STRATEGIC RESEARCH PLAN

To Support
Ecosystem Management Research
in the
Northwest Forest Plan Area

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EXECUTIVE SUMMARY

The interagency Research and Monitoring Group (RMG) was tasked to develop this Strategic Research Plan (SRP). The principal objectives of the SRP are: (1) to identify high-priority thematic areas of research needed to support ecosystem management activities within the Northwest Forest Plan (NFP) area; (2) to act as an umbrella or linking document with any strategic Federal research plans (or accomplishment reports) addressing research support for ecosystem management in the NFP area; (3) to document the process developed to conduct interagency research coordination and the feedback processes developed by the Federal research, management and regulatory agencies; and (4) to further the process of science information transfer to resource managers and other interested stakeholders.

The SRP is directed primarily at Federal research agencies operating within the region and lands covered by the NFP. The major research organizations involved are the Pacific Northwest and Pacific Southwest Research Stations of the USDA Forest Service, the Forest and Rangeland Ecosystem Science Center of the U.S. Geological Survey, the Pacific Northwest Ecosystem Management Research Program of the Environmental Protection Agency, and the Northwest Fisheries Science Center of the National Marine Fisheries Service. The processes and procedures documented in the SRP can be used by the RMG, the Regional Ecosystem Office, the Federal research agencies, and the RIEC to conduct interagency coordination and develop feedback mechanisms between Federal research, management, and regulatory agencies. The research results will also be of value to state and private land management entities and others interested in land management within the region.

The Federal research agencies have identified and agreed on seven major research themes for research coordination and planning. These major research themes are: (1) Understanding Ecological Systems; (2) Individual Species Research; (3) Developing and Evaluating Alternative Management Systems; (4) Resource Restoration and Enhancement; (5) Economic and Social Dimensions of Cultural and Natural Resources; (6) Research to support Monitoring and Inventory Systems; and (7) Decision Support Systems. These major research themes were identified through ecosystem management research planning and research survey efforts conducted in 1993 and 1995. The Federal research agencies are working in an interagency mode to plan and conduct research in all or some of these research themes based on each agency's mission, objective, and research capability.

This document includes a Research Coordination Procedure that provides for interaction and feedback at the Regional Executive level regarding research priorities, activities, science findings, and how those findings can effectively support ecosystem management activities within the NFP area. The steps involved in this Coordination Procedure are described as a series of iterative processes and procedures which would allow for interaction between the Federal research, management and regulatory agencies on a periodic basis. The procedure that is outlined can maintain flexibility for the research agencies to complete interagency (management and regulatory) coordination, interagency strategic research coordination (within the research agencies), and then develop their own research agency plans within the constraints of their agency.

Material is provided dealing with the topic of information transfer, specifically communication of research information to management and regulatory agencies. The RMG does not have the resources to financially support development of information transfer publications or other materials. However, as part of the research coordination process, the RMG can promote information transfer by such activities as coordinating efforts among agencies, providing consolidated lists of materials that are produced, and organizing periodic science forums.

INTRODUCTION

Background

The interagency Strategic Research Plan (SRP) was developed primarily for use by the Federal research agencies in the Pacific Northwest. The SRP is intended to help the Federal research agencies develop a coordinated research approach for support of ecosystem management activities and coordination procedures with the Federal management and regulatory agencies involved in interagency ecosystem management within the area of the Northwest Forest Plan (explained below).

One of the primary examples of interagency ecosystem management activities is the Northwest Forest Plan (NFP) that developed from President Clinton's Forest Conference in April 1993. This conference initiated the planning process that ultimately resulted in the "Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl" (*ROD*) with attached "Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl" (S&G). The *ROD*, S&G and previous documents upon which they were based, have collectively become known as the Northwest Forest Plan. The scientific foundation of the NFP was developed primarily from the federal research agency scientists input and participation in the Forest Ecosystem Management Assessment Team (FEMAT) process. This process involved the synthesis of available scientific information on ecosystem management, followed by the development and evaluation of several alternative approaches to achieve ecosystem management goals within the range of the Northern Spotted Owl. The information developed from this process was used to formulate the Northwest Forest Plan, which is currently being implemented by ten federal agencies.

The interagency Strategic Research Plan was developed by the Research and Monitoring Group (RMG). This group was established as an outcome of a Memorandum of Understanding (MOU) signed (in 1993 and 1998) by the Director of the White House Office on Environmental Policy, the Secretaries of Agriculture and Interior, the Administrator of the Environmental Protection Agency, the Under Secretary of Commerce for Oceans and Atmosphere, and the Assistant Secretary of the Army for Civil Works. The RMG (under the direction of the Regional Interagency Executive Committee [RIEC]) was established to review and evaluate ongoing research, develop a research plan to address critical natural resource commodity and non-commodity questions, and address biological, social, economic, and adaptive management research questions within the Northwest Forest Plan area.

Objectives

The principal objectives for the Strategic Research Plan (SRP) are:

1. to identify high-priority thematic areas of research that are important for forest ecosystem management within the Northwest Forest Plan area. This objective will enable the participating Federal research agencies to conduct the basic and applied research programs necessary to support ecosystem management, which in turn, will provide support for the needs of the Northwest Forest Plan. This research coordination process will also tie in with other high-priority NFP activities, such as Monitoring, and Survey and Manage (S&M) species requirements.

2. to act as an umbrella or linking document with any strategic Federal research plans (or accomplishment reports) addressing research support for ecosystem management in the NFP area, such as the Cooperative Forest Ecosystem Research (CFER) Program (Smith, J., et al., 1997).

3. to document the process developed to conduct interagency research coordination and the feedback

processes developed by the Federal research, management and regulatory agencies; and

4. to further the process of research information transfer to resource managers and other interested stakeholders.

Scope

This plan is directed at Federal research agencies and their units responsible for conducting ecosystem management research. Research results should be applicable to Federal lands managed by the USDA Forest Service, the U.S. Department of Interior, and other lands (state & private) within the range of the northern spotted owl (NSO).

Research, in the context of the SRP, is considered as both basic and applied studies and as other types of science activities that are peer-reviewed and published. In this era of adaptive management, researchers, resource management staff and interested stakeholders are working together more collaboratively. Research staffs still work toward the development of research information, and land management staffs develop the research information for decision-making, but their separate roles are becoming more intertwined as the adaptive management process evolves.

Use of This Plan

Science has a major role to play in clarifying the issues and developing procedures to improve management of both commodity and non-commodity resources of the region's forest lands. The efficient focusing of research effort on important questions will contribute significantly to the success of the NFP and continued evolution of ecosystem management in the region.

The processes and procedures documented in the SRP can be used by the RMG, the Regional Ecosystem Office, the Federal research agencies, and the RIEC to conduct interagency coordination and develop feedback mechanisms between Federal research, management and regulatory agencies. Also, it can provide an interagency framework (with facilitation by the RMG) to help the Federal research agencies to:

- identify high-priority research emphasis areas
- promote needed research based on priorities
- avoid overlapping research efforts
- establish an open forum for scientists to present new information
- serve as a meeting ground for science and management
- make joint, interdisciplinary studies more efficient
- share/distribute databases and other research information

Operationally, this plan will also provide the basic guidance for the RMG to carry out coordination and integration activities through the process described in the next section.

IDENTIFICATION OF MAJOR RESEARCH THEMES FOR RESEARCH COORDINATION AND PLANNING

This section of the SRP describes how major themes of research study were identified for subsequent use by the Federal Research Agency Executives at strategic research coordination and planning sessions. Extensive survey work had been completed in the past to identify the major themes of research needed to support ecosystem management, and the identified research areas from those surveys provided a reasonable basis for communication dealing with strategic research coordination. The primary sources used to identify the major research themes are the:

- **Report of the Research Work Group: A Research Plan to Support Implementation of Ecosystem Management.** Interagency Implementation Team. January 31, 1994. 55 pages (IIT). This is a draft research plan for ecosystem management research in the NFP region. It includes a summary of a research-needs survey of resource managers conducted in 1993. It also includes information derived from an analysis of the FEMAT Report (Busing, R., 1994).

- **Summary of Ecosystem Management Research Survey.** Personal communication, Mike Bollman, MANTEC [former EPA contractor], Corvallis. December 1995. (EMRS)
  This document summarizes results of a survey of scientists thought to be conducting ecosystem management research in the NFP region during the period 1990 - 1994.

The first survey was conducted in 1993 as part of the IIT effort to identify general research topics that were being covered by all research agencies and organizations working in the NFP area. In 1995, a second survey was conducted under the auspices of the Research and Monitoring Committee as a comprehensive attempt to identify pertinent ecosystem management research down to individual studies. This survey included all ecosystem management research being conducted within the NFP area by all agencies and organizations and is referred to as the "Research Survey" and was sent to approximately 700 scientists thought likely to be conducting pertinent studies.

The survey questionnaire requested that research studies be placed in one of ten categories, based on generalized research topic themes. This was done to achieve a logical separation of different research topic themes and facilitate a practical search of the resulting database. The ten categories (or major research themes) for separation in the questionnaire included: (1) Understanding Ecological Systems [basic ecological research]; (2) Individual Species Research; (3) Developing and Evaluating Alternative Management Systems [resource management]; (4) Resource Restoration and Enhancement; (5) Economic Dimensions of Cultural and Natural Resources; (6) Social Dimensions of Cultural and Natural Resources; (7) Research to support Monitoring, Assessment and/or Inventory Systems; (8) Decision Support for Adaptive Management Process; (9) Physical Science; and (10) Ecotoxicology.

Note: The Research Survey included three more topic themes than are referenced in this SRP. In development of the plan, it was decided to combine economic and social dimensions into one category. The themes of physical science and ecotoxicology were not included in the SRP, because the studies were either outside the scope of the SRP or considered under other applicable topic themes.

IDENTIFIED MAJOR RESEARCH THEMES

Based on the development and description of the major research study topics identified and used in the two surveys, the following set of research themes is recommended as an information source by the Federal research agencies for strategic planning and coordination when using the interagency research coordination process illustrated in Figure 1. Generalized information is provided to explain the range of research that would be applicable for each major research study topic.

Understanding Ecological Systems

Many fundamental questions about the function and sustainability of ecological systems are unanswered. Although existing knowledge may be sufficient at some scales(s), the understanding needed to sustain ecological systems, protect habitat, and provide multiple forest values is incomplete. Research is needed to answer fundamental questions about ecological processes and functions, develop standards and measures, and evaluate species and their habitat requirements. Research needs range in spatial scale from micro-sites to landscapes. Research will provide the fundamental scientific information needed to describe the processes and functions necessary for long-term sustainability of ecological systems. This information will also provide the science findings needed to carry out adaptive ecosystem management in the NFP area.

Individual Species Research

Fundamental knowledge about individual species and their habitat requirements is often needed in order to understand the structure and function of ecological systems, especially if those species are considered to be indicator species. Also, some individual species have been the focus of interest and concern for many years and are subjects of considerable demands for management information and research. Under the NFP several species receive special attention, including the Northern Spotted Owl and Marbled Murrelet, and the large grouping of species collectively known as “Survey and Manage” species. Failure to address the concerns can, in some instances, result in legal restrictions on resource management. Consequently, research is needed to develop more detailed information for these high-interest, high-visibility species, or species that have been legally identified as threatened, endangered, or considered being sensitive species. This information can then be used for development of management policy and actions relative to those high-interest species and the ecological systems they are found in.

This plan recognizes that research should focus on ecological systems rather than individual species alone, and emphasizes that individual species research occurs within a broader ecological system framework. However ecological systems do include many individual species, and some of the research in the “Understanding Ecological Systems Theme” concentrates on individual species. The specific Research Theme of “Individual Species Research” is included due to the special legal and management attention being paid to a number of species.

Developing and Evaluating Alternative Management Systems

Management decisions, by necessity, must often be based on incomplete knowledge and assumptions that have not been fully tested. Thus, research is needed to assess the validity of these underlying assumptions, to evaluate the ecological consequences of alternative management strategies and techniques, and to identify new and better management options. Research conducted for this theme would propose, develop and test alternative management systems in order to display the effects and outcomes of different management systems using reproducible methodologies. This research will provide new science-based information that resource managers can use to evaluate and adjust their

management decisions as part of the adaptive management process.

Resource Restoration and Enhancement

Many ecological systems have undergone alterations to the extent that they no longer support certain recognized values. Hence, there is a need to provide knowledge to support ecological system restoration activities so these systems can be restored. Restoration efforts are focused at the watershed level. Watershed restoration and enhancement are comprehensive, long-term activities to restore watershed health and aquatic ecosystems, including the habitats supporting fish and other aquatic and riparian-dependent organisms. Work conducted for this general research theme provides science-based information to aid managers by: (1) developing methods and protocols to assess the feasibility of restoring ecological systems; (2) developing methods and providing technical support for restoration activities; and (3) designing methods to evaluate the effects of restoration strategies. Research work can also provide valuable information about the previous condition of ecological systems prior to alteration, as well as the normal range of variability associated with those ecological systems. This type of knowledge can be useful for managers in establishing restoration goals and to evaluate how well restoration and enhancement activities are achieving those goals.

Economic and Social Dimensions of Cultural and Natural Resources

Research for this theme must be planned and conducted to improve understanding of societal values, desires, and needs related to cultural and natural resources. The shift in management emphasis from stands to landscape level ecological systems is accompanied by the need to re-frame societal and economic research that has traditionally been done at the stand and forest level. Accomplishment of needed research will provide new and better ways to communicate natural resource values to interested publics. Research can also develop the means to measure, analyze and report on changing societal and economic values, demographic shifts, and large-scale cultural shifts. This information can be valuable to the decision-maker for formulation of both large and small-scale resource policy decisions.

Research to Support Monitoring and Inventory Systems

Research to support monitoring and inventory systems is needed to help managers establish baseline information and make measurements of trends over time. The Research role is to develop the scientific foundation to support monitoring and inventory systems, and to assist the management agencies in their implementation role, including data analysis, reporting and interpretation, and evaluation of results to support management decisions within the adaptive management process. Inventory and monitoring systems are essential components of adaptive management and are needed to successfully track and evaluate progress toward achieving the goals of ecosystem management. Greater efficiency, greater accuracy, and reduced costs are important to both managers and researchers. To be successful, these systems must make use of accepted ecological indicators and follow statistically valid designs for assessing baseline condition and trends in ecological systems and species health at multiple scales. Efficient systems are needed that can provide feedback loops between researchers and managers for verification of resource management assumptions or adjustment of those assumptions to achieve the goals of ecosystem management and the NFP.

Decision Support Systems

Research for this theme involves the development and use of decision support systems designed to manage information necessary for decision-making. Much of this research involves the development and utilization of knowledge-based systems with potential to aid decision-makers. These systems present information that provides decision makers with the available knowledge about the conditions under which specific decisions must be made. Research in this area can also be instrumental in systems development enabling interactive public input on local public land policies and decisions, and consequently providing improved public response information to resource managers. Within the context of ecosystem management, decision support systems and related analysis methods would facilitate setting priorities, assessing risks, and refining management options. This should be done at all spatial scales and from both socioeconomic and ecological standpoints.

RESEARCH COORDINATION

This section of the SRP provides information, processes, and procedures to address one of the principal objectives of the SRP: to present a framework for interagency coordination of high-priority research needed to support and to evolve ecosystem management in the NFP area.

Research Organizations

The major research organizations involved in the NFP, based primarily on program size and funding, are (1) the USDA Forest Service, both the Pacific Northwest and Pacific Southwest Research Stations (PNW and PSW); (2) the U.S. Geological Survey's Forest and Rangeland Ecosystem Science Center; (3) the Environmental Protection Agency's (EPA) Pacific Northwest Ecosystem Management Research Program; and (4) the National Marine Fisheries Service's Northwest Fisheries Science Center.

Other organizations which conduct or support relevant research include Federal agencies with natural resource interests or responsibilities such as the U.S. Fish and Wildlife Service, National Park Service, Corps of Engineers, Department of Defense, and others.

Outside the Federal sector are: colleges and universities, primarily those located within or adjacent to the region; Tribes and intertribal organizations such as the Northwest Indian Fish Commission; private organizations such as Weyerhaeuser Co.; the National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI); and Battelle Northwest; and State agencies, such as departments of Natural Resources, Forestry or Fish and Wildlife.

This SRP is aimed primarily at Federal research funded or performed by PNW, PSW, USGS, EPA and NMFS. Other non-federal research organizations (as indicated above) are also making important contributions to support ecosystem management in the NFP area. It is important that this SRP be coordinated with these other research programs.

The Appendix lists the missions of organizations conducting research as submitted for a 1994 report to the Interagency Implementation Team (IIT).

Research Coordination Functions

One objective of this plan is to document the current and developing research coordination mechanisms that the participating Federal agencies are putting in place to support ecosystem management activities in the NFP area. Other objectives of the SRP are to: identify the principal research themes for ecosystem management; and, identify the methods to communicate or transfer research information for use in the adaptive management process. The SRP is not intended to give specific direction to Federal research units. Furthermore, it does not propose any centralized interagency control over research budgets or programs. It is intended to stimulate strategic planning and coordination of ecosystem management research in the NFP area, such as found in the CFER Program (Smith, J., et. al., 1997), by continuing and, hopefully increasing, support for research in general.

Listed below are specific functions that the RMG will perform in this regard:

Coordination among research organizations:

- Facilitate and coordinate planning and recommend program emphases.
- Coordinate efforts across agencies, organizations, and geographical areas.
- Update research budget information for annual research planning.
- Continually assess gaps and overlaps in research, and recommend responses.
- Assess progress toward meeting research objectives relating to ecosystem management in the NFP area.

Coordination among Research activities:

- Provide and coordinate scientific and technical advice.
- Facilitate integration of research and monitoring activities, where appropriate (e.g., identify opportunities for using common sites, sharing data, coordinating objectives, etc.).
- Facilitate peer review of research plans as requested.
- Coordinate multi-organizational responses to major program efforts.

Facilitate communication:

- Facilitate communication between the Research Agency Executives and the Regional Interagency Executive Committee in the areas of research emphasis, research activities, and information-sharing of science findings with significant management implications.
- Work to establish trust between participating organizations and individuals in concert with other implementation groups.
- Serve as an information clearinghouse for current research activities.
- Provide the public with access to information on research in a form that is practical and useful.
- Promote and facilitate communication between organizations and disciplines to help assure that accurate information on activities and findings are provided in a timely manner.
- Provide liaison with executive committees and other groups.
- Coordinate with the Regional Monitoring Team (RMT) and Interagency Resource Information Coordination Council (IRICC) on the integration of research and monitoring databases and analyses.

Research Coordination Procedure

This plan documents the procedures and processes used to coordinate research needed to support ecosystem management activities in the geographic area of the Northwest Forest Plan. The following paragraphs describe the activities involved in the research coordination procedure. The number for each paragraph corresponds to the numbered boxes in Figure 1 (Diagram of the Interagency Research Coordination Cycle).

1. The Research and Monitoring Group (RMG) obtains input and any necessary information for a RIEC interaction session on research results, activities and priorities from several sources (Federal agencies; legal input using the Record of Decision as a baseline, interested non-Federal groups, agencies, or institutions; and interested research scientists).

2. A periodic RIEC interaction session is held where the Research Agency Executives provide a synopsis to the other agency executives regarding ongoing research and research priorities. They also present research results with significant impacts on management actions or NFP standards and guidelines. This session would involve feedback and interaction between the executives to identify the highest priority research areas for future work, and to share how the management and regulatory agencies have utilized research information provided to them in the past. This annual interaction session will aid in the Research Executive's planning and decision process to determine high-priority research areas and evaluation of science information is being utilized.

3. The RMG facilitates a semiannual meeting of the Research Agency Executives to evaluate information from the RIEC interaction session as an aid in establishing Research Priorities for NFP-related work. The research agencies will discuss their future (1-5 years) research plans and discuss how priority research topics for the NFP area will or will not be covered. Opportunities for coordination, changing plans to meet high-priority gaps, altering plans to avoid unnecessary overlap, etc., are discussed. Projected budgets to address the identified research areas will be discussed. From this information, agreements can be reached on the research areas that will be addressed and the programmatic research area that each Research agency will pursue can be defined.

4. The individual research agencies develop their research work plans based on capabilities, mandates, priorities, budgets, and agreements. Other agencies (management, regulatory) and stakeholders may want to have specific research objectives or projects completed and are capable of providing resources (financial, personnel, etc.) to support those research objectives. These interested parties would be defined as "Sponsors" or "Sponsoring Agencies." Step 4 (possibly Step 3) would be where input from sponsors is incorporated.

   - Individual research agencies coordinate with the Sponsors to identify the specific research that the research agency can provide. This is a negotiated process based on the Sponsor's level of support and the ability of the research agency to address the specific research needs.

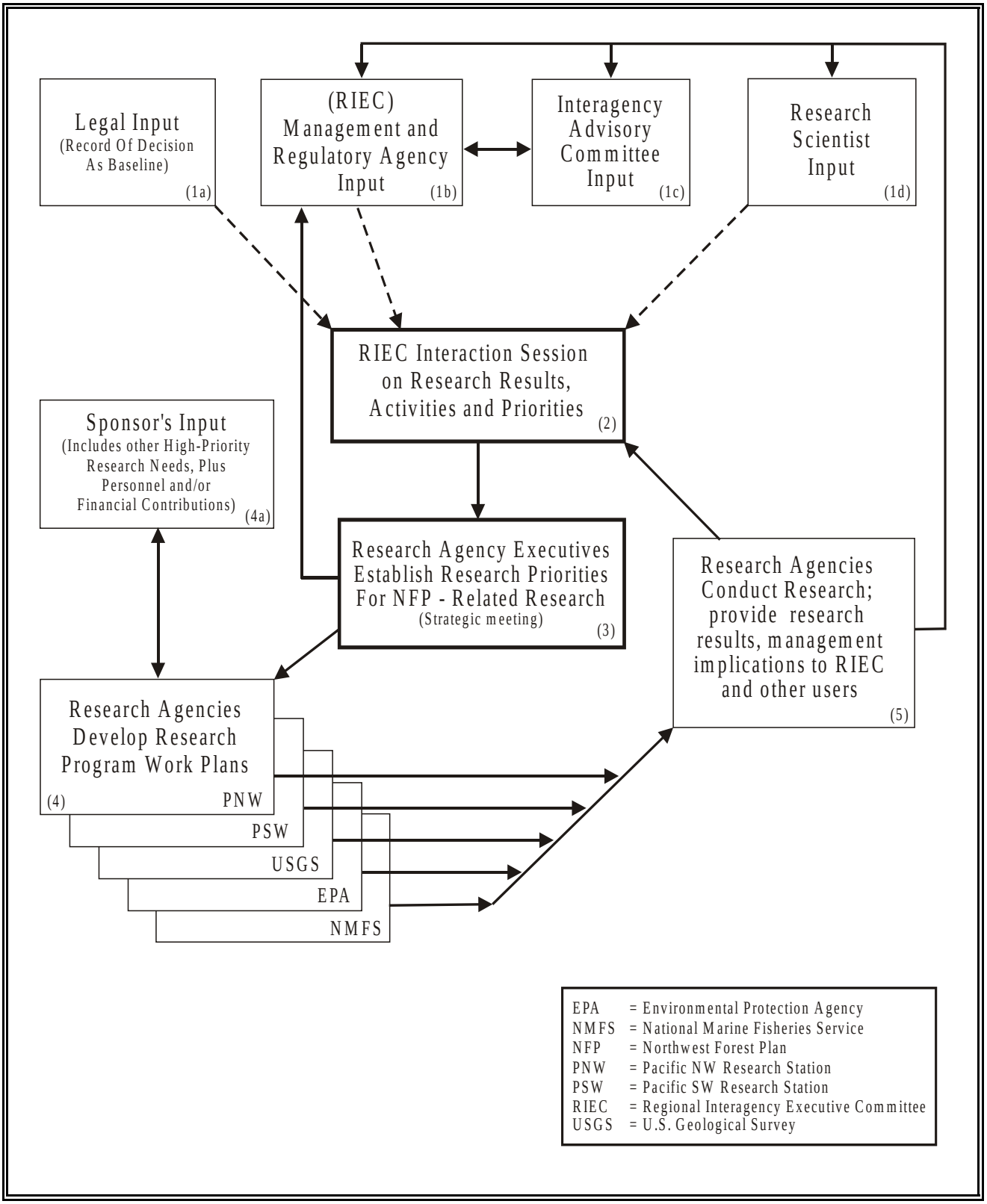
5. The agencies follow their own procedures for budget allocation and conduct of research activity (i.e., the scientists conduct their research, and communicate research information to the Regional Interagency Executive Committee (RIEC) and other research users). The RMG will facilitate preparation of research materials, especially research results with significant management policy implications, for the RIEC interaction session.

A general call for new information will always be in effect and the research representatives will look for pertinent information as part of the assignment. When a new major issue develops, a broad call for state-of-the-science information will be issued to research organizations (universities, non-governmental organizations, Federal, etc.) to further develop any information available on the emerging issue.

Interagency Coordination of Research Information

Linkages between research agency databases are made by the RMG, as is feasible, to remain informed about completed and ongoing research work pertinent to ecosystem management in the NFP area. This would be partially accomplished by utilizing the Science Information System (the U.S. Geological Survey Biological Resources Division database) which is available on the Internet. As this database, and other agency or other organizational databases become more extensive, linkages could potentially be established to access much of the current and ongoing research information, and to help the RMG remains current on relevant NFP research information.

Figure 1. Diagram of the Interagency Research Coordination Cycle.



COMMUNICATION OF RESEARCH INFORMATION FOR THE ADAPTIVE MANAGEMENT PROCESS

Successful implementation of research results will require development of effective communication materials and forums (workshops, conferences, electronic sites) to build professional, political, and public understanding of new scientific information. The Federal research agencies will: (1) establish and conduct collaborative research with the land management and research staffs; and (2) communicate the research findings, but with the expectation that the management and regulatory agencies receiving the information will consider the research findings in the resulting decisions.

The RMG, by its nature, does not have the resources to financially support development of research communication materials. Rather, the function of the RMG is to promote the communication of research information among the participating agencies, coordinate efforts among agencies, and provide consolidated lists of materials that are produced. One role that the RMG can play is to organize periodic science forums for exchange and dissemination of the latest scientific information. The following section on communication of research information is being provided for use by the research agencies as part of the Interagency Research Coordination Cycle (Fig. 1, block 5), and to indicate how research results can be linked to the adaptive management process.

Technology transfer (or communication of information) has been defined by Hobbs and others (1993) as the process of conveying new information in a form that can be understood and evaluated and which will result in an informed decision to reject or adopt the innovation. Ecosystem Management, and the specific example of the NFP, places great importance on the application of current science (research results) in the context of adaptive management. In other words, management practices should be evaluated and changed to meet management objectives and reflect the active pursuit and application of pertinent research results and new scientific findings.

For research activities to be successful, the link between researchers and practitioners must be strengthened (Hobbs and others 1993). Results must be distributed in a timely way to target audiences and in a variety of formats that build understanding. The target groups interested in ecosystem management and NFP implementation include natural resource professionals (including scientists) from the partner agencies, stakeholder groups, politicians, and media interests.

Natural resource extension specialists are commonly assigned the task of finding ways to transfer scientific information to target populations. Communication of research information is also considered part of the overall research process, and, nowadays, scientists are encouraged and credited for such efforts.

In his work to design successful education programs for loggers, Garland (1993) identified a variety of educational approaches used to build understanding for his target groups. These approaches also have application to those involved with implementing the NFP:

Direct Contact . . . . Use of written and electronic information systems

Demonstrations . . . Tours and field trips, videos

Workshops . . . . . Conferences

Publications . . . . . Written and electronic information

The complexities associated with ecosystem management and NFP implementation will require scientists to prepare numerous scientific papers and other publications. They and other specialists will need to help develop workshops, conferences, and field trips. Public Affair's staff will need to assist with development of publications, videos, and briefings for media contacts as well as for key political and opinion leaders.

CONCLUSION

The role of the federal research agencies is quite complex and demanding since they must carry out the identification of principal research themes, and coordinate and integrate research that responds quickly to the changing needs of ecosystem management. At the same time, there is a need to maintain stable long-term research emphases in the appropriate areas. Differing missions and objectives of both research and management organizations must be accommodated. Complexity is increased by the need to assess and integrate biological, physical, economic, social, and cultural components at varying spatial and temporal scales. Furthermore, research results must be made available in a timely and useful way.

The plan identifies the seven major research areas or themes that the Federal research agencies have agreed on for interagency research planning and coordination. These research agencies are conducting research in an interagency mode in all or some of these research themes based on each agency's mission, objective and research capability. The research themes that research is being conducted in include: (1) Understanding Ecological Systems; (2) Individual Species Research; (3) Developing and Evaluating Alternative Management Systems; (4) Resource Restoration and Enhancement; (5) Economic and Social Dimensions of Cultural and Natural Resources; (6) Research to support Monitoring and Inventory Systems; and (7) Decision Support Systems.

This SRP is based on input of scientists, research and resource managers, and others concerned about healthy ecosystems. The resulting interagency coordination processes and procedures outlined in this plan have been discussed, reviewed and pilot-tested by the federal agencies participating in the Northwest Forest Plan. These processes and procedures provide the foundation for on-going and future interagency coordination.

There is high interest and enthusiasm for "getting-on" with the business of ecosystem management. Implementation of high-priority research will require constant adaptation and appropriate levels of funding, because of the problems and the context in which they occur will constantly change. Thus, the plan will hopefully identify the processes needed to achieve that goal.

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APPENDIX

MISSIONS/OBJECTIVES OF FEDERAL RESEARCH ORGANIZATIONS THAT CONDUCT RESEARCH RELEVANT TO ADAPTIVE ECOSYSTEM MANAGEMENT AND THE NORTHWEST FOREST PLAN

USDA Forest Service

Pacific Northwest Research Station, Portland, Oregon

The mission is to serve society by improving understanding, use, and management of natural resources. Our service is basic and applied research and development. We create knowledge of biological, physical, ecological, social, and economic relationships. We make this information relevant and readily available to resource specialists, managers, scientists, and the public. As leaders in the natural resource community, we advocate the use of improved information and technology. Our research programs provide impartial information for the public's understanding and evaluation of issues related to natural resources.

Program goals are to: (1) advance basic ecological sciences, (2) protect the environment, (3) maintain biological diversity, (4) anticipate the effects of global change, (5) serve people in forest lands, (6) involve the public in policy and management, (7) use better economics to base resource decisions, (8) sustain long-term resource productivity, (9) provide new management and analytical approaches, (10) produce wood products, (11) produce a variety of resource values, (12) protect forest health, and (13) inventory forest resources and improve monitoring technology.

Pacific Southwest Research Station, Albany, California

The mission is to develop and provide the knowledge needed for the environmentally sound management of forests and wildlands. Research is carried out in California, Hawaii, and the Western Pacific but focuses primarily on the conifer forests and more arid chaparral and woodlands of California. Research is aimed at improving resource management on these lands. Research emphases are: (1) global change, (2) tropical forestry, (3) fundamental science, (4) forest and wildland ecosystems, (5) social aspects of natural resource management, and (6) water resources and aquatic ecosystems.

USDI Geological Survey

Biological Resources Division

The mission of the Biological Resources Division (BRD) is to provide the scientific understanding and technologies needed to support the sound management and conservation of our Nations's resources. The primary responsibility of BRD is to assist resource and land managers, particularly in the Department of the Interior, by providing them with sound biological information and with assistance in applying the information to their needs. The primary means of gathering this information is through the use of scientific methods applied to monitoring resources and conducting experiments.

Forest and Rangeland Ecosystem Science Center

The Forest and Rangeland Ecosystem Science Center (FRESC) is a multi-disciplinary research center that provides scientific understanding and technology to support sound management and conservation of forest and rangeland ecosystems in the Pacific Northwest and Intermountain West. The FRESC headquarters office is on the campus of Oregon State University in Corvallis, Oregon, with field stations throughout the Pacific Northwest and Intermountain West. FRESC scientists are actively involved in research and technical assistance for the management of millions of hectares of forest ecosystems on National Park Service, Bureau of Land Management, and USDA Forest Service

lands.

Through the Northwest Forest Plan, FRESC scientists are developing approaches for sustainable management that protects the functional integrity of forest ecosystems while meeting social demands for wildlife, fish, water, timber, and recreation.

Oregon Cooperative Wildlife Research Unit, Oregon State University, Corvallis
Research focuses on wildlife conservation issues in the Pacific Northwest. Emphasis is on forest-wildlife management, particularly non-game species, and studies on environmental contaminants in wildlife. Most current studies are on the population ecology of key species.

Water Resources Division
The mission of the Water Resources Division is to develop and disseminate scientific knowledge and understanding of the Nation's water resources. The activities carried out by the Division fall into three broad categories: (1) resource assessment, (2) research, and (3) coordinating the activities and cataloging the products of numerous other entities involved in water research, data acquisition, or information transfer.

Environmental Protection Agency

Environmental Research Laboratory, Corvallis, Oregon
The Environmental Research Laboratory focuses on terrestrial and watershed ecology with research projects contributing to an understanding of processes occurring within ecosystems and across regions. Research is targeted toward understanding ecosystem function and monitoring condition. Of specific interest to the NFP is research on evaluating the ecological consequences of alternative land management practices(alternative futures) and on developing tools for monitoring the status of surface waters and near-stream habitat with known statistical confidence.

U.S. Department of Commerce, National Marine Fisheries Service

The mission in the Pacific Northwest is to provide scientific information for the protection, development, and balanced growth of marine, estuarine, and anadromous aquatic resources. This is accomplished in a broad-based research program (1) investigating and developing mitigation measures for the impasse of dams and water diversions on the migrations of juvenile and adult Pacific salmon and steelhead; (2) developing improved methods of artificially enhancing marine and anadromous fish and shellfish populations, while preserving the genetic diversity of these populations; and (3) investigating and developing mitigation measure for the impacts of habitat perturbations on fisheries productivity.