


# Chapter 5

# Implementation

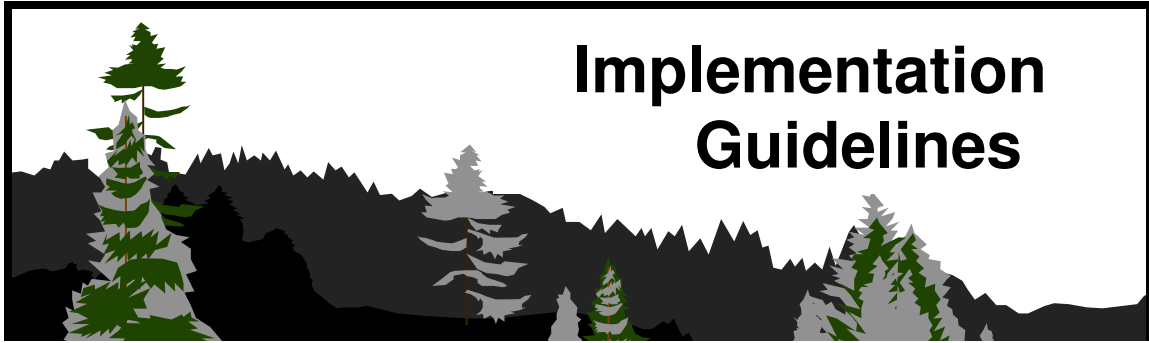


Chapter 3 describes a vision and direction for the management of forest resources on northwest Oregon state forest lands. It described a forest that will provide a multitude of benefits to Oregonians; social, environmental and economic benefits. Chapter 4 describes the concepts and strategies for an approach to forest management that could achieve these benefits. This includes a set of integrated forest management strategies, combined with species-specific and resource-specific strategies. The ability of this forest management plan to achieve the outcomes that are possible and to realize the many benefits that have been described will largely depend on the manner in which these strategies are implemented on the ground.

Chapter 5 describes guidance and standards for processes and activities that will be undertaken to implement the strategies described in this forest management plan. This chapter includes guidelines for implementation planning, asset management guidelines, processes for monitoring and adaptive management, and opportunities for ongoing public involvement in plan implementation.

The main headings in Chapter 5 are:

- Implementation Guidelines ..... 5-2
- Asset Management Guidelines ..... 5-7
- Adaptive Forest Resource Management ..... 5-13
  - Basic Concepts for Adaptive Management ..... 5-14
  - Strategies for Implementing Adaptive Management ..... 5-22
- Public Involvement in Implementation ..... 5-35



This section describes who is responsible for implementing the plan, and how implementation will be carried out.

## Responsibilities

District Foresters are responsible for implementing all aspects of the *Northwest Oregon State Forests Management Plan* on their districts. The key areas include the management strategies for all resources, district monitoring projects, and district public involvement.

The forest planning and operations coordinator is responsible for coordination among districts in the planning area. Key areas include coordinating the development of implementation plans, operations plans, monitoring priorities and projects, periodic operational reviews, and information exchange.

Also part of the Northwest Oregon Area staff, the geotechnical specialist, wildlife biologist, and public use coordinator are responsible for providing technical assistance to district and other state forests personnel in the development of implementation plans, operations plans, and monitoring plans. They are also responsible for providing technical assistance to district and other state forests personnel for field reviews, and for both landscape-wide and site-specific recommendations on specific management activities. They may also have specific responsibilities for monitoring and research projects.

The State Forests Program staff, including administrators and technical specialists, is responsible for providing guidance and direction on statewide program issues. They also may have specific responsibilities as identified in the forest management plan.

## Plan Scope

For the Astoria, Forest Grove, and Tillamook Districts, this plan supersedes the *Long-Range Timber Management Plan / Northwest Oregon Area State Forests*, dated 1984.

For the Clackamas-Marion, Western Lane, and West Oregon Districts, this plan supersedes the *Long-Range Timber Management Plan / Willamette Region*, dated 1988.

## Plan Duration

This plan will be in effect until it is replaced by a new plan. OAR 629-035-0030 requires that the Board of Forestry review the plan at least every ten years.

There are several reasons why it is anticipated that the plan will endure for a decade or even longer. First, the *Northwest Oregon State Forests Management Plan* is a goal-driven plan. The plan strategies will be most successful in achieving the goals if they are applied over the long term, in an adaptive management context. Second, the strategies give field managers substantial flexibility in using existing or new approaches to meet the goals. Monitoring and adaptive management information will be used to incorporate changes necessary to successfully implement the strategies. Third, the Board of Forestry and the public will have access to periodic updates through monitoring reports and implementation plans that will describe how the plan is being applied and provide insight into how well the goals are being achieved. These updates will be a primary mechanism for the Board to determine if there are portions of the plan that should be amended or if development of a new plan is necessary.

## Implementation Priorities

Funding for plan implementation will vary based upon cyclical economic trends. All resource management in the plan is funded through revenues produced from the state forests. Over the long term, it is likely that revenues will support the management activities necessary to meet the forest management plan goals. However, there may be periods of time where revenues limit funding. For this reason, the following priorities are established for conducting activities:

1. Legally or contractually required activities.
2. Minimum activities necessary to achieve the social, economic, and environmental benefits identified in OAR 629-035-0020, including high priority monitoring activities, while emphasizing activities with higher economic return.
3. Fully implement all strategies and monitoring plans.

Implementation plans and operations plans will identify the activities that will be pursued within given time periods based on the anticipated funding levels.

## District Implementation Plans

As described in Landscape Management Strategy 4 in Chapter 4, districts will develop implementation plans that describe the management approaches and activities each district in the planning area will pursue in order to carry out the *Northwest Oregon State Forests Management Plan* (FMP). Requirements for these plans are on the next page.

Each district implementation plan will include information that describes:

- The current condition of stand types and their distribution on the district.
- The desired future condition array for each management basin in the district.
- The projected timeline for reaching the desired future condition.
- How the landscape design guidelines were used to arrange the desired future condition array across the district landscape.
- The extent and location of anchor habitat areas for key species of concern.
- Proposed management activities for the ten-year period that will be necessary to move toward the desired future condition.
- The land management classifications that have been applied in accordance with OAR 629-035-0050 to 629-035-0060 to reflect management strategies of the FMP.
- Management activity levels, outputs, and achievements anticipated for the ten-year period.

Prior to adoption of the forest management plan, draft implementation plans will be developed by each district. These will provide reviewers of the forest management plan, including resource specialists and the public, with the necessary information to evaluate the draft forest management plan and guide management for the first decade of implementation. The information in the implementation plans will be improved and refined during the first few years of implementation. Watershed assessment and forest inventory projects will generate additional valuable information during this time period. As new information becomes available, districts will incorporate it into their implementation planning framework and develop a revised set of implementation plans.

Concurrent with the development of these implementation plans, districts will apply the land management classification system in a manner that is consistent with the goals of this forest management plan. (The land management classification system is described in Chapter 2, on pages 2-58 to 2-59.)

Initial district implementation plans and the associated land management classifications will be available for public review and comment for a 90-day period prior to consideration for approval by the State Forester. Implementation plans that undergo major revisions will be available for public review and comment for a 30-day period prior to consideration for approval by the State Forester. The following circumstances will be considered major revisions:

- ~~Revisions that result in proposed major changes to the forest land management classifications as defined in OAR 629-035-0060.~~<sup>[b1]</sup>
- Revisions that propose changes to the annual harvest level ranges of more than 25% (based on combined acreage of regeneration and partial harvests).

Additional details on the public involvement process can be found later in this chapter.

# Monitoring Implementation Plan

The Department of Forestry will develop a *Monitoring Implementation Plan* (MIP) that describes the approaches and activities that the department 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* (FMP). The MIP guides research and monitoring program in the western Oregon planning area during the initial implementation period.

The objectives of the monitoring program are:

- To determine 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 as stated.
- 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.

Monitoring will provide information to assess the implementation and effectiveness of the management strategies and to evaluate fundamental assumptions that form the planning basis for the FMP (see “Working Hypotheses,” on page 3-18 in Chapter 3). The evaluation of these fundamental assumptions will focus the development of specific monitoring projects to determine if the strategies are achieving their objectives.

The specific objectives of the *Monitoring Implementation Plan* are:

- To describe how implementation monitoring will evaluate achievement of the management strategies, to provide information for internal staff reports and for annual reports to the federal services 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.

## Annual Operations Plans

Annual operations plans will describe the actual projects each district will pursue to implement the forest management plan for a fiscal year. Management activities may include harvest operations; road construction, improvement, vacating, or obliteration; reforestation and young growth management; aquatic habitat restoration; development or maintenance of recreational trails or facilities; etc. Annual operations plans are developed by each district and must be consistent with the longer-term district implementation plans. Resource specialists from both the Oregon Department of Forestry and the Oregon Department of Fish and Wildlife will have an opportunity to provide input to the plans.

The operations plans will be submitted to the District Forester for approval. The District Forester will consider any written comments from resource specialists and the public before approving or denying approval of an operations plan. Once the operations plan is approved, the Department of Forestry has the authority to implement the operations plan.

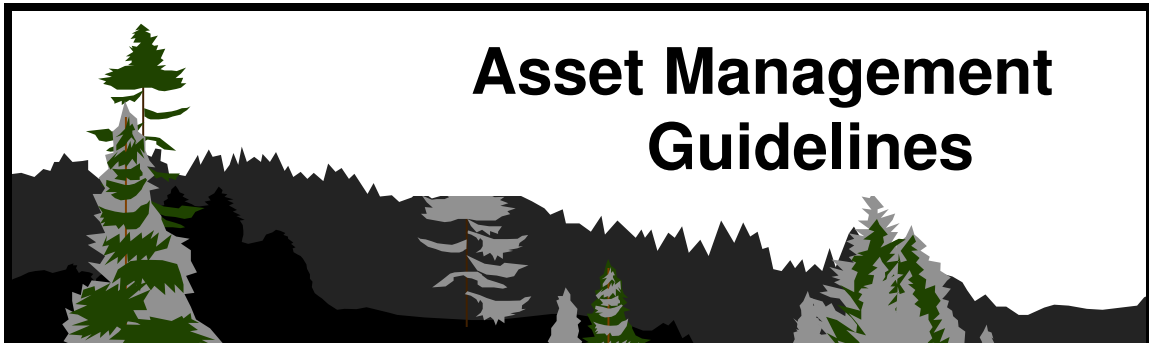
## Team Concept in Implementation

The forest is a diverse and complex weave of resources. This forest management plan has been developed by teams of resource specialists, field foresters, managers, scientists, researchers, and various interests that use or benefit from the forest. Participants have come from local, state, and federal government; universities; various interest groups; and the general public.

This forest management plan calls for the continued use of a number of teams. Listed below are examples of the people it will take to make the plan a success in the long term.

- Teams of field foresters and biologists developing landscape plans and site-specific prescriptions.
- Watershed assessment teams with various technical specialists.
- Monitoring teams of resource specialists, foresters, resource interests, and the general public.

Not all decisions require the use of a team. However, when evaluating approaches or complex resource relationships, a well-directed team is a powerhouse of talent and knowledge. Successful implementation will demand a strong commitment to the ideas in the plan, by the same broad cross-section of resource specialists, managers, researchers, and resource interests that helped build the plan.



The northwest Oregon state forests are a tangible asset of the people of Oregon, and of the counties and local taxing districts where the forests are located. These forests and their rich resources provide both an ecological and economic foundation for local communities and the northwestern Oregon region. The forests must be managed to ensure that healthy, productive, and sustainable forest ecosystems continue to provide social, economic, and environmental benefits to the people of Oregon, into the future.

“Assets”, as they are discussed in this section, are confined to the tangible resources and infrastructure (forest roads and related improvements) on the state forest lands. This section provides a brief overview of what these assets are, details guidelines for efficient and effective management of the assets, and describes the anticipated outcomes in terms of the value of the assets if these guidelines are implemented through time.

## **Description of Key Forest Assets**

### **Lands**

The planning area contains 593,173 acres of Board of Forestry land and 18,828 acres of Common School land. The estimated total bare land value of these lands is \$235 million (Tables 5-1 and 5-2, on page 5-12). More importantly, these lands provide the potential to produce resource values from timber, fish and wildlife, recreation, and a variety of other forest uses. Maintenance of this land base as productive and sustainable forests is essential to maintaining and enhancing the overall asset value of these lands.

### **Forest Products**

The timber stands on the northwest Oregon state forests are an asset to the state, counties, local taxing districts, and to the Common School Fund. The total value of standing timber on lands in the planning area is currently estimated at over \$5 billion (Oregon Department of Forestry 2000e).

Management of the timber asset includes investment of time, dollars, and resources to realize the forest’s ability to generate sustainable timber harvest and revenue over the long term. Investments include direct expenses in young stand management activities such as

precommercial thinning and fertilization; and in forest infrastructure, such as roads and bridges. There are also indirect expenses for overall planning and long-term management, such as forest inventory and GIS systems, research projects, and monitoring projects.

The timber resources are renewable and sustainable, and therefore the forest's revenue-generating potential is viewed in a long-term context.

## **Fish and Wildlife**

The northwest Oregon state forests provide habitat for many species of native wildlife. In this role they have both direct and indirect social, cultural, and economic benefits for local communities and for the citizens of Oregon. Populations of several big game species (deer, elk, and bear) support a recreational hunting industry with significant local and regional economic benefits. To manage this asset, it is important to maintain forest conditions that provide habitats that support harvestable levels of game species.

Populations of trout, salmon, and steelhead are another key asset and support a large recreational fishing industry with significant economic and social benefits. To maintain this asset, it is critical to make investments that will maintain or restore properly functioning aquatic habitats. Investments in this area also contribute to improved availability of these same species to support commercial fishing interests offshore.

A variety of other wildlife species have value for non-consumptive uses such as wildlife viewing. As such, there is a tangible asset value in maintaining diverse habitats that contribute to sustainable population levels for these species.

## **Recreation**

Many state forest lands are close to the state's major cities in the Willamette Valley. As "near urban" forests, they have significant tangible and intangible value as a source of recreational opportunities. In addition to the recreational value of the fish and wildlife resources, these forests support a host of other recreational activities that provide direct social and economic benefits both locally and regionally.

Off-highway vehicle (OHV) use in the Tillamook State Forest is a major recreational activity and one that produces significant revenue to local and regional businesses. Non-motorized trail use on state forest lands also supports local and regional economies, through purchase of services, supplies, and equipment related to these uses. Popular uses are horseback riding, mountain biking, and hiking.

Camping is a popular activity on the state forests, and the Tillamook State Forest has several improved campgrounds. A fee system generates revenue from these campgrounds, and supports the ongoing management.

Investments in infrastructure and opportunities for recreationists, such as the development and maintenance of interpretive centers, campgrounds, trails, trailheads, and other facilities, add to the net asset value of the forest.

## **Water Resources**

The waters that flow from the state forest lands are another major asset to local communities. There are many major streams and rivers that originate on these lands. Several of these are water sources for municipal water systems, and many more support smaller diversions for domestic and agricultural use. Several streams supply water for fish hatchery operations. In addition, these waterways support key populations of fish species and support a diverse array of recreational opportunities, as discussed earlier.

In order to maintain the asset value of the water resources, it is key to protect and maintain high levels of water quality.

## **Forest Roads and Related Infrastructure**

Integrated forest management to achieve the goals of this plan requires a high quality, well-maintained system of forest roads and associated infrastructure. Currently, there are approximately 3,290 miles of “active” forest roads on state forest lands in the planning area. These range from mainline access roads serving large areas for a variety of uses, to short spur roads that may only receive intermittent use for specific purposes. Related infrastructure includes 153 bridges and thousands of culverts. In aggregate, these forest roads and their related infrastructure have an estimated value of \$209 million. Thus, they represent a significant investment in these state forest lands that has occurred over time, and a significant asset value. Cost effective design, construction, and maintenance of forest roads is essential to protecting this investment and to achieving the array of resource values that constitute greatest permanent value.

## **Guidelines for Asset Management**

Maintaining and/or enhancing the value of the assets described in this plan is fundamental to maintaining the ability of these forest lands to provide for sustainable timber and revenue, and to produce the other resource values described in administrative rule. The asset management guidelines below and on the next page derive from language in state law, Board of Forestry policy, and Department of Forestry policy.

Implementation of this forest management plan will be consistent with the guidelines below and on the next page, in order to assure that the asset value of these forests is maintained or enhanced through plan implementation.

- Conserve forest lands by maintaining the state forest land base.
- Maintain a land exchange and acquisition program that actively pursues acquisitions and exchanges as a means to consolidate state forest lands for management efficiencies, economic values, or enhanced stewardship practices.

- Actively manage in a sound environmental manner to provide sustainable timber harvest and revenues to the state, counties, and local taxing districts.
- Maintain a budgeting and financial management system that assures that revenues derived from these state forest lands are sufficient to cover the department's costs of implementing this plan.
- Prioritize and undertake investments in stand management activities such as precommercial thinning and fertilization that are designed to increase timber quality and/or quantity and enhance wildlife habitat values.
- Maintain key investments in development and protection of forest infrastructure, such as roads, bridges, and recreational trails and facilities.
- Maintain key investments in information systems such as forest inventory and GIS systems, in order to support overall plan implementation and to contribute to assessing the value of assets over time.
- Prioritize and undertake investments in research and monitoring projects, in order to ensure the success of adaptive forest resource management under this plan.
- Develop strategic plans for addressing identified critical forest health issues so as to minimize the effect of insect and disease on the timber asset.
- Implement marketing strategies designed to maximize the value received for products sold from state forest lands.
- Implement timber accountability strategies and systems designed to assure that the state and other beneficiaries receive anticipated revenue from the sale of timber and other products.
- Grow and harvest trees to produce timber, revenues, jobs, and habitat for native species.

## **Summary of Anticipated Outcomes from Implementing the Asset Management Guidelines**

Tables 5-1 and 5-2, on page 5-12, show the total current value of the land and timber on the northwest Oregon state forests. These numbers were calculated using timber volumes from the forest inventory and estimated bare land values from recent land transactions.

In addition to generating the annual revenues, which are detailed in the implementation plans, the base asset value of the land and timber is expected to increase as a result of implementing this forest management plan.

This increase in asset value is expected to result from several factors:

- Increasing bare land values in the northwest Oregon region.
- Increasing standing timber volume and average stand value on these forests as average stand age and size increase through time. This will be accomplished through active density management (precommercial thinning and partial cutting) and investments in pruning and fertilization. Based on the decadal analysis conducted by Oregon State University, it is estimated that standing timber inventory will increase from approximately 17.4 billion board feet today, to 28.4 billion board feet when the desired future condition is achieved. This is a 63 percent increase in the timber asset value.
- Increasing value of facilities and infrastructure on these state forest lands. This includes roads, bridges, recreational facilities, trails, and other infrastructure investments.
- Increasing ability of these lands to provide direct and indirect economic benefits associated with diverse wildlife habitats, properly functioning aquatic systems, broad recreational opportunities, and high levels of water quality.
- Increasing carbon sequestration values of these forest lands over time, as the forests grow from younger to older age classes.

Implementation of the plan's strategies is expected to result in significant revenue to the state, counties, and local taxing districts. The district implementation plans provide details on anticipated revenues by district, associated expenses, and the resulting net income expected.

**Table 5-1. Value of Land and Standing Timber, by District  
(Board of Forestry Lands)**

<b>District</b>	<b>Acres</b>	<b>Bare Land Value</b>	<b>Timber Value</b>	<b>Infrastructure Value</b>	<b>Total Value</b>
Astoria	133,960	\$ 61,731,209.00	\$ 1,371,860,420.00	\$ 46,153,406	\$1,479,745,035.00
Tillamook	243,767	\$ 82,849,811.00	\$ 1,584,284,053.00	\$ 93,390,570	\$1,760,524,434.00
Forest Grove	116,769	\$ 45,387,829.00	\$ 1,096,928,238.00	\$ 30,916,176	\$1,173,232,243.00
West Oregon	29,508	\$ 13,127,207.00	\$ 245,822,241.00	\$ 10,588,139	\$269,537,587.00
Clackamas-Marion	46,755	\$ 14,677,574.00	\$ 394,250,936.00	\$ 18,801,990	\$427,730,500.00
Western Lane	22,414	\$ 9,312,991.00	\$ 322,574,067.00	\$ 3,318,604	\$335,205,662.00
<b>Total</b>	<b>593,173</b>	<b>\$ 227,086,621.00</b>	<b>\$ 5,015,719,955.00</b>	<b>\$203,168,885.00</b>	<b>\$5,445,975,461.00</b>

**Table 5-2. Value of Land and Standing Timber, by District  
(Common School Lands)**

<b>District</b>	<b>Acres</b>	<b>Bare Land Value</b>	<b>Timber Value</b>	<b>Infrastructure Value</b>	<b>Total Value</b>
Astoria	2,040	\$ 940,069.00	\$ 10,504,448.00	\$ 702,844	\$12,147,361.00
Tillamook	5,035	\$ 1,708,069.00	\$ 42,190,319.00	\$ 1,905,930	\$45,804,318.00
Forest Grove	954	\$ 196,011.00	\$ 2,860,008.00	\$ 249,324	\$3,305,343.00
West Oregon	8,058	\$ 3,584,705.00	\$ 76,794,718.00	\$ 2,899,936	\$83,279,359.00
Clackamas-Marion	954	\$ 299,542.00	\$ 6,414,408.00	\$ 383,714	\$7,097,664.00
Western Lane	1,787	\$ 742,063.00	\$ 20,256,705.00	\$ 265,202	\$21,263,970.00
<b>Total</b>	<b>18,828</b>	<b>\$ 7,470,459.00</b>	<b>\$ 159,020,606.00</b>	<b>\$6,406,950.00</b>	<b>\$172,898,015.00</b>



Adaptive policy design stresses the use of methods and concepts that are often not simple to explain, demand the explicit admission of ignorance, and place a premium on imagination rather than on precision of thinking. Anyone who is convinced that it is important to design and use adaptive policies should be prepared for an uphill battle: he implicitly places high importance on long-term objectives and will have to act as an active advocate of these objectives while trying to be dispassionate about the available scientific evidence.

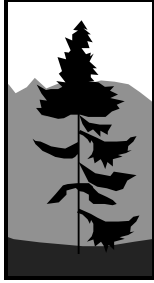
*C. J. Walters, 1986*

The issues surrounding forest management are ecologically, socially, and economically complex. This complexity, along with our limited understanding of forest ecosystems and the unpredictable character of many natural events, contributes to uncertainty about the outcomes of forest resource management decisions. Changing social values and goals further increase uncertainty and contribute to controversy. Adaptive resource management is presented as the conceptual and operational framework to address these issues in the context of the *Northwest Oregon State Forests Management Plan*—and the proposed *Western Oregon State Forests Habitat Conservation Plan*.

Adaptive management is an approach to resource management that explicitly acknowledges uncertainty about the outcomes of implementing management policies, and deals with this uncertainty by treating management activities as opportunities for learning how to manage better. Management activities are not just modified as a result of new information. Rather, they are deliberately designed to increase understanding about the system being managed.

In other words, we don't know exactly how everything will turn out, and therefore we plan our actions so we can learn from them. We use what we learn to do better in the future.

This section describes the concepts, process, and strategies of adaptive management. This section also describes the importance of research and monitoring for obtaining information necessary for decision-making, the role of stakeholders in adaptive management, and the process for dealing with changes in policies and practices when needed.



# Basic Concepts for Adaptive Management

The following key concepts provide the foundation for adaptive forest resource management as it is described in this plan:

- Adaptive management is a system of making decisions that recognizes that ecosystems and society are always changing.
- Adaptive management is not a replacement for decision-making at any level, but a system for making better decisions.
- Successful adaptive management requires a well-designed process including a strong monitoring program.
- Adaptive management requires a well-defined framework for dealing with change.

**Concept 1. Adaptive management is a system of making, implementing, and evaluating decisions that recognizes that ecosystems and society are always changing. It is a systematic, rigorous approach for learning from our actions, improving management, and accommodating change (Holling 1978; Lee 1993; Nyberg 1998; Walters 1986).**

In the administrative rules which govern state forest management (OAR 629-035-0000 to -0110), adaptive management is defined as a scientifically based, systematically structured approach that tests and monitors management plan assumptions, predictions, and actions, and then uses the resulting information to improve management plans or practices. It is the goal of the Department of Forestry, through the application of adaptive management techniques, to continually improve management policies and practices by learning from the outcomes of operational programs. Adaptive management requires managers and decision-makers who are willing to learn by doing, and who acknowledge that making mistakes is part of learning.

Adaptive management involves:

- Explicitly recognizing that there is uncertainty about the outcome of management activities.
- Deliberately designing management policies or plans to increase understanding about the system, and to reveal the best way of meeting objectives.
- Carefully implementing the policy or plan.
- Monitoring key response indicators.
- Analyzing the outcomes, considering the objectives and predictions.
- Incorporating results into future planning decisions.

## **Concept 2. Adaptive management is not a replacement for decision-making at any level, but a system for making better decisions.**

Adaptive management is more than simply altering objectives and practices in response to new information. It is a formal, rigorous approach to management where activities are treated as opportunities for generating information about the system being managed. With traditional approaches to management, learning is haphazard, and improvements in management are slow and incremental, often because of inadequate or inappropriate monitoring and failure to incorporate results into future planning and decision-making.

Although adaptive management has many benefits, it is not a universal remedy. It can help resolve disagreements stemming from gaps in knowledge, but it cannot resolve conflicts over values. Similarly, it can help managers respond to changes in values, but it cannot predict them. Adaptive management is a way to learn how to manage consistently within an overall vision, but it is not a process for developing that vision.

Adaptive management cannot eliminate surprise events (Hilborn 1987). Managers can deal with surprises only by expecting the unexpected, by modifying management when surprises occur, and by implementing plans that do not foreclose management options. Adaptive management does not eliminate uncertainty. It helps managers deal with it.

Adaptive management is not a replacement for research. Among other roles, research can lead to better predictions and hypotheses about the effects of management activities. Such information is particularly valuable when social, budgetary, or ecological constraints dictate that management apply a single treatment everywhere.

Finally, adaptive management does not relieve decision-makers and managers of the obligation to proceed with caution when the risk and cost of negative outcomes are high, for example, when an activity has a high probability of causing irreversible ecological damage. Adaptive management is not an excuse for continuing with harmful activities.

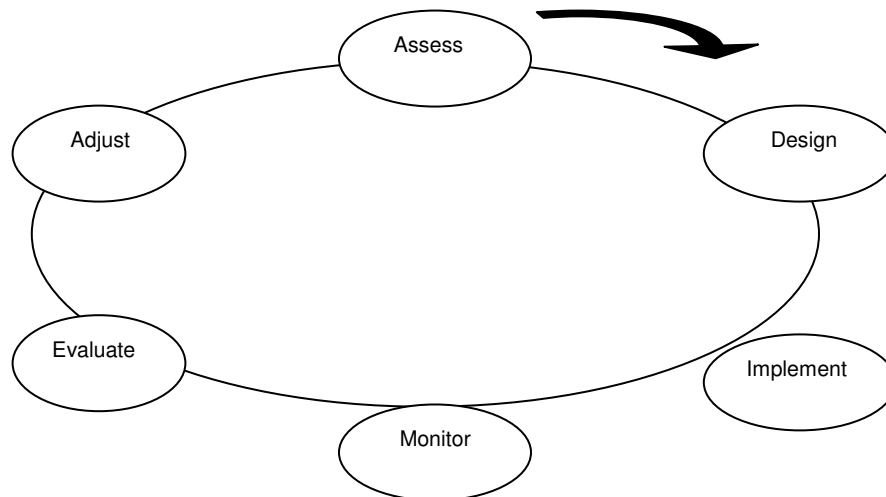
In summary, adaptive management is not really much more than common sense. But common sense is not always in common use (Holling 1978). Pilot projects, test modeling, and market surveys are all ways that adaptive management is used in other professions. These techniques can be extended to natural resource management, with the inclusion of environmental considerations, and the integration of systematic and rigorous assessment and planning processes.

### **Concept 3. Successful adaptive management requires a well-designed process, including a strong monitoring program.**

There are six main elements of adaptive management (after Nyberg 1998) that will be applied as this plan is implemented.

1. Problem assessment.
2. Design experiment and monitoring plans.
3. Implement plans.
4. Monitor.
5. Evaluate outcomes.
6. Adjust activities and policies.

The framework formed by these six elements (see the figure below) is intended to encourage a thoughtful, disciplined approach to management, without constraining the creativity that is vital to dealing effectively with uncertainty and change. In practice, some of the steps will overlap, some will have to be revisited, and some may be better done in more detail than others. All of the steps are essential to adaptive management. Omission of one or more will hinder the ability to learn from management actions. In addition, to build a knowledge base, it is crucial to document the key elements of each step and communicate the results, especially for long-term projects.



**Figure 5-1. The Six Steps of Adaptive Management**

These elements are discussed briefly in the following sections. Although these elements describe a framework that will be useful in a broad range of management activities, here the framework is meant to be applied to the development of management experiments to test the integrated forest management strategies in the forest management plan. Management experiments range from relatively small-scale, short-term operations on a unit, to long-term tests of silvicultural prescriptions at multi-watershed scales.

**Step 1: Assessment — Define the scope of the management problem (e.g., a particular stand structure type), synthesize existing knowledge about the system, and identify potential outcomes of alternative management actions. Make predictions about outcomes, in order to assess which actions are most likely to meet management objectives.**

This step sets boundaries on the spatial and temporal scales and the range of factors to be considered. Problems can be bounded effectively by defining the following parameters:

- The breadth of factors considered (e.g., timber production, biodiversity, etc.).
- The depth of detail.
- The spatial scale and resolution (e.g., stand, landscape, bioregion).
- The time scale and resolution (e.g., 20 years, one rotation, 500 years).

During this exploration and forecasting process, key gaps in understanding of the system are identified. These gaps may limit the ability to predict outcomes.

Management experiments should focus on those questions where the expected value of information is high. Once uncertainties and key questions have been identified, hypotheses can be developed to test assumptions about management actions (Underwood 1995). To make decisions, managers need to know more than simply whether a treatment results in a particular effect. Managers also need to know:

- The magnitude of a response to a management activity.
- The response over a range of conditions.
- The reason for a particular response.

**Step 2: Design — Design experiments and related monitoring plans that are informative and provide reliable feedback.**

The Department of Forestry intends to use a mix of active and passive approaches. In many instances a range of management actions will be compared. It may be worthwhile to evaluate several designs, one of which may be a passive design, in which only the “best” alternative is tested. In some situations, actions will be tested in a small-scale pilot project before testing them at a larger scale, in order to narrow the range of plausible actions and refine methodologies. In situations or areas where the risk of damage is high and irreversible, managers may decide to postpone any management intervention until research and trials in less vulnerable areas provide more information.

In the design of the management experiments, it is important to select indicators that are relevant to the objectives and responsive to management actions. Indicators are measurable attributes of system behavior that allow evaluation of management options and, eventually, assessment of outcomes. Indicators should be selected so that some

respond in the short term, some in the medium term, and others in the long term, and at different spatial scales (e.g., site, landscape, region) (Holling 1978; Noss 1999; Walters 1986). Careful selection of response indicators goes hand in hand with development of the monitoring protocol, which should specify the following items (see also Step 4).

- The type and amount of baseline (pre-treatment) data required.
- Frequency, timing, and duration of monitoring.
- Indicators to be monitored at each interval.
- Appropriate spatial scales for monitoring different indicators.
- Who is responsible for undertaking different aspects of monitoring.

It is important to plan how the data will be managed and analyzed (e.g., access, analysis, interpretation, storage). Managers will need to define the intensity and degree of response in an indicator that will trigger a change in management actions or objectives. Adjustments should reflect the trade-off between the costs of acting if preliminary results later prove to be incorrect, and the costs of not acting if they later prove to be correct. A system should be established to communicate results and information.

For the FMP, research will be conducted to obtain information needed to inform decisions, and will include several different approaches, as described below.

- **Replicated management experiments** — Rigorous experimental design is important for distinguishing between alternative hypotheses and characterizing cause-and-effect relationships between management activities and observed outcomes.
- **Non-replicated management experiments** — For many problems in forest management, particularly large-scale disturbances, replication is often impractical or impossible. Although managers may be able to replicate treatments at a small scale, extrapolating the results to the large scale at which many management actions occur can be uncertain.
- **Other sources of information** — Although well-designed management experiments may be the most powerful way to discriminate between alternative hypotheses, it is sometimes impossible or impractical to design experiments at an operational scale, in an operational setting. In such cases other sources of information will be used to help identify the most likely hypotheses and best policies, and interpret outcomes. Such information sources include:
  - Results from research on ecosystem processes.
  - Extrapolation of results from small-scale experiments.
  - Descriptive or observational studies.
  - Retrospective studies of past management activities.
  - Observation of natural variability, rather than deliberate manipulation.
  - Local knowledge.
  - Expert opinion.

**Step 3: Implement — Implement experiments and monitoring as designed. Decide when and what type of deviations are acceptable. Ensure that these circumstances are clear and accepted by all involved. Monitor implementation, and document any deviations from the plan.**

**Step 4: Monitor — Measure environmental characteristics and conditions over an extended period of time, in order to determine status or trends in various aspects of environmental quality.**

Monitoring is often neglected, 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 surprising events.

The challenge is to clearly understand why monitoring is an important activity, to decide which characteristics to measure, to determine what information these characteristics indicate, and to use that information to make better informed management decisions.

For the FMP, monitoring is organized into three categories.

- **Implementation monitoring** is used to determine if the objectives, standards, guidelines, and management practices specified in the FMP are being accomplished. Sometimes used as a synonym, **compliance monitoring** is used to determine if specified actions or criteria are met. Implementation, or compliance, monitoring asks the question, “Are we doing what we said we would do?”
- **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 FMP. 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 asks, “Are the management practices producing the desired results?”
- **Validation monitoring** is used to determine whether data, assumptions, and coefficients used to predict outcomes and effects in the development of the FMP are correct. Validation monitoring seeks to verify the assumed linkages between cause and effect. Validation monitoring asks, “Are the planning assumptions valid, or are there better ways to meet planning goals and objectives?”

These types of monitoring are not mutually exclusive, nor are they conducted in a linear progression. Validation and effectiveness monitoring are most powerful when used in combination.

A well-designed monitoring program is statistically credible, cost-effective, and practical.

When done in conjunction with good experimental design and appropriate data analysis, monitoring can allow managers to:

- Determine whether practices are meeting objectives.
- Improve understanding of the mechanisms that underlie ecosystem function and change (to test alternative hypotheses).
- Determine the effect of management actions on the ecosystem.
- Identify thresholds and anticipate shifts in the state of the ecosystem.

**Step 5: Evaluate — Analyze data and compare actual results to the forecasts made in Step 1. The evaluation should explain why outcomes occurred and include recommendations for future action.**

Predicted responses to alternative treatments and how those responses will affect future management activities should be documented when the management experiment is designed. These feedback loops will provide a framework to guide change. Outcomes can be the result of the management activity, or of some unanticipated factors, or both. Negative or unexpected outcomes can be just as informative as positive, predicted outcomes. All results must be documented and communicated.

**Step 6: Adjust — Verify or update the hypotheses used to make the initial forecasts, and adjust management actions as necessary. Review the objectives, and adjust as necessary to ensure they remain consistent with overall goals and values.**

It should be specified at the outset how information will be used to adjust management, in order to facilitate timely and appropriate application of new information, and also to ensure that the monitoring program answers questions relevant to management decisions.

Predetermined quantitative or qualitative changes in key indicators should trigger predetermined changes in management activities or guidelines. These trigger points should be defined for a variety of time frames, so that changes in management are not unnecessarily delayed by indicators with long response times. Preliminary data can serve as early warning signals that trigger adjustments in management to avoid irreversible detrimental changes. The size of these adjustments should reflect a balance between the reliability of the data and the potential cost of not adjusting activities.

Additional information on adjusting management activities or objectives is presented later in this chapter, under the heading “Effecting Change.” A number of methods can be used to document plans and communicate results, including written progress and final reports, presentations, seminars, field trips, informal discussions, and posters.

Finally, managers and team leaders have a critical leadership role in encouraging the conditions that facilitate adaptive management. Institutional environment and individual attitudes are as critical to effective adaptive management and learning as the actual steps followed (see Senge 1990). In an atmosphere that is conducive to long-term learning, mistakes are recognized as the price of innovation and are treated as opportunities to learn, incentives to improve are greater than the fear of failure, there is less demand for quick fixes, and people are explicitly rewarded for innovation and learning.

**Concept 4. Adaptive management requires a well-defined framework for effecting change.**

The *Northwest Oregon State Forests Management Plan* must be implemented using a scientifically based, systematically structured approach that tests and monitors management plan assumptions, predictions, and actions, and then uses the information to improve management plans or practices. Monitoring and research must be linked to the process through hypothesis development, information gathering, analysis, and reporting.

Technical specialists and field managers must evaluate results and make recommendations for change to the appropriate decision-makers. Proposed changes may involve minor adjustments in management practices, or they may require significant changes at policy and planning levels.

There are four planning levels at which change may be proposed, considered, and initiated: the Forest Management Plan level, the District Implementation Plan level, the Annual Operations Plan level and the Management Activity level. The Forest Management Plan level demands the broadest review and most rigid approaches before change is allowed, whereas the Management Activity level requires the least review and provides the simplest avenue to change.

The range of decisions that will be made, how they will be made, and who will make them are described in more detail in the strategies that follow.



# Strategies for Implementing Adaptive Management

The following actions will be taken to ensure a strong adaptive approach for forest management in the context of the *Northwest Oregon State Forests Management Plan*:

**Adaptive Management Strategy 1: Implement an adaptive management process and framework that provides for change at the appropriate planning level and in a timely manner.**

The range of decisions that will be made, how they will be made, and who will make them are described in the following tables and discussed in more detail in the text that follows.

**Table 5-3. Effecting Change**

<b>Forest Management Plan</b>  <b>(Long Term – 10 Years or More)</b>	<b>District Implementation Plans</b>  <b>(Periodic – Maximum 10-Year Interval)</b>	<b>Annual Operations Plans</b>  <b>(Annual)</b>	<b>Management Activities</b>  <b>(As Appropriate)</b>
<b>Examples of What Might Change</b>			
FMP <ul style="list-style-type: none"> <li>• Stand type percents</li> <li>• Arrangement</li> </ul>	<ul style="list-style-type: none"> <li>• Landscape design</li> <li>• Silvicultural approaches, i.e., sequence of treatments, etc.</li> <li>• Management opportunities &amp; objectives</li> </ul>	<ul style="list-style-type: none"> <li>• Approaches to meeting objectives, e.g., silvicultural prescriptions</li> <li>• Monitoring projects</li> </ul>	<ul style="list-style-type: none"> <li>• Techniques for culvert installation, snag creation, etc.</li> </ul>
<b>Examples of Public Involvement</b>			
Formal <ul style="list-style-type: none"> <li>• BOF meetings</li> <li>• OAR process</li> <li>• Public meetings</li> <li>• Technical specialist or citizen input committees</li> </ul> Informal <ul style="list-style-type: none"> <li>• Voluntary participation in monitoring program</li> <li>• Regular reporting processes, including monitoring reports</li> <li>• Public submittal of information</li> </ul>	Formal <ul style="list-style-type: none"> <li>• Public review &amp; comment processes</li> <li>• Public meetings</li> <li>• Technical specialist or citizen input committees</li> </ul> Informal <ul style="list-style-type: none"> <li>• Voluntary participation in monitoring program</li> <li>• Regular reporting processes, including monitoring reports</li> <li>• Public submittal of information</li> </ul>	Formal <ul style="list-style-type: none"> <li>• Review &amp; comment period</li> </ul> Informal <ul style="list-style-type: none"> <li>• Voluntary participation in monitoring program</li> <li>• Regular reporting processes, including monitoring reports</li> <li>• Public submittal of information</li> </ul>	Informal <ul style="list-style-type: none"> <li>• Voluntary participation in monitoring program</li> <li>• Regular reporting processes, including monitoring reports</li> <li>• Public submittal of information</li> </ul>

(Table continued on next page)

**Table 5-3 continued. Effecting Change**

Forest Management Plan  (Long Term – 10 Years or More)	Implementation Plans  (Periodic – Maximum 10-Year Interval)	Annual Operations Plans  (Annual)	Management Activities  (As Appropriate)
<b>Examples of Monitoring</b>			
<p><b>Framework Implementation</b></p> <ul style="list-style-type: none"> <li>• Are we doing what we said we would do?</li> </ul> <p><b>Effectiveness</b></p> <ul style="list-style-type: none"> <li>• Are the management practices producing the desired results?</li> </ul> <p><b>Validation</b></p> <ul style="list-style-type: none"> <li>• Are the planning assumptions valid, or are there better ways to meet goals and objectives?</li> </ul>	<p><b>Identify and Implement Projects</b></p> <p>Projects:</p> <ul style="list-style-type: none"> <li>• What is the condition of State Forests based on stand type percentages and habitat availability?</li> <li>• Is active management promoting habitat development by moving stands toward layered and older forest structures?</li> <li>• Are our silvicultural practices used to achieve forest structures sufficient to maintain a full array of forest products?</li> <li>• Is structure-based management helping to improve forest health on State Forests?</li> </ul> <p>Protocol development and implementation Data gathering and analysis Evaluation Communication</p>		

When Department of Forestry managers and staff receive new information, they recommend changes to the appropriate official for each of the four planning levels, as shown below. This official makes the final decision. At all four levels, various sources of information can trigger change: public input, monitoring information, research information, and operational input.

**Table 5-4. Decision-Makers for the Four Planning Levels**

Planning Level	→	Who Decides
FMP	→	Board of Forestry/State Land Board
District Implementation Plans	→	State Forester
Annual Operations Plans	→	District Forester
Management Activities	→	Management Unit Forester

## **Effecting Change through Planning Processes**

The plan's success will depend on timely changes in strategies, approaches, and prescriptions in accordance with new knowledge. As new information is available, it must be evaluated in the context of the guiding principles, goals, and strategies of the FMP.

As Tables 5-3 and 5-4 show, decisions on change will be made by different people or groups at different levels. For example, if research or monitoring information shows that the forest stand type percentages in Landscape Management Strategy 1 should change by a substantial amount, a fundamental change in FMP strategies, this decision would be made by the Board of Forestry and the State Forester, after a formal public involvement process.

Where the proposed change does not significantly alter the fundamental strategies, changes may be instituted by field personnel without a formal approval process. For example, field staff could make a decision to create snags by girdling trees instead of blasting out the tops.

The methods for change at each level are discussed below.

### **Forest Management Plan**

At this level, planning is typically at broad spatial and long temporal scales, and identifies general goals and strategies. Changes made will likely apply to all the districts within the planning area.

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 make forecasts for at least 10 years, and generally for 30 to 100 years or more. These plans are reviewed periodically and, at a minimum, at least every 10 years. It will frequently take 10 years or more to develop relevant monitoring information for these long-term forecasts.

#### **What types of changes might occur at the FMP level?**

Changes could occur in the FMP's fundamental concepts and strategies. The FMP integrated forest management and landscape strategies that would require this level of evaluation address:

- Stand type percentages.
- Patch characteristics and arrangement.
- Structural habitat components.
- Aquatic and riparian conservation strategies.
- Upland management activities.

### **Who makes the decision to change the FMP?**

The Board of Forestry/State Land Board and State Forester will weigh the scientific, operational, and public information in a formal public process to determine changes to the FMP.

### **What will be the basis for recommending changes?**

Monitoring projects will focus on the overall implications of the management strategies and assumptions in the FMP. This work will generally be long-term and at broad landscape scales that include many specific monitoring and research projects. This information will help guide changes in the strategies, objectives, and potentially even the goals of the FMP. For example, to determine if the FMP strategy on stand type percentages is successful, it will be necessary to determine if the percentages provide for the range of native species, if the habitat components provide the habitat as expected, and if the stand types and percentages provide functional habitat for the intended species.

### **What are the opportunities for public involvement in FMP changes?**

Many opportunities will be offered for public involvement. Formal processes will include Board of Forestry meetings, FMP administrative rule hearings, public meetings and workshops, and public input or special interest committees. Less formal opportunities will exist for volunteer involvement in actual monitoring projects and comments on periodic monitoring reports.

## **District Implementation Plans**

Changes at this level will occur over the whole planning area, or for a district or basin, and over time frames longer than one year but no more than ten years. The district implementation plans determine how the FMP strategies will be implemented in each district. These plans include the management activities scheduled for the next ten years and 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.

### **What types of changes might occur at the implementation plan level?**

Changes could be made to the long-term landscape design of stand types, anticipated sequence of stand treatments, the management opportunities that will be pursued over the next ten years, and other elements. Changes to the actual strategies themselves will not be made at this level.

### **Who makes the decision to change district implementation plans?**

The State Forester, ~~in consultation with appropriate other federal or state agencies~~, will weigh the scientific, operational, and public information, when considering the approval and subsequent changes to district implementation plans.

### **What will be the basis for recommending changes?**

Monitoring will focus on issues covered by implementation plans and issues relevant at district levels. Areas of interest will include silvicultural pathways, and approaches used to develop structural components such as snags, remnant old growth, and green trees.

The research and monitoring coordinator will organize the development of projects, interpretation of data, and proposals for change. Teams with appropriate technical and operational expertise will evaluate information and make proposals for change.

**What are the opportunities for public involvement in implementation plan changes?**

Many opportunities will be offered for public involvement. Formal processes may include public meetings and workshops, and technical specialist or citizen input committees. Less formal opportunities will exist for volunteer involvement in actual monitoring projects and comments on periodic monitoring reports.

**Annual Operations Plans**

Annual operations plans identify all major forest management activities that are proposed for the next year. This includes 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 effect change from year to year, at scales ranging from site-specific to district-wide.

**What types of changes might occur at the annual operations planning level?**

Annual operations plans are specific action plans that describe specific projects. Silvicultural prescriptions, recreation projects, stream enhancement approaches, and other projects could be changed to improve outcomes. In the case of silvicultural prescriptions, examples might include thinning to lower densities or changing the mix of species being planted. For recreation, an example is a change in hiking or OHV trail standards.

**Who makes the decision to change annual operations plans?**

Each District Forester will weigh the scientific, operational, and public information through the annual operations planning process, and then make changes and approve annual operations plans. The operations planning process includes review by Department of Forestry staff and a variety of technical specialists.

**What will be the basis for recommending changes?**

Monitoring will focus on issues covered by annual operations plans. Areas of interest will include the assessment of silvicultural prescriptions, methods used in stream restoration projects, effectiveness of operational approaches, and techniques to develop or retain structural components such as snags, remnant old growth, and green trees.

Districts will work with the research and monitoring coordinator to develop necessary monitoring projects and interpret data from monitoring and research. The technical and operational evaluation team approach used at the FMP and implementation plan levels will be used for many issues; however, districts may choose to initiate change based upon local information that is soundly based.

**What are the opportunities for public involvement in annual operations plan changes?**

Annual operations plans are prepared by each district and will be made available for public comment prior to consideration for approval by District Foresters. Other opportunities may exist for volunteer involvement in actual monitoring projects and comments on periodic monitoring reports.

**Management Activities**

Agency personnel learn and make changes on a daily basis in the forest. In order to achieve the best possible results, it is critical to adapt practices to new information and changing conditions. Frequently, professionals on the ground can identify improved techniques that can be used immediately to achieve better results. In addition, some changes can be incorporated into an ongoing project based upon new information from monitoring and research, or from larger-scale information sources offering applicable and appropriate information.

**What types of changes might occur at the management activity level?**

At this level, change will generally involve adjusting specific techniques. Reasons might include learning a technique that will produce better results, or a more cost-effective way may be found to get a particular job done.

An example is the creation of snags from live trees. In this case, cutting or blasting tops out of trees may have been the preferred method, but based on research or operational concerns the decision may be made to girdle or inoculate trees instead. This decision does not affect the basic principle of developing snags, but merely changes how it is done.

**Who decides to make changes at the management activity level?**

Field supervisors will be responsible for weighing the scientific and operational advantages and disadvantages of changes and determining whether change is appropriate.

**What will be the basis for recommending changes?**

Change at the management activity level may occur without any formal process constraints.

**What are the opportunities for public involvement at the management activity level?**

These decisions are typical of the daily field work of natural resource professionals and are made in a tight time frame. Opportunities may exist for volunteer involvement in actual monitoring projects or in commenting on periodic monitoring reports.

## Technical and Operational Adaptive Management Review Team

The research and monitoring coordinator is responsible for coordinating the development of monitoring projects, interpretation of data from monitoring and research, and development of proposals for change. Throughout the year information will be available from many sources, including Department of Forestry monitoring projects, research, operational feedback from the field, and the general public. The research and monitoring coordinator, together with Department of Forestry resource specialists and field administrators, will assess the information to determine key issues for the current year.

When the discussion topics are identified, the research and monitoring coordinator will assemble a team to evaluate the information from research, monitoring, operational input, and the public, and to make proposals for change. The expertise on the team will vary depending on the topic. Table 5-5 describes the pool from which team membership will be drawn.

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**Table 5-5. Adaptive Management Review Team Membership**

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<b>Core Members</b>	<b>Pool Members</b>
Research and Monitoring Coordinator	Field managers
Area Forest Planning Coordinator	Area resource specialists
Program Forest Planning Coordinator	Program resource specialists
	Other agency resource specialists
	Academics
	Consultants/contractors
	County representatives
	Citizen/interest group representatives

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The team will provide reports to the state forests program director, interpreting the available information and making recommendations for change.

### Evaluation of Technical Information

Information evaluation or data analysis may be done by the team or some other group, as deemed appropriate by the research and monitoring coordinator. For evaluation and analysis, the goal is to explain the data, its weaknesses, and strengths; identify triggers and thresholds for the data set and resource; reach conclusions; and make recommendations.

Triggers and thresholds are critical, in order to determine if change is needed. In a complex ecosystem, triggers or thresholds are rarely achieved with unequivocal certainty.

The analyst will have to decide if the information indicates a sufficient risk to the system, given normal variability and error in data collection. To add to the complexity, biological triggers may differ from social or political triggers and thresholds.

In these complex situations, risk assessment becomes a significant part of the adaptive process. Risk evaluation is a critical concept that links monitoring and research information to effective and efficient adaptive management decisions. In cases where the system or population is particularly sensitive or the risk is high, the thresholds for change will be lower and triggers more sensitive. Where risk to the resource is not as great, thresholds may be higher and the triggers more demanding. More data may be needed to justify a change. Assessments of risk and resource sensitivity that affect thresholds and triggers will be presented to decision-makers along with recommendations.

Even during technical analysis, situations may arise where people will not agree on the interpretation of the data. A process will be developed for issue resolution, in order to help the team clearly articulate their concerns and differences and arrive at as much of a consensus as possible before offering their conclusions and recommendations. If technical issues cannot be resolved, then the only option may be to include one set of technical information and recommendations, along with a report of the differing opinions expressed by the team.

**Adaptive Management Strategy 2: Develop and implement a monitoring program designed to evaluate the working hypotheses over time. Review and update a monitoring implementation plan at least every ten years.**

### **The Application of Monitoring**

Monitoring is an important step in the adaptive management process and is, therefore, a key element in the *Northwest Oregon State Forests Management Plan*. The basic principles of monitoring as it relates to adaptive management are presented earlier in this chapter. This section describes how monitoring will be used in the adaptive management strategies of the FMP.

Oregon administrative rules for state forest management (OAR 629-035-0000 to 0110) require forest management plans to include general guidelines for “implementation, monitoring, research, and adaptive management” that describe “the approach for determining whether the strategies are meeting the goals of the Forest Management Plans; and, the process for determining the validity of the assumptions used in developing the strategies.” For this FMP, Guiding Principle 14 commits the Department of Forestry to using an adaptive management approach, with monitoring and research as part of that approach.

It will take many decades to fully implement the strategies described in Chapter 4 of this plan, and to produce the desired future condition of stand types on the landscape. Over time, monitoring and research will indicate the extent to which the assumptions underlying the strategies are correct and if the strategies are accomplishing their intended purpose. As monitoring provides feedback, the plan will be fine-tuned and improved through adaptive management (McAllister et al. 1998).

## Monitoring Framework

Information from monitoring and research will be planned for and used to assess the following items:

- **Assumptions and hypotheses** — Are the basic assumptions and hypotheses that support the strategies scientifically valid? (See Chapter 4. Also compare the summary of working hypotheses in Chapter 3, page 3-18.)
- **Resource condition** — Can historic and current conditions serve as a basis for estimating desired future conditions and likely trajectories of changes in resources?
- **Ecological/cultural trends** — Are resources changing due to ecological, social, political, and economic influences outside the scope of the plan's management actions?
- **Management actions** — How are the plan's strategies being implemented?
- **Management effects** — How are the resources changing in response to management actions?

These questions serve as the basis for developing specific monitoring projects or research needs. As information becomes available from the monitoring program, as well as from researchers and others working on forest management issues, it will be evaluated to determine additional information needs and necessary changes to the management strategies.

## Key Questions

The Department of Forestry will conduct implementation, effectiveness, and validation monitoring. Initially, the department will emphasize implementation and effectiveness monitoring. A more formal research effort may be necessary to evaluate the validity of the underlying assumptions of the management strategies. The Department of Forestry will help support the necessary research at selected research institutions.

Implementation and effectiveness monitoring will concentrate on a series of key questions:

- Does the FMP provide for healthy, productive, and sustainable forest ecosystems that over time and across landscapes provide a full range of social, economic, and environmental benefits to the people of Oregon?

- Does the FMP maintain and restore properly functioning aquatic and riparian habitats?
- Does the FMP protect, maintain, and enhance native wildlife habitats, recognizing that forests are dynamic and that the quantity and quality of habitats for species will change across landscapes and over time?
- Does the FMP provide sustainable timber harvest?
- Does the FMP provide for healthy forests by managing forest insects and diseases and by using appropriate genetic sources of forest tree seed and trees?
- Does the FMP maintain or enhance long-term forest soil productivity?

The monitoring program must assess not only ecological processes and management activities, but also the cultural and economic circumstances linked to them. Therefore, monitoring projects must be designed to provide information to evaluate the integration of natural and social systems.

The key questions must first be broken down into components that can be addressed by specific monitoring projects. Projects will be developed around precise, well-focused monitoring questions that focus on specific information needs. Monitoring projects will be initiated as determined by requirements of the management experiments. Identification and definition of monitoring needs will be part of the decision analysis process during the “assess” and “design” phases of adaptive management.

## **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.

**Data storage and analysis** — Because the FMP focuses on landscape issues and large-scale responses to management, primary responsibility for data storage and analysis will be at the program level. Data will be stored in a central database, in order to maintain data integrity and consistency. Data collected at the district or site-specific scale will be available in raw form for archiving and use at the district if desired. However, the general approach early in the monitoring program will be to provide analyzed information back to the districts. Data will be made easily accessible to the public, except for data that are exempt from disclosure under public records law (e.g., specific locations of threatened and endangered species).

Analysis will be done with appropriate analytical tools. Potential tools include spatial analysis, univariate and multivariate statistical analysis, trend analysis, and basic graphical analysis. Planning for analysis will occur during the project development phase rather than in reaction to the data gathered. Primary responsibility for coordinating and completing analyses will be with the adaptive management team, as already described under the heading, “Effecting Change through Planning Processes.”

**Reporting** — Information, analysis, and recommendations for action will be presented in an annual report. Preparation of this report will be coordinated with other reporting requirements (e.g., reports to the Board of Forestry) so that a single report can satisfy more than one requirement. At a minimum the report will include the following information.

- Objectives for the monitoring program.
- Effects on the covered species and/or habitat.
- Location of sampling sites.
- Methods for data collection and variables measured.
- Frequency, timing, and duration of sampling.
- Description of the data analysis.
- Evaluation of progress toward achieving measurable biological goals and objectives.

This report will be the basis for determining the need to adapt management policies, biological or habitat goals, or monitoring activities. This report 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 may also be available, and monitoring program updates and project descriptions will be available on the Department of Forestry's web site. As the monitoring program develops, reporting mechanisms will be refined and improved.

## **Coordination**

In light of increased monitoring occurring within state, federal, and non-governmental organizations in the Pacific Northwest, coordinated efforts are critical to the success of the plan. 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 also for the 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.

## **Current Monitoring**

Although the state forests management program has not had a formal monitoring program, conditions on state forest lands have been monitored for many years. Resource specialists, such as the insect and disease program staff and the wildlife biologists, have conducted aggressive monitoring and research projects to stay abreast of issues such as Swiss needle cast incidence and severity, and habitat protection and use for northern

spotted owls and marbled murrelets. The state forests management program cooperates with the Oregon Department of Forestry's forest practices monitoring program, Oregon Department of Fish and Wildlife, Oregon State University, federal agencies, and private landowners. The state forests management program will use these contacts and data sources to help establish a formally structured monitoring program. In the future, monitoring projects, data analysis, and storage needs will be included in area and district implementation plans and in an annual program-wide monitoring report.

**Adaptive Management Strategy 3: Conduct a comprehensive review of the goals and strategies of this FMP every ten years following adoption.**

At the completion of the initial ten-year implementation period, and every ten years thereafter, the Oregon Department of Forestry will compile a ten-year Implementation and Monitoring Report, that summarizes the management activities that have occurred over the period, the results of monitoring and research efforts during that time, and any proposed changes to the FMP strategies to better meet the goals. In preparing this report, the department will collaborate with other agencies as necessary to obtain the best available information, and will support any major modifications proposed with information from independent scientific review. Examples of the types of issues that will be considered during the comprehensive review process:

- The overall effectiveness of the strategies in moving towards the desired future condition of stand types and a functional arrangement of those stands.
- What we have learned about species responses to specific activities and to the stand structures and the implications of this information to the FMP.
- The status of developing habitat and the extent to which species are colonizing and using that habitat.
- The ability of ODF to meet the range of resource goals described in the FMP.

Outcomes or recommended changes that evolve out of the ten-year comprehensive review will be implemented using the appropriate process, dependent on the significance of the change.

**Adaptive Management Strategy 4: Conduct a comprehensive review of the landscape management strategies when 30% in aggregate of LYR and OFS stand types is achieved on lands in the planning area.**

This review will be conducted as part of a ten-year comprehensive review (described above). This review will be constructed to reevaluate the desired future condition stand type array described in Landscape Management Strategy 1 and determine whether the best available scientific information supports continuing to pursue that DFC, or if it supports some other desired future condition.



The Oregon Department of Forestry is committed to public participation in land management decisions (OAR 629-035-0080 and Guiding Principle 9). The guidelines in the *Draft Public Involvement Guidance* (Oregon Department of Forestry 2000f) describe the department's public involvement policies and procedures. Public participation in the development of forest management plans and this FMP was discussed in Chapters 1 and 2. Public input is also important in developing recreation plans.

The result of an effective public involvement program will be decisions that are made with a full understanding of public concerns and that are, in turn, better understood and trusted by the people affected. Although public participation is not by itself sufficient to ensure public acceptance of decisions, it is a necessary component.

### **Early and Continuous Involvement**

The benefits of public involvement cannot be achieved by means of a simple public notice and comment period once plans or projects are completed. The Department of Forestry prefers to involve the public early, so that concerns can be addressed as part of the planning process, rather than after the fact in a review or mediation. Early public participation is particularly important in the case of large-scale, complex projects or plans such as this FMP.

### **Appropriate Scale and Flexibility**

The public involvement program should be appropriate for the scale and complexity of the project. A long-term, extensive public participation program is required for large-scale, complex projects that call for comprehensive evaluations.

Public involvement must be a flexible process, adapting to different sets of environmental issues and public concerns. The Department of Forestry will design and implement public involvement programs that match the needs of the project, and that reflect the needs and preferences of people involved. Since public involvement is a dynamic process, the department may need to revise public participation plans when necessary.

## **Accountability and Timeliness**

Participants in a public involvement process must be accountable for their actions. The Department of Forestry will ensure that the participation process is directly linked to the decision-making process. Participants should report back to their constituents in a fair and accurate manner, and follow through on any negotiated commitments. The department must ensure that members of the public have adequate time in which to review information and provide meaningful input (Oregon Department of Forestry 2000f). Stakeholders and other people involved should recognize that the decision-makers remain accountable for making the decision. Decision-makers should explain their decision, clearly demonstrating how the public's input has been used, or explaining why the results have not been incorporated in the decision.

## **Shared Process and Mutual Respect**

Public involvement programs will often bring together people representing a wide range of perspectives, opinions, and values. The process should be conducted in an atmosphere of mutual respect.

## **Public Involvement Techniques**

Techniques should match needs. There is no single best public involvement technique. There are many techniques, and each may be effective in a particular set of circumstances or in response to the preferences of a particular public group. Specific techniques are presented in the *Draft Public Involvement Guidance* (Oregon Department of Forestry 2000f).

## **Public Involvement in District Implementation Plans and Annual Operations Plans**

Public involvement can provide local forest managers with additional information and ideas as they develop implementation plans and annual operations plans to achieve the goals of this forest management plan. Ongoing public involvement during implementation of this plan is also critical to gaining public understanding, acceptance and support for local plans and operations.

Public involvement opportunities will be provided as district implementation plans, land management classifications, and annual operations plans are reviewed and approved. These opportunities will be designed to meet the goals provided in OAR 629-035-0080 and Guiding Principle 9 (Chapter 3):

- To seek insight, opinion and data on planned management actions.
- To build understanding, acceptance and support for the forest management planning process and decisions.

- To offer information to the public about forest systems and forest stewardship.
- To provide the public with meaningful opportunities to comment and affect planning decisions at a time when public involvement can contribute positively to the planning decisions under consideration.

District Foresters will be responsible for developing and implementing public involvement opportunities that will meet these objectives. At a minimum, the following opportunities will be provided:

**District Implementation Plans** — Prior to submitting initial implementation plans and the associated land management classification maps to the State Forester for approval, there will be a ninety-day public comment period in order to gather public input. All public comments submitted in writing will be forwarded to the State Forester, along with each District Forester's recommended implementation plan and land management classifications.

The State Forester shall approve, modify, or deny the recommended implementation plans. If the State Forester modifies a recommended plan, the modifications will be incorporated into the original plan and appropriate revisions made to land management classifications. If the State Forester denies the recommended plan, the District Forester shall prepare a revised or new implementation plan and/or revised or new land management classifications as appropriate.

Prior to submitting a revised or new implementation plan, and/or revised or new land management classifications, after a previous denial, there will be a thirty-day public comment period to gather public input. All public comments submitted in writing will be forwarded to the State Forester, along with the revised or new implementation plan. The State Forester shall approve, modify, or deny this plan. The process described in this paragraph will be followed until approval of an implementation plan is obtained.

**Annual Operations Plans** — The District Forester must consider any written comments from resource specialists and the public before approving or denying approval of an operations plan.