

State Forests Monitoring Program

Strategic Plan

**for the Northwest and Southwest Oregon
State Forests Management Plans**

December 2002

Executive Summary

The *State Forests Monitoring Strategic Plan* provides the overall framework for how ODF will conduct monitoring and support research related to the *NW/SW State Forests Management Plans* (FMP). The timeframe for this strategic plan is ten years.

This strategic plan is directly tied to the “working hypotheses” and forest management strategies identified and described in the FMP. It sets a direction for monitoring and research work by identifying initial high priority projects that will contribute to our understanding of management strategy effectiveness and assumptions related to the FMP. It also identifies priority research and monitoring themes which will translate over the next ten years into additional projects to contribute to the evaluation of the FMP.

Sections 1 – 3 deal with “administrative” issues. These include the relationship of monitoring to overall FMP information needs; the importance of monitoring as a part of an adaptive approach to forest management; definitions of the various types of monitoring; and staffing, funding, and information management.

Section 4 and the Appendices present the substance of the plan. These sections describe the issues and key monitoring questions associated with each of the management strategies. These questions focus on the most important current information needs and provide guidance for designing specific monitoring projects.

Implementation of the integrated management strategies is expected to result in functional habitat conditions for all native species. Because of their importance, the emphasis of the monitoring is on implementation and effectiveness of the landscape management, the aquatic and riparian, and the forest health strategies (Section 4.1). Monitoring projects for specific species of concern will be developed in conjunction with the *Western Oregon State Forests HCP* (Section 4.2). Monitoring of strategies for specific resources (Section 4.3) will emphasize implementation monitoring approaches to help determine specific resource goals that the integrated strategies alone may not achieve. Asset management considerations, dealing mainly with timber revenue issues, complete the discussion of specific strategies (Section 4.4). Initial high priority projects are identified, as well as initial research and monitoring themes, which are: Stand structure development and wildlife relationships; Hydrologic functions and aquatic and riparian habitat; Young stand development; and Forest health. These themes are meant to encompass a problem complex that includes a number of more specific issues and questions, and, therefore, a number of potential research and monitoring approaches to meet the information needs. In addition to the list of initial projects, work related to these themes will be pursued over the next ten years (Section 4.5).

The Appendices summarize program elements such as roles and responsibilities of program staff and the State Forests research policy. The most important are Appendix C, which presents the anticipated timelines for research and monitoring activities for the first implementation period, and Appendix F, which more fully describes the priority research and monitoring projects that are either already underway or in the planning phase for implementation in the near future.

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Acronyms and Abbreviations Used

| | |
|---------------|---|
| ADF | Assistant District Forester |
| AOP | (District) Annual Operations Plan |
| CFER | Cooperative Forest Ecosystem Research program |
| DEQ | Department of Environmental Quality |
| DF | District Forester |
| DSL | Division of State Lands |
| EM | Effectiveness Monitoring |
| FMP | Forest Management Plan |
| FPMP | ODF Forest Practices Monitoring Program |
| FPPS | Forest Projection and Planning System |
| HCP | Habitat Conservation Plan |
| IM | Implementation Monitoring |
| IP | (District) Implementation Plan |
| LYR | Layered forest structure |
| MUF | Management Unit Forester |
| NCRSEA | North Coast Range Special Emphasis Area |
| NSO | Northern Spotted Owl |
| NWFMP | <i>Northwest Oregon State Forests Management Plan</i> |
| OAR | Oregon Administrative Rule |
| ODF | Oregon Department of Forestry |
| ODFW | Oregon Department of Fish and Wildlife |
| OFS | Older Forest Structure |
| ORS | Oregon Revised Statute |
| OWEB | Oregon Watershed Enhancement Board |
| PNWTIRC | Pacific Northwest Tree Improvement Research Cooperative |
| R&M Coord. | Research and Monitoring Coordinator |
| REG | Regeneration forest structure |
| RMA | Riparian Management Area |
| RMP | Recreation Management Plan |
| RUF | Reforestation Unit Forester |
| SBM | Structure-Based Management |
| SFMP | ODF State Forests Monitoring Program |
| SLI | Stand Level Inventory |
| SOHEA | Spotted Owl Habitat Emphasis Area |
| SNC | Swiss Needle Cast |
| STR | Silviculture Treatment Record |
| SWFMP | Southwest Oregon Forest Management Plan |
| Type F stream | Fish bearing stream |
| Type N stream | Non-fish bearing stream |
| USDA | United States Department of Agriculture |
| USDI | United States Department of the Interior |
| USFS | United States Forest Service |
| USGS | United States Geological Service |

State Forests Monitoring Program

Strategic Plan

for the Northwest and Southwest Oregon
State Forests Management Plans

1. Introduction and Background

1.1 Purpose and Scope

This *Strategic Plan* describes the approaches and activities that the Oregon Department of Forestry will undertake over the course of the initial ten-year implementation period to assess compliance with and effectiveness of the resource management strategies described in the *Northwest Oregon State Forests Management Plan* (NWFMP) and the *Southwest Oregon State Forests Management Plan* (SWFMP). The *Strategic Plan* will guide research and monitoring activities in the planning areas during the implementation period of the Forest Management Plans (FMPs).

The objectives of the monitoring program are:

- To help evaluate that state forests are managed to achieve the greatest permanent value by providing the full range of social, economic, and environmental benefits to the people of Oregon.
- To determine whether FMP programs and strategies are implemented properly;
- To determine whether FMP programs and strategies result in anticipated habitat or other conditions for the species of concern;
- To assist the adaptive management process by providing information on the species of concern, testing critical assumptions in the plan, and by providing a learning opportunity to refine management decisions to better meet plan objectives.

The specific objectives of this plan are:

- To describe general monitoring issues that are anticipated to be addressed during the initial ten-year implementation period;
- To describe implementation monitoring that will occur on an annual basis to provide information for internal staff reports and other entities;
- To provide a framework to aid prioritizing and developing specific monitoring projects to assess the effectiveness of the management strategies;
- To describe how these monitoring activities will help assess the validity of key assumptions that underlie the management approaches or strategies;

- To describe the funding mechanisms and level of commitment to monitoring during the initial ten-year implementation period, and;
- To describe planned monitoring and research activities and to present a description of the roles and responsibilities of ODF staff, researchers, and contractors (App. A & B) and a timeline (App. C) for their completion (see appendices).
- To fulfill the requirements of the Monitoring Implementation Plan as described in the FMPs.

1.2 Management Planning Process

For a better understanding of how and where monitoring fits in the overall forest management activities, a brief description of the planning process is helpful. Planning begins with a broad-scale, long-term forest management plan (the FMPs) that provides overall direction for managing the state forests in the planning areas. This plan presents goals and strategies for managing resources on state forest lands. Information, decisions, and management in the FMP encompass landscape scales, policy concepts, and social, cultural, and environmental influences that may extend beyond state forest lands. These plans are reviewed periodically and, at a minimum, at least every ten years. It will frequently take ten years or more to develop relevant monitoring information for these long-term forecasts.

The FMPs provide overall management direction and establish specific strategic approaches for meeting the management goals of the plans. Each district in the planning area develops an implementation plan (IP) which describes in more detail how the management strategies will be applied on that district. These plans are designed to describe forest management activities scheduled for the next ten years and provide estimates of the district's progress toward the FMP goals. These plans are reassessed periodically, at least every 10 years, or if some significant event occurs or information is received that would significantly change the planned activities or approaches.

Each district prepares an annual operations plan (AOP) which shows the exact location and nature of management activities that are proposed for a given fiscal year. These documents are the most detailed level of planning. The AOPs include silvicultural prescriptions, recreation projects, road construction and maintenance, stream restoration projects, and any other major projects. Monitoring information will be gathered about the short-term effects, implementation, and contribution of these activities toward FMP goals. This information will be used to assess the need to effect change at scales ranging from site-specific to district-wide.

Monitoring will provide information to assess the implementation and effectiveness of the management strategies and to evaluate fundamental assumptions which form the basis for the set of integrated forest management strategies in the FMPs (Table 1.1).

Table 1.1: Working Hypotheses of the *Northwest and Southwest Oregon State Forests Management Plans*
(p. 3-18 NWFMP, p. 3-12 SWFMP):

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1. The citizens of Oregon will continue to support integrated and active management of state forests in Western Oregon to provide for multiple outputs and benefits.
 2. An active and integrated forest management approach will provide for high levels of sustainable and predictable timber and revenue while concurrently providing habitat for native fish and wildlife species.
 3. Identification and protection of key habitat areas for specific species will maintain existing populations as a source to colonize new habitat.
 4. Species will colonize new habitat as it develops over the longer term.
 5. A diverse array of stand types will, at various times, provide for achievement of all the resource goals outlined in the FMPs.
 6. Providing for biodiversity at the landscape level requires providing for an array of forest conditions through time and space that emulates conditions created by historic disturbance regimes.
 7. Providing for a diverse array of forest conditions through time can be accomplished in a managed context through the application of silvicultural principles.
 8. A diverse array of forest conditions will enhance overall forest health and reduce the risks of catastrophic loss from insects and disease.
 9. Active management through a combination of landscape-level strategies and site-specific standards will result in maintaining and restoring properly functioning aquatic and riparian habitats.
 10. Timber markets will exist over time for the range of timber types and qualities that will be produced from state forests. The diverse “portfolio” of products available from a diverse array of stand structures will strengthen the ability of state forests to capitalize on changing markets.
 11. A diverse array of forest conditions will provide diverse recreational opportunities on these state forest lands.
 12. Long-term management of natural resources can only succeed within a framework that provides for change.
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Collectively, these working hypotheses form the basis for the set of integrated forest management strategies to be implemented through the FMPs. Addressing these fundamental assumptions will help focus the development of specific monitoring projects to determine if the strategies are achieving their objectives.

Monitoring projects will be established at the level of activity described in the AOPs. When aggregated, results of these activities will inform the evaluation of the effectiveness of the management strategies as well as the validity of the underlying assumptions.

Forest management is ecologically, socially, and economically complex. The monitoring program must incorporate not only the assessment of ecological processes and management activities, but also the cultural and economic circumstances linked to them.

Monitoring projects must be designed to provide information to evaluate the integration of natural and social systems.

Some systems and procedures are already in place that address the social and economic aspects of ODF operations. They include tracking harvest volumes and revenues, administering timber sales, analyzing harvest schedules, monitoring recreational uses and needs, etc. Therefore, during the initial ten-year period, the monitoring program described in this plan will concentrate on the environmental and ecological aspects of the FMPs.

1.3 Adaptive Management

A major difficulty in designing long-term landscape-scale forest management plans is that natural systems are dynamic and scientific knowledge and modeling capabilities are limited. There are always uncertainties, even when the best expert opinion and scientific knowledge are used. This uncertainty is addressed through the ongoing application of adaptive management.

Adaptive management is the process through which management practices are incrementally improved by implementing plans in ways that provide opportunities to learn from experience. Through a broad program of monitoring, surveys, reporting and cooperative research, ODF will evaluate the biological relationships and habitat responses to management actions. This process will provide a credible method to assess whether our management strategies are functioning as intended. With this information we can develop appropriate modifications to the strategies to ensure that the FMPs continue to meet their management objectives.

The primary purpose of adaptive management is to demonstrate, with sound scientific information, why a change in management would be necessary. The key components of the management strategies will be tested through this adaptive process to determine if specific objectives are being met within the planning area. This process is ongoing throughout the term of the plans.

1.4 Monitoring

Monitoring is often neglected in conventional approaches to management, but it is critical to adaptation and improvement. Monitoring allows assessment of how management activities actually affect indicators. This information allows managers to evaluate the effectiveness of alternative actions, adjust hypotheses, and take appropriate corrective action. Monitoring can also determine if actions were implemented as planned, and may detect unexpected outcomes.

In the context of the FMPs, and for the purposes of this plan, monitoring is organized into three categories:

- **Implementation monitoring** is used to determine if the objectives, standards, guidelines, and management practices specified in the FMPs are being accomplished. Sometimes used synonymously, **compliance monitoring** is used to determine whether specified actions or criteria are being met. Implementation, or

compliance, monitoring asks the question, “Are we doing what we said we would do?” A typical implementation monitoring question related to the FMPs is, “Were silvicultural prescriptions conducted according to District Annual Operations Plans?”

- **Effectiveness monitoring** is used to determine if the design and execution of the prescribed management practices are achieving the goals, objectives, and desired future conditions stated in the FMPs. Every management decision is intended to achieve a given set of future conditions. Effectiveness monitoring can be used to compare existing conditions to both past conditions and the desired future conditions to describe the overall progress or success of the management activities. Effectiveness monitoring is a longer range program than implementation monitoring and asks the question, “Are the management practices producing the desired results?” A typical monitoring project could be designed around the question, “Does active management accelerate stand structure development?”
- **Validation monitoring** is used to determine whether data and assumptions used to predict outcomes and effects in the development of the FMPs are correct. Validation monitoring seeks to verify the assumed linkages between cause and effect. Validation monitoring asks the question, “Are the planning assumptions valid, or are there better ways to meet planning goals and objectives?” Validation monitoring is long term and will be accomplished through formal research and effectiveness monitoring projects. For example, a long-term validation project could deal with the question, “Does OFS have functions similar to those of old growth forests?” Over the long term, aggregated information from research and monitoring projects will help validate a number of key assumptions that form the basis for the development of the FMPs (see Table 1.1)

A more complete discussion of the concepts behind the monitoring program and their application in this document can be found in the FMP documentation (p. 5-13 NWFMP, 5-12 SWFMP).

The monitoring activities described in this plan will concentrate on a series of issues and key questions related to the species, resources, conditions, and processes. These overarching issues and questions may often not be answered directly. They must first be broken down into components that can be addressed by specific monitoring projects. The anticipated projects described in this plan will be further developed around precise monitoring questions that focus on specific information needs. Well-focused monitoring questions determine which system attributes, or indicators, will be monitored. The need for monitoring projects will be based on an analysis of recent and current research, information needs, and the requirements of the management approaches.

2. Monitoring Program Implementation

ODF will concentrate on implementation and effectiveness monitoring to generate feedback for evaluating the success of the management strategies. Because of the breadth and complexity of the FMPs, implementation monitoring will provide a continuous

source of information to assess compliance with individual conservation measures (e.g. riparian prescriptions) and implementation requirements (e.g. snag targets). Effectiveness monitoring involves more comprehensive analysis of information collected over time, specific monitoring projects, and experimental research to determine if the strategies are in fact achieving the goals of the management and conservation strategies. Research is conducted to evaluate the underlying assumptions of the management strategies and there is a variety of research efforts already underway that will contribute information to our program. ODF will help support necessary additional research at selected research institutions.

Through their description of the application of management strategies to achieve desired future conditions, District Implementation Plans will provide a foundation for the determination of specific monitoring needs for the planning period. Annual Operations Plans will describe the specific management actions that will be undertaken in the upcoming year. Opportunities to address specific monitoring needs will be identified through annual operations planning. Section 4 provides a detailed discussion of monitoring approaches and key questions for the management strategies described in the FMPs.

2.1 Implementation Monitoring

Implementation monitoring involves tracking actions that occur or re-occur throughout the planning period and simply determining whether or not these activities were conducted as planned, and in some cases what the immediate results were. Activities tracked through implementation monitoring generally have measures that are fairly certain and do not require elaborate or complex study designs (e.g. counting snag or live trees retained). Because of the higher level of certainty involved with activities tracked through implementation monitoring, management responses to implementation monitoring results are very specific and well defined in advance. Costly experimental study would not be needed to determine how to “right the wrong”, the activity would simply be corrected as soon as possible.

To determine proper implementation of the management and conservation strategies and to establish baseline conditions from which to measure effectiveness of the strategies, it will be necessary to collect information both pre- and post-operation. “Operations” are any changes in forest stands, including such diverse activities as timber sales, habitat improvement or enhancement, recreation infrastructure, etc. This information will serve as a basis for estimating desired future conditions and likely trajectories of changes in resources. Post-operation information in particular will establish a starting point from which to measure trends to help determine if resources are changing due to management activities or because of influences outside the scope of the plan, and whether resources are progressing along expected trajectories.

For example, when dealing with timber sales, pre-harvest estimates will be conducted during the timber sale cruise, while post-harvest information will be acquired in conjunction with the timber sale contract administration. Data collection will be coordinated to contribute to and draw from data produced through the ODF stand level inventory and permanent plot network. Sampling methods and data quality standards will

allow direct input into the stand level inventory “data repository”. Protocols and data record forms will be established during project development. The sampling frequency of operations has not yet been determined.

A technical work group was formed to define implementation monitoring requirements for commercial forest management and other operations. The objectives of the work group are to develop or adapt methods, protocols, and reports for implementation monitoring and accomplishment reports and to design and implement a pilot project to test and refine methods and procedures for implementation monitoring. A similar work group will be established to define implementation requirements for reforestation and young stand management activities.

2.2 Effectiveness Monitoring

In general, the management activities outlined in the FMPs are expected to increase the diversity of stand types and more complex structures on the landscape that will benefit the species of concern. However, some activities provide more certain benefits than others. Some may even be considered experimental measures because their benefits have not yet been determined using rigorous scientific methods and experimental design. For these activities, scientific study is used to make a judgement on their effectiveness and to provide information useful in developing appropriate management responses. This process is called effectiveness monitoring.

Effectiveness monitoring will be conducted through specific projects that are designed to address key questions related to the management and conservation strategies (see Section 4). Once the critical questions have been identified and prioritized, design of the specific monitoring project will include, when appropriate:

- Review of currently available information;
- Involvement of stakeholders;
- Identification of and coordination with other monitoring;
- Development of a monitoring protocol that outlines the problem, the design and methods, the specific sites, quality assurance/quality control (QA/QC) requirements, data analyses, and time frames;
- Reporting commitments; and,
- Budget/Cost involved.

Potential methods for effectiveness monitoring include photo points, fixed plot installation and sampling, and in-stream temperature or water quality sampling. Data acquired in these projects will be used to evaluate the success of the strategies in meeting the biological goals of the FMPs. Sampling protocols and data record forms will be established as part of the project development.

A number of implementation and effectiveness monitoring issues and questions have been identified. An initial activity of the monitoring program will be to prioritize these issues and questions and to establish technical working groups to specify monitoring approaches.

2.3 Research

Research and monitoring activities will be the main source of information needed for decision making within the adaptive management framework. Monitoring will focus on specific assessment criteria related to performance of the management strategies, while research will focus on overarching questions about the validity of key assumptions in the FMPs.

Current fiscal budget guidance states that high priority projects identified in the forest plans will be initiated and that existing commitments will be maintained. In line with this guidance, budget requirements for research and monitoring include:

- Maintaining existing research commitments;
- Initiating new research projects to answer specific information needs to assess progress of the forest plans;
- Initiating a pilot project to develop and evaluate concepts and approaches for implementation monitoring.

Details of specific research projects are reported in the annual research and monitoring reports.

3. Infrastructure

3.1 Staffing

The Research and Monitoring Coordinator will organize and manage the initiation of monitoring projects, interpretation of data from monitoring and research, and development of proposals for change. ODF Section Managers (Tech. Serv., Asset Mgmt., Info. Sys., etc) will offer guidance in the development of research and monitoring policies and plans as well as provide services such as revenue analysis and database management. Responsibilities of staff and area resource specialists include providing input into the development of relevant research and monitoring questions and approaches, reviewing proposals and reports, and leading or assisting project development and implementation. District personnel will also provide input into the development and implementation of relevant research and monitoring questions and projects. They will assist in protocol development, data collection, and reporting. District staff will produce an annual monitoring report for inclusion in the annual program-level monitoring report to the State Forester and Board of Forestry (also see App. A & B).

Throughout the course of the initial implementation period information will be available from numerous sources, including Department of Forestry monitoring projects, research from a variety of sources, operational feedback from field personnel, and the general public. The research and monitoring coordinator, in conjunction with ODF resource specialists and field personnel, will periodically assess the incoming information to determine the key issues that will be the focus of discussion for the upcoming planning year.

Adaptive Management Review Team

As described in the FMPs (p. 5-29 NWFMP, p. 5-28 SWFMP), the research and monitoring coordinator will periodically assemble a review team or teams with appropriate technical and operational expertise to evaluate the body of information from research, monitoring, operational input, and the public, and to make proposals for change. This Adaptive Management Review Team will provide guidance in identifying specific monitoring questions that are critical to evaluating the success of FMP strategies and identifying possible methods to address these questions. This group would also make recommendations for establishing technical work groups to develop monitoring projects for specific issues. The work groups will examine issues in more detail and make recommendations for monitoring or research projects and to develop or adapt methods, protocols, and reports for monitoring and accomplishment reporting.

The Review Team will provide continuity to the overall monitoring effort as well as a link to individual monitoring work groups. Members of the Review Team will bring a strong understanding of what is necessary to make the FMPs successful. Core members of the Team will include representatives from among the ADFs, Area staffs, program, and technical specialists. Depending on the topic, the expertise on the team may vary to include experts from academic institutions, consultants, county representatives, and interest group representatives.

3.2 Funding

The State Forests Research Policy reviewed by the Board of Forestry and adopted by the State Forester in 1995 (Appendix D) states that approximately 5% of the State Forest Management Program annual budget can be invested in research, monitoring and technology transfer. Budgets for the program are prepared on both a biennial and annual basis. Proposed biennial and annual expenditures on Board of Forestry lands are based on projected revenues to the program fund, which is comprised of the State's share (~36%) of receipts generated from the sale of forest products and certain other use fees collected. The remainder of these receipts (~64%) are distributed to the counties and local taxing districts. The program receives no general fund support from the State Legislature.

As a result of this “dedicated” funding structure, biennial and annual expenditures are somewhat variable in response to shifting revenue levels that are largely beyond the agency's control. Proposed expenditure levels in the biennial budget may not be reached, due to lower than projected revenue. Because the planning timeline for annual budgets is shorter, revenue estimates are generally more accurate and fiscal budget proposed expenditures provide a more accurate picture of the activities that will actually occur on the ground. For these reasons, the funding and prioritization elements described in this plan will be applied through the fiscal budget process. ODF's fiscal budgeting process incorporates the concept of “levels”, and provides criteria for prioritizing various activities. Monitoring and research are activities that are addressed in this “levels” system.

The Department will use the budget levels concept to assure that average annual expenditures for monitoring under this plan can be approximately 5% of the aggregate fiscal State Forests Program operating budgets, contingent on the prevailing financial

situation, budget limitations, and ability to carry out projects. This will ensure that high priority activities are accomplished, and to increase the likelihood that medium and low priority activities are accomplished. This will lead to a variable level of expenditure on monitoring activities throughout the ten-year period that is consistent with the Board of Forestry policy on this issue.

The annual monitoring and implementation report will include a summary of monitoring expenditures for the previous fiscal year, and the percentage of the district, Area, and Salem staff budgets represented by the total expenditures.

3.3 Reporting and Information Management

A successful monitoring program requires acting on collected information in a timely manner. However, in order to have relevant, high quality data to act on, an organized system must securely store, analyze, and report project results using the collected data.

3.3.1 Data storage and analysis

The Stand Level Inventory (SLI) will be an important “repository” for most monitoring information. One of two formal vegetation inventory systems employed by the State Forests Program, SLI will provide current or recent information about forest vegetation characteristics and where they occur on the landscape. The other inventory system is the State Forests permanent plot inventory that provides information on forest vegetation condition and a measure of the vegetation change over time at the broad forest scale. Both systems will provide information needed for assessments related to the FMP strategies, for example stand structure classification, wildlife habitat suitability, and watershed assessments.

SLI will accept information from a number of different sources, provided that information is collected with accepted methods and data quality standards (as described in the SLI documentation). The main focus for SLI is for vegetation related information, but the sampling protocols are flexible enough to provide for collection, compilation, and reporting of other information as well. The Silvicultural Treatment Record system (STR) will be the main database tool for reforestation and young stand management data. Plans for enhancement of STR include accommodation of a variety of sampling approaches to enable management of operations planning and tracking. There will be linkages between the two systems so, eventually, even “stand exam” surveys may serve to populate the SLI database as well.

All monitoring data will be available in a central database as part of the State Forests Integrated Information System, designed and maintained by the State Forests Information Unit. Some information collected for monitoring purposes is also used on a daily basis for forest management planning and operations. For this reason, the primary storage location for monitoring information contained in the Stand Level Inventory and the Silvicultural Treatment Records program will be at the districts. When data from these programs is needed for analysis, it will be uploaded to Salem from the districts. Data for the Permanent Plot Inventory and for projects and issues that focus on smaller spatial or basin specific scales will be organized at the State Forests Program level. For monitoring

data stored on the districts, data integrity and consistency will be maintained by periodic reviews of the data by the Research and Monitoring Coordinator.

Data will be made easily accessible to the public, except for data that are exempt for disclosure under public records law (e.g. specific locations of threatened and endangered species). Analysis will occur using appropriate analytical tools, depending on the question, experimental design, and data structure. Potential tools include spatial analysis, univariate and multivariate statistical analysis, trend analysis, and basic graphical analysis. Analysis of monitoring data will occur at the program level or, in many cases, be conducted by researchers or contractors as part of a project plan. Planning for analysis will occur during the project development phase rather than in reaction to the data gathered.

3.3.2 Reporting

Timely reporting of monitoring information will be of utmost importance. Analyzed information, with recommendations for management action, will be reported annually for activities during a fiscal year. At a minimum the report will present:

- Questions being addressed
- Project summaries
- Progress reports
- Preliminary results

These reports will also describe actions that are about to be undertaken by ODF in the upcoming reporting period. Modifications or adjustments that follow from monitoring results or operational experience will also be described in the reports when necessary.

The specific format and level of detail provided in these reports will vary depending on the time period in question (certain details will only become available or be relevant at a given point in time) and the nature and extent of activities that have occurred. For instance, District Implementation Plans and Monitoring Plans are revised only periodically and will therefore not be included in every report. Similarly, detailed monitoring results may not be realized in any given year. To the greatest extent possible, the Department of Forestry will attempt to combine all reports, planning documents, and supporting information into one package for review. This combination of reporting and planning documentation should provide for more efficient and informed reviews.

The information contained in these reports will allow tracking of the level of compliance with the strategies of the FMPs during the period of time covered by the report, adequacy of funding, monitoring results, adaptive management decisions and overall consistency with the objectives and expectations for implementation of the management strategies. This report may also form the basis for determining the possible need to adapt management policies, biological or habitat goals, or monitoring activities.

During the first ten years of the implementation period of the FMPs, monitoring reports will be developed on an annual basis, although accomplishment reporting will be phased in over the first two reporting years. During the first comprehensive review (after ten years) it will be determined whether periodic (2-5 years) reporting is more appropriate.

Landscape-level changes and the results of effectiveness monitoring are not likely to be realized during one-year periods. Trends are usually discernible only after several years. Multiple-year reporting intervals may be sufficient to detect both any trend that may inform adaptive management decisions and any compliance issues that develop in the long-term.

The reports will form the basis for determining the possible need to adapt management policies, biological or habitat goals, or monitoring activities. Reports will be available to the Board of Forestry, the public, and other state and federal agencies. The state forests management monitoring program will also provide an annual oral report and update to the Board of Forestry. Special project reports that stand alone as individual studies or technical papers may also be available, and monitoring program updates and project descriptions will be available on the Department of Forestry's site on the World Wide Web. As the monitoring program develops, reporting mechanisms will be refined and improved.

10-year Report

The Monitoring Plan is intended to cover the first 10 years of FMP implementation. While it is likely that the plan will be revised somewhat during this period, there are several elements of the first comprehensive report that can be anticipated at the individual district as well as the area-wide level:

- Numbers and types of operations conducted;
- Comparison of present "current condition" with future "current condition";
- Report on one full sampling cycle on the Permanent Plot Inventory Network;
- Report on the status of the Stand Level Inventory;
- Results of the study on effects of management practices on riparian function;
- Initial results of the study on the effects of commercial thinning on the incidence and severity of Swiss needle cast
- Initial results of the study to determine the effects of different reforestation practices on stand condition at commercial thinning age;
- Initial results of study of stand structure development and wildlife relationships;
- Initial results on the effectiveness of road strategies; and,
- First estimates on the economic implications of the FMPs, particularly effects on harvest levels and revenues.

3.3.3 Coordination with other programs

In light of increased monitoring activities occurring within state, federal, and non-governmental organizations in Pacific Northwest, coordinated efforts are critical to the success of the FMPs. Coordination with regional monitoring programs (such as the federal *Northwest Forest Plan* and the *Oregon Plan for Salmon and Watersheds*) will help ensure the most efficient application of financial and human resources. Cooperation and exchange of information among programs will allow for a more extensive exploration of the effects of the landscape management objectives and generation of recommendations for adapting management or monitoring activities. Other forms of

coordination include participation in multi-agency monitoring committees; contact, planning, and coordination with watershed councils; review, application, or modification of existing protocols; joint development of protocols with landowners, stakeholders, and other agencies; and data sharing.

Opportunities for Public Involvement

The purpose of public involvement in the implementation of the FMPs is to improve the quality and effectiveness of the implementation process by providing the citizens of Oregon with a variety of opportunities to provide input into decisions about implementation of the FMPs, and to develop informed consent among potentially affected interests.

Specifically for the monitoring program, ODF will provide the public the opportunity to comment on the planning and prioritization of research and monitoring projects. The ODF plan for public involvement provides additional opportunities for ongoing and regular review and comment on planned operations, including monitoring projects. ODF will also provide information to the public about the FMPs and the activities associated with implementation, including implementation of the monitoring program.

4. Management Strategies and Key Questions

The FMPs describe a set of integrated management strategies designed to meet long-term habitat goals and to provide for properly functioning aquatic systems at the landscape level. Specific strategies will be implemented to protect and provide habitat in the short-term for all species of concern. All of the strategies are based on assumptions that will become the object of implementation and effectiveness monitoring. Monitoring and adaptive management will be the essential information source and approach that will guide implementation of all the strategies. The specific strategies are summarized below (Table 4.1).

Table 4.1: Management Strategies of the Northwest Oregon and Southwest State Forests Management Plan (FMPs)

-
- 1) Integrated forest management strategies
 - Landscape management strategies
 - Aquatic and riparian strategies
 - Forest health strategies
 - 2) Strategies for species of concern
 - 3) Strategies for specific resources
 - Agricultural and grazing resources
 - Air quality
 - Cultural resources
 - Energy and minerals
 - Land base and access
 - Plants
 - Recreation
 - Scenic resources
 - Soils
 - Special forest products
 - 4) Economic considerations, including revenues and economic impacts.
-

The following sections describe the issues and key monitoring questions associated with each of the strategies. Clearly, the questions that follow are not the entire “population” of possible monitoring questions. They are a foundation to be built upon or changed as new information is acquired. They address the most important current information needs as expressed in the discussion of the management strategies in the FMPs. The questions are intended to provide guidance for designing the specific monitoring projects. Detailed approaches and techniques will be developed for each question with appropriate assistance from experts and input from various interested parties.

As indicated, many of the implementation monitoring questions refer to short-term or site-specific issues. These results will be presented in annual reports and reports of specific pre- and post-operation surveys. Substantial progress will be made on many of the effectiveness monitoring questions within the first implementation period and some results will be a part of the 10-year review of District Implementation Plans. Other questions are longer-term and will require more extensive research and monitoring to answer. Results of effectiveness monitoring will help validate underlying assumptions and hypotheses, as presented in Section 1.

The following sections provide an overview of the management strategies, the issues and key monitoring questions to be addressed through implementation and effectiveness monitoring projects, as well as the information needs and possible methods. Recent or on-going research and surveys are reported as sources of information to aid prioritization and implementation of effectiveness projects.

4.1 Integrated Forest Management Strategies

The FMPs present a set of integrated strategies that allows landscape-level management of the forest as a whole, resulting in a broad range of habitat conditions. The strategies are designed to be applied through active silvicultural management. The integrated strategies consist of a set of four landscape management strategies, which are the core of structure-based management. The landscape management strategies are supplemented by aquatic and riparian strategies and forest health strategies. Up-slope issues such as roads and slope stability are addressed in the aquatic and riparian strategies. This set of integrated strategies will not focus on specific sites or species, but they will be applied across the landscape. Certain species- and site-specific issues are addressed in District Implementation Plans, Annual Operations Plans, and in the proposed Western Oregon Habitat Conservation Plan. These integrated strategies will contribute to development of a range of habitats that will accommodate most wildlife species and contribute to maintenance and restoration of biodiversity.

4.1.1 Landscape Management Strategies

(p. 4-47 NWFMP, p. 4-45 SWFMP)

The landscape management approach, based on the concepts of Structure-Based Management, will result in diverse forests of more complex stand types that will contribute to the range of habitats necessary for all indigenous species and broad biodiversity. Active silvicultural operations will be used to develop forest stands with particular structural characteristics that meet the habitat needs of wildlife, including the needs of threatened and endangered species.

It is anticipated that it will take 50 to 100 years to achieve the array of stand structure types of the landscape management approach on all districts in the planning areas. If this approach is successful, it is intended to replace the need for the specific, short-term approaches for individual species or individual sites. In the meantime, it may become necessary to adjust these short-term approaches over the course of stand development. For this reason, implementation and effectiveness monitoring of the landscape management strategies will receive the highest priority.

Strategy 1. Actively manage the state forest landscape and specific forest stands to produce the desired future array of stand structure types across the landscape in each Department of Forestry district and produce high levels of sustainable timber and revenue.

Type of monitoring: Implementation, Effectiveness

Strategy 2. Develop a landscape design that arranges the forest stand types to create a variety of patch types, patch sizes, and patch placement on the state forest landscape over time.

Type of monitoring: Implementation

Strategy 3. Actively manage the state forest landscape to incorporate structural habitat components into the forest at a landscape level:

- a) Retain remnant old growth trees or patches of old growth.
- b) Retain an average of five green trees per acre during regeneration harvest.
- c) During harvest activities, retain all existing snags; manage to provide at least two hard snags per acre, at least 15 inches in diameter on average across the landscape on each district; manage to provide at least six snags per acre in older forest structure stands, at least two of which must be 24 inches or larger in diameter.
- d) During harvest activities, retain existing down logs; during regeneration harvest, retain an average of 600 to 900 cubic feet of hard conifer logs (decay class 1 and 2) per acre, including an average of two logs per acre greater than 24 inches in diameter (at the largest end), where available; manage to achieve OFS stands that contain 600 to 900 cubic feet per acre of sound down logs (decay class 1 or 2), or 3000 to 4500 cubic feet of down logs in any or all decay classes (1-5).
- e) Manage vegetative communities to create complex multi-canopied forests or at least to increase the amount of layering in most stands.
- f) Manage to include a variety of native species.
- g) Manage vegetative communities to encourage diverse herb and shrub layers.
- h) Manage stands for gaps to provide horizontal diversity; natural openings due to windthrow, insects, and disease, etc. will suffice in many cases; however, where a deficiency exists, consider creating gaps through management activities.

Type of monitoring: Implementation, Effectiveness, Validation

Strategy 4. Develop implementation plans for each district that provide more specific information on the application of Landscape Management Strategies 1 – 3 for a ten-year period.

Type of monitoring: Implementation

Implementation Monitoring (Initial Key Questions)

- Was an assessment of current forest condition and determination of desired future condition conducted?
- Was a District Implementation Plan (IP) developed?
- Are IP goals and objectives reflected in Annual Operations Plans?

Implementation of these management strategies is addressed in District Implementation and Annual Operations Plans. Annual Operations Plans describe the specific management actions to be undertaken in the upcoming year. Monitoring needs required as a result of those actions can then be determined. Additional sources of information include updates of the Stand Level Inventory (SLI) and re-measurements on the permanent plot network. Appropriate methods will be selected and data collection protocols developed (e.g. ODF, 1998).

Stand structure targets are described in District Implementation Plans. These plans include descriptions of the current stand conditions in each district and will present a landscape design that is consistent with the landscape design guidelines. These designs

describe or display how the desired future stand conditions will be arrayed across the landscape to achieve the variety of patch types, sizes, and arrangements necessary to provide functional habitat conditions. The plans also identify the type of silvicultural activities that will be applied during the implementation period and how those activities are expected to move stands towards the identified desired future conditions.

Development and implementation of District Implementation Plans will be tracked through the internal review process of IPs, resolution of the reviews and final approvals. The relationship of AOPs to IPs will be monitored through the AOP approval process and through annual district accomplishment reports that summarize actual AOP activities.

Effectiveness Monitoring (Initial Key Questions)

- Does active management accelerate development of more complex stand structures?
- Does the strategy of retaining green trees serve to supplement snag development or recruitment of down woody debris?
- Are the expected wildlife species using snags and down wood as habitat?
- Does active management result in the expected arrangement of habitats across the landscape?
- Do habitat characteristics of OFS have a similar function to those provided by old growth forests?
- Does a diversity of horizontal and vertical stand structures increase functional habitat for species that prefer mature forest components?

Effectiveness of the strategies will be addressed through use of baseline information on landscape characteristics determined through pre- and post-operation reports, existing/updated inventory information, and additional surveys and fixed-plot analyses as necessary. The baseline of stand structures may change since initial estimates were based on inventory data not well suited to identify stand types.

Monitoring projects will provide information to evaluate if stands are moving toward the intended future conditions. These projects will be established in a sub-set of stands to determine and track stand structure development over time across the landscape. The Stand Level Inventory (SLI) protocol will be the primary tool for measuring pre- and post-operation stand conditions. Annual data reports will include pre- and post-operation information on stand structure components such as green tree retention, snags, down wood, etc. Periodic ten-year reports will include information on district-wide levels of these components.

Validation Monitoring (Key assumptions)

- An active and integrated forest management approach will provide for high levels of sustainable and predictable timber and revenue while concurrently providing habitat for native fish and wildlife species.
- Providing for biodiversity at the landscape level requires providing for an array of forest conditions through time and space that emulates conditions created by historic disturbance regimes.
- Providing for a diverse array of forest conditions through time can be accomplished in a managed context through the application of silvicultural principles.

- Timber markets will exist over time for the range of timber types and qualities that will be produced from state forests.
- A diverse array of forest conditions will provide diverse recreational opportunities on these state forest lands.

Validation monitoring is long term and will be accomplished through the formal research and effectiveness monitoring projects described. ODF will support and participate in research efforts to evaluate the relationships between habitat needs and stand structures.

Next steps include working with staff specialists and others to design a “Stand Structure Development and Wildlife Relationships” study (see Appendix F), prioritizing and implementing projects, developing project plans and data collection protocols.

Relevant research is being conducted in the Cooperative Forest Ecosystem Research (CFER) (partners include ODF, BLM, USGS, and OSU) and other long-term research programs, for example: Influence of thinning on growth and survival of understory shrubs (Tappeiner, Sullivan – CFER). Old-growth stand development (Tappeiner et al. – CFER). Thinning to increase vigor of old-growth trees (Tappeiner, Latham – CFER). Avian response to thinning (Edge, Loegering – CFER). Small mammal response to thinning (Hayes, Larson – CFER) Influence of coarse wood on small mammals (Hayes, Waldien – CFER). See the CFER annual reports for additional information. Carey, et al. (1999) and Hemstrom, et al. (1998) provide guidelines for effectiveness monitoring of stand development. Methods for determining the effectiveness and ecological importance of snags and woody debris can be found in Bull, et al. (1997) and Stevens (1997). In addition, ODF is supporting research on the interactions of forest management, specifically commercial thinning, and Swiss needle cast disease (Maguire et al., 2001) and on management options for the development of young stands toward complex forest structures (Puettmann, 2002).

4.1.2 Aquatic and Riparian Strategies

(p. 4-59 NWFMP, p. 4-57 SWFMP)

In conjunction with the landscape management strategies discussed above, the strategies for aquatic and riparian resources will maintain and restore properly functioning aquatic systems on state forest lands.

Strategy 1. Implement watershed assessment and analysis:

- a) Develop a comprehensive watershed assessment and analysis process for state forest lands that is consistent with, but more rigorous than, the existing Oregon Watershed Enhancement Board (OWEB) process.
- b) Conduct watershed assessments and analyses on priority watersheds on state forest lands within the planning area, within the initial ten-year implementation period following plan adoption.
- c) Cooperate with local watershed councils and adjacent landowners, to assure that watershed assessments on Department of Forestry lands consider conditions and limiting factors on other lands to the greatest extent possible.

- d) Analyze information collected through watershed assessments and other inventory and assessment projects, and effectively apply the results at the appropriate planning level through the adaptive management process.

Type of monitoring: Implementation

Strategy 2. Apply management standards for aquatic and riparian areas. Establish and maintain riparian management areas adjacent to all streams, in accordance with the standards and guidelines described in the proposed Western Oregon State Forests Habitat Conservation Plan, and Appendix J of the FMPs.

Type of monitoring: Implementation

Strategy 3. Restore aquatic habitats:

- a) Complete assessments to identify potential factors that could be contributing to undesirable aquatic habitat conditions, or that could be limiting the recovery of aquatic habitats.
- b) Identify, design, and implement projects to remedy identified problems in a timely manner.

Type of monitoring: Implementation

Strategy 4. Apply alternative vegetation treatment to achieve habitat objectives:

- a) Complete basin-level assessments to evaluate whether alternative vegetation treatments are needed to achieve properly functioning aquatic habitat conditions in a timely manner. Where appropriate, use the information from the assessments to plan alternative vegetation treatments.
- b) Alternative vegetation treatment projects will be planned using a multi-disciplinary approach involving a variety of resource specialists.
- c) Alternative vegetation treatment projects will be monitored and evaluated over time to assure that the objectives are being achieved, and undesirable effects are being minimized. The results of these evaluations will be incorporated into these management activities in an adaptive management context.

Type of monitoring: Implementation, Effectiveness

Strategy 5. Apply specific strategies to other aquatic habitats: Establish and maintain riparian management areas adjacent to other aquatic habitat areas in accordance with the standards described in the proposed Western Oregon State Forests Habitat Conservation Plan, and Appendix J of the FMPs.

Type of monitoring: Implementation

Strategy 6. Slope stability management strategies:

- a) Through the watershed assessment process developed under Aquatic and Riparian Strategy 1, complete a broad level assessment of landslide hazards on state forest lands in the planning area (Level 1).

- b) During district implementation planning and annual operations planning, utilize geotechnical specialist expertise in evaluating alternatives that can minimize, mitigate for, or avoid risk in high and moderate hazard areas (Level 2).
- c) During project planning and design, utilize geotechnical specialist expertise in designing operations that will minimize, mitigate for, or avoid identified risks (Level 3).

Type of monitoring: Implementation, Effectiveness

Strategy 7. Forest roads management strategies:

- a) Through the watershed assessment process developed under Aquatic and Riparian Strategy 1, complete a comprehensive inventory of existing roads on state forest lands in the planning area.
- b) Through development and updating of district implementation plans, apply the processes and standards for transportation planning described in the Forest Roads Manual.
- c) Forest road design, construction, improvement, and maintenance will be carried out in accordance with the processes and standards described in the Forest Roads Manual.
- d) Identify and prioritize roads for closure and/or abandonment using information gained from the comprehensive forest roads inventory, and in accordance with the standards described in the Forest Roads Manual.

Type of monitoring: Implementation

Implementation Monitoring (Initial key questions)

- Were necessary watershed assessments conducted?
- Are operations conducted consistent with the management standards applicable to stream type as described in the FMPs?
- Were the forest roads management strategies implemented as specified?

Implementation of these management strategies is addressed in District Implementation and Annual Operations Plans. Annual Operations Plans describe the specific management actions to be undertaken in the upcoming year. Annual reports will include pre- and post-operation information on stand structure targets for RMAs, results from appropriate components of watershed assessments, and information on the implementation of management standards for road construction and maintenance, fish passage, and hazard assessments. Sampling protocols and descriptions of sampling methods can be found in Barker, et al. (1999), MacDonald, et al. (1991), Oregon Department of Forestry (1999), Oregon Plan for Salmon and Watersheds (1999), and Watershed Professionals Network (1999). Appropriate methods will be selected and data collection protocols developed.

Effectiveness Monitoring (Initial key questions)

- Does the combination of the landscape management strategies and the aquatic and riparian strategies lead to riparian stand conditions that provide for properly functioning conditions?

- Does application of the management standards for forest road design, construction, improvement, and maintenance minimize road-related landslides and sediment loading to streams?
- Does application of the risk evaluation process minimize the occurrence of management-related landslides?

Effectiveness will be addressed by using baseline information to be collected on riparian stand conditions across all stream types. Riparian stands will be periodically assessed to determine if management is maintaining or restoring an array of habitat conditions. A sub-set of streams will be periodically re-inventoried to evaluate how aquatic habitat conditions are changing over time in a variety of streams. Development of aquatic habitat in actively managed riparian areas will be compared with habitat development in streams in passively managed young stands. Water quality parameters will be measured periodically on a sub-set of riparian management treatments to assess whether the resulting post-activity conditions are adequate to meet the needs of aquatic species. Many of these issues will be addressed in watershed assessments or specific projects will be conducted on high priority questions (see “Stream Temperature and Riparian Function”, Appendix E and F).

Effectiveness of the upland management strategies will also be addressed through research to identify sources of large woody debris in streams and to assess the level of large woody debris entering aquatic systems from up-slope sources. The relationship between management activities and landslide frequency will be assessed. Forest roads inventories will be updated periodically on each district. Projects will be established to evaluate water quality in sub-basins that have varying road densities and also have varying levels of road improvement.

Validation Monitoring (Key assumptions)

- Active management through a combination of landscape level strategies and site specific standards will result in maintaining and restoring properly functioning aquatic and riparian habitats.

Validation monitoring is long term and will be accomplished through the formal research and effectiveness monitoring projects described. ODF will support and participate in research designed to evaluate interactions between riparian area management and aquatic habitat condition and use.

Next steps include coordination of monitoring plans with the Oregon Plan for Salmon and Watersheds and with the monitoring activities of the ODF Forest Practices monitoring program, and working with staff specialists, including forest engineering and geotechnical specialists, to design and implement specific projects. Transportation and road maintenance plans are being developed.

The ODF SFMP and FPMP recently (2002) initiated a joint monitoring project to determine the effectiveness of FMP aquatic and riparian strategies and Forest Practices riparian rules in protecting stream temperature and promoting riparian structure that provides necessary functions for the protection of fish and wildlife habitat (Peck, et al. 2002). Additional relevant research is being conducted in the Cooperative Forest

Ecosystem Research (CFER) and other long-term research programs, for example: Influence of thinning on instream habitat and fish populations (Gresswell, Bateman – CFER) Large woody debris production and input (Hibbs, Sullivan – CFER) Environmental controls on woody plant diversity in W. Oregon riparian forests (Hibbs, Sarr – CFER) Large wood recruitment and redistribution (Gresswell, May – CFER) Functional role of large wood (Gresswell, May – CFER). ODF published a report on storm impacts and landslides of 1996 (Robison, et al. 1999).

4.1.3 Forest Health Strategies

(p. 4-77 NWFMP, p. 4-75 SWFMP)

The integrated forest management strategies are expected to provide many of the conditions necessary to maintain good forest health. Forest health strategies are designed to keep the effects or impacts of pests to acceptable levels, recognizing that these levels of acceptance will vary over time and space as objectives and constraints change. The forest health strategies apply to upland and riparian areas.

Strategy 1. Actively manage the forest to maintain or improve forest health.

Strategy 2. Detect and monitor pest populations, damage levels, and trends.

Strategy 3. Use the Integrated Pest Management (IPM) process to implement suppression or prevention actions when pest populations or damage exceed acceptable levels.

Strategy 4. Assess and manage forest genetic resources.

Strategy 5. Implement the Strategic Plan for Managing State Forests Affected by Swiss Needle Cast (2000).

Strategy 6. Participate in research and cooperative programs that align with our management objectives, to improve our knowledge and actively enhance forest health and biodiversity.

Strategy 7. Cooperate with other agencies and associations to prevent the introduction of non-native pests.

Type of monitoring for all strategies: Implementation

These strategies have been implemented state-wide and on-going monitoring efforts are established in other ODF program areas.

Recent or on-going activities to implement these strategies, include: Thinnings to reduce incidence of disease; planting disease resistant species; annual aerial surveys to track pest damage, locate areas of significant damage, and identify potential salvage areas; ground surveys to quantify damage at stand or sub-basin level; periodic stand exams; trapping for certain insect pests; participation in the national Forest Health Monitoring Program; long-term genetic field trials; participation in Coop Tree Improvement Program; participation in Regional Forest Gene Conservation Program; Swiss Needle Cast Cooperative; blister rust resistance trials; and spruce weevil risk rating.

Additional projects will be developed to address specific information needs, such as the relationship between needle cast severity and seed source or the effects of commercial thinning on needle cast infected stands.

Implementation Monitoring (Initial key questions)

- Are the Forest Health strategies implemented correctly?

Effectiveness Monitoring (Initial key questions)

- Does implementation of the forest health strategies keep the effect of pests and pathogens to acceptable levels?
- Are the occurrence and distribution of pests and pathogens influenced by different stand structures as a result of active management?
- Does thinning of dense single-species stands limit the spread of certain pests and pathogens?

Validation Monitoring (Key assumptions)

- A diverse array of forest conditions will enhance overall forest health and reduce the risks of catastrophic loss from insects and disease.

4.2 Strategies for Specific Species of Concern

(p. 4-81 NWFMP, p. 4-79)

The integrated management strategies are intended to result in conditions on the landscape and in aquatic and riparian areas that will provide functional habitat conditions for all native species. However, some species may require specific conservation and protection measures to supplement these underlying strategies. State forests will be managed to provide the habitats and other conditions that will support populations of size, distribution, and productivity that are consistent with the long-term survival and conservation of these species.

Strategies for specific species such as Northern spotted owls and marbled murrelets will be developed as the management strategies are finalized in the Western Oregon Habitat Conservation Plan. If an HCP is not obtained, monitoring will focus on the effectiveness of the FMP strategies, plus “take avoidance” measures.

4.3 Strategies for Specific Resources

(p. 4-85 NWFMP, p. 4-81 SWFMP)

The integrated management strategies (Section 4.1) are intended over time to result in habitat conditions on the landscape that will provide functional habitat conditions for all native species. Additional species-specific strategies for species of concern (Section 4.2) are intended to protect existing key habitat areas or sites considered critical to the short-term survival of individuals or populations. The following strategies are designed to meet specific resource goals that the integrated strategies alone may not achieve. Where appropriate, implementation, effectiveness, and validation issues are identified for each

of the strategies. These specific actions will occur within the framework of the integrated strategies. Taken together, all the strategies described represent the specific actions that will be taken to achieve the management goals of the FMPs.

4.3.1 Agricultural and Grazing Resources

(p. 4-86 NWFMP, p. 4-82 SWFMP)

Agriculture

- 1) Agricultural uses will be considered on a case by case basis. Permits will be issued when these activities are compatible with other forest resources and activities.

Grazing

- 1) Grazing leases on Board of Forestry lands will be considered on a case by case basis and issued when they are compatible with managing for greatest permanent value of the lands and do not conflict with other resources.
- 2) Grazing leases on Common School Forest Lands will be considered on a case by case basis and those leases will be issued by the Division of State Lands (DSL) when they are compatible with other resources.

Implementation monitoring: Track issue of permits and leases.

4.3.2 Air Quality

(p. 4-88 NWFMP, p. 4-84 SWFMP)

- 1) To protect visibility in Class I wilderness and national park areas:
 - a) Conduct prescribed burning outside the restricted July 1 to September 15 period.
 - b) Comply with the provisions in the Visibility Protection Plan that allow exemptions to the summer burning prohibition in the case of (a) coastal conifer and hardwood conversion burning; (b) western Cascade research and hardwood conversion burning; (c) application of the emergency clause, which deals with undue, adverse economic impacts on the forest industry caused by unusual weather conditions.
 - c) Advise the Department of Environmental Quality (DEQ) of any significant changes in prescribed burning that would cause emissions to exceed allowable increments over baseline levels, in accordance with the Prevention of Significant Deterioration Rule.
 - d) As a long-term (15-year) effort to further remedy existing impairment and prevent future impairment, develop and implement best available technology (BAT) in cooperation with DEQ, federal landowners, and private landowners.
- 2) Comply with the Oregon Smoke Management Plan
- 3) Continue to implement alternatives to prescribed burning, and use burning techniques that reduce smoke emissions.

Implementation monitoring: Track compliance with seasonal burning restrictions and with the Oregon Smoke Management Plan.

Effectiveness monitoring: Do burning restrictions maintain air quality/visibility in wilderness areas and national parks?

4.3.3 Cultural Resources

(p. 4-90 NWFMP, 4-85 SWFMP)

- 1) Complete an inventory and assessment of cultural resource sites and conduct a prehistoric and historic cultural resource review.
- 2) Develop a cultural resource database for tracking and planning purposes, including a system of recording, filing, and retrieving cultural resource site data from GIS overlays and basin level inventories.
- 3) Develop a procedure for integrating site protection into forest activity plans by providing practical guidelines for recognizing, assessing, recording, and protecting sites.

Implementation monitoring: Track and report on development of the inventory, database, and guidelines.

4.3.4 Energy and Minerals

(p. 4-94 NWFMP, p. 4-89 SWFMP)

- 1) Survey, evaluate, and identify aggregate rock sources important for the long-term management needs of Oregon state forests.
- 2) Review and update Division of State Lands (DSL) and Oregon Department of Forestry (ODF) roles, responsibilities, and procedures dealing with mineral and energy resource assessment and prospecting and mining permit applications involving state forest land.

Implementation monitoring: Assessment of rock source plans and review of ODF/DSL joint activities.

4.3.5 Land Base and Access

(p. 4-96 NWFMP, p. 4-91 SWFMP)

Land base:

- 1) Minimize the amount of forest land used for roads, road corridor clearings, landings, and mineral extractions by ensuring that construction and development specifications are designed to efficiently meet management activity objectives.
- 2) Follow the procedures in ORS 197.180 and OAR 660-30, 660-31, and the Department's State Agency Coordination Program, OAR 629-20, to assure that land use programs and activities are consistent with Statewide Land Use Planning Goals

and are compatible with acknowledged county comprehensive plans and land use regulations.

- 3) Continue with an active land exchange and acquisition program in those districts that have favorable consolidation opportunities.
- 4) Develop and implement land survey plans for each district in order to establish and/or reestablish state forest boundaries to meet management activity needs.

Access:

- 1) Develop a database and GIS overlay of the road and trail network to use for planning and tracking purposes.
- 2) Construct, improve, and maintain road and trail systems using engineering design, construction techniques, and maintenance programs consistent with the type and level of use, level of difficulty and hazard, amount of resource risk, and the minimum standards set by the Forest Practices Act.
- 3) Consult and coordinate with adjacent landowners concerning possible road sharing opportunities to avoid unnecessary duplication of road systems.

Construction, improvement, and maintenance of road and trail systems will be accomplished in accordance with the processes and standards described in the *Forest Engineering Roads Manual* and in the *Recreation Design Standards and Management Guidelines Manual*.

Implementation monitoring: Track compliance with the requirements described above.

4.3.6 Plants

(p. 4-99 NWFMP, p. 4-94 SWFMP)

- 1) Maintain a variety of seral stages, stand structures, and stand sizes across the landscape by implementing the integrated forest management strategies. These include the landscape management, aquatic and riparian, and forest health strategies.
- 2) Protect riparian vegetation during forest operations by applying aquatic and riparian strategies.
- 3) Protect endangered, threatened, candidate, and rare plants as identified by the Oregon Natural Heritage Program by following procedures for complying with state and federal Endangered Species Acts for plants.
- 4) Contribute to statewide efforts to reduce the quantity and range of invasive, non-native plant species.

Implementation monitoring: Track compliance with the requirements described above.

Effectiveness monitoring: Does implementation of the integrated forest management strategies protect the habitat needs of native plant species on state forest lands?

4.3.7 Recreation

(p. 4-101 NWFMP; p. 4-96 SWFMP)

Strategies for the entire planning area:

- 1) Complete recreation management plans (RMP) for the following forests: Clatsop State Forest, Santiam State Forest, West Oregon/Western Lane District state forest lands.
- 2) Develop a set of standards and guidelines to govern recreation management activities and facility development and maintenance.
- 3) Complete development of a coordinated volunteer program for the northwest Oregon state forests to maximize the efficient use of volunteers in recreation management efforts.
- 4) Pursue cooperative agreements with user groups and other agencies and organizations to diversify the funding for recreation management projects and programs.
- 5) Develop consistent themes and interpretive media for informing the public about the management of state forest land.
- 6) Apply OAR 629-25 governing recreational use, combined with an effective law enforcement program designed to meet each district's needs.

Tillamook State Forest strategies:

- 1) Continue to implement the action items identified in the Tillamook Comprehensive Recreation Management Plan adopted by the Board of Forestry in 1993 and updated in 2000.
- 2) Continue with the implementation of the Tillamook State Forest Interpretive Master Plan. Identify and pursue opportunities to use Tillamook State Forest materials for interpretive opportunities on other state forests.

The RMPs focus on a short-term action plan, describe the role of the forest as a recreation provider, and provide a map of the designated activity zones. An important element of the action plan is to monitor, record, and analyze information on recreation in the forest and determine emerging new activities and trends.

Recreation use monitoring is currently being conducted on the Tillamook State Forest. It is intended that use monitoring will be extended to the Clatsop and Santiam State Forests and to the West Oregon district. In the future, recreation use monitoring will be continued and expanded consistent with available resources. These activities will be coordinated with other monitoring efforts occurring on the forest. Survey data will be collected to assess levels of trail use, camping, and other recreational activities. Consistent procedures to monitor resource impacts from recreation activities will be developed and, when necessary, adaptive management measures will be applied.

Implementation monitoring: Recreation strategies will be tracked through accomplishment reporting of the Area/District recreation specialists.

4.3.8 Scenic Resources

(p. 4-105 NWFMP, p. 4-97 SWFMP)

- 1) Identify and classify areas for level of visual sensitivity in accordance with the Forest Land Management Classification System described in Oregon Administrative Rule. Conduct management activities consistent with the requirements of the administrative rule.
- 2) Identify other areas of visual sensitivity according to criteria for moderate and low sensitivity levels. Conduct management activities consistent with visual management objectives identified for moderate and low sensitivity levels.
- 3) Develop a visual resource management handbook and training manual for use by managers to help them effectively incorporate landscape design concepts into district implementation plans and annual operations plans.

Much of the work necessary to accomplish the scenic resource strategies has already occurred through comprehensive recreation planning efforts and through forest land management classification.

Implementation monitoring: Identification and classification of areas for the level of visual sensitivity in accordance with the Forest Land Management Classification System described in Oregon administrative rule; Development of a visual resource management handbook and training manual.

4.3.9 Soils

(p. 4-108 NWFMP, p. 4-100 SWFMP)

- 1) Comply with all Oregon Forest Practices Act requirements for soil protection.
- 2) Minimize management-induced slope soil movements by obtaining timely geotechnical input.
- 3) Maintain quantities of organic material in the soil (duff and litter).
 - a. Conduct prescribed burns under conditions that minimize the impact to soil organic materials. For example, take into consideration the amount and distribution of fuels, fuel moisture, weather conditions, and topography.
 - b. During timber harvest, use logging systems that minimize disturbance to the existing duff, litter, and woody debris, except where disturbance is desirable to facilitate regeneration. To the greatest extent practicable, retain logging residue (limbs, tops, cull logs, etc.) while not creating an unacceptable fire hazard.

Implementation monitoring: Track compliance with the requirements described above.

4.3.10 Special Forest Products

(p. 4-110 NWFMP, p. 4-102 SWFMP)

- 1) On districts where special forest products are an active resource, develop inventories for specific, high demand products.

- 2) Develop and provide districts with the following resources to assist with special forest product management.
 - a) Provide districts with a manual to guide special forest product sales
 - b) Develop a standardized accountability process (load tickets, etc.)
 - c) Review and revise, as needed, the Department of Forestry's directives that pertain to special forest products.
 - d) Coordinate and disseminate special forest product information between districts, and communicate about special forest product activities with adjacent landowners.
- 3) Where districts identify a need, districts will develop a special forest products sale planning program.
 - a) Identify the major products that will be emphasized on each district (for example, moss, salal, boughs, mushrooms, beargrass) as well as the other incidental products that may be requested.
 - b) For the major and incidental products, delineate logical sale units and personal use areas that can be made available throughout the district over time.
 - c) Develop a harvesting schedule based on the productivity of special forest products for both commercial harvesting and personal use.

Some of the work necessary to accomplish the special forest products resource strategies has already occurred through earlier planning and assessment efforts. Additional information to support implementation of this strategy will become available during plan implementation through updated forest inventory and other data collection efforts.

Implementation monitoring: Track development of inventories and sale planning.

4.4 Asset Management Guidelines

(p. 5-7 NWFMP, SWFMP)

The goal for management of state forest lands is to “secure the greatest permanent value of such lands to the state” (OAR 629-035-0000 - 0110). Just as the landscape management strategies will provide habitats and conditions necessary to support and protect numerous species of plants and wildlife and to maintain good forest health, they also ensure management of forests to provide “healthy, productive, and sustainable forest ecosystems that over time and across the landscape provide a full range of social, economic, and environmental benefits to the people of Oregon”

Implementation Monitoring (Initial key questions)

- Are mechanisms in place to collect, track and analyze data on timber harvest and revenues to the state, counties, local taxing districts, and the Common School Fund?

Several ODF programs are responsible for the business management functions. These include financial management that is accomplished through revenue and expenditure planning, revenue forecasting, and biennial and fiscal budgeting. Dispersal of revenues to

the counties and other recipients is tracked. The Forest Management Plans serve as the basis for financial management planning, as it identifies the appropriate types and levels of management activities that achieve the legal mandates for managing the lands.

The State Forests Program currently produces several reports:

- Volume and value harvested (monthly, calendar year, fiscal year)
- Volume and value of sales sold (calendar year, fiscal year)
- Uncut volume under contract (annual)
- Planned sales (fiscal year)
- Acres sold – clearcut and partial cut acres by sale, district, area (any time period)
- Revenue distributed to counties (from ODF Finance division)

Annual reports for County Forest Trust Land and Common School Forest Land include volume and revenues by ODF ownership type and by county. The Finance Division makes quarterly payments to the counties as timber is removed from the timber sales. The ODF Annual Report, produced by the Resources Planning Division, reports acres harvested off all ownerships (for the federal fiscal year), volume removed (for the calendar year) by county, and volumes by tree species categories (western Oregon). These reporting structures will be reviewed with the Asset Management Section to determine if they provide the necessary information to report on the economic component of FMP implementation.

Effectiveness Monitoring (Initial key questions)

- Are timber harvests and revenue predictable and sustainable?
- What changes occurred in employment in the forest products industry that are attributable to management practices of the FMPs?
- What changes occurred in timber markets that are attributable to management practices of the FMPs?
- What effects do management practices have on transportation infrastructure (e.g. truck vs. rail)?
- How are management practices affecting special forest products?

Validation Monitoring (Key assumptions)

- Active and integrated forest management will provide for high levels of sustainable and predictable timber and revenue.
- Timber markets will exist over time for the range of timber types and qualities that will be produced from state forests.

In 1996, Resources Planning Division produced a lengthy report “NW Oregon State Forests Management Plan: Connection to State and Local Economies November 1996” (Lettman, 1996). The report covers background; economic analysis approach; Oregon forest ownership patterns, ages, and sizes; Oregon and local population trends; Oregon economic performance and outlook. It describes local economies and non-timber resource uses, including recreation and special forest products. The report summarizes the NWFMP strategies (as of 1996) and the economic impacts of the strategies in the

short- and long-term. Appendices include timber volume harvests, relationship between forest management and anadromous fish, economic impact of coho salmon, and big game hunting activities. The study concludes that implementation of the forest management strategies of the NWFMP will affect numerous financial and non-financial values associated with northwest Oregon state forests: commercial, recreational, and others. While state forests are not a major factor in the Oregon state economy, they are significant to local communities as a source of revenue to local government, as a source of employment in the local community, and as source of diverse recreational opportunities. For example, the study reports that for every one million board foot change (either increase or decrease) in harvest levels in northwest Oregon, approximately 23 jobs would be created or eliminated with an average wage of \$27,300 (1993 dollars). In addition, revenue distributions, county general funds, and school budgets are affected. It is proposed to update this analysis toward the end of the initial implementation period in order to assess trends in the impacts of the FMP strategies on local economies.

This wide array of tracking records and reporting functions provides a significant base, as well as a well established system, to determine trends in economic costs and benefits of the FMPs.

4.5 Prioritization of Monitoring Activities

Projects have been identified that will contribute to understanding of the effectiveness of key management strategies, the underlying assumptions, and the working hypotheses related to the FMP. These projects are a high priority for ODF initiated projects in this implementation period. They include:

- Implementation monitoring procedures and reporting
- The interaction between Swiss needle cast and commercial thinning
- Assessment of young stand management strategies
- Stream temperature and riparian function
- Northern spotted owl and marbled murrelet surveys and site monitoring
- Stand structure development and wildlife relationships
- Forest road strategy effectiveness
- Socio-economic report update
- Public acceptance assessment

These projects and their related strategies are briefly described in Appendix F and the anticipated timeline for their implementation is outlined in Appendix C. ODF is also involved in a number of relevant ongoing studies and cooperative efforts which are summarized in Appendix E.

As guidance in pursuing additional projects and opportunities, ODF has identified a series of research and monitoring themes. These themes are meant to encompass a problem complex that includes a number of more specific issues and questions, and therefore, a number of potential research and monitoring approaches to meet the information needs. These themes are:

- Stand structure development and wildlife relationships;

- Hydrologic functions and aquatic and riparian habitat;
- Young stand development;
- Forest health

Taken together, the ODF projects to be initiated and in progress, ongoing cooperative work, and additional work related to the identified themes, will provide a good foundation of monitoring and research information to help evaluate ODF's first FMP implementation period.

The following considerations were applied in setting initial priorities among effectiveness monitoring projects and will be used to help prioritize information needs within the research and monitoring themes:

- Is the activity central to answering critical effectiveness or validation questions relative to key FMP strategies?
- Will the activity provide information that will be critical to a scheduled periodic review?
- Does the package of activities result in a balanced program – i.e. it includes a variety of resources and disciplines, and includes both short term operational studies and longer term studies?
- Is there an activity or project currently underway that is a cooperative effort with other organizations and requires an on-going commitment for the project to be successful?

From the initial effectiveness monitoring questions described in this plan, monitoring teams will develop more specific monitoring questions, recommend project priorities, identify coordination opportunities, and working with technical specialists and others, develop detailed approaches and methods for answering the monitoring questions. In some cases, appropriate methods may already exist, and can be adopted. In some cases, ODF will initiate monitoring or research projects. In other cases, ODF will be asked to support relevant research or monitoring activities proposed by others. At the project development or evaluation level, activities will be assessed using a number of considerations including:

- The applicability of the results (broadly vs. narrowly applied) to ODF lands and objectives:
- The ability to define a question and project that will yield meaningful results;
- The availability and qualifications of researchers (for ODF sponsored research);
- The timeframe in which results will be available (balance long and short term projects)
- The “efficiency” of the project, i.e. consider the probability of success, benefit of information, cost of the work.
- The ability for ODF to successfully implement the project.

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6. Appendices

Appendix A: STATE FORESTS MONITORING PROGRAM GENERAL ROLES & RESPONSIBILITIES

Overall Program

| PERSONNEL | RESPONSIBILITIES |
|--|---|
| Research and Monitoring Coordinator | Overall coordination of State Forests R&M program. Leads the development of R&M policies, plans, and implementation. Coordinates/integrates staff specialist input. Assists in budgeting. Coordinates overall tech transfer. |
| State Forests Program Director | Provides overall responsibility for State Forests Program policies and budget. |
| Technical Services Section Manager | Provides supervision and guidance in the development of R&M policies and plans. Supervises tech. staff specialists. Provides resources, budgeting. |
| Planning Coordinator | Leads FMP accomplishment reporting effort. |
| Other Section Managers (Asset Mgmt.; Integrated Information Systems, etc.) | Provide input into the development of R&M approaches. Track and analyze sale and revenue data. Provide information management services, e.g. GIS, Stand Inventory, database management, etc. |
| Staff and Area Specialists | Propose relevant R&M questions. Participate in integrating disciplines and approaches. Lead or assist project development and implementation. Review proposals and reports, make recommendations on funding. Provide tech transfer. |
| District Representatives | Provide input into the development of R&M approaches. Implement agreed upon approaches and/or administer some contracts. Participate in discussions/decisions on R&M needs and approaches. Provide field support for studies. |
| ODF Technical and Operational Adaptive Management Review Team | Provide guidance on monitoring questions, priorities, funding recommendations. Make recommendations on est. of tech work groups. Conduct periodic program assessments (staffing, workload etc.) |
| Scientists, Researchers, Agency Representatives (e.g. ODFW, USFS) | Review/comment on R&M plans. Provide info on current work & literature. Review/comment on R&M questions, protocols, design. Act as leads on some projects. |
| Contractors | Perform R&M work as contracted for ongoing work or specific projects. |
| Public | Provide regular review and comment on R&M plans and priorities. Participate in specific monitoring projects. |

Appendix A: Continued

Implementation Monitoring

| ACTIVITY | RESPONSIBILITY |
|---|---|
| Protocol Development | R&M Coord.; appropriate district & staff contacts (i.e. RUFs, MUFs, Engineers, Info Unit, technical specialists etc.) |
| Data Collection | Districts or contractors (as determined) |
| Monitoring Reporting – Outline & Components | Review Team |
| Annual District Imp. Monitoring Report | ADFs |
| Annual Program Imp. Monitoring Report | R&M Coord. |

Effectiveness Monitoring and Research

| ACTIVITY | RESPONSIBILITY |
|--|--|
| Research/Monitoring question refinement & prioritization | R&M Coord.; Coord. Team; staff specialists; public input. |
| Project Design/Project Plan (see Section 2.2.2) | R&M Coord.; Staff Specialist(s); district contacts; cooperators. |
| Project Implementation | As stated in project plans. Options: staff/field; University cooperators; contractors etc. |
| Reporting | As stated in project plan |

Appendix B: STATE FORESTS MONITORING PROGRAM ACTION PLAN

The State Forests Monitoring Strategic Plan will itself be implemented through the following action plan. The action plan identifies three general activity areas. Activities and responsibilities are identified for each area. Most activities are clearly defined and have obvious timelines and responsibilities. Other activities are less well defined and will require guidance from the Review Team or a technical working group, or both, to establish specific activities and timelines and to set priorities (see Appendix C). The action plan and timeline will be updated as activities are completed and will serve as the basis of the annual monitoring “operations plan”.

| ACTIVITY | RESPONSIBILITY |
|--|---|
| GENERAL | |
| Strategic Plan Review | R&M Coord. |
| Finalize Strategic Plan – Public Review Draft | R&M Coord. |
| Strategic Plan – Public Review | R&M Coord., Area Imp. Advisory Comm. |
| Establish Adaptive Mgmt. Review Team | R&M Coord.; Area staff; District staff |
| Identify roles, responsibilities, products for Review Team | R&M Coord.; Area staff; District staff |
| Determine reporting requirements for districts (IM, EM) | R&M Coord.; Coordination Team; District staff |
| Receive annual reports from districts (for previous fiscal year) | District staff |
| Annual monitoring report (for previous fiscal year) | R&M Coord.; District staff |
| Annual fiscal budgeting | Tech. Services Mgr., R&M Coord. |
| Biennial budgeting | Tech. Services Mgr., R&M Coord. |
| Program priority setting; project initiation | Coordination Team; R&M Coord. |
| Review/input on program development | Area Imp. Advisory Comm. |
| Permanent plot reports | R&M Coord.; Information unit |
| IMPLEMENTATION MONITORING | |
| Workgroup to define and prioritize IM/EM questions, measures and reports; establish pre/post sampling requirements | R&M Coord.; Implementation Monitoring Workgroup |
| Development of methods and standards (LMS 3 e.g. snags, down wood, etc.) | Area Task Force; R&M Coord.; Information Unit; Staff Silviculturist |
| Implementation monitoring pilot study for commercial forest management | Area Task Force; R&M Coord.; District staff; Information Unit |
| Full implementation of pilot study results | R&M Coord.; District staff; Information Unit |
| Develop IM approaches for HCP | Area Task Force; R&M Coord.; District staff |

Appendix B: Continued

| ACTIVITY | RESPONSIBILITY |
|--|---|
| EFFECTIVENESS MONITORING and RESEARCH | |
| | |
| Research accomplishment report | R&M Coord. |
| Update research policy | R&M Coord. |
| Research symposium | R&M Coord.; Research cooperators |
| Swiss needle cast-CT project | R&M Coord.; I & D; OSU |
| Aquatic/riparian function project | R&M Coord.; Forest Practices staff |
| Stand structure/wildlife project | R&M Coord.; Staff spec.; CFER |
| Young stand development project | R&M Coord.; Staff silviculturist; OSU |
| Spotted Owl research projects | R&M Coord.; Staff spec.; Research coop. |
| Marbled Murrelet research projects | R&M Coord.; Staff spec.; Research coop. |
| Headwater amphibian surveys (only w/ HCP) | R&M Coord.; Staff spec.; Research coop. |
| | |

Appendix C: STATE FORESTS MONITORING PROGRAM TIMELINE - INITIAL PROJECTS

This table presents the initial timelines for planned research and monitoring activities for the first implementation period. Timelines that extend over multiple years do not necessarily mean that activities will be conducted at all times during that period. They serve to indicate activities that are long-term and that different elements will be carried out at different times within the indicated time frame.

| Activity | Year (Quarter) | | | | | | | | | | | |
|---|-------------------|------|------|------|------|------|------|------|------|------|------|--|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | |
| GENERAL | | | | | | | | | | | | |
| Strategic Plan Review | | | | | | | | | | | | |
| Strategic Plan Final Approval | | | | | | | | | | | | |
| Annual research and monitoring program report (for previous FY) | | | | | | | | | | | | |
| Annual fiscal budgeting | | | | | | | | | | | | |
| Biennial budgeting prep. | | | | | | | | | | | | |
| Program priority setting; project initiation. | | | | | | | | | | | | |
| Review/input on program development | | | | | | | | | | | | |
| "State of the Forest" report from permanent plots | | | | | | | | | | | | |
| IMPLEMENTATION MONITORING | | | | | | | | | | | | |
| Workgroup to define/prioritize IM questions, measures, and reports | | | | | | | | | | | | |
| Establish pre/post operation sampling requirements | | | | | | | | | | | | |
| Develop methods and standards to assess stand components (snags, down wood, etc.) | | | | | | | | | | | | |
| IM pilot study for older stands: Pilot study install/report | | | | | | | | | | | | |
| Full implementation of results | | | | | | | | | | | | |
| Develop IM for HCP | Upon HCP approval | | | | | | | | | | | |
| EFFECTIVENESS MONITORING and RESEARCH | | | | | | | | | | | | |
| Research symposium in conjunction with State Lands meeting or other forum (tent.) | | | | | | | | | | | | |
| Swiss needle cast/Commercial thinning project-Perm. Plots; Retrospective study | | | | | | | | | | | | |
| Aquatic/riparian function project (with Forest Practices) Project planning | | | | | | | | | | | | |
| Installation/reporting | | | | | | | | | | | | |
| Stand structure/Wildlife relationships: Project plan development; Implementation, surveys, etc. | | | | | | | | | | | | |
| Young stand management study installation | | | | | | | | | | | | |
| Implementation, surveys, etc. | | | | | | | | | | | | |
| Northern Spotted Owl research: NCASI thinning final report | | | | | | | | | | | | |
| Pre-HCP site surveys | | | | | | | | | | | | |
| Continue cooperative research: CFER, SNC, Stand Mgmt., etc. | | | | | | | | | | | | |
| Road strategy effectiveness project (plan / implement) | | | | | | | | | | | | |
| Socio-Econ report update | | | | | | | | | | | | |
| Public acceptance surveys | | | | | | | | | | | | |

Appendix D: STATE FORESTS RESEARCH POLICY (1995)

Overall Context and Linkage to the FPFO

The Board of Forestry's Forestry Program for Oregon (FPFO) includes an objective related to research and monitoring: "Use research and monitoring of the forest condition to understand the effectiveness of forest regulations and management strategies, incorporate the knowledge gained into policies and programs". As the FPFO notes, "Sound forest management is based upon decisions that take into account the best available information about all components of the forest – trees, fish and wildlife, soil, air, water, and recreation. This requires a commitment to an ongoing research program that is targeted to meet overall objectives."

The Board of Forestry Policy for Practicing Silviculture on State Forests notes that: "this policy commits ODF to an ongoing program of monitoring and research. Adaptive management will be used to incorporate new information as it becomes available."

Research, in the context of this policy, includes formalized research, monitoring, and technology transfer. The Oregon Department of Forestry works closely with the Oregon Forest Research Laboratory and other research entities in obtaining the best available information in support of sound forest management.

Background and Situation

The Department manages about 800,000 acres of forest land through the State Forest Management Program. Historically, the Department has been actively involved in supporting research and participating with research institutions to design, develop, and implement research projects. The Department of Forestry recognizes the Oregon Forest Research Laboratory as the state entity with specific responsibility for the conduct of forestry research in Oregon. Federal Agencies (USDI, USDA) and other state agencies also have forestry related research programs which are relevant to the mission of the Department.

Public funding for forestry research at state and federal institutions has declined markedly over the last decade. In 1995, Oregon rated thirteenth among the states in funding for forestry research. Forest land management organizations in Oregon are finding it increasingly difficult to acquire the necessary level of scientific knowledge through publicly funded research programs. Concurrently, threatened and endangered species considerations, and emphasis on providing for a range of resource values in managed forests has accelerated the need for valid scientific information in support of sound forest management.

The level of the State Forest Management Program involvement and investment has not kept pace with the number and complexity of issues and opportunities that currently exist. In addition, a pro-active approach is needed to ensure that priority scientific information needs are met in a systematic and logical manner.

Long Range Management Plans for State forest lands and the Policy for Practicing Silviculture emphasize the need for adaptive management approaches. Adaptive management requires a significant commitment to obtaining critical information over time and "feeding" the information back into the decision-making process. Current levels of research, monitoring, and technology transfer are inadequate to meet the standards established in long range management plans and by policy.

Research Policy Goal

The State Forests research policy goal is to acquire knowledge in a timely and cost-effective manner concerning questions of significant importance to achieving the Program's mission, and ensure that knowledge is effectively and efficiently transferred and applied.

Funding

Financial resources will be committed to reaching the research goal. Approximately 5% of the State Forest Management Program budget will be invested in this effort. Periodic evaluations

will be undertaken to determine how the funding level contributes to achieving the goal. As necessary, funding will be increased in order to more effectively achieve the goal.

Guiding Principles

The policy is framed by the following guiding principles:

1. Research supported by the State Forest Management Program will contribute to achieving the Program's mission.
2. The Program will actively participate with research organizations to direct, design, and conduct research that meets the program mission.
3. The Program will sponsor research rather than conduct research. For example, the Program will not build a research organization such as the Forest Research Laboratory at OSU.
4. Research will provide knowledge to support all aspects of the Program.
 - It will include all relevant disciplines, e.g., insect and disease, forest genetics, silviculture, fish and wildlife, etc.
 - It will include a component of operational research to support timely decision-making by operational managers, e.g., University of Washington Stand Management Cooperative.
 - It will include a component of strategic research to enable the program to be proactive in dealing with potential future issues and to create new opportunities, e.g., Northern Spotted Owl Retrospective Study.
 - It will include short term research that addresses immediate needs, as well as longer term research that require more time to yield useful results.
5. Research priorities will be assessed using criteria developed by Program employees.
6. The Program will identify important information needs, prioritize support for research projects, and take a proactive approach to acquiring needed information.
7. Research cooperatives will be used where feasible to increase cost effectiveness.
8. The Program is committed to technology transfer and implementation of research and monitoring results.

State Forests Research Policy Implementation

To effectively implement this policy, the following process will be undertaken:

1. **Information Needs Assessment**

Conduct a periodic assessment of critical information needs that can be potentially addressed by research. This assessment will be used as the basis to determine important issues and opportunities that affect State forest lands that are potentially worthy of research support.
2. **Evaluation**

Using criteria, rank the relative merit of information needs that are identified in the needs assessment. Determine what methodology will be most effective and efficient to address priority information needs i.e., literature review, transfer, and application of existing knowledge, monitoring or formalized experimentation. The task of determining appropriate methodologies may be conducted by Department

personnel and/or a research institution that is responsible for addressing the specific information need.

Determine type and level of support

Organizational support for research may take several forms including direct funding, in-kind work or cooperative participation. For long term projects the Program will consider factors such as fluctuating revenues and budget levels when determining research priorities. Longer term research will be designed to provide measurable interim products, when feasible, to insure that some benefits are provided even in the event of early termination due to funding constraints.

3. **Determine appropriate organizational structure and staffing**

State Forest Management program personnel will work directly with research institutions to design appropriate studies. Personnel will work directly with principal investigators to insure that research objectives reflect identified critical information needs. In addition, program employees will work with research personnel to insure that new information is transferred to appropriate levels, in an understandable manner. Using the adaptive management concept, on-going monitoring will be needed to insure that research results are valid when translated into practice.

Overall responsibility for implementing this policy will be the responsibility of the State Forest Management Program Director with decisions and project management delegated to appropriate levels in the organization. Organizational structure and staffing levels may need to be adjusted to effectively implement this policy. The Forest Research Laboratory at Oregon State University and other stakeholders will be involved in the implementation of this policy.

Approved by the State Forester

September 14, 1995

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Appendix E: STATE FORESTS RESEARCH AND MONITORING PROJECTS

Background and Funding History

The Oregon Department of Forestry manages about 800,000 acres of forest land through the State Forest Management Program. Historically, the ODF has been actively involved in supporting research and participating with research institutions to design, develop, and implement research projects. ODF works closely with numerous research departments at Oregon State University and with Federal (e.g. USDI, USDA) and other state agencies that have forestry related research programs relevant to the mission of the Department. In this context, research includes experimental approaches, monitoring, and technology transfer.

The recently approved Forest Management Plans for state forest lands emphasize the need for adaptive approaches to management. Adaptive management requires a significant commitment to obtaining critical information over time and to ensuring that the information enters the decision-making process. The state forests research and monitoring program is in place to ensure that the levels of research, monitoring, and technology transfer are adequate to meet the information needs established in the long range management plans.

A formal policy for State Forests Program research was adopted in 1995 (see Appendix G, NW-FMP). One of the first steps of the research program was to conduct an information needs assessment. This initial assessment led to the initiation of a series of large-scale, long-term projects, including studies of northern spotted owl demographics and habitat use, marbled murrelet habitat requirements, Swiss needle cast cooperative, Coastal Oregon Productivity Enhancement (COPE) projects, etc. Several major studies have been completed, such as the spotted owl research to be discussed, the work on marbled murrelet habitat characteristics, and the COPE program. Results of these studies have been presented at symposia, published in the peer-reviewed literature, and are available as project reports and summaries.

The research policy states that approximately 5% of the State Forest Management Program annual budget can be invested in research, monitoring, and technology transfer. As a result of the funding structure, biennial and annual expenditures are somewhat variable in response to shifting revenue levels. During the time this research policy has been in effect, the research budget has ranged from about \$350,000 to a high of almost \$1 million. Over the past several years, the research expenditures have been reduced, a reflection of the winding down of large projects such as the spotted owl and marbled murrelet studies. The current (FY 2002) research budget is approximately \$850,000. This includes support for ongoing commitments and budgeting for new research. In addition, approximately \$650,000 is committed to timber sale and site-related T&E surveys for spotted owls and marbled murrelets that provide valuable baseline information for trends monitoring. Further baseline work is being conducted in conjunction with the revision process for the Elliott State Forest management plan and HCP, and is supported through the Coos district.

Recent and Current Research and Monitoring Projects

A strong commitment to research and monitoring is vital to ensure that forest management plans are supported by key stakeholders. Research and monitoring activities will be the main source of information needed for decision making within the adaptive management framework. Monitoring will focus on specific assessment criteria related to performance of the management strategies, while research will focus on overarching questions about the validity of key assumptions in the FMPs.

The current budget guidance states that high priority projects identified in the forest plans will be initiated and that existing commitments will be maintained. In line with this guidance, budget requirements for research and monitoring include:

- Maintaining existing research commitments;
- Initiating new research projects to answer specific information needs to assess progress of the forest plans;
- Initiating a pilot project to develop and evaluate concepts and approaches for implementation monitoring.

ODF supports research in five general activity areas:

- Integrated studies
- Wildlife/silviculture interactions
- Insects and disease
- Research cooperatives
- Surveys

The approved long-term NW and SW Forest Management Plans now serve as the basis for identification of specific information needs that must be addressed through new projects. New work will focus on the FMP landscape management strategies, since a working hypothesis of the management plans is that they will lead to the stand structures and habitat attributes necessary to support healthy and productive forest ecosystems.

The following sections provide brief summaries of recent and current research as well as of proposed new research (Summary 2002).

Integrated Studies

Cooperative Forest Ecosystem Research (CFER): Cooperative research program supported by OSU, USGS, and ODF. Projects are focused on

- Ecology and management of biodiversity in young forests
- Ecology and management of riparian zones
- Ecology and management of special interest species.

This program is making significant contributions of information on how to tailor forest management to achieve the objectives of the long-range Forest Management Plans. CFER is also continuing the work, initiated by the COPE program, on thinning/wildlife relationships on the Tillamook State Forest. (Ongoing)

APHIS Collaborative Research Team: (USDA Animal and Plant Health Inspection Service, Olympia WA) Beginning with surveys in 1995, bear damage was considered significant and unacceptable in Northwest Oregon state forests and considerable funds were being expended on control via feeding and snaring. Since then, bear damage has declined, possible due to stand aging and needlecast, however it is still significant in places and may reoccur. A better understanding of bear damage and likely alternative control strategies was deemed important. As a result of this work, recommendations were developed for management practices in areas with a history of bear damage. For example, bears seem to prefer higher levels of cambial carbohydrates and low terpenoid levels. High carbohydrates are associated with conifers with high growth rates and are increased by thinning and fertilization and decreased by pruning. The timing and aggressiveness of precommercial thinning will directly affect bear damage. But this can be significantly reduced by pruning. Damage will normally decrease as stands age, crowns lift and trees slow in basal area growth. Today, big game browse is seriously limiting reforestation with western redcedar and control measures are of significant expense. Alternative control measures would be immediately applicable. The purpose of the CRT is to share information on animal damage control research, assess highest priority joint needs and help focus federal research work on the most needed area. Non-lethal control is preferred. (Ongoing)

Swiss needle cast and commercial thinning: (OSU, ODF Districts) Observations and limited data suggest that thinning stands with severe Swiss needle cast may increase symptom development and exacerbate thinning shock. The interaction of pre-commercial thinning (stands

10 – 30 years old) and Swiss needle cast is being investigated in a project funded by the Swiss Needle Cast Cooperative. However, the growth and development following thinning of older stands (30+ years old) with varying degrees of Swiss needle cast damage is largely unknown. Proposed research will address 1) growth trends following thinning of older stands with varying levels of Swiss needle cast damage, 2) interactive effects of Swiss needle cast with intensity of thinning, and 3) possible interactions between thinning, disease severity, and seed source (where data are available).

The approach includes a combination of a retrospective study of stand growth since thinning with permanent monitoring plots to track future growth. Results from the retrospective will be available at the end of the first year. Results from permanent plots will be available at intervals, depending on the measurement schedule. The study will require a minimum 10-year duration to establish trends in stand development after thinning. (Ongoing – Initiated FY2001)

Implementation Monitoring Pilot Study: (ODF Districts) Implementation monitoring is used to determine if the objectives, standards, guidelines, and management practices specified in the FMPs are being accomplished. Approaches for implementation monitoring are recommended in the State Forests Monitoring Program Strategic Plan. To determine proper implementation of the management and conservation strategies and to establish baseline conditions from which to measure effectiveness of the strategies, it will be necessary to collect information both pre- and post-operation. This information will serve as a basis for estimating desired future conditions and likely trajectories of changes in resources. Post-operation information in particular will establish a starting point from which to measure trends to help determine if resources are changing due to management activities or because of influences outside the scope of the plan. Pre- and post-operation information requirements are specified in the Monitoring Plan.

A variety of methods and sampling standards must be developed to collect this information to estimate the quantity and distribution of stand structures or special habitats. Data collection will be coordinated to contribute to and draw from data produced through the ODF stand level inventory and permanent plot network. Methods and standards for the inventory are currently under development, as are data aggregation techniques for the permanent plot data.

There are many unknowns associated with this phase of the monitoring program, for example development of sampling methods for down wood, quantification of structure types, quality assurance standards, and determination of monitoring costs. A pilot project will be initiated to test implementation monitoring concepts on at least two districts with differing forest types. The pilot will help determine personnel needs, time requirements, and budget requirements for implementation monitoring across the planning area. Results of the pilot will also help determine if the methods and standards meet data quality requirements of the stand level inventory and whether information on more or fewer forest attributes is needed to establish baselines to evaluate implementation and effectiveness of the management strategies. (Ongoing – Initiated FY2002)

Stream Temperature and Riparian Function: (ODF Forest Practices Monitoring Program, ODF State Forests Monitoring Program, ODF Districts, Forest Industry) ODF SFMP and FPMP are coordinating a study to evaluate stream temperature and riparian condition before and after harvesting. Sites will be evaluated on both privately-owned and state-owned forestland. The objective of the study is to provide a coordinated monitoring effort with which to evaluate effectiveness of forest practices rules and standards on private lands as well as the effectiveness of the aquatic and riparian strategies described in the Northwest Oregon State Forests Management Plan on state-owned forestland. Specific monitoring questions include:

- Are the riparian rules and strategies effective in meeting DEQ water quality standards regarding stream temperature?
- Are the riparian rules and strategies effective in maintaining large wood recruitment to streams, downed wood in riparian areas, and shade?

- What are the trends in riparian area regeneration?
- What are the trends in overstory and understory riparian characteristics and how do they, along with channel and valley characteristics, relate to stream temperature and shade?
- How do invertebrate, amphibian, and fish communities respond to harvesting near streams under current riparian rules and strategies? (Ongoing – Initiated FY2002)

Integrative Young Stand Management Strategies for Productivity and Structural Diversity:

(OSU, ODF Districts) The proposed project will investigate assumptions critical for successful implementation of the ODF NWFMP. Currently the management plan entails two approaches to achieve the desired structural conditions in a stand. The approach deemed suitable for most forest land separates regeneration activities from activities aimed at developing Older Forest Structure (OFS). Thus, aspects of stand structure are not considered during the regeneration phase, but become a management concern at the time of the first commercial thinning. This approach allows active management to produce revenue while stands develop to be suitable for commercial thinnings. Alternatively, areas with operational constraints, e.g., riparian areas, are managed “extensively,” that is, they are usually planted at lower density and not managed to provide revenues through early commercial thinnings. This extensive approach allows forest managers to modify regeneration and early stand management practices to accelerate development of OFS.

The first approach assumes that early stand management with the goal of revenue production has not foreclosed options in terms of stands developing all desired structural components. It also assumes that forest managers have the full flexibility in actively managing these stands. Alternatively, this implies that stands established with the goal to develop into OFS do not provide the flexibility to manage them for revenue production.

This proposal aims at examining these assumptions and determining whether alternative management approaches are feasible and/or more efficient at achieving the desired goals. Specifically, two sets of studies will investigate the development of young Douglas-fir monocultures and mixed species stands managed for revenue production with the goal of determining at what specific stage various structural components (of interest in OFS) disappear. In addition, the studies determine under which conditions, if any, management activities can ensure persistence of these structural components and evaluate the associated tradeoffs in stand growth and economic returns.

Specific structural goals addressed in this study include a) the amount and diversity of understory vegetation, an important layer in development of OFS for wildlife habitat and various other ecological aspects and b) crown structure, which is considered important for bryophytes and lichen development and associated wildlife habitat characteristics. (New proposal – Initiation in FY2003)

Wildlife/silviculture interactions

Demography of Northern Spotted Owls on State Forest Lands: (Oregon Cooperative Wildlife Research Unit) By estimating the health of northern spotted owl populations in younger forests, ODF took the first step toward making decisions about management of local populations. Through collection of detailed site information, we have been able to formulate a short term strategy that focuses on the protection of the most valuable sites while we try to develop habitat on the larger landscape. The objectives of the study were to provide demographic estimates for local owl populations on the Elliott and Clatsop State Forests and to establish activity centers and assign status for management purposes. (Completed)

Home Range and Habitat Use of Northern Spotted Owls on State Forest Lands: (OCWRU) ODF’s short- and long-term goals for northern spotted owls are to provide for the continued existence of owls currently on ODF lands, while using silvicultural techniques to develop

additional owl habitat to support a larger future population and contribute to the recovery of the species. Data collected on which stands owls use for foraging and roosting was used to guide the efforts of the investigation into the structural differences between high and low use stands, and how those stands developed. ODF will use this information to develop silvicultural prescriptions to accelerate the development of owl habitat. The objectives of the study were to determine which forest stands within spotted owl home ranges are used for foraging and roosting by spotted owls, to determine how spotted owls are using a mosaic of forest stands dominated by young forest, and to determine home range size of spotted owls inhabiting younger forests. (Completed)

Northern Spotted Owl Habitat Characteristics on State Forest Lands: (Forest Sciences Lab, OSU) ODF's long term strategies focus on developing large areas of forest with layered and "old forest" characteristics, with the intent of providing habitat for many species, including owls. This research will help guide ODF's efforts to create prescriptions for this purpose, and contribute to the overall knowledge base concerning owls in younger stands. The objectives of the study were to describe the differences between stands used for nesting, roosting and foraging, and stands probably not used by owls, within the known home ranges of individual birds, and to investigate the differences in development of stands with low and high owl use. (Completed)

Results of these three related Northern Spotted Owl studies were presented at the Board of Forestry meeting in September, 2001.

Adaptive Management Monitoring of Northern Spotted Owls: (NCASI) Thinning regimes are vital to ODF's current and future strategies to develop stands along a variety of pathways. This study will help quantify the response of owls to thinning activities to better assess risks associated with forest management activities near owl sites. The objective of this study is to evaluate the effects of thinning on northern spotted owls. ODF supports a Coast Range replicate study area around the Western Lane district. (Ongoing)

Marbled Murrelet Habitat Characteristics on State Forest Lands in Western Oregon: (OCWRU) ODF will use structure-based management techniques to develop habitat in the future. A quantitative description of marbled murrelet nesting habitat is important in determining silvicultural pathways to implement this strategy. The general objective of the study was to describe nesting habitat of marbled murrelets. Tree climbing techniques and observation of nesting behaviors was used to summarize the characteristics of nest and non-nest plots, to monitor active nests for nesting success and failure, and to characterize successful nests. The study found a number of active and old murrelet nests on state lands on the Coos, Tillamook, and Astoria districts. Statistical differences in tree and nest platform characteristics were found between nest and non-nest plots. The study also identified nests in younger stands than previously known. (Completed)

Marbled Murrelet Nest Predation: (Univ. Washington) ODF's marbled murrelet habitat occurs in isolated patches, both at the stand and landscape scales. Part of ODF's long-term murrelet conservation strategy is aimed at providing larger, less fragmented blocks of habitat that are configured on the landscape in a way that makes them functional. The objectives of this study were to describe the range of potential predators on marbled murrelet eggs and chicks, to determine abundances of potential predators of murrelet nests in stands of differing size and configuration, and buffered by stands of different complexity, to determine rates of predation on murrelet eggs and chicks by different types of predators in those stands, and to investigate landscape characteristics that may influence predator abundance in and around those stands. The study showed that predation rates of artificial nests are very high and that corvids (Stellars and gray jays) are the primary predators of eggs. Small mammals may be more important predators than previously thought. Flying squirrels and deer mice are the primary predators of artificial chicks. Nesting habitat (more complex stands) that is buffered by stands of simple structure is more sheltered than stands buffered by complex structure or with no buffer next to clearcut edges. The theory is that simple habitats do not support much species diversity, including predators, and that brushy vegetation in open clearcut areas provides forage for

corvids, thereby increasing overall predator populations in nearby nesting habitat. Corvid counts have shown that corvids are edge-related, and longevity of artificial nests is higher as distance to edge increases. A Washington component of this study on the Olympic Peninsula showed that longevity of artificial nests is low near human influence (e.g. campgrounds), regardless of stand complexity, size, configuration or distance of the nests to edge. (Completed)

Insects and disease

Swiss Needle Cast Site Hazard Rating: (OSU) If SNC severity can be predicted on a site-by-site or even more general basis, then management actions can be refined to make best use of species other than Douglas-fir, and where genetically tolerant Douglas-fir can best be used. Such a capability will also allow us to adjust expectations of stand development based on disease influences. The objective of this work is to develop a reliable predictive risk assessment of Swiss needle cast in Oregon. The study will help identify and determine the relative importance of site and stand characteristics that can be used to predict the severity of SNC. The study processes and analyzes existing ground and aerial survey disease information and will develop a method of analysis of satellite imagery to map distribution of the disease in Oregon. The environmental conditions, management practices and other factors that are associated with the occurrence of the disease will also be determined. (Ongoing)

Thinning and Laminated Root Rot (LRR) Interaction: (USDA Forest Serv., PNW) Laminated root rot is widespread throughout the range of Douglas-fir and is a frequent, and particularly disruptive component of stands in the Oregon coast range. Although clearcutting coastal stands has been a standard harvesting technique, public opinion has caused a shift away from clearcutting and toward the increased use of other silvicultural tools such as thinning. However, the effect of thinning LRR infected stands on the rate of blowdown, root disease intensification or subsequent mortality due to LRR is largely unknown. Management activities, such as mid-rotational thinning, must be planned with full knowledge of the influence that such an activity will have on the development and impact of root diseases. Virtually no hard data exist regarding the outcome of thinning in coastal Douglas-fir stands affected by LRR. The objectives of this study are to develop tools to predict the effects of thinning strategies on subsequent disease intensification and mortality in stands affected by LRR, caused by *Phellinus weirii*; to evaluate a proposed system to predict and risk of LRR-caused blowdown prior to thinning a Douglas-fir stand; and, to evaluate the distribution of LRR within infected coastal Douglas-fir stands. (Ongoing)

Black Stain Root Disease Monitoring: (ODF) Black stain root disease (caused by the fungus *Leptographium wageneri*) is a serious disease of young Douglas-fir. The fungus kills trees by plugging the water-conducting tracheids in the roots and lower stem. Black stain is widely distributed, but it is particularly severe in 10 to 30 year-old stands in parts of southwest Oregon. Proximity to known black stain root disease patches can affect management options for a stand. Occurrence of black stain has increased dramatically during the past decade, and appears related to certain management practices and stand conditions. This disease is more common and often more severe in stands that have been pre-commercially thinned or that have a history of site disturbance, especially tractor logging. This study will document the distribution of black stain root disease and describe trends in occurrence over time. This information will be useful in formulating appropriate management strategies for the forest. (Ongoing)

White Pine Blister Rust Resistance Trials: (ODF, USDA Forest Serv.) White pine once was a component of the Coast range and has all but disappeared due to blister rust and logging. White pine is cold tolerant and resistant laminated root rot and, as such, is an important but minor species in the Coast range. Assessment of field performance of genetically resistant trees is the basis for planting of seedlings across sites with different disease risk ratings. This study is intended to demonstrate and quantify genetic resistance to blister rust on typical outplanting sites. (Ongoing)

Sitka Spruce Weevil Hazard Rating: (OSU) Problems with Swiss needle cast in Douglas-fir make it imperative that ODF plant trees better adapted to the coastal environment and increase stand diversity whenever possible. Sitka spruce is a fast growing tree that requires little site preparation, is resistant to animal damage, and is responsive to fertilization. It is also shade tolerant and outlives western hemlock on most sites. The major impediment to planting spruce is the perception that weevil infestations in young spruce result in unacceptable damage to tree form and height growth. This work was intended to develop a hazard rating model that can be used to rank potential spruce planting sites in northwest Oregon based on susceptibility to weevil damage. The study produced a model that will allow foresters to predict those areas and conditions under which the weevil is likely to cause the least amount of damage, and start to reintroduce this important species back into its native range. (Completed)

Additional forest health monitoring projects conducted by Forestry Assistance I&D include participation in the federal Forest Health Monitoring program to conduct insect and disease aerial surveys and various insect and disease ground surveys; surveys to determine distribution of Balsam Woolly Adelgid; an aerial and ground-truth surveys to map areas with Port Orford cedar in southwest Oregon to determine relative amounts of damage and mortality caused by black bears and Port Orford cedar root disease; and aerial and ground surveys in southern Oregon to determine the extent and severity of Sudden Oak Death.

Research cooperatives

Swiss Needle Cast Cooperative (SNCC): (OSU) Swiss Needle Cast causes significant impacts in the Douglas-fir forests in western Oregon. The disease causes growth loss and alters stand structural development, affecting many aspects of forest management. The Coop supports research across a broad range of disciplines to understand the disease and causal or contributing factors. Major areas of research include impacts on tree growth, pathogen biology/ecology, host physiological response, silvicultural treatments, host tree genetics/resistance, direct control, and tree nutrition. Based on research to date, SNC epidemic is not likely the result of a new virulent strain of the fungus. Genetic tolerance exists within the Douglas-fir population, but may be overwhelmed under high disease pressure. Upcoming research will address effects of the disease on stands older than 30 years old, the effects on stand dynamics in the Tillamook Burn, and how to manage young stands with severe to moderate damage. ODF has initiated a study to determine the response to commercial thinning in affected stands. (Ongoing)

Stand Management Cooperative: (Univ. Washington) The mission of the cooperative is to provide a continuing source of high-quality information on the long-term effects of silvicultural treatments and treatment regimes on stand and tree growth and development and on wood and product quality. Work of the cooperative has been restricted to managed plantations of Douglas-fir, and to a limited extent, western hemlock. While ODF has shifted away from intensive plantation management for industrial wood production, the main focus of this coop, there is still a legacy of established and previously intensively managed Douglas-fir plantations. Growth and development in these plantations is still poorly understood. Thus this coop provides background information for structure-based management and could provide directly relevant information if future management were to shift. (Ongoing)

Hardwood Silviculture Cooperative: (OSU) The objective of this research cooperative is to develop an understanding of red alder plantation growth and development under a range of possible silvicultural practices. If ODF decides to intensively manage a significant acreage of red alder plantations, this research will provide the necessary information to develop operational prescriptions for site location, planting, pruning, pre-commercial and commercial thinning and timing of final harvest. (Ongoing)

Pacific Northwest Tree Improvement Research Cooperative (PNWTIRC): (OSU) This cooperative supports a variety of applied research projects oriented toward tree improvement and seed orchard programs. Information from the coop supports ODF's investment in genetic tree improvement and enhances the quality of the reforestation program. Research in the coop develops methods to improve management of the Schroeder seed orchard. (Ongoing)

Northwest Tree Improvement Cooperative (NWTIC): (OSU) NWTIC represents the R&D side of tree improvement (selection, breeding, and progeny testing) and provides the regional "umbrella" support for more than 20 tree improvement programs. It develops common breeding approaches and linkages between local programs. It also provides guidance, administration, data analysis, record-keeping, and other forms of support. NWTIC provides regional support, but implementation is the job of the local tree improvement programs. (Ongoing)

Oregon Headwaters Research Cooperative (OHRC): (OSU, ODF) The ecology of headwater systems and their importance to downstream habitats and functions is not well understood. This is in part because headwater streams have not received as much attention as other portions of the watershed. Research and management policies have mainly focused on either larger fish-bearing streams or the headwalls above these small streams. The OHRC has formed to help address headwater research needs. The purpose of the cooperative is to investigate local and downstream effects of forest management on the biota and habitat characteristics of headwater stream systems. The goals of the OHRC are 1) to gain scientific understanding of the physical and biological processes of headwater stream systems, and 2) to examine the local and downstream responses of headwater streams to a range of forest management prescriptions. (Ongoing – Initiated FY2002)

Surveys

T&E surveys: (Contractors) ODF policy states that we will take measures to avoid take of listed species. Timber sales are surveyed according to established protocols to determine presence or occupancy of T&E species (currently northern spotted owl and marbled murrelet) to help ODF avoid take of the species and to ensure that our timber harvesting activities will remain in compliance with the federal and state endangered species regulations. In addition to sale related surveys, known T&E sites are monitored on an annual basis to determine occupancy and productivity. The spotted owl information contributes to regional databases. Surveys of timber sales will continue until the issuance of a Habitat Conservation Plan that covers the threatened or endangered species. (Ongoing)

Kilchis River Herptile Surveys: (ODFW) An objective of the long-term forest management plans is to provide habitats for native species. Very little is known about the habitats of some species, including some aquatic amphibians. This study was done, in part, to determine what amphibian species are present in at least one basin. The objectives of the study were to determine relative abundance of aquatic and riparian amphibian species throughout the Kilchis watershed, to provide graphical summaries of data and maps that facilitate exploratory analysis of amphibian distribution at the watershed scale, and to examine associations between the occurrence or frequency of commonly observed amphibian species and potential explanatory variables. A variety of amphibians were encountered during the surveys. The Columbia seep salamander, a species about which little is known, was encountered at every site sampled, most frequently in the headwater stream reach. (Completed)

Bat Bridge Surveys: (BCI) The objective of this study conducted by Bat Conservation International (BCI) in conjunction with the U.S. Fish and Wildlife Service and Oregon Department of Fish and Wildlife, was to evaluate bridges for bat use on ODF lands in the mixed forests of the Oregon Coast Range. Characteristics of occupied structures and surrounding habits were compiled to determine preferred roost characteristics. Several species of bats are recognized

as sensitive species in Oregon. Forest bats consume insect pests that can cost foresters millions of dollars annually. (Completed)

In June 1999, 137 bridges were surveyed for bat use in Astoria, Tillamook, Forest Grove, and Coos Districts. Three species of bats were found using bridges as day roosts. Only 31 of 137 of the ridges surveyed contained suitable day or night roost habitat for bats, and of those, 48% were occupied or had signs of use. The surveyors provided information on methods of providing appropriate crevices during bridge installation or modifying existing bridges to increase bat roosting habitat.

As part of the revision of the forest management plan and the habitat conservation plan for the Elliott State Forest, a number of surveys are being initiated to determine presence and abundance of species and their general habitat requirements. Surveys will cover aquatic inventories, amphibians, small mammals, bats and birds. A study has also been initiated to evaluate the use of radar as a technique to survey murrelets on the Elliott.

Survey and Monitoring of Snag-nesting Purple Martins (*Progne subis*) in Western Oregon: (Northwest Habitat Institute, ODF, BLM, USFWS, Private Industry, Conservation groups) The purple martin is a BLM Assessment Species and is considered by ODFW to be a Sensitive Species. At present most of the known purple martin nesting in Oregon is associated with artificial nest structures provided by humans. Relatively few martin nest sites have been documented in natural cavities provided by snags.

This is an interagency and multi-partner project. The project focuses on surveying for and documenting purple martin distribution in upland habitats in western Oregon where they are using snag cavities. The study will describe the general habitat around colonies, including characteristics of nest snags and the elevational range being used. To the extent possible, basic natural history information including time of arrival, egg laying dates, fledging dates, and competition with other secondary cavity nesters will be gathered. (Ongoing – Initiated in FY2002)

Appendix F: STATE FORESTS MONITORING PROGRAM HIGH PRIORITY INITIATIVES

The purpose of this appendix is to highlight the high priority research and monitoring projects and initiatives that will be conducted during the initial implementation period. Some of these projects are already underway and are described in more detail in Appendix E. Others are in the planning phase and timelines will be updated as the projects are implemented.

Ongoing Projects (Recently implemented)

Implementation monitoring workgroup and pilot project: A technical workgroup was established to determine personnel needs, time requirements, and budget requirements for implementation monitoring. This project will provide valuable information on how to conduct implementation monitoring and assess compliance with all management strategies. The project started in March, 2002. Interim results will be presented in November/December, 2002. A final report will be presented in November/December, 2003.

Swiss needle cast and commercial thinning: This project is related to the Landscape Management and Forest Health Strategies. The purpose of the project is to determine the interaction between thinning of older stands (30+ years old) and disease severity and intensity of thinning. The approach includes a combination of a retrospective study of stand growth since thinning with permanent monitoring plots to track future growth. Results from the retrospective study will be available in early 2003. Results from the permanent plots will be available at intervals, depending on the measurement schedule. The study will be conducted for at least 10 years.

Assessment of young stand management strategies: This project is related to the Landscape Management Strategies and is designed to determine that early stand management has not foreclosed options for older stands to develop all desired structural components. The approach includes retrospective and manipulative studies. The final report of the retrospective analysis will be available in June, 2004, and initial results of the manipulative studies are expected in June, 2005.

Stream temperature and riparian function: This project is designed to provide information to assess the effectiveness of the Aquatic and Riparian Strategies. This is a joint project of the State Forests and the Forest Practices Monitoring Programs. The project started in June, 2002 and is being conducted on both privately and state-owned forest land. A pre/post- study design that established control, treatment, and downstream reaches is being used. Water temperature, channel, overstory and understory riparian characteristics will be monitored two years prior to harvest and for five years after harvesting to evaluate harvest effects and recovery rates. Pre-harvest data are expected in 2003, depending on the timing of the installation of the temperature probes and vegetation surveys. A final report is expected in 2008, but may go longer if sites are harvested later than Fall 2003 – Spring 2004.

Planned Projects

Northern spotted owl and marbled murrelet studies: Pre-HCP surveys are ongoing. Monitoring projects are being developed as the HCP strategies are finalized. If an HCP is not obtained, studies will focus on the effectiveness of FMP strategies plus “take avoidance” measures.

Stand structure development and wildlife relationships: A key assumption of the forest landscape management strategies is that they will provide for native species and habitats. We are currently developing a project to address several questions related to this assumption: To what extent does the array of forest structure types incorporate habitat elements for native species?; How are forest structure types being utilized by native species?; How does the configuration of habitats support native species?; and, What structure types are currently limited? The first phase of the project will be to determine what information is already available and what techniques we have to address these questions. Results of the first phase will link FMP stand structure types and structural elements to wildlife habitat characteristics and will make recommendations for

options to study the effectiveness of the strategies in the field. The second phase of the project will be the implementation of field studies. Planning for this project started in July, 2002. A request for proposals for the first phase is expected by December, 2002. It is intended to start the first phase in early 2003.

Forest road strategy effectiveness study: One of the stated goals of the FMPs is that management activities will meet or exceed the requirements of the Forest Practices Act. This will be particularly important in relation to construction and maintenance of forest roads and potential effects of roads on aquatic and riparian resources. Principles and guidelines for forest roads are expressed in the *Forest Roads Manual*. Part of the vision statement for forest roads on state-owned forest lands reads: "Roads are designed, constructed and maintained in the most cost-efficient manner, while providing a high level of protection to other natural resources" and "Roads are constructed in the best locations for carrying out anticipated activities, while minimizing the impacts on natural resources." Planning for a project or projects to test these principles will begin in 2003.

Socio-economic report update: Several of the key assumptions of the FMPs relate to the provision of sustainable and predictable timber and revenues and the existence of timber markets for the range of timber types and qualities that will be produced from state forests. The report, *Northwest Oregon State Forests Management Plan: Connection to State and Local Economies, November 1996*, summarized the NWFMP management strategies (as of 1996) and the potential economic impacts of the strategies in the short- and long-term. We intend to update this study late in the initial implementation period (2009-2010). We will begin working with the ODF Resources Planning Division to determine what information will be needed to improve the next version of the report.

Public acceptance surveys: The first working hypothesis of the NW/SW FMPs states that "The citizens of Oregon will continue to support integrated and active management of state forests in Western Oregon to provide for multiple outputs and benefits". We intend to test this assumption late in the initial implementation period (2009-2010). We will begin working with ODF Public Affairs and the survey research institute at OSU to determine methods and survey designs.