

Goal 1. Develop a fundamental understanding of ecological, social, and economic systems and their interactions.



Priority 1.1
Advance the understanding of structure, function, and processes of terrestrial ecological systems.

Increasing human populations have led to a greater focus on the use of forests and the recognition that the resource is bounded. Consequently, forest and associated rangeland management and sustainability have become issues of not only local importance but also of regional and global concern. Addressing concerns for biodiversity and healthy forests requires a fundamental understanding of how biological and physical components of terrestrial systems function and interact. We will pose science questions to develop this understanding by focusing on the pattern, structure, and function of ecosystems. Disturbance and the relations between the biological and physical components of ecosystems influence the function of ecosystems, including both above- and below-ground processes. Understanding the pattern and composition of vegetation, including physical and biological factors that

control vegetation succession and composition (disturbance), provides scientists with the knowledge to discover the habitat relations required by individual species and species assemblages—particularly regarding food webs. These questions may be addressed at multiple scales from regions through landscapes to patches and microsites.



Priority 1.2
Advance the understanding of structure, function, and processes of aquatic and riparian ecological systems.

Fish and riparian habitat are among the most prominent management issues in the Pacific Northwest. Coupled with these are issues of water quality and supply. In addition to the continued concern about salmon declines and loss of aquatic productivity are concerns about the decline of amphibians. A fundamental understanding is required of how biological and physical components of aquatic and adjacent systems function and interact. To develop this understanding, we will pose science questions that focus on landscape hydrology, stream morphology, nutrient dynamics, disturbance processes, and microclimates; fish, amphibian, and invertebrate ecology and population characteristics; and riparian

ecology and links with upland and adjacent aquatic areas. Research findings will provide the foundation to create and formulate feasible management options, estimate the consequences and risks of those options, and aid in developing criteria for assessing alternatives for riparian areas and aquatic systems.



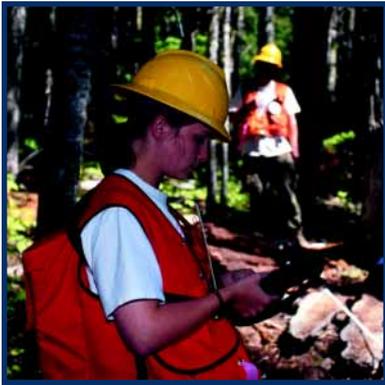
Priority 1.3
Improve the understanding of social and economic processes and their interaction with natural resource values and uses.

Forested ecosystems produce many goods and services. Values for these goods and services are established and expressed in various ways including formal market mechanisms as well as long-standing, contentious debates among people with vastly different perspectives. Natural resource management and policy must be based on an understanding of the interactions among the various goods and services that forests can produce, and changes in the mix of goods and services that society values and wants produced. This requires a fundamental understanding of the role of markets, marketlike institutions, and how people form their opinions and interact in public dialogue. Science questions will be posed about

market mechanisms, institutions, the structure and characteristics of human populations and how social and economic changes influence the value and use of natural resources. Focus will be given to the relations between places people value and use (for example, for recreation) and other natural resources. We will examine how alternative mechanisms engage people in natural resource management and how people form their judgments about the acceptability of forest management. We will develop measures of social and economic adaptability and understanding of the role of natural resources in social and economic development. We will develop resource pricing and valuation methods and understanding of the operation of national timber products markets. Our work will include traditional and nontraditional forest products. Collectively, this research and development is instrumental in designing natural resource management regimes to ensure that forest resources and products are sustained for future generations.



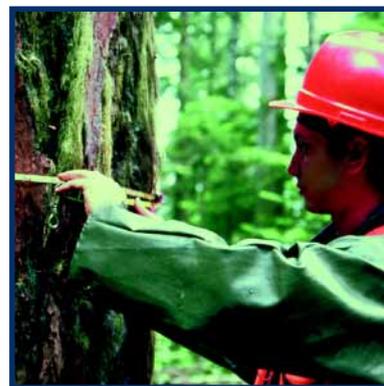
Goal 2. Assess the status and trends of ecosystems and natural resources and their uses.



Priority 2.1
Conduct inventories of forest resources and use.

As resource demands of an expanding human population generate the potential for unprecedented changes in forest ecosystems, credible, broad-scale forest monitoring information is increasingly sought to monitor long-term trends and their spatial distribution and extent. Inventory and monitoring systems must be refined so that they can be used to identify real trends and changes in forest attributes beyond an historical range of variation. Forest managers and others who influence forest management decisions also need up-to-date information on the status of forest ecosystems and the products derived from them to address questions of sustainability, identify conservation needs, evaluate the likely broad-scale effects of alternative management strategies, and support forest policy decisions.

Geographically comprehensive, landscape-scale ecosystem inventories of forest resources are needed and congressionally mandated on all forest lands in the five Pacific Coast States and the Pacific Islands. These continuous remeasurements of permanent field plots and other inventory and monitoring activities will generate information on the current status of land use, ownership, vegetation, resource interactions, supply of timber and nontimber forest products, and ecosystem health. A comprehensive set of forest attributes will be collected from which interpretations can be made about wildlife habitat quality, fire hazard assessment, rare species abundance, riparian resource protection, and ecosystem sustainability. Expected benefits include better informed decisions about land management, resource investment, and conservation priorities, as well as production of data for forest researchers.



Priority 2.2
Analyze and assess resource trends.

Regional, national, and global-scale assessments of the status and condition of forest resources will be developed from a combination of Station inventory and moni-

toring information and information from other sources. Results of these assessments will include understanding of the trends in indicators for species and ecosystem conditions and insights into the human use of forest resources that are central to setting the context for broad decisions about forest resource management. Analyses of forest resources to assess past changes and make projections of future resource quantity and quality, including land use, ownership, vegetation, resource interactions, timber supply, and ecosystem health will be conducted. Timber supply will be analyzed by prices, owner objectives, and inventory characteristics. Research will be conducted to extend detailed on-the-ground information to the landscape level. Analysis and assessment of trends will help managers address existing and emerging issues, and identify opportunities that will provide a foundation for the development of management options. Benefits will include helping scientists identify new research questions and addressing potential interactions across scales of observation.

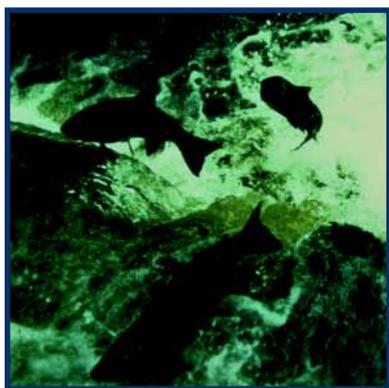


Priority 2.3
Develop monitoring protocols and data analysis techniques.

Current interest in species viability and ecosystem health has created an increasing need to develop protocols for monitoring elements or species that have not been previously monitored. Simultaneously, increased focus on landscape management and ecosystem sustainability has fundamentally changed the nature of monitoring questions, from that of species or individual forest attributes, to a more holistic, integrated approach. With limited resources available for developing protocols and techniques, and for supporting their application, more efficient and effective approaches are needed to progress to a broader focus. Activities in this priority will include developing inventory and monitoring protocols as well as models and analytical techniques for aquatic, riparian, and terrestrial systems; economic activities; and public values and behavior. Results of this research and development will increase efficiency in monitoring activities, produce new inventory and monitoring information on forest systems, provide analysis techniques for interpretation of monitoring results, and help managers learn

from past decisions and identify the need for change (that is, adaptive management).

Goal 3. Develop science-based options for informed management.



Priority 3.1 *Manage riparian and aquatic areas for multiple values.*

Multiple demands create conflict over resources in aquatic and riparian environments including water, habitat, fish, wildlife, amphibians, recreation, timber management, and energy. Most of our science knowledge is centered on individual ecological components (for example, species and their habitats). Science information is needed to understand the links between ecological, social, and economic components. Research will pursue understanding of the interactions among aquatic and riparian resources to improve watershed restoration, roads management, timber harvest, and the management of exotic plants, animals, and other organisms, and activities on lands under various ownerships. Management for multiple values requires assessing comparative risks and uncertainties. Research will develop strategies and ana-

lyze the tradeoffs among ecological components, human populations, and their links at various scales. These strategies will provide for multiple uses and values and suggest options for their allocation while sustaining the integrity of aquatic and riparian systems.



Priority 3.2 *Restore ecosystems at risk and reduce the risks people face.*

Restoration of ecosystems requires an operational knowledge of the ecological pattern, structure, and function of the ecosystem. Experience with the effects of perturbations, whether human induced (grazing, road construction, and fire management) or naturally induced (insects, disease, natural fire, and herbivory), helps scientists understand the normal range of variability to which ecosystems respond. Resilience, the ability of an ecosystem to self-repair, is one of the cornerstones of restoration science. The Station will discover the limits to resiliency and determine pathways to recovery when ecological tolerances have been exceeded. Our research is designed to gain knowledge about the complexity of interaction among the different disturbance events,

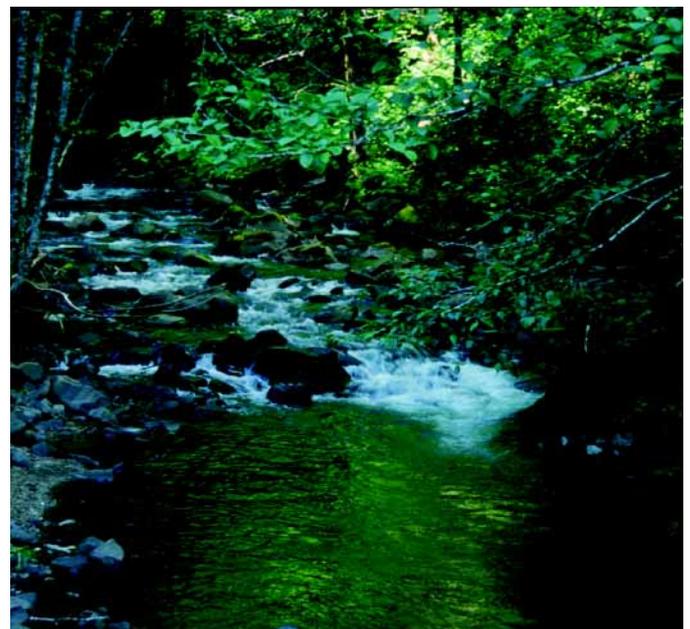
including their frequency and extent, in order to understand how these interactions influence ecological patterns, structure, and function. Given new knowledge about cause and effect, scientists will be able to develop predictive capabilities designed to help managers understand the risks and opportunities that are available when making choices on how best to restore ecosystems.



Some ecosystems have a high risk of disturbance events, such as fires, insect and disease outbreaks, floods, landslides, and invasion of nonnative plants and animals. These events can put people and property at risk and reduce the values that people derive from forest lands, such as clean water, recreation experiences, and timber products. Some current management strategies designed to address specific issues, such as the restoration of threatened or endangered fish species, might be unsuccessful because they ignore the risk of such events. Research efforts will provide land managers with information to improve the design of protection and restora-

tion management strategies that are more efficient and effective at reducing risks.

Through research, the Station will learn how to assess accumulated risk, or risk abatement, across landscapes where multiple forms of disturbance are considered simultaneously. Advanced techniques will be developed to improve the measurement and display of risks so that the public and land managers can consider them in their decisions. Research will be conducted on how the public forms its opinions about the risks and consequences of these uncharacteristic events and their opinions of the effectiveness of management strategies to reduce the risks to people and ecological sustainability. Consequently, land managers will be able to design future protection and restoration management strategies that more efficiently and effectively reduce the risks of these disturbance events to both people and ecosystems.





Priority 3.3
Develop recreation and tourism options for diverse populations.

Opportunities to participate in outdoor recreation are an important component of the quality of life for residents of Western states. The increasing importance of recreation, especially tourism, presents social challenges; these may include conflict within communities and conflicts between residents and nonresidents (that is, tourists). Changes in the structure of local economies, including greater dependence on the provision of tourism-related services, often in place of employment in extractive industries and manufacturing, also contributes to fundamental changes in social conditions at the community scale. Tourism, much of it directly dependent on the environment and natural resources of the region, has been one of the fastest growing components of Western state economies for more than a decade. Among the most significant challenges to forest management associated with recreation and tourism is the fact that management success will depend on the ability to understand and direct human behavior.

Recreation and tourism as a management concern increases the need for research that examines the social consequences of economic change. Thus the emerging, applied resource management challenges associated with recreation and tourism will require a research program that is integrated across biophysical and social sciences. Although manipulation of landscapes and ecosystems will be among the tools used to accomplish policy and management goals, it will be critically important to identify, assess, and implement a broad and diverse set of management tools that are targeted at human behavior. There is also a need for research—across a range of scales—to define and measure carrying capacities that simultaneously consider recreation services and ecological functions.



Priority 3.4
Produce wood within sustainable frameworks.

Demand for wood products is expected to increase in the United States and throughout the world; therefore, providing raw material for industrial products will be a continuing demand on forests in the United States and elsewhere. At the same time, concerns over the effects

of timber harvesting on the ability of forests to sustain various nontimber goods and services also have increased. There are two major issues of concern. One is the possibility that wood production—on any lands—may not be compatible with other uses of forested land. If true, society must make increasingly difficult tradeoffs among timber, water quality and supply, habitat for fish and wildlife, recreation, and other uses of forests. A second concern is whether lands whose primary use is timber production will be able to sustain and potentially increase timber production for future generations with acceptable effects on other objectives and values.

Policymakers, managers, and the general public are giving increasing attention to the possible use of market-based approaches, such as certification, as a means of addressing these concerns by linking consumer choices to forest management practices.

Key science questions, therefore, include elements of sustainability, compatibility, and market competitiveness: How do we manage forests more efficiently where wood production is the primary value, while continuing to protect and enhance other important societal values? How can we address joint production of wood and other forest-based goods and services as coequals, thereby achieving the goal of compatibility? The research

needed to address these questions includes developing silvicultural options for timber production while maintaining or improving long-term site productivity; developing integrated operational systems and associated social and economic information for management options and decisionmaking at stand and landscape levels; studying how people form perceptions about wood production and how that knowledge can be used to design management strategies; and studying the manner in which markets operate, and how they affect policy and management options.



Priority 3.5
Create operational strategies for conservation of biodiversity.

The concept of biodiversity is broad and complex, and includes knowledge of individual species, species assemblages, and species interactions at multiple scales. Much of our conservation research has focused on single species at high risk of extinction and these species are protected by federal regulations. Over the last several years, however, the list of potential species at risk has continued to grow exponentially, and it is becoming increasingly clear that multiple-species approaches at

landscape or regional scales are needed to provide protection for broad groups of species, or biodiversity in total. Without new approaches, management options will continue to be constrained by single-species approaches.

We will continue to address viability concerns about key species at risk by examining habitat and population trends and developing tools and guides for integrated management. New research, however, will focus on developing multiple-species approaches at landscape and regional scales, not only to protect species potentially at risk but also to proactively avoid future species listings that further constrain management options. This will include exploring and developing broad concepts and options for conserving biodiversity and improving understanding of the diverse functions of species within an integrated framework of ecological sustainability. Research will develop methods of risk analyses and decision-support tools that will be specifically structured to estimate and display the uncertainty and risks of new management approaches. Our research also will strive to understand the formation of public judgment on conservation issues in order to build consensus on the social acceptance of new options.

Goal 4. Communicate science findings and enhance their application.

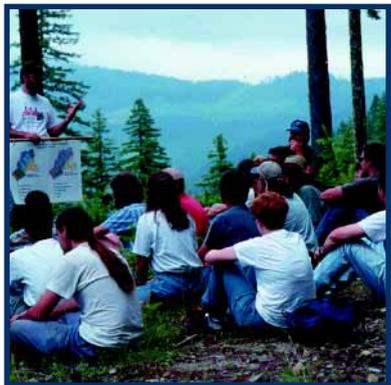


Priority 4.1 *Respond to emerging issues.*

Critical issues continuously emerge for which decisions will be made before long-term scientific studies can be completed. Relevant research findings exist but have yet to be synthesized and directed at the emerging issue. Station initiatives will clarify such issues from a scientific perspective and determine how current scientific information can be made useful to policymakers. The scientific information will be synthesized and integrated to bring focus to the issue. Gaps in information that can be readily filled with short-term research will be identified and appropriate studies conducted. Findings will be packaged and delivered in ways that facilitate their use in decisionmaking including public dialogue and processes used by decisionmakers.

This priority will provide decisionmakers with information about options for forest and associated land. It has the potential to reduce conflict by developing options

and describing their consequences in a way that clarifies the character and form of the issue beyond polarized advocacy. As we learn along the way, our research questions will be shaped to address new and forthcoming issues.



Priority 4.2
*Bridge the gap
between
information
generation and
its use.*

Successful delivery of science means that our clients and partners receive information that is understandable and readily meets their needs. Traditional venues of technology transfer often do not completely address the requirements of land managers, policymakers, and resource specialists, who are increasingly confronted with complex science information that may be difficult to interpret. To enhance the application of science to land management decisions and policies, the PNW Research Station emphasizes conduits for relevant science to readily inform decision processes by paying special attention to the information needs of managers, appropriate and efficient avenues of delivery, and mechanisms (institutional links or processes) that promote collaboration between scientists and managers.

Research information will focus on improving policy decisions. Efforts will be increased to interact and collaborate with clients and partners and to overcome barriers that hinder our understanding of one another. The Station will work toward a shared appreciation of the value of science in land management decisionmaking, which will help manage expectations about the contributions of scientists in issue resolution. We will deliver high-quality scientific information, as well as monitor the success of our efforts and adapt them as needed.

Consequently, we expect increased use of our scientific information because its accessibility and relevancy will be improved. Policymakers, land managers, and scientists will increasingly communicate with one another. As a result, land managers will be able to make well-informed decisions.





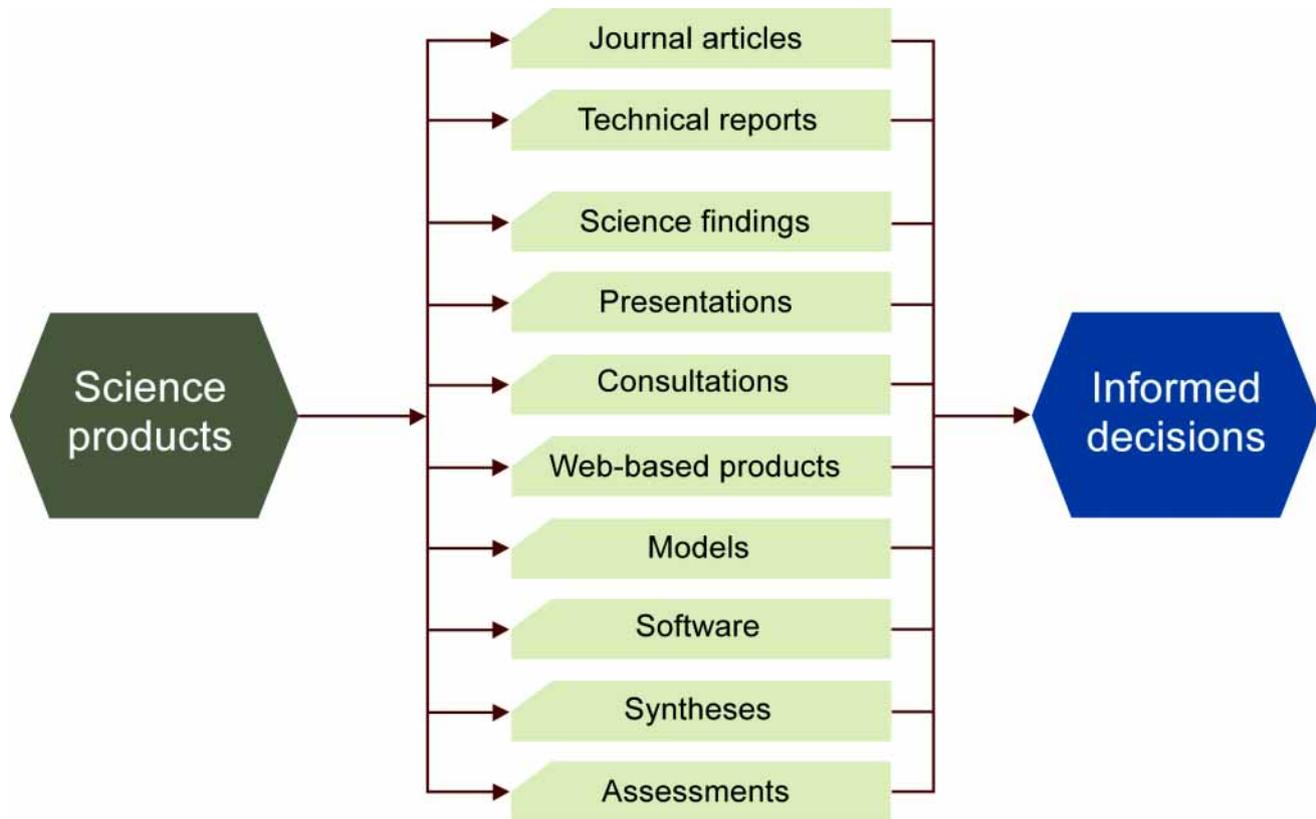


BASIC PRINCIPLES OF SERVICE

Our focus is on clients and partners. The PNW Research Station will produce for a broad client base, including private landowners and public land managers. Attention will focus especially on those who make or influence decisions about how land is managed and other research scientists who augment and validate the Station's science findings.

We help solve problems. The Station will provide scientific findings to help managers and policymakers make informed decisions about how to manage land—all lands, now and into the future. Our research contributes to public consensus about natural resource management through presentation of science-based assessments of resource management opportunities and risks.





We have a measured role in land management. It is important that the Station provide impartial information to develop options for management of land that ensures ecosystem sustainability now and in the future. Because current land management options often embody tradeoffs among diverse values, research will seek to provide knowledge to foster development of land management options that may increase compatibility among otherwise conflicting land uses.

We are responsive to client and partner needs and changes in priorities. The Station will continually strive to improve the timeliness and quality of products and

services. To do so, a flexible and resilient organization has been built around formal and informal teams and programs that can respond to client needs and changes in priorities.

We use collaboration and partnerships. A strong culture of collaboration with clients, partners, scientists, and science managers throughout the research and development process is essential. The broad and complex problems confronting society require collaborative efforts to solve them. Within that context, the Station must gauge its capacity and take into account its long-term capability, strengths, and comparative advantages.



"Developing reasonable solutions is very difficult in part because the method of knowledge generation and its delivery is in a period of uncertainty and flux"

-World Bank 1999



We serve the scientific community. Station scientists are productive members of and make creative contributions to the scientific community. Station scientists publish in scientific outlets to communicate with other scientists and to ensure the scientific credibility of our results. The Station also publishes a peer-reviewed Station series for timely release of scientific findings and communication of more extensive information and technical guidelines and tools.

We assertively deliver and communicate our science findings. Quality science findings are our main product. But these products must be packaged in ways

to make them understandable and useful to our clients and partners. Communication is more than just publication. We will communicate through workshops, symposia, field trips, and site visits, as well as through electronic media and videos. The Station will be proactive in communicating and disseminating our scientific information so that it can be considered in land management decisions before they are made.

We maintain a high-quality work environment.

Everything done by the Station is dependent on the creativity and productivity of our people.

OPERATIONAL GUIDELINES

The Station recognizes and rewards high-quality work and provides professional development and growth opportunities for all employees. It also strives to provide efficient and effective research and administrative processes.

We exercise and protect scientific freedom. Within the broad areas of priority research, research scientists have the creative space and scientific independence to pursue the most promising lines of research inquiry. The Station produces science in an environment that fosters scientific freedom, creativity, flexibility, mutual respect and support, innovation, and collaboration. We seek to maintain a productive environment for creation of scientific knowledge over the long term, coupled with a continuous flow of new tools, information, and concepts to aid management and policy decisions.





Accountability is shared. Everyone is accountable for making appropriate contributions to achieving agreed-upon objectives. Supervisors are accountable for providing the resources necessary to achieve objectives, and subordinates are accountable for achieving the agreed-upon objectives. Progress toward the objectives will be monitored. Feedback gained will be used to make adjustments, if necessary, in objectives, assignments of people, and available resources.

The Station has developed a flexible and resilient organization built around formal and informal teams and programs that can respond to client needs and evolving priorities. We endeavor to create a capable workforce with top-quality scientific and support abilities that is able

to respond to future science challenges and demands. Station personnel are able to form ad hoc work groups to effectively address science questions unconstrained by official organizational boundaries. The ad hoc work groups also involve collaborators outside the Station, including university faculty, the technical and scientific staff of other agencies, and landowners.

An important goal is to create a diverse workforce that is representative of the larger national workforce in gender, ethnic background, and physical abilities. Within this diverse workforce, all employees treat each other with dignity and respect, valuing each other's perspectives and values.



SUMMARY

As we enter the 21st century, not only has the list of questions needing scientific investigation changed dramatically, but also the character of the questions has changed. Questions are contentious, cover broad scales in space and time, and are highly complex and interdependent. In response to these increasingly complex natural resource issues and changing societal attitudes, the science program at the PNW Research Station has similarly become more complex, in particular focusing on the interplay and interrelations among biophysical, social, and economic dimensions.

Our four goals address the complexity of these questions. Our priorities will generate a mix of basic and applied research to enhance the ability of society to make difficult choices about resource management. Goal and priority setting is not easy; it is also a process that requires constant review and revision. More opportunities exist than the Station has resources to address. Yet choices will be made so that research is effective and meets the critical needs for scientific information. These goals and priorities will be used to develop research program proposals, make incremental adjustments in the Station's research portfolio, and seek collaborative relations with other research institutions, clients, and potential partners.

In developing goals and priorities, the Station considered important natural resource issues, the Station's comparative advantage, the opportunity to build on the established capability of the Station, and the concerns expressed by our clients, partners, and employees. Consequently, our focus has shifted from the direction we developed 5 years ago. We will put greater emphasis on production forestry in a sustainable context, recreation and tourism, conserving biodiversity as a proactive approach to preventing species from being listed, forest health and associated fire risk, and forest inventory and analysis.

Science remains our anchor. The Station ensures its products are timely and have enduring usefulness. Our

focus is to create new knowledge and to affect its application. This is done by developing new tools, concepts, and frameworks based on results from our research and other knowledge.

This strategic plan is designed to articulate the mission and vision and to establish reasonable goals for the PNW Research Station. It provides the Station with the opportunity to communicate these goals and objectives with our constituents, permits ownership in our plan, makes effective use of our resources by focusing them on high-priority issues, and provides a base from which progress can be measured. The next step is to develop an implementation plan for the Station.



The Forest Service of the U.S. Department of Agriculture is dedicated to the principle of multiple-use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives—directed by Congress—to provide increasingly greater service to a growing Nation.

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USDA Forest Service
Pacific Northwest Research Station
P.O. Box 3890
Portland, OR 97208-3890

Web site: <http://www.fs.fed.us/pnw>
Telephone: (503) 808-2592
Publication requests: (503) 808-2138
FAX: (503) 808-2130
E-mail: desmith@fs.fed.us



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USDA Forest Service
Pacific Northwest Research Station
333 S.W. First Avenue
P.O. Box 3890
Portland, OR 97208-3890

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