, including the Joint Fire Science Program meeting in San Antonio, Texas; a related meeting in Salt Lake City, Utah; and the National Advanced Resource Technology Center outside Tucson, Arizona. Over 250 people attended the various meetings. Presentations included altered fire regime patterns, spread of invasive plants after fuel treatments, consequences of fuel-reduction treatments, and restoration of sagebrush steppe ecosystems.

New Metaphors for Ecosystem Restoration. A small group of scientists, writers, and philosophers convened in Oregon from September 12 through 15, 2002, to discuss new metaphors for ecosystems and their restoration.



Recreation and tourism workshop. Scientists met with people from recreation and tourism organizations, agency staff, and others. The 24 participants identified research needs for recreation and tourism issues.

Restoring ecosystems: fire ecology, planning, and application in western Oregon. About 200 people met in Eugene, Oregon, in May 2002, to learn about historical wildfire, prescribed fire, and forest management with fire in mind, in forests of western Oregon.

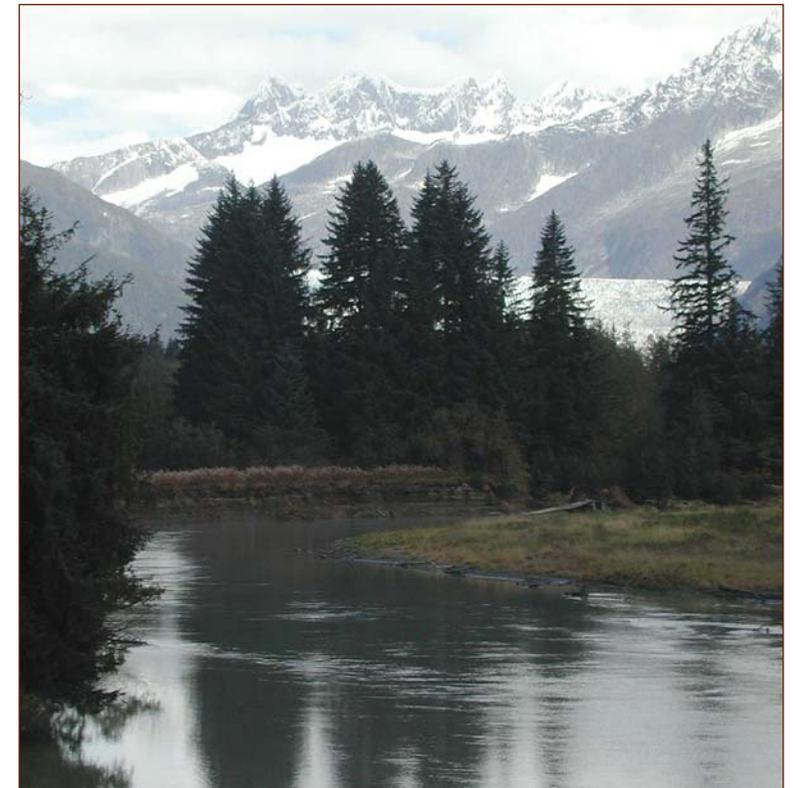
Silvicultural strategies for riparian management. A seminar and field trip were held in Roseburg, Oregon, about managing forests near streams and sensitive aquatic environments. Twenty-four small-woodland owners, watershed council representatives, and others attended the session, which was a partnership between PNW Research Station and Oregon State University's Sea Grant program.

Silviculture and biodiversity in second-growth forests in Alaska. Station scientists led workshops and field trips to discuss upland young-stand management in Alaska forests and active management to promote wildlife habitat and wood quality values. Sixty-two people, representing the state of Alaska, national forests, Alaska Native Corporation, timber industry, and universities, attended the workshops.

Silviculture and biodiversity in second-growth forests in Oregon and Washington. Station scientists gave presentations and led field trips for many groups on managing second-growth forests for multiple values including biodiversity, stand dynamics, canopy dynamics, and other silvicultural topics. Groups included the Oregon State Forester and senior staff; forest leadership teams for the Olympic, Mount Baker-Snoqualmie, and Gifford Pinchot National Forests;

Bureau of Land Management silviculturists; congressional staff; county commissioners; tribal representatives; and natural resource managers. Field trip locations included forests in central Oregon, coastal Oregon, Puget Sound area, and Olympic Peninsula. A total of 242 people attended the various field trips and meetings.

Small-diameter timber: resource management, manufacturing and markets. About 500 people attended this symposium in Spokane, Washington, in February 2002. Station research presented included the creating



opportunities project, related to management and use of small-diameter, densely stocked forest stands; insect and disease considerations; wildlife considerations; and economic and ecological consequences of prescribed fire and fuel-reduction treatments. The symposium was sponsored by PNW Research Station and Washington State University.

Starkey Experimental Forest. Over 500 people, including tribal foresters, agency staff, Society of American Foresters, and international visitors, attended tours and workshops on Starkey Experimental Forest outside La Grande, Oregon. Topics included management of elk, deer, and cattle in forests; nongame wildlife management; fuels reduction; and invasive plants.

Survey and manage salamander training workshops. Over 100 people attended two workshops in Hood River, Oregon, in April 2002. One session was on the general ecology, management, and survey protocols of rare and uncommon salamander species within the range of the Northwest Forest Plan. The other session was on the ecology of the Larch Mountain and Van Dyke's salamanders.

Technology transfer at universities. Station scientists gave guest lectures at graduate and undergraduate levels at many universities. Scientists also advised students, advised on the development of new graduate programs, and mentored students on senior projects. The universities included the University of Washington, Central Washington University, Washington State University, Oregon State University, Eastern Oregon University, and Virginia Technical Institute. Topics included flying squirrel and chipmunk ecology, amphibian ecology, general ecology, old-growth ecology, vertebrate ecology, whitebark pine ecology, invasive plants, species conservation strategies, wildlife habitat and transportation networks, fisheries topics, culvert passage for aquatic species, freshwater ecology of anadromous salmonids, and vegetation responses to climate change.

Watershed stewardship education program. This program trains local landowners and other interested people on the ecology, physics, biology, and sociology of watershed functions, processes, and management. After 80 hours of classroom and field training, those who pass are certified as "master watershed stewards," and are then local experts who can work with landowners and watershed councils in identifying watershed issues and carrying out restoration projects. PNW Research Station scientists led the riparian ecology and management module of the course in Tillamook County, for a class of about 30 people. This program was a partnership between the Station and Oregon State University's Sea Grant program. The training guide developed for this first session will be further tested and produced on CD-ROMs in 2003.

Wind River canopy crane. About 30 environmental journalists, who were at a conference in Portland, took a field trip to the canopy crane on Wind River Experimental Forest in Washington, on October 18, 2001.





Conservation Education

Many scientists chose their work for a reason as simple as a childhood love for salmon, mushrooms, or volcanoes. If they can share their work with children, scientists get a chance to remember why they went into the field and to help children discover how exciting science can be. PNW Research Station scientists make time to share their expert knowledge with children and teenagers in a variety of programs in Alaska, Oregon, and Washington.

Minorities in agriculture, natural resources, and related sciences (MANRRS). The 2002 national conference was held in Portland and attracted about 800 people. Station employees helped to plan and staff the career fair, which is designed to attract more minorities to the fields of agriculture and natural resources.

Discovering New Horizons. This career workshop for middle school and high school girls reaches about 300 students and is sponsored by the Linn-Benton-Lincoln Education Service District. Station staff talked about science and natural resource careers at the workshop, held in Corvallis, Oregon.

Forest Camp Outdoor School. Six Station staff taught modules on “the web of life” and “conservation detective” to over 120 sixth-grade students from the Corvallis area, at the Forest Camp Outdoor School for environmental education. At the Fall Creek fish hatchery in Alsea, Oregon, and other locations, the students learned to read ecological processes in the outdoors, understand ecological relationships, and see how forests are managed.

Inner-City Youth Institute. The institute encourages inner-city young people to learn about the environment and related careers. PNW Research Station staff continued to support this program through

ecology clubs in inner-city middle and high schools. The Station also sponsored a summer camp program for middle-school students; camp sessions were held in Corvallis, Oregon, and at the H.J. Andrews Experimental Forest, outside Blue River, Oregon. At the Andrews, young people talked with scientists and saw science in action out in the forest.



Edna Mo

Young student learns about trees and science.

Station staff helped with another summer program called Alberta Nature Teams, designed for elementary school children. The institute is a partnership among the USDA Forest Service, Oregon State University, Audubon Society of Portland, Oregon, and Bureau of Land Management.

Nature talks. These summer weekend programs are a partnership among the Cascade Center for Ecosystem Management, H.J. Andrews Experimental Forest, and McKenzie River Ranger District. A total of about 110 people attended the talks in national forest campgrounds. The topics were spotted owl research, aquatic insects, forest-floor arthropods, and forestry, politics, and common myths.

Northwest Science Expo science awards. PNW Research Station sponsored awards for middle school and high school students at the 2002 Northwest Science Expo, which took place in March at Portland State University. The plaques were for “Outstanding Science Project About Forests.”

Old-growth forest poster. PNW Research Station provided expert information and Goodnature Publishing provided artwork and printing, in a partnership that produced large posters of the “Pacific Northwest Old-Growth Forest.” Station staff developed a student activity guide for teachers to go with the poster.

Outdoor forest camp. Station staff taught environmental education topics to about 120 sixth-grade students from rural schools in Linn and Benton Counties. The outdoor forest camp took place near Sweet Home, Oregon.

Outdoor schools. Station scientists taught stream ecology and environmental education to about 120 fifth- and sixth-grade students at outdoor schools in Corvallis, Lebanon, and Astoria, Oregon.

Salmon Watch. Oregon Trout developed the Salmon Watch program to give middle school and high school students the chance to see spawning wild salmon in Oregon rivers and learn about wild salmon through related hands-on activities. In partnership with the program, Station staff led field trips for a total of about 500 students to streams near Alsea and Sweet Home, Oregon. Along with introducing young people to the joy of watching wild salmon, staff taught the students about salmon, their habitats, and relations between aquatic ecology and watersheds.

School presentations and mentoring. Station scientists gave many presentations to and helped with science projects for students from first grade through high school. The scientists reached about 500 students in Alaska, Oregon, and Washington. Just three examples of the many topics covered are “belly-button botany” for second-graders in Alaska, “fungi in our forests” for sixth-graders in Oregon, and “carnivore ecology and snow tracking” for sixth-graders in Washington.

Snakes! Station scientists taught the ecology and biology of snakes to a Girl Scout troop in Corvallis, Oregon, in cooperation with Oregon State University.



Courtesy Oregon Trout

High school students learn about wild salmon and water quality through the Salmon Watch program. Middle Fork of the John Day River, eastern Oregon.

Tour guides and winter ecology. Station scientists provided information to winter-life snowshoe tour guides in Leavenworth, Washington, about winter ecology and snow tracking. The guides used the information when they led snowshoe tours for a total of 380 people. The snowshoe tours are an interpretive activity sponsored by the U.S. Fish and Wildlife Service, Leavenworth Fish Hatchery, and Wenatchee National Forest.

Training volunteer naturalists. Station staff helped train 25 volunteers for the summer naturalist corps at the Creamers Field Migratory Waterfowl Refuge, near Fairbanks, Alaska.

Wolfree. Station employees served as mentors for about 100 young people, in ecology programs with Portland and Vancouver middle school and high school students. Programs are sponsored by Wolfree, Inc., and about half the young people are from low-income inner-city and rural communities that have little access to high-quality science or outdoor programs.

Yachats Mushroom Festival. Station scientists gave a presentation on “Crouching scientists, hidden fungi: detecting forest fungi,” and led a guided walk at the Yachats Mushroom Festival on the Oregon Coast.



Honors and Awards

Chief's Superior Science Award

Thomas A. Spies, research forester, received this award from the Forest Service Chief. Spies was cited for his contributions to forest ecology, including the structure and dynamics of forests, especially old growth, and for his contributions to the ecological basis of forest management and policy.

New Century of Service

David Pilz, botanist, received this award from the Forest Service Washington Office, for innovation and public service in leading the team for productivity and sustainable harvest of edible forest mushrooms.

Toward a Multicultural Organization Award

Cynthia L. Miner, general biologist, received this award for creating a diverse workforce and helping to make scientific work accessible to a diverse audience.

Todd Wilson, wildlife biologist, received this award from the Forest Service Chief. Wilson was cited for developing a backpack training program for the Girl Scouts, teaching ecosystem concepts to girls of all ages through games and outdoor activities, and hiring and working with physically challenged and minority employees and students.

Frederick T. Haley Writing Award

Yasmeen Sands, student communications specialist, received this award from the University of Washington at Tacoma, for the best long analytical research paper.

Certificate of Merit

Martin G. Raphael, supervisory research wildlife biologist, received this award from the U.S. Department of Agriculture. He was cited for his exceptional effort in helping to prepare a new concept to meet National Forest Management Act diversity requirements for forest planning rules.

Best Scientific Publication for 2001, Rocky Mountain Research Station

Keith Aubry, research wildlife biologist, received this award as one of the authors of RMRS-GTR-30WWW, "Ecology and Conservation of Lynx in the United States."

Award of Excellence, Western Division of the American Fisheries Society

Peter A. Bisson, research fishery biologist, received the highest lifetime achievement award given by the Western Division. He was cited "in recognition of outstanding professional achievements, exceptional competence, and numerous contributions to fishery science within the Western Division."



Rise to the Future

Peter A. Bisson, Gordon Reeves, and James Sedell, received this award from the Forest Service Washington Office. They were cited for their professional excellence in research.

Certificate of Appreciation

Deanna J. Stouder received this award from the Forest Service Washington Office. She was cited for “outstanding professional support and advice to the Under Secretary for Natural Resources and Environment.”

Chief’s Award for Excellence in Technology Transfer

Michael Furniss received this award from the Forest Service Washington Office. He was cited for his work on the water-road technology series, which included publications, software, and nationwide training.

Savery Outstanding Master’s Student Award

David Rundio, biological science technician, received this award from the Oregon State University College of Agriculture, in recognition of his public service, leadership, research capability, and research that benefits Oregon agriculture and natural resources.

T.G. Scott Award, Master’s Student

David Rundio, biological science technician, received this award from the Oregon State University Department of Fisheries and Wildlife, in recognition of his research excellence and potential.

Certificate of Appreciation

Bruce Hansen received this certificate from the Forest Service Northeast Research Station, in recognition of his assistance with information technology procurement.

Best Web site

Dan White, audiovisual specialist, received this award from the Joint Fire Sciences Program. The award recognized the Web site he designed, on the fire and fire surrogate study, as the best out of 110 current Joint Fire Sciences Projects.

Most responsive principal investigator

Roger D. Ottmar, research forester, received this award from the Joint Fire Science Program Board of Governors, in recognition of his work.

Certificate of Appreciation

David L. Peterson, research ecologist, received the certificate from the city of Lake Forest Park, Washington, in recognition of his serving as chair of the city’s Environmental Quality Commission from 1999 to 2002. The commission assisted the city with Endangered Species Act compliance, wetland restoration, open space protection, and natural resource education.

O. C. Wallmo Award for excellence in deer research

John Kie, wildlife biologist, received this award in recognition of his outstanding contributions to knowledge and improved management of mule deer and black-tailed deer. The award is given biennially by the Western Association of Fish and Wildlife Agencies.

Silviculturist of the Year for the Alaska Region

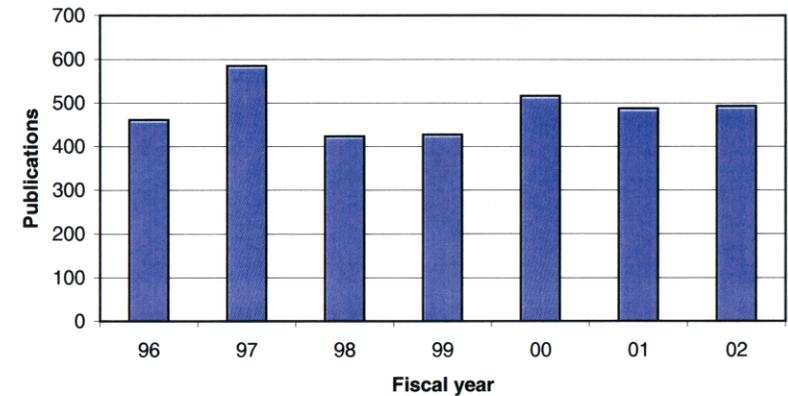
Robert Deal, research forester, received this award from the Forest Service Alaska Region. The award is given to the silviculturist or silvicultural technician who is recognized by her/his peer silviculturists in the region as providing outstanding leadership and/or innovation in the field of silviculture.



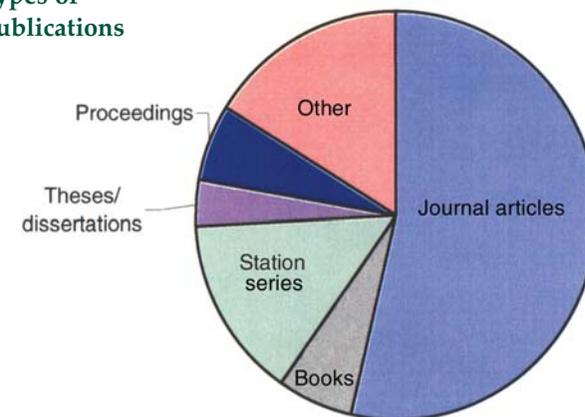
Publications

- 493 publications total
- 160,000 copies of Station series publications distributed in response to requests
- 8,000-12,000 journal article reprints distributed by scientists in response to requests
- About 400 publications available online; all new Station publications are placed online
- 9 issues of *PNW Science Findings* published; about 10,000 copies distributed each issue
- 2 issues of *PNW Science Update* published; about 5,000 copies distributed each issue
- 5-disk CD-ROM set published, "The Interior Columbia Basin Ecosystem Management Project: Project Data"
- 1 CD-ROM published, forest inventory data for state of Oregon

Total Publications



Types of Publications



Finances and Workforce

The PNW Research Station is supported by two funding sources. The largest part of our funding comes from federal appropriations. Our other funding source is direct client support, which comes from various organizations needing scientific information.

2002: PNW Research Station Finances and Workforce, by the Numbers

Fiscal year 2002: October 1, 2001 to September 30, 2002

Funding Sources

- Federal appropriations \$37.1 million
- Direct client support \$12.1 million
- Total funding \$49.2 million

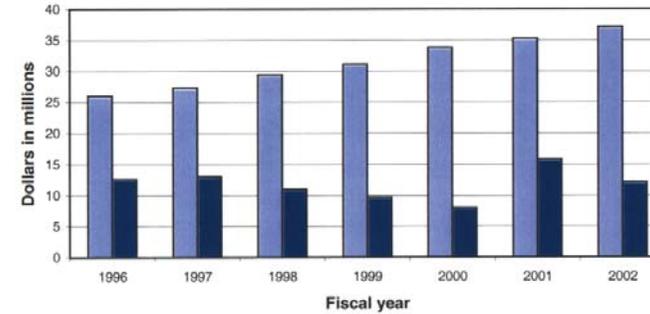
Distribution of Funds

- Employee costs 53 percent
- Support and operations 33 percent
- Distributed to cooperators 14 percent
- Of \$6.8 million to cooperator 85 percent went to educational institutions

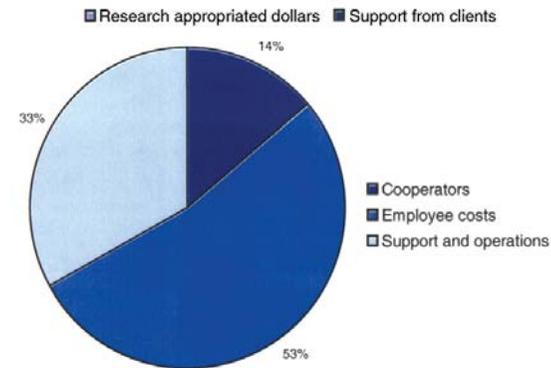
Workforce Statistics

- Permanent workforce 279 employees
- Of the permanent workforce 32 percent or 89 employees are scientists
- Temporary workforce 243 employees
- Station total workforce 522 employees

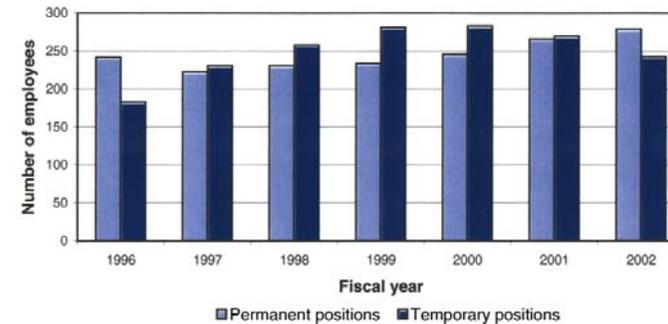
Incoming Funds



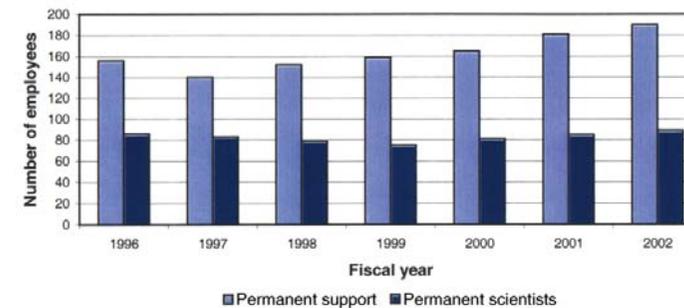
Distribution of Funds



Employees



Types of Positions





Cooperators Who Receive Funding for Studies from the PNW Research Station

In 2002, the PNW Research Station distributed about \$6.8 million to its cooperators. Some funds originally budgeted for distribution were borrowed for the emergency fire situation in summer 2002, resulting in a lower total distribution than in the previous year.

The list below includes all cooperators who currently have agreements and partnerships with the Station.

Educational Institutions

Central Washington University
Eastern Oregon University
Johns Hopkins University
Michigan State University
Northern Arizona University
Oregon State University
Portland State University
Saint Louis University
University of Alaska (Fairbanks and Sitka)
University of Arizona
University of Brasilia (Brazil)
University of British Columbia
University of California (Berkeley)
University of Idaho
University of Maine
University of Minnesota
University of Montana
University of New Mexico
University of Notre Dame
University of Oregon
University of Tennessee
University of Waikato (New Zealand)
University of Washington

Washington State University
West Virginia University

Other Federal Agencies

U.S. Department of Agriculture, Agricultural Research Service (Northwest Irrigation)
U.S. Department of Agriculture, National Wildlife Research Center
U.S. Department of the Interior, Bureau of Land Management
U.S. Department of the Interior, Geological Survey
U.S. Department of the Interior, National Park Service

State Agencies

Oregon Department of Agriculture
Oregon Department of Fish and Wildlife
Oregon Department of Forestry

Government Agencies in Other Countries

Fundcao Para O Desenvolvimento Cientifico E Technologico INPE (Brazilian Space Agency)

Nongovernment Organizations

Alaska Manufacturers Association
American Fisheries Society
Confederated Tribes of Grand Ronde
Earth Systems Institute
Greater Flagstaff Forests Partnership
Institute for Applied Ecology
Institute for Culture and Ecology
Wildlife Conservation Society

Private Industry

National Council for Air and Stream Improvement

Clients Who Provide Funding for Studies to the PNW Research Station

In 2002, the PNW Research Station received about \$2.2 million in support from clients other than the National Forest System, State and Private Forestry, and other research stations. The list below includes all clients who currently have agreements and partnerships with the Station.

Educational Institutions

Auburn University
Oregon State University
University of Alaska
University of Maine
University of Montana

Other Federal Agencies

Environmental Protection Agency
National Aeronautic & Space Administration (NASA)
Natural Resources Conservation Service
Northwest Power Planning Council
U.S. Agency for International Development
U.S. Department of Defense
U.S. Department of the Interior, Bureau of Land Management
U.S. Fish and Wildlife Service

State Agencies

Oregon Department of Parks and Recreation
Oregon Department of Agriculture
Oregon Department of Forestry
Washington Department of Natural Resources

Nongovernment Organizations

Center for Invasive Plant Management
Columbia Basin Fish and Wildlife Federation
Institute for Culture and Ecology

Private Industry

American Forest and Paper Association
Boise Cascade Corporation
Campbell Group
Cascade Timber Consultants
Miami Corporation
NW Natural Gas
Plum Creek Timber Company
Simpson Timber Company
Starker Forests
Weyerhaeuser Corporation





Research Programs

Aquatic and Land Interactions

Program Manager:
Deanna J. Stouder
Forestry Sciences Laboratory
3625 93rd Ave. SW
Olympia, WA 98512
Phone: 360-753-7652
E-mail: dstouder@fs.fed.us

Ecosystem Processes

Program Manager:
John A. Laurence
Forestry Sciences Laboratory
3200 SW Jefferson Way
Corvallis, OR 97331
Phone: 541-750-7357
E-mail: jalaurence@fs.fed.us

Focused Science Delivery

Program Manager:
R. James Barbour
Pacific Northwest Research Station
P.O. Box 3890
Portland, OR 97208-3890
Phone: 503-808-2542
E-mail: jbarbour01@fs.fed.us

Forest Inventory and Analysis

Program Manager:
Susan A. Willits
Forestry Sciences Laboratory
P.O. Box 3890
Portland, OR 97208-3890
Phone: 503-808-2066
E-mail: swillits@fs.fed.us

Human and Natural Resources Interactions

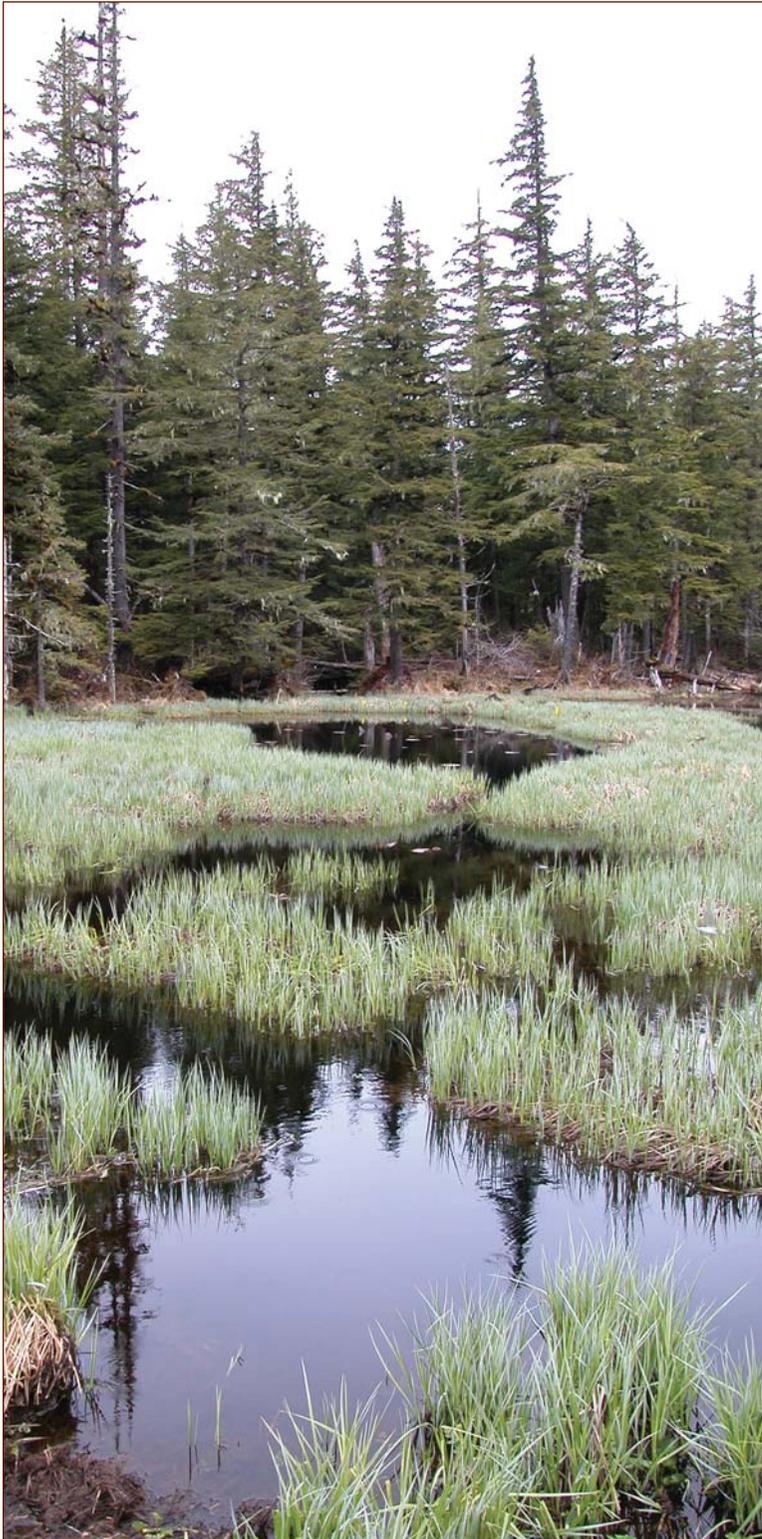
Program Manager:
Richard W. Haynes
Forestry Sciences Laboratory
P.O. Box 3890
Portland, OR 97208-3890
Phone: 503-808-2002
E-mail: rhaynes@fs.fed.us

Managing Disturbance Regimes

Program Manager:
Edward J. DePuit
Forestry Sciences Laboratory
1133 N Western Avenue
Wenatchee, WA 98801
Phone: 509-662-4315, ext. 222
E-mail: ejdepuite@fs.fed.us

Resource Management and Productivity

Program Manager:
Charles E. Peterson
Forestry Sciences Laboratory
P.O. Box 3890
Portland, OR 97208-3890
Phone: 503-808-2026
E-mail: cepeterson@fs.fed.us



If you are interested in more information about the PNW Research Station, would like to receive copies of publications, software, or videos mentioned in this report, or would like to receive a quarterly list of publications written by Station scientists, please contact:

Cynthia L. Miner
Communications and Applications Director
Pacific Northwest Research Station
P.O. Box 3890
Portland, OR 97208-3890
(503) 808-2135
clminer@fs.fed.us

or

browse PNW Research Station on the Web at:
<http://www.fs.fed.us/pnw>

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Writer - Valerie Rapp

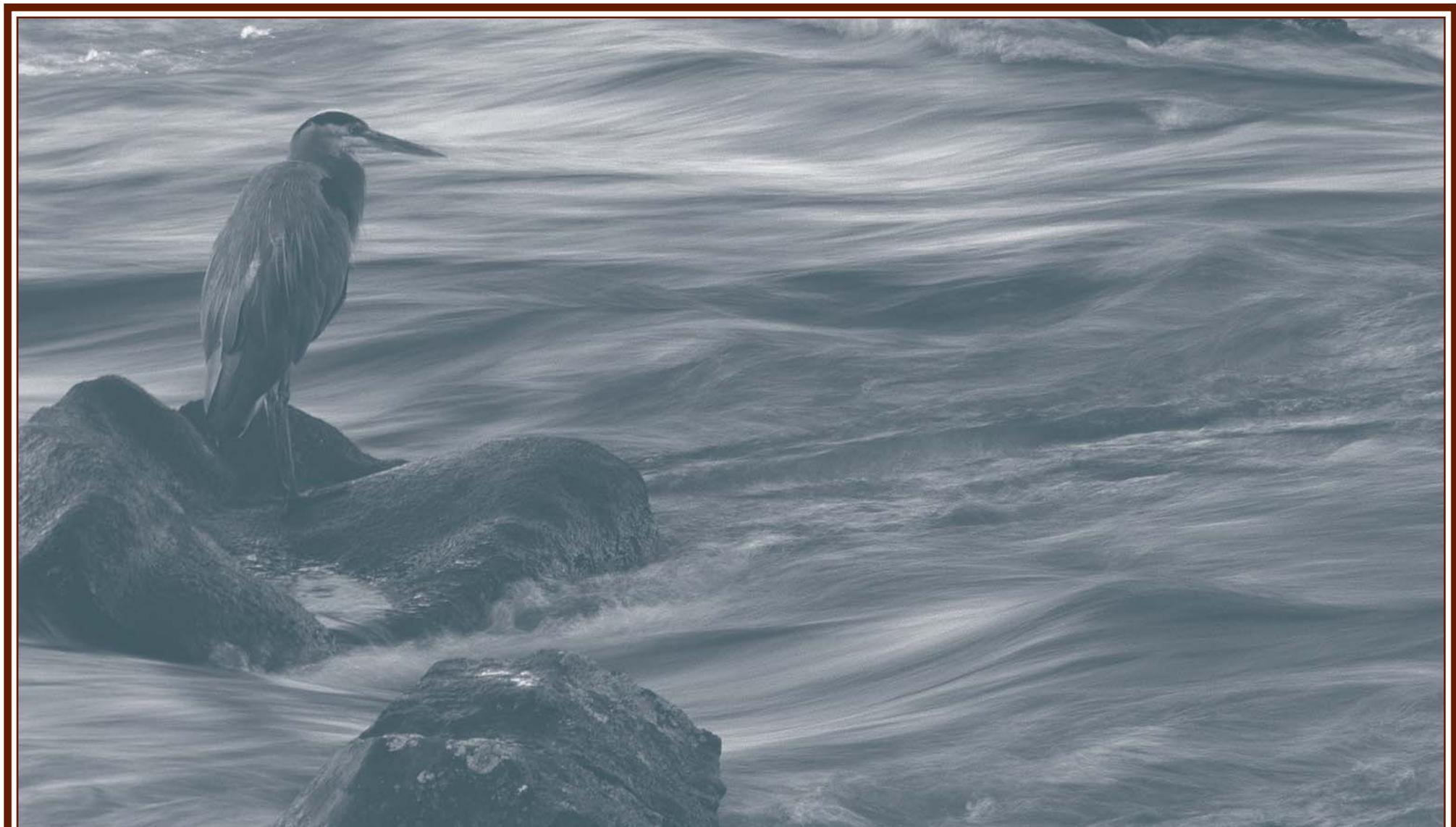
Editor - Lynn Starr

Design and layout - Jenny Beranek

Art direction and production - Frank Vanni

Photographs - credits with photos

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*Science Accomplishments
of the Pacific Northwest Research Station*