Chapter 5

Resource Management Strategies

Chapter 5 presents the resource management strategies to be implemented in the Elliott State Forest. Resource management is designed to generate an appropriate balance of economic, environmental, and social values from this state forest. The land management goals listed in Chapter 3 embrace the concepts of "sustainable" and "integrated" that are fundamental to the management of the Elliott State Forest.

An interagency multidisciplinary team used the concepts listed in Chapter 4 to develop the resource management strategies. The concepts were derived from legal mandates and scientific research in the fields of silviculture, forest ecology, fisheries, and wildlife biology, and stream ecology. The strategies are the heart of the FMP and provide the direction for achieving the goals and vision outlined in Chapter 3.

The main headings in this chapter are:

Strategies for Managing the Elliott State Forest

The *Elliott State Forest Management Plan* presents a set of integrated strategies that are the basis for managing the forest landscape as a whole. They are designed to be applied through a system of active management. The FMP includes strategies for sustainable economic and social benefit, strategies for sustainable forest ecosystem management, and strategies for integrated resource management that consider specific values beyond the landscape management approach.

Together, this body of integrated strategies will be applied across the landscape, providing both the coarse filter or landscape level management focus, and the necessary fine filter emphasis for certain resource values. These integrated strategies will provide diverse forest habitats that are likely to accommodate most native wildlife species associated with forested habitats in the Oregon Coast Range. Additional species-specific strategies may be addressed in a proposed HCP.

This FMP stresses both the achievement of landscape management and stand complexity in the long term, in addition to regular, sustainable, timber harvest through silvicultural operations. It provides for the maximization of revenue to the CSF in the long term, consistent with sound techniques of land management.

It is essential that the strategies for sustainable forest ecosystem management be applied in an adaptive management context. Over time, monitoring will reveal if the strategies are accomplishing their intended purpose. As monitoring provides feedback, the FMP will be fine tuned and improved.

Because the Elliott State Forest is 90.5 percent CSFLs, the State Land Board sets the harvest level for these lands by approving the FMP through its regular administrative process.

The BOF approves the FMP for Elliott BOFLs by adopting the FMP as an OAR. A separate IP is approved by the State Forester that specifies the harvest level for BOFLs, reflecting the CSFLs harvest level.

The IP will describe the activities for achieving the approved harvest levels, and moving the forest towards the vision and landscape design for a specified period of time (generally ten years or less). The district IP also provides a perspective on the timeframe for transitioning toward the future landscape design and achieving the forest vision. AOPs that are consistent with the IP are developed to apply the specific strategies on the ground.

Strategies for Sustainable Economic and Social Benefit

The economic and social benefits of managing the Elliott State Forest are two important legs of sustainability; the third is environmental benefit. These three legs of sustainability are interdependent. To provide these benefits, it is essential to meet the legal mandates that include constitutional and statutory requirements related to the purpose of the lands, as well as other state and federal laws designed to protect environmental and biologic values.

The forest must be managed to produce products and revenue for the CSF to meet economic goals. The forest also provides social benefits such as jobs and recreational opportunities.

The challenge of managing a complex forest system with competing goals is a difficult one. This FMP is designed to address that challenge and provide an approach for managers to achieve the multiple goals for the forest.

Strategy 1: Meet Legal Mandates and Trust Obligations

The Elliott State Forest will be actively managed with the intent of meeting legal mandates for these lands.

The most fundamental of these mandates is to maximize revenue for the CSF, and produce revenue for counties and local taxing districts. This mandate will be met primarily through regular timber harvest and marketing, along with the sale of special forest products. Managers will regularly review procedures and outcomes to ensure that an efficient and cost-effective approach is applied in carrying out the strategies in this FMP.

By agreement with the State Land Board and DSL (for CSFLs), and by OAR (for BOFLs), the ODF is directed to develop long-term management plans. The plans for CSFLs are to be prepared by ODF, to govern all management activities including the overriding objective of revenue production and, consistent with this primary objective, managing for other public values. The plans for BOFLs are to be based on the best available science and contain specific elements that must be addressed.

The FPA applies to state forest lands as well as to other ownerships. This act declares it public policy to encourage economically efficient forest practices that ensure the continuous growing and harvesting of forest tree species consistent with sound management of soil, air, water, fish, and wildlife resources, as well as scenic resources within visually sensitive corridors, and to ensure the continuous benefits of those resources for future generations of Oregonians. Management of the Elliott State Forest will meet or exceed the requirements of the FPA.

ODF will coordinate with the ODFW and ODA in developing plans that comply with the state ESA and that are consistent with the constitutional mandate for CSFLs.

ODF will meet the federal ESA either by applying policies and guidelines that will avoid take, or through an ITP obtained through approval of an HCP.

Strategy 2: Provide Predictable and Dependable Products and Revenues

This FMP is designed to produce predictable and dependable forest products and revenues generated primarily through timber harvest. However, other special forest products will be marketed as well. Land uses such as easements, rights-of-way, and recreation, are acceptable as long as they do not detract from the primary revenue-generating activity.

The economic outputs from this FMP were analyzed and identified during its development to provide reliable revenues to the beneficiaries and meet the constitutional mandate to maximize revenue to the CSF. The harvest level in the FMP will be designed to meet these obligations by taking a long-term view of maintaining the productivity of the resource. The forest will be managed to produce a sustainable, even-flow harvest of timber, subject to economic, environmental, and regulatory considerations.

It is expected that harvest levels will vary to some degree over time, but harvest generally will be a regular and predictable amount from year to year without large variations in quantity. Factors that may affect this regular output of products and revenue include changing market conditions and their effect on the demand for forest products. It is anticipated that the greatest amount of revenue will be generated through regeneration harvesting, with thinning of both young and older stands as they become silviculturally available. When practical, high value products for specialty markets will be identified and marketed.

Strategy 3: Provide Social Benefits and Values through Forest Management

Forests can be managed to provide many social benefits. Different social values are of particular importance to various individuals and groups. This FMP will produce a variety of social benefits that include economic benefits mentioned in the two previous strategies.

Social benefits from this FMP include the production of commodities that result in a regular source of employment for the local and regional economy, products used by forest industry businesses, and revenue to support education and other public programs. These benefits will be provided through commercial timber harvest and through harvest of special forest products. Other commodities include personal use firewood valued by local residents, both for its intrinsic value and for the experience and satisfaction of collecting a renewable resource to heat their homes.

Opportunities for recreation will be made available to the public. Recreational opportunities will mainly be dispersed and undeveloped. However, ODF will cooperate with user groups and other agencies in providing recreational opportunities where compatible with other forest management activities. These may include but are not limited to hunting, angling, kayaking, hiking, off-road vehicle use, and trail biking.

Forest management that produces diverse forest conditions is also valued by many people as a social benefit. This includes plants, fish, and wildlife for hunting, and viewing, and for the pleasure of knowing that these populations and habitats exist. Clean air, water, and productive soils are highly valued. Strategies that establish and maintain properly functioning aquatic and riparian habitats will enhance fish populations that sustain recreational and commercial fisheries.

Social benefits will be provided through the implementation of the landscape and integrated strategies in this FMP. The integrated strategies specifically address the social values mentioned above. The overall landscape strategy is anticipated to provide a diverse forest and a level of forest products that will provide jobs and business opportunities, and contribute to a prospering economy.

These social benefits are not mutually exclusive, but are intertwined and interdependent. Producing economic benefit also produces social values and enables investments in environmental benefits. Environmental benefits help maintain the productivity of the forest and provide social benefits as well. Sustainable forest management involves consideration for all values of the forest.

Strategies to Plan for Long-Term Forest Productivity Using Principles of Sustainable Forest Ecosystem Management

Current landscape design methodologies incorporate site history, natural disturbance regimes, and successional processes (Diaz and Bell 1997). Hunter and Calhoun (1996) suggest that the intensity of land use varies in a continuum from no human manipulations to management so intensive that natural ecosystems are replaced by artificial or cultivated ecosystems. In what they call the triad approach, three distinct land-use types can coexist at some level within a region without compromising the goal of sustaining biological diversity. The types are: 1) intensive commodity production areas; 2) areas with little or no resource use by people except low-intensity recreation; and 3) areas in which modest resource use is allowed (maintenance of diversity and ecosystem function takes precedence over commodity production). Using examples from forest, grassland, wetland, and aquatic ecosystems, they argue that all three types of land use have validity, and that in different situations a different balance among these uses could improve resource conservation. For example, in a region where multiple use forest management is dominant, timber production could be intensified in some areas, allowing other areas to be set aside as conservation areas with no net effect on production.

These three land-use types are generally represented in this FMP by: 1) stand structure types that are managed primarily for intensive commodity production and are in early and intermediate structure stages; 2) conservation areas with little or no resource use; and 3) areas that are managed for advanced structure, where ecosystem function takes precedence over commodity production. The triad concept does not suggest an equal allocation of land use types. Exact values in each sector must come from case-specific analyses (Seymour and Hunter 1999). This approach reflects the fact that not every piece of ground must function as suitable habitat at all times to maintain viable populations. The key questions focus on the proportion and spatial arrangement of the three types that give a reasonable probability of maintaining diversity through time. On the other hand, some ecological functions must be sustained on every piece of ground, especially those related to soils, nutrient cycling, and the interactions between land and water that regulate hydrologic flows and produce clean water (e.g., in riparian habitats along perennial streams).

Sustainable forest ecosystem management will maintain the forest landscape in an identified range of stand structures and landscape conditions, as described in this chapter. This range of stand structures and their relative abundance across the landscape will remain reasonably stable, although individual stands will continue to change. There will be a network of conservation areas within the landscape. Some of the stands in these conservation areas currently are or will eventually become old growth as that condition is defined in Chapter 4. Because the structures will be in a dynamic balance across the landscape, the forest will provide a steady flow of timber volume and revenue, jobs, habitats, and recreational opportunities.

The approach is based on active management, with the main emphasis on the use of sound silvicultural approaches for producing diverse habitats, forest products, and social benefits. These silvicultural practices are designed to contribute to the range of habitat types or stand structures used by native wildlife species and to enhance biodiversity. Sustainable forest ecosystem management will move forest management away from approaches that stress conflict and trade-offs between uses, and toward an approach that stresses integration and compatibility of uses over time and space. Instead of managing the forest to produce habitat for individual species, the forest will be managed to produce the range of habitats needed by native wildlife species. This approach will reduce the likelihood of having to manage in a crisis situation for individual species or for individual sites.

Strategy 1: Actively Manage the Elliott State Forest for a Diversity of Stand Structures Across the Landscape

The planning area will be managed to achieve particular ranges of three stand structure types: early structure, intermediate structure, and advanced structure. For the purposes of this FMP, these structure types will be defined as follows (see "Concept 1: Recognize the Importance of Forest Disturbance Regimes and Stand Development Processes" in Chapter 4 for more detailed qualitative descriptions of these types and the stand development processes they represent):

	Early Structure
Tree size:	Average diameter of the largest 40 trees per acre of the new cohort, is generally less than or equal to 6 inches DBH.
Description:	The trees are seedlings or saplings, usually less than 15 years old. Herbs and shrubs are widespread and vigorous, covering 20 to 80 percent of the ground.
	Intermediate Structure
Tree size:	Average diameter is generally between 6 and 18 inches DBH, but may be larger. Tree heights generally range from 40 to 100 feet.
Description:	Trees dominate the site and form a single, main canopy layer. There may be little or no understory development, or may include the development of understory trees. Shrub and herb layers may be absent altogether or present and diverse. Generally, herbs, shrubs, and grasses may cover up to 40 percent or more of the forest floor. The stand does not have significant vertical layering of tree crowns.
	Advanced Structure
Tree size:	Trees 18 inches DBH or greater are predominant in the overstory, and trees are 100 feet or taller. Advanced structure stands have at least 20 trees per acre of 18 inches or larger DBH and 100 feet or more in height, and at least 10 of these trees are at least 24 inches DBH. Understory trees average 30 feet in height.
Snags and downed wood:	Stands usually have some snags and downed wood; amount not defined.
Layering:	Vertical layering is extensive. Tree canopies have two or more layers, and shrub or herb layers are diverse in terms of species and vertical arrangement. At least 30 percent of the stand is composed of layered patches where at least 60 percent of the vertical space from the upper canopy to the forest floor is filled with layered tree crowns, branches with foliage, and a significant amount of shrubs.
Other Characteristics:	Highly diverse stands in this structure may develop the following additional components often associated with older forests: • 8 or more live trees per acre at least 32 inches in diameter • At least 6 snags per acre, 2 of which must be at least 24 inches in diameter; the remaining 4 must be at least 12 inches in diameter • A total of 3,000 to 4,500 cubic feet of downed logs in all decay classes 1 through 5; or 600 to 900 cubic feet per acre of sound downed logs in decay classes 1 or 2 • At least one large remnant tree per five acres • Multiple tree species, including shade-tolerant species; some trees with defects or decadence; and diverse understory vegetation

Note: DBH = diameter breast height

The desired ranges of each of the three stand structures are shown in Table 5-1.

Table 5-1. Landscape Design: Percent of the Elliott State Forest Allocated to Different Stand Structures

Advanced structure	40%–60%
Intermediate structure	35%–45%
Early structure	5%–15%

Conservation areas (Strategy 2) are counted as advanced structure by virtue of their current condition, use by owls or murrelets, contribution to the habitat needs of other species, and persistence on the landscape.

Each management basin (see the "Land Base and Access" section in Chapter 2) will have a target percentage of advanced structure identified for implementation planning purposes, consistent with an overall target of 40 to 60 percent advanced structure across the forest. The following techniques, among others, will be used to accomplish this strategy:

- In conservation areas, allow stands to maintain or develop into advanced structure with little management
- Outside of conservation areas:
    - Partial cuts to maintain or enhance tree growth and diversity of vegetative communities
- Regeneration harvests in both intermediate and advanced structures where it is determined that they are not needed to produce other stand structures or are not consistent with landscape design (Sustainable Forest Ecosystem Management Strategy 3)

The rate of harvest will vary by basin depending on the current amount of advanced structure stands present, the desired percentage of these stands, and the silvicultural methods employed to develop stand complexity across the landscape over time. For management basins that are below the basin target for advanced structure, harvest of advanced structure will only occur when the basin has reached its advanced structure target. Once a basin has reached its advanced structure target, it will be maintained at or above the target.

Over time, the configuration of stand structures located outside the conservation areas will change across the landscape as early and intermediate structure stands mature and some advanced structure stands are harvested and regenerated. Specific decisions on the location and arrangement of stands outside the conservation areas will be made through the district implementation planning process.

In addition to managing for early, intermediate, and advanced stand structure types, the following elements of stand structure will be retained and/or promoted across the landscape.

Remnant Old Growth—Retain identified remnant old-growth stands.

Consistent with the definition for old growth in Chapter 4, remnant old-growth stands are defined for this FMP as stands that are over 20 acres in size and are at least 175 years of age as of 2004. These stands have been identified on the forest and occur as small isolated patches, primarily located in conservation areas (see Figure 5-1). Because the occurrence is limited, the ODF will retain the identified remnant old-growth stands to provide this element of diversity across the forested landscape for the length of this FMP.

Species Composition—Retain hardwood species on the forest.

Under this FMP, the strategy for hardwoods is to retain approximately the same amount and species composition as existed in the forest at first implementation of this FMP. Approximately 10 percent of the Elliott State Forest is in hardwood stands, defined as stands with at least a 70 percent hardwood canopy. A significant hardwood component will be located in riparian conservation areas and threatened and endangered species core areas (T&E cores), and in other areas of the forest designated as advanced structure. In addition, hardwoods will be retained as an important component of live tree retention, with a particular emphasis on the less abundant myrtle and bigleaf maple, which are especially important to wildlife. In addition, a certain amount of red alder that exists in current plantations and that will seed into new regeneration harvests will be retained in these stands.

Multi-Layered Forest Canopies—Manage vegetative communities to create a multi-canopied forest.

Forest canopies that have multiple layers are associated with habitats for a variety of wildlife species. In this FMP, the definition for advanced structure includes criteria for multiple canopy layers of both trees and shrubs. Stands will be managed to promote the development of multi-layered tree canopies, especially (but not exclusively) those stands targeted for advanced structure.

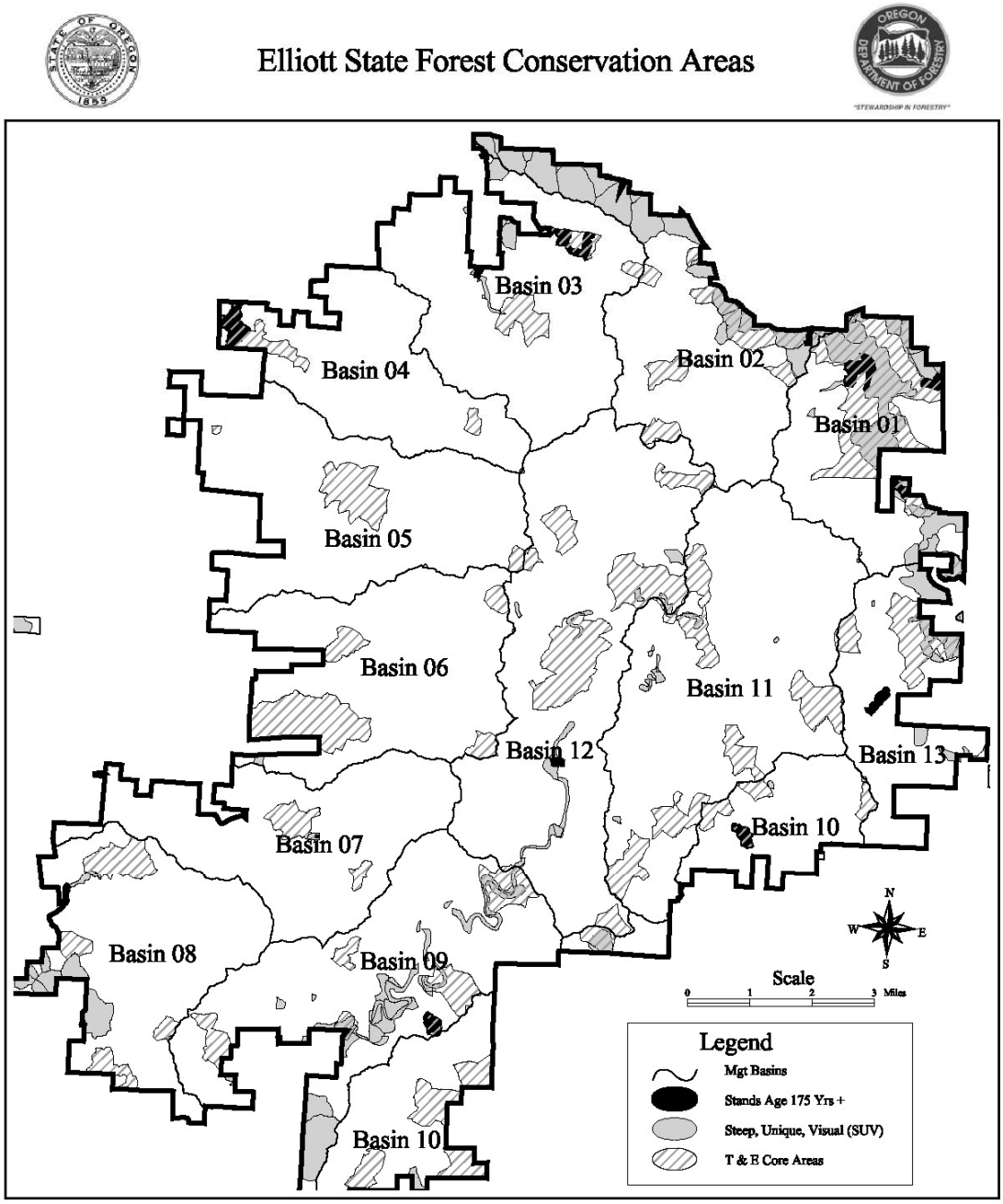

Figure 5-1. Conservation Areas on the Elliott State Forest (Excluding Riparian Areas)

Herbs and Shrubs—Manage vegetative communities to encourage diverse herb and shrub layers.

Herbs and shrubs are important components of forest habitats in all structural stages for many species of wildlife. Development of multiple layers of vegetation will increase the amount of vertical diversity in the stand, and provide additional habitat niches that can support increasing numbers of wildlife species. Forest stands will be managed to provide the light and other characteristics needed for development of diverse layers of native herbs and shrubs.

Gaps—Manage vegetative communities to provide horizontal diversity.

A within-stand gap is an interruption in the continuity of the vegetative community in a stand. In most cases, such gaps are considered to be small openings (½ to 2 acres) where herbs, shrubs, and new trees are being established within larger stands where the dominant feature is an overstory tree canopy.

These within-stand gaps provide horizontal diversity to a stand, compared to the vertical diversity provided primarily by canopy layering. Forest stands will be managed such that the processes that lead to gap formation, such as windthrow, insects, and disease, will continue to provide this component of diversity.

Strategy 2: Establish Conservation Areas to Protect Special Resources

Conservation areas are designed primarily to maintain habitats known to be important to threatened and endangered species, such as northern spotted owls and marbled murrelets. In addition, conservation areas may fulfill other functions on the landscape, such as:

- Offering benefits to other species using these habitats, especially those using late successional habitats
- Providing stepping stones of advanced structure between late-successional reserves on adjacent federal forest lands
- Maintaining unique or special habitats not necessarily associated with federally listed species
- Contributing to diverse forest conditions on the landscape by providing relatively unmanaged areas across the forest
- Serving as reference areas when testing overall landscape strategies

For the most part, conservation areas are those in which little or no active management will occur. However, some activities related to forest management that are expected to occur include vehicle traffic on forest roads, wildfire suppression and control, road maintenance, minimal road construction, harvest unit guylines or tailholds, stream rehabilitation work, stream survey work, and animal survey work. Removal of trees or snags for safety reasons may also occur in some circumstances, such as when a dead tree is leaning over a forest road. In addition, management activities that further the purpose of the conservation area may be allowed in some areas, such as management to attain mature forest conditions along streams.

When large-scale disturbance events occur, such as severe fire or insect and disease outbreaks, conservation areas will be evaluated through an adaptive management process to determine if they can still function for their intended purpose. Active management, including salvage, may be applied if the evaluation indicates that it would help restore the conservation area's function in a timelier manner.

Types of Conservation Areas

Conservation areas serve different purposes, as described below. Figure 5-1 on the previous page shows conservation areas on the forest, except for the riparian areas (which are too complicated to show on this scale).

Threatened and Endangered Species (T&E)Core Areas—These conservation areas are designed to protect specific wildlife habitat and have been established based upon current advanced structure conditions and known use by the northern spotted owl, marbled murrelet, and bald eagle. In some cases, these T&E cores are part of, or next to, existing steep, unique, or visual lands. T&E cores are designated across the forest and are distributed so that there is at least one in each management basin.

Factors considered when determining the location of the T&E core areas included the following:

- Location of northern spotted owl nest sites or activity centers
- Location of areas receiving concentrated use by northern spotted owls, as measured by telemetry
- Location of occupied marbled murrelet stands and/or known nest trees
- Location of bald eagle nest trees
- Location of late successional habitat, including identified marbled murrelet habitat and older, advanced structure stands

The T&E cores range in size from less than 100 to over 1,000 acres (with an average of 150 acres).

Unique Habitats—Some areas are classified as conservation areas partially because they represent habitats that the ODF has determined are rare or unique on the landscape, but do not necessarily provide habitat for threatened and endangered species. Such conservation areas are described briefly below.

Old-Growth Stands: This category includes stands over 175 years of age as of 2004. These old-growth stands are rare in the Elliott State Forest because of the fire history of the forest. Most of these stands are included in T&E cores; however, a few old-growth stands are not known to include resident spotted owls or marbled murrelets, and thus are classified as unique habitat.

Unique Forest Types: Two conservation areas primarily contain forest types that are rare in the Elliott State Forest—a stand of myrtle in the Big Creek Basin, and a stand of bottomland hardwoods dominated by bigleaf maple in the Ash Valley Basin. The scattered tracts also contain some unique forest types such as oak/grass prairies, rocky areas, serpentine soils, and other unique habitats.

Riparian Management Stream Bank and Inner Zones—RMAs function to protect streams and riparian areas from disturbance; filter sediment from uplands; and supply food, cover, shade, and large wood. Riparian corridors provide diverse habitats and connectivity throughout the stream network of a watershed. Within 25 feet of either side of fish-bearing and large and medium non-fish-bearing stream channels (stream bank zone), no management activities are allowed. Outside this area to 100 feet (inner zone), the forest will be managed to develop or maintain mature forest conditions. No harvest will occur within these inner zones, except as necessary to facilitate the establishment of mature forest conditions. Other activities expected to occur in the stream bank or inner zone include cable yarding corridors, traffic, and maintenance on existing roads, wildfire suppression and control, fish and wildlife enhancement projects, and fish and wildlife survey work. See Strategy 6 under "Sustainable Forest Ecosystem Management" for more details on RMAs, including activities associated with non-fish bearing streams.

Other Special Resource Areas—In addition to the special habitats described above, there are lands in which little or no management is expected for reasons not associated with habitat values. These lands are classified as steep, unique, or visual. The function of

these areas is described in more detail below. Timber harvest may occur if compatible with resource values in these areas; however, little active management is expected other than the occasional removal of hazard trees. Although they are not specific to wildlife habitats, these lands can provide valuable wildlife habitats in addition to their primary function.

Steep, Unique, and Visual Lands: These lands include areas classified as non-silviculturally capable because they are rocky, swampy, or covered by water, or because, for various other reasons, they have little to no commercial value for timber production. Currently, the Elliott State Forest has a few parcels of rocky or swampy lands scattered throughout the forest. Most parcels are less than five acres, though a few are as large as 20 acres.

Areas almost exclusively associated with the steep, rocky slopes on either side of major rivers or streams include the Umpqua River, Mill Creek, and West Fork Millicoma River. These protected corridors vary in width from 1,000 to 4,000 feet. Slopes affected by public safety considerations fall within this category.

Areas in which scenic values are the primary values to be maintained include lands buffering recreational areas, highway corridors, river corridors, lakeshores, and other scenic attractions.

Strategy 3: Design a Functional Arrangement of Stand Structures

The district Implementation Plan will include a landscape design consistent with the guidelines that follow to achieve the variety of patch types, sizes, and arrangements necessary to provide functional habitat for native species. See Appendix C for a more detailed description of the concepts on which these guidelines are based and for additional considerations. These guidelines apply to all habitat types, from early to advanced structure. The application of these principles and guidelines will be discussed and reflected in the landscape design section of the district Implementation Plan.

The following considerations will provide guidance to forest managers during implementation planning for arranging stand structures on the landscape in a manner that will ensure functional habitat for a variety of wildlife species.

Considerations for Habitat Patch Size and Distribution

- Provide a variety of patch sizes across the landscape.
- Limit the extent of early structure and areas of high-edge contrast adjacent to conservation areas, particularly T&E cores. Retention of some advanced and intermediate structures in these areas, while the recently harvested stands develop into intermediate stands, may benefit the function of the conservation areas.
- Consider the shape of patches, and provide patches that are circular in shape to provide better interior habitat.
- Where isolated patches of advanced structure exist or are planned, strive for a minimum size of 120 acres. Isolated patches are those with greater than 50 percent of the boundary adjacent to early structure or surrounded by forest land where future patch contributions are not anticipated, such as plantations on other land ownerships. Isolated patches below 120 acres will provide benefits for only a limited array of species inhabiting advanced structure conditions.
- Minimum distance between patches should be a function of size and frequency within a management basin. Smaller patches should be placed closer together than larger patches.

Habitat Connectivity Outside of the Conservation Areas

Landscape connectivity and structural complexity across the Elliott State Forest can be achieved with landscape level goals for stand complexity and structural components outside the conservation areas, coupled with a logical landscape design developed during implementation planning.

In management basins with relatively high levels of advanced structure, connectivity is likely to be provided for many species by a greater amount of this habitat type. However, where advanced structure stand targets are relatively low, the arrangement of advanced

structure patches becomes more important. The following considerations provide guidance relative to providing habitat connectivity within and among management basins.

- Maintain and develop advanced structure in locations that provide connectivity among patches of advanced structure in a basin.
- Place some advanced structure patches near drainage divides to enhance species movements between management basins.

Each basin will have a different amount and placement of conservation areas, advanced habitat patches, riparian corridors, and other unique habitat areas. Each of these areas can maximize its contribution to overall wildlife diversity when considered in relation to other similar habitat within the basin as well as in relation to similar habitat within adjacent basins.

Strategy 4: Actively Manage to Provide Key Legacy Structural Components Outside of Conservation Areas

This strategy presents approaches for managing the structural components listed below.

- Live trees
- Snags
- Downed wood

Although these approaches were developed specifically for retention in clearcut harvest units, retention of these structures in all stand structure types provides valuable wildlife habitat and other ecological values. Individual stands may exceed or fall below these standards; however, it is expected that, on an AOP basis, harvested stands on average will meet these structural retention standards. Monitoring efforts will test the viability of these approaches over time. Appendix C describes the concepts behind these strategies and provides a rationale for the targets and ranges in this FMP.

Other important structural components of stands include multi-layered canopies, multiple native tree species, herbs and shrubs, and gaps. These are described in more detail in Strategy 2 under "Sustainable Forest Ecosystem Management." Managers are expected to retain or develop these characteristics in stands consistent with the overall stand management objectives.

It is expected that structural components will be retained at the desired levels during any management activities, unless they create clear safety or fire hazards, or if their retention would result in unacceptable additional operational difficulties, environmental hazards, or threats to public improvements. The following guidelines will govern special circumstances affecting retention of the structural components:

Guidelines for Special Circumstances

- **Safety Concerns**—Where retention would constitute a significant safety hazard or result in a violation of state or federal law, individual trees or snags may be removed.
- **Pest Management Concerns**—Where retention would constitute a significant threat to surrounding stands because of the presence of insect or disease agents, individual trees or snags may be removed. The ODF forest entomologist or forest pathologist will be consulted in making the determination of significant threat.
- **Severe Operational Concerns**—Where retention would result in impacts on the ability of the ODF to protect other key resources identified in this FMP, individual trees or snags may be removed.
- **Salvage**—Salvage refers to the harvest of trees that have died, are dying, blown down, or are hazardous to public safety. The age and size of salvaged trees may vary. Trees may be salvaged individually or in larger parcels, depending on the

cause and extent of the damaging agent. The economic return and the benefits of leaving all or a portion of the dead trees on an area are weighed when considering salvage operations. In the event of a major fire, windstorm, or other catastrophic disturbance, prompt salvage operations will be conducted to prevent build-up of epidemic insect populations, and to minimize economic loss. The same retention guidelines will be used as for other harvest operations. In the absence of a catastrophic disturbance, it is unlikely that significant amounts of salvage will occur.

Structural Component Standards

Strategies 4a through 4c address standards for retention of structural components in clearcut units. These standards will be met outside of the streambank and inner zones of Type F and large or medium Type N streams in the harvest unit. Individual stands may exceed or fall below these standards; however, it is expected that, on an Annual Operation Plan (AOP) basis, harvested stands on average will meet these structural retention standards.

Strategy 4a. Live Tree Retention

- Retain 2 to 4 live trees per acre.
- Ensure that retained trees are larger trees, in general greater than or equal to the stand's average diameter breast height (DBH).
- Retain minor species (conifer or hardwood) of any diameter as part of or in addition to this target where operationally feasible and practical.
- To address the needs of a broader variety of wildlife species, retain at least 25 percent of the leave trees required to meet the standard in upslope areas or in RMAs that extend well into upslope areas.

Guidelines for Live Tree Retention

Live trees will be retained to meet the short-term habitat needs of species, to serve as a source of future snags and downed wood, and to provide legacy trees in future stands. Legacy trees are living trees that are carried forward into a new stand following disturbance, with the intent that most will persist through future rotations. In the long term, legacy structures will be present in all stand types across the landscape.

- Consider a variety of types of live trees for retention, including:
    - Larger trees (trees that exceed the mean DBH of the stand)
    - Defective trees, such as broken or multiple topped, damaged, diseased, or other deformed live trees
    - Sound, healthy trees with good crowns
    - Hardwood or conifer species other than Douglas fir

- Trees may be retained in a variety of arrangements throughout each harvest unit, including uniform or random distributions as well as dispersed clumps.
- Trees may be retained at higher levels in some units, and lower levels in others, with the intent of achieving the average for all regeneration harvest units in a given AOP. Considerations include providing potential recruitment for snags or downed wood where these structural elements fall short of landscape objectives. For example, if insufficient hard snags are available, more live trees should be left.

Strategy 4b. Retain Existing Snags of All Decay Classes Where Operationally Feasible During Harvest Activities

- Retain at least three hard snags per acre (decay class 1 or 2) at least 15 inches or larger DBH.
- If fewer than three hard snags per acre exist after harvest, create one snag per two acres, using live trees larger than 20 inches DBH.
- When the average DBH of the trees to be harvested is less than 20 inches, snag creation is not required.

Guidelines for Snag Management

Snags will be provided to meet the habitat needs of cavity-using species and to serve as a source of future downed wood. Management will be designed to provide snags within all stand types through time, through a combination of existing snag retention, natural mortality in maturing stands, and artificial creation.

- Snags should be retained in a variety of arrangements throughout the landscape. Uniform or random distributions as well as dispersed clumping will be used to provide for a variety of habitat and predator/prey conditions. Some snags should be left on or near ridgetops when possible and practical.

Strategy 4c. Retain Existing Downed Wood of All Decay Classes Where Operationally Feasible During Harvest Activities

- Retain an average of 300 to 600 cubic feet per acre of hard logs (decay class 1 or 2), with the minimum volume of 20 cubic feet for any individual piece.
- When available, at least two logs per acre must meet or exceed 26-inch diameter at the large end.
- At least 50 percent of volume should be conifer logs.

The following exceptions to the standards above apply when the average DBH of the trees to be harvested is less than 20 inches:

- Retain an average of three to six logs per acre (decay class 1 or 2), with the minimum volume of 20 cubic feet for any individual piece.
- At least 50 percent of volume should be conifer logs.

Guidelines for Downed Wood Management

Downed wood will be provided to meet the habitat needs of wildlife species, provide for other key ecosystem functions, and provide the structural legacy necessary for advanced structure development. Achieving the downed wood component often requires a significant amount of time (many decades), especially in areas where existing stands are deficient in this material. Management will be designed to provide downed wood within all stand structures through time, through a combination of existing downed wood retention, natural mortality in maturing stands, and artificial creation. Large-diameter logs (greater than 26 inches) are an important component of advanced structure; because larger logs decompose more slowly, large logs placed during regeneration harvests will contribute to downed wood needs into the future.

- Retain downed wood in a variety of arrangements within individual harvest units and throughout the landscape. Uniform or random distributions as well as dispersed clumping should be used to provide for a variety of habitat conditions.
- Retain a portion of the downed wood when salvaging windthrow and other dead timber.
- Retain live trees and snags to provide for downed wood contributions through the course of forest development during the life of each stand.
- Retain and, where necessary, provide for the supply of downed wood at the time of partial cut harvests to supplement downed wood in more developed structure stands.

Strategy 5: Actively Manage for a Diverse and Healthy Ecosystem Applying the Principles of Integrated Pest Management

Strategy 5a. Actively Manage the Forest to Maintain or Improve Forest Health

The most effective way to maintain or improve forest health is through active management of stands. Generally, management activities are intended to promote tree vigor, keep pest populations and damage within desired levels, encourage biodiversity, and provide long-term productivity. Active management for forest health may include the following strategies:

- Maintain appropriate stocking levels through thinning.
- Favor appropriate tree species.
- Maintain or create desired stand structures.
- Optimize the natural influences of pathogens and insects on trees and stands to create desired conditions.
- Maintain a diversity of tree species.
- Optimize genetic variation within tree species.
- Plant seedlings that are well-suited to the site and avoid unnecessary planting stress.
- Prevent buildups of pest populations through sanitation, salvage, and the use of repellents.
- Maintain healthy RMAs.
- Minimize injury to trees during stand management activities.
- Avoid damage to soils.

Strategy 5b. Detect and Monitor Pest Populations, Damage Levels, and Trends

A critical step in forest health management is describing the extent, distribution, and severity of damage caused by major forest pests. Conducting monitoring activities over time allows for the description of changes in forest condition and helps evaluate the effectiveness of management. See the discussion of monitoring under “Adaptive Forest Resource Management” in Chapter 6. Several techniques applied in monitoring and detection of forest pests are listed below.

- Aerial surveys

- Ground surveys
- Stand exams/resource inventories
- Trapping for insect pests, including exotic pest introductions
- GIS for long-term tracking
- Participation and coordination with the national Forest Health Monitoring Program

Strategy 5c. Use the IPM Process to Implement Suppression or Prevention Actions when Pest Populations or Damage Exceed Acceptable Levels

The Insect and Disease Control Law (ORS 527.310 to 527.370) states that the State Forester shall implement the IPM process (described in ORS 634.122) on state forests. IPM is not a strategy per se, but a coordinated decision-making process that uses the most appropriate of all reasonably available means to minimize the effect of forest pests in an environmentally sound manner to meet site-specific management objectives. The steps in the process are listed below.

- Define the management unit.
- Define the site-specific management objectives.
- Establish detection and monitoring systems for pests or damage.
- Evaluate pest conditions in the management unit.
- Establish pest population or damage thresholds, and take action when exceeded or where historical documentation has verified a recurring problem.
- Develop potential strategies and evaluate them with the following criteria: effectiveness, operational feasibility, cost-effectiveness, ecological soundness, environmental impact, and management objectives for the site.
- Implement the selected strategy.
- Monitor and evaluate results of the activity.
- Maintain current and accurate records.
- Structure the program so it can be adjusted to accommodate changes or varying situations.

Strategy 5d. Assess and Manage Forest Genetic Resources

Many planted forest stands in Oregon pre-date current scientific understanding about the importance of seed source. Data from long-term genetic field trials demonstrate that poorly adapted Douglas-fir seed sources can yield poor survival, slow growth, and

susceptibility to many pathogens (Silen 1996). An assessment of older planted or seeded forest stands in state forests will be conducted, and will include an evaluation of forest health indicators to determine if stands are growing to expectations. Stands that are at high risk can be considered for earlier harvest.

Reforestation projects on the Elliott State Forest will take advantage of the highest quality seed to assure that forest trees and forest stands are well-adapted to planting locations and are capable of growing vigorously with resilience to forest health threats. The ODF is also involved in genetic improvement efforts to improve levels of pest resistance.

Strategy 5e. Implement Strategic Plans to Address Insect and Disease Outbreaks

These strategic plans may include specific strategies developed to address diseases such as Swiss needle cast, sudden oak death, root rot or other diseases, or plans to address significant insect infestation problems.

Strategy 5f. Participate in Research and Cooperative Programs That Align with Elliott State Forest Management Objectives, to Improve Knowledge and Actively Enhance Forest Health and Biodiversity

Often, forest health problems are best investigated through a structured and credible research effort. By cooperating in research projects, the ODF can assure that results will be applicable to state forest lands. Some current examples include the Swiss Needle Cast Cooperative and the Regional Forest Gene Conservation Program.

Strategy 5g. Cooperate with Other Agencies and Associations to Prevent the Introduction of Non-native Pests

There is increased potential for the introduction of exotic forest pests in western Oregon with the recent increase in international trade of wood and other products. The ODF supports regulatory and monitoring efforts coordinated by the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) and the ODA. If a new pest is introduced, the ODF will participate in interagency eradication efforts if necessary.

Strategy 6: Manage Aquatic and Riparian Systems

The landscape-level component of the aquatic and riparian strategies consists of the sustainable forest ecosystem management strategies described earlier in this chapter. Over time, the application of these strategies is intended to create forest conditions on the landscape that will emulate historic conditions and processes relative to aquatic systems.

The second component of these strategies is a set of more site-specific or prescriptive strategies designed to protect key resource elements or provide for specific functional elements not necessarily addressed by the forest landscape strategies.

Finally, critical to the evaluation and refinement of both the landscape level and site-specific approaches is watershed analysis. Watershed analysis is a strategy designed to collect and synthesize key watershed information that will be used to further evaluate the two components listed above.

In addition to the sustainable forest ecosystem management strategies, the strategies for aquatic and riparian systems are as follows:

- Use watershed analysis to inform management decisions.
- Apply management standards for aquatic and RMAs.
- Maintain or improve aquatic habitats.
- In special circumstances, apply alternative vegetation treatment to achieve habitat objectives in riparian areas.
- Apply specific strategies to other aquatic habitats: wetlands, lakes, ponds, bogs, seeps, and springs.
- Manage slope stability.
- Manage forest roads.

Strategy 6a. Use Watershed Analysis to Inform Management Decisions

A watershed analysis for the Elliott State Forest was completed in October 2003 (Oregon Department of Forestry 2003). The purpose of the watershed analysis is to measure current resources and improve the understanding of natural processes that influence fish habitat, wildlife habitat, and water resources throughout the Elliott State Forest. Consequences of human activities on these resources are also addressed through the analysis. Using current inventories of the forest, or those that could be extrapolated from studies conducted on similar areas, the analysis may be applied to, but not limited to:

- Developing a revised FMP and HCP
- Implementation planning
- Annual operational planning

- Total maximum daily load studies
- Restoration activities
- Public education and outreach
- Long-term resource monitoring

The analysis is based on protocols suited to Elliott State Forest management needs, using the Oregon Watershed Enhancement Board manual and protocols as a foundation. The protocols were adjusted to include more rigorous information collection procedures for specific information "modules" based on forest management topics.

The watershed analysis used basins based on fifth field scale HUCs as developed by the U.S. Geological Survey (USGS). These fifth field analysis basins, in most cases, are consistent with the 13 management basins of the Elliott State Forest. The Coos Watershed Association served as a sub-contractor in developing the analysis. Both the Tenmile Lakes Basin Partnership and the Lower Umpqua Watershed Council reviewed the assessment and analysis documents and provided input.

Information in the watershed analysis will be considered and, as appropriate, applied through IPs. This current watershed analysis will be supplemented with additional resource information as data on the watershed processes and interactions on the Elliott State Forest become available through future management activities and planning efforts.

Strategy 6b. 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 below.

More site-specific prescriptive standards for aquatic and riparian areas constitute a key piece of the second tier of the balanced approach, and will guide forest management activities to achieve properly functioning aquatic and riparian habitat conditions over time. All management actions will be consistent with these standards.

The standards will be applied until the adaptive management process results in identification of alternative strategies or standards that better meet the objectives for aquatic and riparian habitats. As new information and a better understanding of the watershed functions and processes become available, this knowledge will be integrated into the management of riparian and aquatic habitat.

The management standards include specific provisions for establishing RMAs, and describe how management is to occur within these areas.

RMAs will be established immediately adjacent to waterways for the purpose of protecting aquatic and riparian systems, and maintaining the functions and ecological processes of the waterways. Within these areas, special management considerations and operational restrictions will be applied, and the protection of aquatic resources will be a high priority.

The width of RMAs will vary by the type and classification of the water body. These widths were developed by considering the functions and processes to be achieved or maintained by management activities. The width of an RMA is measured horizontally, beginning at the average high water level of the water body, or the edge of stream-associated wetland, side channel, or channel migration zone (whichever is farthest from the waterway), and extending toward the uplands. The width of these areas will be expanded, if necessary, to fully encompass certain sensitive sites such as seeps, waterfalls, or other special sites noted in the management prescriptions.

RMA widths are intended to be averages applied over the length of a management site. The actual extent of a specific RMA can be varied to tailor vegetation retention to site-specific conditions, or to address special resource considerations. For example, an RMA boundary may be expanded where a potentially unstable slope adjacent to a stream could deliver materials to the stream. The intent of this action is to increase the potential for large wood delivery should a disturbance event occur. Variations in RMA design will always be completed in a manner consistent with the management objectives for the specific aquatic or riparian area.

See "Concept 5: Maintain and Enhance Properly Functioning Aquatic Systems" in Chapter 4 for related discussion and definitions of terms used in this strategy. See Tables 5-2 and 5-3 for the specific management standards that will be applied in these areas.

Guidelines: The Four Zones of a Stream Riparian Management Area

RMAs established along streams will contain four zones. The purposes of, and differences between, these four zones are explained below.

Aquatic Zone—The aquatic zone is the area that includes the stream channel(s) and associated aquatic habitat features. This zone includes beaver ponds, stream-associated wetlands, side channels, and the channel migration zone. The other zones of a RMA are established upslope from the outer edge of these features.

Stream Bank Zone—The stream bank zone is the land closest to the stream, including the stream banks. Most riparian functions are supported to some extent by vegetation in this zone, including providing aquatic shade, delivering downed wood and organic inputs (leaves and tree litter) to the stream and riparian area, stabilizing the stream bank, contributing to floodplain functions, and influencing sediment routing processes.

- The stream bank zone is the area within 25 feet of the outer edge of the aquatic zone for all streams. This zone exists on both sides of a stream.

Table 5-2. Management Standards for Type F Stream RMAs

All Stream Sizes: Large, Medium, and Small	
Stream bank zone 0 to 25 feet	• No harvest • Full suspension required during cable yarding • No ground-based equipment operation • Leave any trees damaged or felled from yarding activities
Inner RMA zone 25 to 100 feet	• Manage for mature forest condition[1] • No management activity where mature forest condition exists, or where conditions are suitable for development of mature forest condition in a reasonable time frame without further treatment • Actively manage where necessary to achieve the desired future condition in a timely manner • Minimum 15-year interval between harvest entries, and minimum number of entries necessary to achieve the desired future condition • Partial cutting will maintain a conifer density of at least 25 relative density, and will retain at least 50 trees per acre • No more than 10 percent vegetative disturbance allowed from cable yarding • Full suspension wherever possible, or one-end suspension on all cable-yarded material • Ground-based equipment operation limited to area more than 50 feet from aquatic zone and slopes less than 35 percent, and allowed on no more than 10 percent of area • Leave any trees damaged or felled from yarding activities and additional felled, girdled, or topped trees to contribute toward downed wood targets[2] • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to 160 feet	• Retain at least 10 to 45[3] conifer trees and snags per acre (15 to 70 trees per 1,000 feet of RMA)[4] • Retain all snags as safety permits • Less than 10 percent ground disturbance from yarding activities • Retain all dead and downed material that was present prior to the operation

[1] Desired mature forest condition consists of a stand dominated by large conifer trees, or where hardwood-dominated conditions are expected to be the natural plant community (a mature hardwood/shrub community). For conifer stands, this equates to a basal area of 220 square feet or more per acre, inclusive of all conifers over 11 inches DBH. At a mature age (80 to 100 years or greater), this equals 40 to 45 conifer trees 32 inches in DBH per acre.

[2] Up to ten trees per acre will be retained as felled, girdled, or topped trees during partial cutting, to reach a target of 600 to 900 cubic feet per acre of hard downed wood.

[3] Outer zone tree retention target will be increased when less than the target number of conifers is present in the inner zone. The process for calculating the outer zone retention target is described in the section following the RMA prescription tables.

[4] All trees retained will be dominant or co-dominant conifer trees (if available). To balance the need for short-term and long-term recruitment of large wood to the aquatic zone, preference will be given to retaining trees on adjacent slopes, trees leaning toward the aquatic zone, and trees closest to the channel.

Table 5-3. Management Standards for Type N Stream RMAs

Large and Medium Type N Streams	
Stream bank zone 0 to 25 feet	• No harvest • Full suspension required • No ground-based equipment operation • Leave any trees damaged or felled from yarding activities
Inner RMA zone 25 to 100 feet	• Manage for mature forest condition[1] • No management activity where mature forest condition target already exists • Actively manage where beneficial to achieve desired future condition • Minimum 15-year interval between harvest entries, and minimum number of entries necessary to achieve the desired future condition • Partial cutting will maintain a conifer density of at least 25 relative density, and will retain at least 50 trees per acre • No more than 10 percent vegetative disturbance allowed from cable yarding • Full suspension wherever possible, or one-end suspension on all cable-yarded material • Ground-based equipment operation limited to area more than 50 feet from aquatic zone and slopes less than 35 percent, and allowed on no more than 10 percent of area • Leave any trees damaged or felled from yarding activities and additional felled, girdled, or topped trees to contribute to downed wood targets[2] • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to 160 feet	• Manage to retain at least 10 conifer trees and snags per acre (15 trees per 1,000 feet of RMA)[3] • Retain all snags as safety permits

[1] Desired mature forest condition consists of a stand dominated by large conifer trees, or where hardwood-dominated conditions are expected to be the natural plant community (a mature hardwood/shrub community). For conifer stands, this equates to a basal area of 220 square feet or more per acre, inclusive of all conifers over 11 inches DBH. At a mature age (80 to 100 years or greater), this equals 40 to 45 conifer trees 32 inches in DBH per acre.

[2] Up to ten trees per acre will be retained as felled, girdled, or topped trees during partial cutting, to reach a target of 600 to 900 cubic feet per acre of hard downed wood.

[3] All trees retained will be dominant or co-dominant conifer trees (if available). To balance the need for short-term and long-term recruitment of large wood to the aquatic zone, preference will be given to retaining trees on adjacent slopes, trees leaning toward the aquatic zone, and trees closest to the channel.

Table 5-3 continued. Management Standards for Type N Stream RMAs

Small Perennial Type N Streams (applied to at least 75 percent of reach)[1]	
Stream bank zone 0 to 25 feet	• No harvest • No ground-based equipment operation
Inner RMA zone 25 to 100 feet	• Manage to retain at least 15 to 25 conifer trees and snags per acre (25 to 40 trees per 1,000 feet of RMA)[2,3] • Retain all other snags as safety permits • Within 500 feet of a confluence with a Type F stream, retain all hardwoods, non-merchantable trees, and other conifers as necessary, to achieve 80 percent shade over aquatic zone • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to 160 feet	• Manage to retain 0 to 10 conifer trees and snags per acre (0 to 15 trees per 1,000 feet of RMA)[2,3] • Retain all snags as safety permits
Small Seasonal Type N Streams: High Energy Reaches (applied to at least 75 percent of reach)[1]	
Stream bank zone 0 to 25 feet	• No harvest • No ground-based equipment operation
Inner RMA zone 25 to 100 feet	• Manage to retain at least 15 to 25 conifer trees and snags per acre (25 to 40 trees per 1,000 feet of RMA)[2,3] • Retain all other snags as safety permits • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to 160 feet	• Manage to retain 0 to 10 conifer trees and snags per acre (0 to 15 trees per 1,000 feet of RMA)[2,3] • Retain all snags as safety permits

[1] Prescription to be applied to at least 75 percent of perennial stream reach, including the first 500 feet above the confluence with a Type F, and areas that meet the definition of a Special Emphasis Area according to the definitions in the section following these tables.

[2] All trees retained will be dominant or co-dominant conifer trees (if available). To balance the need for short-term and long-term recruitment of large wood to the aquatic zone, preference will be given to retaining trees on adjacent slopes, trees leaning toward the aquatic zone, and trees closest to the channel.

[3] In meeting the tree retention target for the inner and outer zones, preference will be given to retaining trees within the inner zone. Where there are sufficient trees within the inner zone to meet the combined target for the two zones (40 trees per 1,000 feet), no additional leave trees are required in the outer zone.

Table 5-3 continued. Management Standards for Type N Stream RMAs

Small Seasonal Type N Streams: Potential Debris Flow Track Reaches (applied to at least 75 percent of reach)[1]	
Stream bank zone 0 to 25 feet	• No harvest • No ground-based equipment operation
Inner RMA zone 25 to100 feet	• Manage to retain at least 10 conifer trees and snags per acre (15 trees per 1,000 feet. of RMA)[2,4] • Retain all other snags as safety permits • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to160 feet	• Retain trees and snags sufficient to meet landscape management strategy targets
Other Small Seasonal Type N Streams (applied to at least 75 percent of reach)	
Stream bank zone 0 to25 feet	• Maintain integrity of stream channel • No ground-based equipment operation
Inner RMA zone 25 to100 feet	• Manage to retain at least 10 conifer trees and snags per acre where operationally feasible (15 trees per 1,000 feet of RMA)[2] • Retain all other snags as safety permits • Retain all dead and downed material that was present prior to the operation
Outer RMA zone 100 to160 feet	• Retain trees and snags sufficient to meet landscape management strategy targets

[1] Prescription to be applied to at least 75 percent of stream reach, including the first 500 feet above the confluence with a Type F stream.

[2] All trees retained will be dominant or co-dominant conifer trees (if available). To balance the need for short-term and long-term recruitment of large wood to the aquatic zone, preference will be given to retaining trees on adjacent slopes, trees leaning toward the aquatic zone, and trees closest to the channel.

[3] In meeting the tree retention target for the inner and outer zones, preference will be given to retaining trees within the inner zone. Where there are sufficient trees within the inner zone to meet the combined target for the two zones (40 trees per 1,000 feet), no additional leave trees are required in the outer zone.

[4] To maximize the influence of retained trees on debris flow processes, preference will be given to retaining these trees as close to the stream channel as operationally feasible, or on adjacent slope features that exhibit a high potential for failure and delivery to the stream.

Inner RMA Zone—The inner RMA zone is the next area away from the stream, adjacent to the stream bank zone. Vegetation within this zone contributes substantially to desired riparian functions, including providing aquatic shade, delivering a greater proportion of the potential large wood available, and contributing organic inputs to the stream. Vegetation within this area also provides some protection to certain aspects of riparian micro-climate. Because vegetation in this zone has a relatively greater role in supporting riparian functions and processes, a high priority is placed on management actions in this area.

- The inner RMA zone extends from 25 feet (the outer edge of the stream bank zone) to 100 feet from the stream. This zone exists on both sides of a stream.

Outer RMA Zone—The outer RMA zone is the portion of the RMA farthest from the stream. Vegetation within this zone may still contribute to certain riparian functions and processes, but to a lesser extent than the two zones closest to the stream. The primary functions provided by vegetation in this area include additional contributions of large wood to the riparian zone and stream channel, and the protection of riparian micro-climate. In some cases, the outer zone may also partially buffer the two inner zones from certain disturbance events such as windthrow.

- The outer RMA zone extends from the edge of the inner zone at 100 feet out to 160 feet from the stream. This zone exists on both sides of a stream.

Guidelines: Stream Classification

Determination of the applicable management standards for riparian areas is based on a stream classification system. Streams are grouped into two major categories based on the primary beneficial uses of the stream. Streams are further classified according to size, based on average annual flow. Flow pattern (perennial and seasonal) is also considered for small non-fish-bearing waters. This classification system is generally consistent with the method used for administration of the FPA, as described in the ODF's Forest Practice Technical Note 1—Stream Classification (Oregon Department of Forestry 1994b).

Beneficial Use Classifications

Streams and other aquatic habitats are classified into two major groups based on the presence or absence of certain fish species. The following definitions will be applied in classifying streams.

- **Fish-bearing (Type F)—**Waters that are inhabited at any time of the year by anadromous or game fish species, or by fish species that are listed as threatened or endangered under either federal or state ESAs.
- **Non-fish-bearing (Type N)—**Waters that are not fish-bearing (see previous definition).

Stream Size Classifications

Streams are further classified by size, based on estimated average annual flow. The following definitions apply to these size categories.

- **Small—**Average annual flow of two cubic feet per second (cfs) or less.
- **Medium—**Average annual flow greater than two cfs, but less than ten cfs.
- **Large—**Average annual flow of ten cfs or greater.

Flow Pattern Classifications

Small non-fish-bearing (Type N) streams are also classified according to the flow pattern exhibited in normal water years. For the purposes of this FMP, the following definitions will be used.

- **Perennial Type N Streams—**Streams that are expected to have summer surface flow after July 15.
- **Seasonal Type N Streams—**Streams that only flow during portions of the year; these streams are not expected to have summer surface flow after July 15.

Some seasonal non-fish-bearing streams are further classified as:

- **Seasonal High Energy Streams—**Seasonal streams with physical conditions that favor the periodic transport of coarse sediments and wood during high-flow events. For the purposes of this FMP, and in the absence of specific geomorphologic identification, stream reaches with an average gradient exceeding 15 percent, and an active channel width of five feet or more will be defined as seasonal high energy streams.
- **Potential Debris Flow Track Reaches—**Potential channelized debris flow track reaches are reaches on seasonal Type N streams that have been determined to have a high likelihood of delivering wood to a Type F stream.

The ODF field staff will make the determination of the likelihood that a reach will deliver wood to a Type F stream via a channelized debris flow, using the following criteria:

- The seasonal stream reach must terminate at or below a high landslide hazard location. High landslide hazard locations include:
    - Active landslides (slopes with tension cracks, unvegetated soil scarps, or jackstrawed trees caused by slope movement)
    - Slopes steeper than 75 percent, excluding competent rock outcrops
    - Headwalls or draws steeper than 65 percent
    - Any other site determined to be of marginal stability by an ODF geotechnical specialist
- The path of a potential channelized debris flow and the likelihood that a debris flow will reach a Type F stream. If any one of the following conditions is present along the path from the high-risk site to the Type F stream, a debris flow is likely to stop and the stream reach would be determined to have a low probability of wood delivery to the Type F stream (Benda and Cundy 1990):

- The presence of a channel junction that is 70 degrees horizontal or more, provided the channel downstream of the junction is less than 35 percent gradient
- The presence of a stream reach that is less than six percent gradient for at least 300 feet
- The stream channel is unconfined
- Other characteristics that, in the judgment of the geotechnical specialist, are likely to cause debris flow deposition

Management Standards for Riparian Management Areas

The following standards will guide management activities so that properly functioning riparian and aquatic conditions will be created over time. These standards will apply until alternative standards are identified through the adaptive management process. As new information and a better understanding of the watershed functions and processes become available, this knowledge will be integrated into the management of riparian and aquatic habitat through the adaptive management process. The management standards are presented in Tables 5-2 and 5-3.

Increasing Outer Zone Conifer Retention on Type F Streams

On Type F streams, in situations where the number of conifers available for retention within the inner zone is not adequate to achieve the large wood delivery potential of a mature forest condition, additional conifers will be retained in the outer zone to provide additional large wood recruitment potential.

This additional outer zone target will apply when the number of conifers of suitable size (11 inches or greater DBH) in the inner zone is less than the mature forest condition target of 45 trees per acre (100 trees per 1,000 lineal feet of stream for a 100-foot inner zone).

The number of additional conifers to be retained in the outer zone will be equal to the deficit from the inner zone target, adjusted to account for the different widths of the zones. For example, if the inner zone has an average of 70 suitable conifers per 1,000 feet of stream, then the additional retention level for the outer zone would equal 30 times 0.7, or an additional 21 conifers per 1,000 feet of outer zone.

In no case shall the number of conifers required to be retained in the outer zone exceed the inner zone target for mature forest condition. This means that no more than 70 conifers per 1,000 feet of outer zone, or 45 trees per acre, are required. In addition, no trees shall be required to be retained in the outer zone in locations where, because of topography, they would have no opportunity to reach the area within the channel migration zone and thus potentially function as large wood in the stream channel. All conifers retained under this strategy shall meet the conifer retention criteria as described in footnotes to Tables 5-2 and 5-3: dominant or co-dominant trees, with preference given to retaining trees on adjacent slopes, trees leaning toward the aquatic zone, and trees closest to the channel.

Perennial Type N Stream Special Emphasis Areas

On small Type N streams, the required RMAs will be located to provide protection to the following special emphasis areas. These special emphasis areas may be especially important to certain species (such as amphibians), or to the functions and processes within a watershed.

Seeps and Springs in Inner Riparian Management Area Zone, Connected to Aquatic Zone

The 25-foot stream bank zone of the stream, which is the no-harvest zone, will be extended around the outer perimeter of side slope seeps and springs that are within 100 feet of the aquatic zone and connected to the channel via overland flow. The inner zone will follow that boundary.

Source Areas of Perennial Streams

The 25-foot stream bank zone, which is the no-harvest zone, will be extended for a distance of 100 feet above the initiation point of perennial flow.

Stream-Associated Wetlands

The 25-foot stream bank zone, which is the no-harvest zone, will be extended around the outer perimeter of the wetland area.

Stream Junctions

The 25-foot stream bank zone (no harvest) will be extended for a minimum of 100 feet upstream and downstream, on each stream, where two or more small Type N perennial streams intersect.

Significant Waterfalls

A significant waterfall is one that has an identifiable splash zone. The splash zone is the area immediately adjacent to the stream channel that is occupied by vegetation commonly associated with wet areas, i.e., mosses, maidenhair (*Adiantum pedatum*) or licorice fern (*Polypodium glycyrrhiza*), and other hydric species. For these sites, the stream bank zone (no harvest) will be extended around the outer perimeter of the splash zone of the waterfall.

Key Terms

Active Channel Width—The average width of the stream channel at the normal high water level. The normal high water level is the stage reached during average annual high flow. This high water level mark often corresponds with the edge of streamside terraces; a change in vegetation, soil, or litter characteristics; or the uppermost scour limit (bankfull stage) of a channel.

Average High Water Level—The stage reached during the average annual high flow period. This level often corresponds with the edge of streamside terraces, marked changes in vegetation, or changes in soil or litter characteristics.

Bog—A wetland that is characterized by the formation of peat soils and that supports specialized plant communities. A bog is a hydrologically closed system without flowing water. It is usually saturated, relatively acidic, and is dominated by ground mosses, especially sphagnum. Bogs are distinguished from other wetlands by the dominance of mosses and the presence of extensive peat deposits.

Channel Migration Zone—An area adjacent to an unconfined stream channel where channel migration is likely to occur during high flow events. The presence of side channels or oxbows, stream-associated wetlands, and low terraces are indicators of these zones. The extent of these areas will be determined through site inspections using professional judgment.

Stream-Associated Wetland—A wetland that is immediately adjacent to a stream. This includes wetlands that are adjacent to beaver ponds, side channels, or oxbows that are hydrologically connected to the stream channel by surface flow at any time of the year.

Wetland—An area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Strategy 6c. Maintain or Improve Aquatic Habitats

The aquatic habitat maintenance or improvement strategies are intended to correct human-induced conditions on the forest that may contribute to aquatic habitat deficiencies, or that may limit desired aquatic habitat conditions. The maintenance or improvement strategies will promote aquatic habitat conditions that will support the short-term survival needs of aquatic organisms. Also, these strategies will make it more likely that properly functioning aquatic habitat conditions will be attained in a timely manner. Finally, these strategies will encourage forest conditions that will support the ecological processes necessary to naturally create and maintain complex aquatic habitats on a self-sustaining basis.

This approach addresses aquatic habitat maintenance or improvement on a comprehensive basis, and uses both short-term and long-term management actions. These strategies will improve levels of aquatic function in the short term (to meet the immediate habitat

needs of aquatic species and place aquatic habitats on a pathway toward desired conditions), while establishing and maintaining self-sustaining habitats over the long term. The following strategies and actions will be implemented as part of the aquatic habitat maintenance or improvement strategy.

Use information obtained from the Elliott State Forest watershed analysis to identify potential factors that could be contributing to undesirable aquatic habitat conditions.

This strategy will be implemented primarily through the watershed analysis strategies described earlier. Road inventories and risk assessments, aquatic habitat inventories, and riparian vegetation surveys are key sources of information used in the analysis.

Identify, design, and implement projects to correct identified problems in a timely manner.

- Aquatic habitat improvement projects will be designed with the intent of mimicking natural processes. The use of "engineered" or "constructed habitat" approaches to stream enhancement will be minimized.
- Projects will be designed and implemented using a multidisciplinary approach, and with direct consultation with the ODFW and in cooperation with local watershed councils.
- Project planning and design will consider habitat conditions, stream processes, and the disturbance regime at both the watershed and site-specific scale.
- Projects will be designed and implemented consistent with the natural dynamics and geomorphology of the site, and with the recognition that introduction of materials will cause changes to the stream channel.
- A priority will be placed on projects that supplement natural "legacy" elements (large wood) that are lacking because of previous disturbance events, and/or management activities.
- Projects will be designed to create conditions and introduce materials sufficient to enhance or re-establish natural physical and biological processes. An emphasis will be placed on projects that re-introduce large "key" pieces of large wood to stream channels in natural configurations.
- Wood placement activities will utilize materials that are expected to be relatively stable yet functional in these dynamic stream systems. The intent is to maximize the functional attributes of large wood, and minimize potential conflicts with public safety in downstream reaches. Reliance on artificial anchoring methods (such as cables) will be minimized, and will only be used in cases of significant concern for public safety.
- Projects will be implemented in a manner that minimizes the potential for negative effects to riparian areas.

- Constructed habitat projects will only be used where these efforts are deemed necessary to support the continued survival of aquatic species. These projects (when deemed necessary) will only be placed in areas where the created habitat type would be expected to occur naturally.

Strategy 6d. Apply Alternative Vegetation Treatment to Achieve Habitat Objectives in Riparian Areas

The term "alternative vegetation treatment" refers to the application of silvicultural tools and management techniques in RMAs, using standards that differ from general riparian management standards, for the purpose of changing the vegetative community to better achieve the FMP's aquatic and riparian habitat objectives.

Potential projects include silvicultural treatments such as the conversion of hardwood stands to conifer species, selective removal of hardwoods from mixed-species stands, the establishment of shade-tolerant conifer seedlings, the creation of gaps in hardwood stands to establish conifer seedlings (shade-intolerant and shade-tolerant), or other similar practices not specifically described in the management standards for riparian areas.

The alternative vegetation treatment strategies will apply alternative silvicultural approaches in riparian areas where basin-level stand conditions are inconsistent with the attainment of properly functioning aquatic habitat conditions in a timely manner. These strategies will be implemented in a way that maintains diverse riparian plant communities (heterogeneity) at the landscape and basin scales, and that minimizes the potential for adverse effects to aquatic resources.

Use 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.

This strategy will be implemented primarily through the watershed analysis strategies described earlier, applied at the basin level.

Alternative vegetation treatment projects will be planned using a multi-disciplinary approach involving a variety of resource specialists.

These projects will be designed with the involvement of resource specialists from the ODF and the ODFW. The specialists involved in a given project will vary according to the resources and physical conditions present at the site.

Alternative vegetation treatment projects will be monitored and evaluated over time to ensure that the objectives are being achieved, and that undesirable effects are being minimized. The results of these evaluations will be incorporated into the management activities in an adaptive management context.

The FMP recognizes that these treatments are experimental actions, and that over time managers will gain additional knowledge and experience through monitoring and

research. This knowledge will be applied in an adaptive management context, to more successfully meet the multiple resource objectives for riparian and aquatic habitats.

Strategy 6e. Apply Specific Strategies to Other Aquatic Habitats

The Elliott State Forest contains other numerous aquatic habitats including, wetlands, lakes, ponds, bogs, seeps, and springs. The management objectives for these waters are generally similar to the objectives for streams, but the specific prescriptions are sometimes different. The following strategies apply to these other aquatic habitats.

Establish and maintain RMAs adjacent to other aquatic habitat areas in accordance with the standards described in this FMP.

These waters support diverse plant and animal communities, are connected to other waters in a basin, and play a significant role in the hydrologic patterns and functions of watersheds. Some species have adapted to, or are dependent on, the conditions found in and near these other aquatic habitats. These areas can also be sensitive to land management activities.

The strategies for other aquatic habitats will maintain the productivity of these habitats, protect the integrity of these sites and maintain hydrologic functions, provide suitable habitats for fish and wildlife dependent on these unique habitats, and contribute to habitat conditions needed for maintaining other native wildlife species of concern.

Prescriptions

The prescriptions for other aquatic habitats are presented in Tables 5-4 and 5-5.

Table 5-4. Management Prescriptions for Lakes, Ponds, and Wetlands

Greater Than 1 Acre
• Establish a 25-foot no harvest zone, starting from the high water line, or wetland boundary (whichever is greater). • Establish a RMA of 100 feet from the high water line, or wetland boundary (whichever is greater). • Manage vegetation to achieve and maintain mature forest conditions. • The site-specific prescription will classify the wetland.
From ¼ Acre to 1 Acre
• Establish a 25-foot no harvest zone, starting from the high water line, or wetland boundary (whichever is greater). • Establish a RMA of 50 feet from the high water line, or wetland boundary (whichever is greater). • Within the RMA, harvest activities will retain at least 50 percent of the existing live tree basal area, or 110 square feet of basal area per acre (whichever is greater). Retained trees generally will be representative of the existing diameter classes and species distribution, with a preference for retaining trees greater than 20 inches DBH. • If the waterway is inhabited by fish, or is identified as an important area for temperature-sensitive amphibian species, at least 80 percent shade will be maintained over the aquatic area. • The site-specific prescription will classify the wetland.
Less Than ¼ Acre
• Establish an RMA of 50 feet for waters containing fish (Type F), or 25 feet for non-fish-bearing (Type N) waters. These areas will be measured from the high water line, or wetland boundary (whichever is greater). • For Type F waters, harvest within the RMA will retain at least 50 percent of the existing live tree basal area, or 110 square feet of basal area per acre (whichever is greater). Retained trees will generally be representative of the existing diameter classes and species distribution, with a preference for retaining trees greater than 20 inches DBH. • For Type N waters, hardwood trees and brush will be retained to protect the hydrologic functions and wildlife habitat values of the site. • If the waterway is inhabited by fish, or is identified as an important area for temperature-sensitive amphibian species, at least 80 percent shade will be maintained over the aquatic area.
Stream-Associated Wetlands
• Stream-associated wetlands are considered to be components of the aquatic habitat of streams, and will be managed according to the objectives and prescriptions specified for the associated stream.

Table 5-5. Management Prescriptions for Bogs, Seeps, and Springs

Bogs
• Establish a 25-foot no harvest zone, starting from the high water line or wetland boundary (whichever is greater). • Establish an RMA of 100 feet from the high water line or wetland boundary (whichever is greater). • Manage vegetation within the RMA to achieve and maintain mature forest conditions.
Seeps and Springs
• Where possible, these aquatic areas should be incorporated into the RMAs of adjacent streams, and vegetation retention provided according to the stream prescription. In practice, this may simply require adjusting the boundary of a stream's RMA to fully encompass the spring or seep. • Other management considerations for some of these areas were described earlier in the section titled "Perennial Type N Stream Special Emphasis Areas."

Strategy 6f. Manage Slope Stability

Landslides and other geologic processes can have dramatic effects on watersheds, including aquatic and riparian areas. The following strategies address concerns about landslides and slope stability.

The objective in relation to landslides and slope stability management is to minimize the occurrence of management-induced slope failures and mitigate potential negative impacts on aquatic and riparian habitats. This will be accomplished through application of risk-based management principles and BMPs. Minimizing road-related landslides and chronic erosion (sedimentation to streams) is fundamental to this objective. Hazard assessment and risk-based management for in-unit slides, and ensuring that large wood is available in the track of potential debris slides and torrents, will promote properly functioning conditions for future aquatic habitat inputs. Monitoring and hazard assessment, combined with adaptive management, will ensure that this objective is realized.

Enhance current understanding of the processes that influence slope stability in the Elliott State Forest through watershed analysis and other information.

Such processes include, but are not limited to, soil type mapping, slope mapping, geologic history and processes, root strength influences, influences of road construction

on slope stability, influences of stand age, influences affecting sediment delivery to fish bearing streams, and review of historic slope failures and relevant case studies.

Information gained through watershed analysis (Oregon Department of Forestry 2003) and other documents will be used to inform management decisions on the Elliott State Forest, including slope stability strategies. Relevant information will be incorporated into IPs and AOPs.

Evaluate alternatives that can minimize, mitigate for, or avoid risk in high and moderate hazard areas during District implementation planning and annual operations planning.

High hazard level areas are those that are likely to contain sites with relatively high probability of failure. Moderate hazard level areas may contain sites with moderate probability of failure. Low hazard level areas have a low chance of containing sites with a high or moderate probability of failure.

Design operations that will minimize, mitigate for, or avoid identified risks during project planning and design.

Geotechnical specialist input will be used as appropriate when alternatives are being considered for proposed operations. The district will coordinate geotechnical specialist review, and will be responsible for subsequent evaluation of alternatives and selection of the course of action.

Use site-specific geotechnical evaluation.

Road alternatives will receive site-specific geotechnical evaluation when the forest engineer needs to compare risk of road location, design, or construction alternatives.

Annual Operations Plans—A geotechnical specialist will provide initial hazard and risk assessment for timber harvesting and road construction operations in the AOP, early enough in the process to allow for proper consideration of alternatives (boundary changes, leave tree placement, etc.). Risk management may include ensuring that large wood is available in the track of potential debris slides and torrents, to promote proper conditions for future aquatic habitat inputs. The district is responsible for requesting review from the geotechnical specialist. For timber harvesting and road construction operations, the following process will be used:

- Operations in high hazard level areas will be evaluated by the geotechnical specialist during the AOP review for assessment of risk (likelihood of delivery to aquatic system).
- Operations in moderate hazard level areas will be investigated by district personnel to ensure that no high landslide hazard sites exist. If high landslide hazard sites are identified by field personnel, the geotechnical specialist will assess the risk of delivery to the aquatic system.
- Operations in low hazard level areas will not be expected to have any further geotechnical review. However, if high landslide hazard locations are identified

during fieldwork, the geotechnical specialist will be consulted and the site evaluated in the same manner as high hazard level areas.

The effect of the forest operation on the landslide potential (potential increase in the probability of failure or landslide rate) will be judged based on slope, landform, underlying rock material, type of operation (road building, regeneration harvest, partial cut, thinning, etc), or other geomorphic or management characteristics.

Managing Risk

If the risk is low (minimal or no likelihood of delivery to aquatic system), no management modification will be recommended.

If the risk is moderate or high, management modifications to improve the likelihood of beneficial results may be recommended.

If the risk is moderate (potential to deliver but likelihood is low), the condition and significance of the aquatic resource will be further assessed. If the aquatic resource is already significantly degraded, the geotechnical specialist will develop recommendations for mitigating the harvest operation. Otherwise, no modifications to the operation will be made.

If the risk is high (likely to deliver to the aquatic system), the geotechnical specialist will develop recommendations for avoiding, mitigating, or minimizing the risk. This will include an evaluation of the potential debris chute or run-out channel, consistent with the criteria provided for identification of debris flow track reaches in the RMA strategies.

Strategy 6g. Manage Forest Roads

The *Forest Roads Manual* (Oregon Department of Forestry 2000) contains specific processes, procedures, and standards for road system management. It also describes the roles and responsibilities of the various resource specialists and land managers involved in road system management.

The road system will be managed to prevent water quality problems and associated impacts on aquatic and riparian systems, minimize disruption of natural drainage patterns, provide for adequate fish passage where roads cross fish-bearing streams, and minimize acceleration of natural mass-wasting processes.

The construction and use of forest roads is an integral part of actively managing state forest lands. Roads provide essential access for forest management activities, fire protection, and a variety of recreational uses. However, roads can be a major source of erosion and sedimentation. Proper road system planning, design, construction, and maintenance will prevent or minimize water quality problems and associated effects on aquatic resources, and significantly extend the useful life of a forest road. Quality information on the status and condition of existing roads is also essential to an effective maintenance or improvement program designed to meet the objectives stated above.

The vision of the ODF transportation system is a road network that will provide effective access for all necessary activities taking place in the forest. The transportation system will be actively managed to protect forest resources. The road network will be minimized

to achieve forest management objectives. Barriers to fish passage created by road crossings will be corrected. Roads will be constructed in the most appropriate locations for carrying out anticipated activities, and the standard for forest roads will be a suitable match for the terrain and type of access needed. The roads will be effectively maintained to prevent degradation to other forest resources. Where appropriate, roads will be closed or vacated, and the land they occupied may be returned to active forest management. Adaptive resource management processes will be used to modify future practices as managers gain additional knowledge of resource needs and protection and learn more appropriate methods for meeting the objectives of this FMP.

The four primary areas of road system management are listed below and addressed in detail in the ODF's *Forest Roads Manual* (Oregon Department of Forestry 2000).

- Transportation planning
- Road design, construction, and improvement (including drainage systems)
- Road maintenance
- Road closure

Utilize the watershed analysis process developed under Aquatic and Riparian Strategy 1, to supplement the existing inventory of roads in the Elliott State Forest.

The district has already conducted a comprehensive road hazard inventory to a common standard specified through Oregon Plan protocols. The information from this inventory is being used to identify priority restoration and improvement projects related to the forest roads system.

Information obtained through the October 2003 watershed analysis for the Elliott State Forest, as described in Aquatic and Riparian strategy 1a, has identified additional information needs relevant to ongoing improvement of the Elliott State Forest road network. Additional information needs will be addressed through the implementation planning process.

Through development and updating of the district IP, apply the processes and standards for transportation planning described in the *Forest Roads Manual*.

The initial district IP will contain applicable portions of the transportation planning elements described in the *Forest Roads Manual*.

Forest road design, construction, improvement, and maintenance will be carried out in accordance with the processes and standards described in the *Forest Roads Manual*.

Identify and prioritize roads for closure and/or vacation using information gained from the comprehensive forest roads inventory, and in accordance with the standards described in the *Forest Roads Manual*.

Strategies to Integrate Resource Management Across the Elliott State Forest

Thus far, this chapter has presented the strategies for sustainable forest ecosystem management, which are the basis for coarse filter management or managing the forest landscape as a whole. The remainder of this chapter presents the management strategies for additional individual resources in the Elliott State Forest, as described in the Guiding Principles and Resource Management Goals presented in Chapter 3. The strategies to integrate resource management represent the fine filter or site-specific management strategies for resource values that the sustainable forest ecosystem management strategies alone may not achieve.

Agricultural and Grazing Resources

Agriculture

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.

Agricultural activities on state forestlands in the district have occurred on a limited basis in recent years, and are not expected to increase in the future. If the demand for agricultural use should increase, the ODF will consider these activities to the extent that they are compatible with the other resource goals.

BOF policies allow for non-exclusive permits to be granted for special uses. Agriculture is considered a special use. Agricultural activities are allowed only within the scope of a special use permit. These permits allow ODF to control the activity and protect other resources by the provisions used in the permit.

Grazing

Grazing leases on CSFLs will be considered on a case-by-case basis. Leases will be issued by the DSL when they are compatible with other resources.

The ODF and the DSL have overlapping land management responsibilities on CSFLs with regard to grazing. The ODF will actively review grazing plans, but will rely on the DSL to administer grazing leases on CSFLs. DSL management of grazing must comply with the current OARs for rangeland management on CSFLs.

Grazing leases on BOFLs 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.

Grazing activity has been minimal in the district. Anyone requesting a grazing lease must prepare a grazing management plan that addresses the following items:

- Suitability and carrying capacity of the land for grazing.
- How livestock will be kept out of areas where land use designations preclude grazing.
- How grazing will be managed to protect or be compatible with timber production, cultural resources, fish and wildlife, soils, special forest products, and water resources.
- How livestock will be prevented from trespassing onto adjacent lands.

Before the grazing management plan is approved, the ODF must determine that the plan adequately addresses all concerns and that the department's share of revenues generated under the plan will cover all costs of administering the plan.

Air Quality

Limit prescribed burning to specific areas where any of the following occurs:

- Slash loads or competing vegetation are barriers to establishing a new stand after harvest.
- Slash loads constitute an unacceptable risk of wildfire.
- Slash loads may increase the risk of debris flows.
- Slash loads or competing vegetation are barriers to forage vegetation for ungulates.

Burn slash only under weather and fuel moisture conditions that will minimize the risk of significant fire escape.

Continue to protect the forest from wildfire through fire prevention and suppression activities.

Comply with the Oregon Smoke Management Plan and burn only after obtaining permits required under the Plan. The current conditions described in Section 2 outlines the objectives of the Smoke Management Plan and lists procedures for conducting prescribed burning in Oregon. Because it is an element of DEQ's State IP, the Smoke Management Plan contributes to meeting NAAQS. As a whole, it reduces emissions from

prescribed burning in western Oregon and minimizes smoke intrusions into designated population areas.

Implement alternatives to prescribed burning, and use burning techniques that reduce smoke emissions. Prescribed burning will remain a necessary tool to reduce fuel loads, prepare sites for reforestation, and provide certain types of wildlife habitat. Because circumstances vary in different locations, smoke-reduction techniques must be prescribed on a site-specific basis. Some techniques, such as small wood utilization, may be driven by market conditions.

Cultural Resources

The cultural resource strategies recognize that historic sites, relics, and structures are public resources and provide important clues to the historic use of state forest lands. Forest management activities such as timber harvest, road construction, and recreation site development can irreversibly destroy the integrity of historic sites. A cultural resource management program for the Elliott State Forest will be applied to meet both legal protection mandates and internal protection priorities.

Complete an inventory and assessment of cultural resource sites.

An inventory of sites must be available to district staff to effectively manage cultural resources. Cultural resource sites may range from sites with legally mandated protection to sites with little or no significance. Each site identified will be assessed and rated for its legal or nonlegal protection status. The ODF will rate sites for significance using the following categories:

- Mandated Protection (Class I)
- Internal Protection (Class II)
- No Protection (Class III)

Table 5-6 describes the categories of site significance, criteria used to designate sites, and relative management objectives for each site category. The tools and guidelines needed by managers will be developed for use at the district level, with coordination from the Cultural Resource Specialist from the Salem State Forest Program.

A prehistoric and historic cultural overview is a professional-level review, including extrapolation and interpretation of existing literature and information specific to the Elliott State Forest. Such an overview was completed in 1998 by Stepp Consulting of Corvallis, Oregon. This document provides the understanding and context for making cultural resource and other resource management decisions.

Table 5-6. Cultural Resource Classes and Objectives

ODF Class	Site Protection Categories	Site Criteria and SHPO Site Examples	Management Objectives
I Mandated Protection	**A. Pre-Historic Archaeological Site:** Created/used before Euro-American inhabitancy	• The site has a record of creation/use by an indigenous culture (OAR 736-51). • Sites may include lithic quarries, lithic scatters, camps, villages, burials, and sites of objects such as symbols, tools, and facilities.	• Management activity excluded to protect sites from any excavation, alteration, disturbance or removal of remains. • If disturbance is necessary and detrimental to structure/site integrity, an SHPO Archaeological Permit is required to excavate, alter, disturb or remove remains in the immediate area. Permits are to be reviewed by qualified archaeologist. • Extend Level 1 objectives and consideration to sites that are soon to qualify for higher levels of significance (sites within 5 years of age minimum).
	B. Historic Archaeological Site: Created/used by humans after Euro-American inhabitancy	• The site has a record of creation/use by recent post-European culture (proof of existence, not remains). • The site is at least 75 years old; consider 45-year-old sites in planning horizon. • Sites may include shipwrecks, homesteads, camps, towns, monuments, tools, facilities, grave sites and cemeteries.	• Same as above.
	C. Historic Sites: Created/used by humans after Euro-American inhabitancy	• The site has aboveground structural remains or work of a master. • The site is at least 50 years old; consider 45-year-old sites in planning horizon. • Sites include bridges, tunnels, trestles, rockwork, roads, and trails that usually have structural or marked remains.	• Same as above, except that: SHPO Archaeological Permit is not required (may be exempt).

Table 5-6 continued. Cultural Resource Classes and Objectives

ODF Class	Site Protection Categories	Site Criteria and SHPO Site Examples	Management Objectives
II Internal Protection	**B. Historic Archaeological Sites:** ---------- **C. Historic Sites:**	• Less than 75 years old • Valuable for public use and education ---------- • Less than 50 years old • Valuable for public use and education Examples: railroad grades, camp sites, lookout remains, sites related to ODF history (tree genetic trials, guard stations).	• Give highest protection to sites close in age to Level 1 significance. • Protect the site from disturbance where possible. Survey, remove, and catalog site/relics if destruction is unavoidable. • No legal requirements, except complete protection of grave sites and any work of a master.
III No Protection	**B. Historic Archaeological Sites:** **C. Historic Sites:**	• Less than 75 years old • Not valuable for public use value	No special management action is required. Before disturbance, gather information on site, record in inventory, and map. Remove relics, label, and store for Interp/Ed programs or archival use.

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.

Existing cultural resource databases will be incorporated into the district GIS to assist in the planning of long- and short-term management actions. Making cultural resource data easily accessible will greatly aid in protecting cultural sites and meeting long-range plan goals. The process of preparing a database for conversion to GIS-compatible files has begun, but review and refinement of this work is required.

Develop a procedure for integrating site protection into forest activity plans by providing practical guidelines for recognizing, assessing, recording, and protecting sites.

As the cultural resources management program is being developed, new or known sites will be encountered by ODF field staff in carrying out management plans and activities. A system will be developed to provide guidance in recognizing, recording, and protecting sites in the short term, as well as after strategy 1 is implemented. This system will identify procedures best carried out at the intermediate planning level (management basin) and at the annual planning level (activity area or site).

Much of the work necessary to accomplish the cultural resource strategies has already occurred through recent statewide planning efforts. It is anticipated that the remaining work called for by these strategies will be completed during the initial 10-year implementation period.

Energy and Minerals

Maximize long-term revenues to the CSF, counties, and local taxing districts while minimizing effects to natural resources (forests, fish, wildlife, etc.).

If lands are identified where development of one or more subsurface resources is expected to generate the highest long-term revenue flow, such lands will be managed accordingly, with the following exceptions:

- Lands designated in the forest inventory and approved by the State Land Board (CSFL) and the State Forester (BOFL) as having a land use that precludes gas, oil, or mineral development.
- Lands that will produce another commodity with a higher contribution than gas, oil, or minerals to the long-term production of revenue. If production of the other commodity is compatible with gas, oil, or mineral development, both will occur.
- Lands where such development would conflict with legal requirements for the protection of other resources.

- Lands that are temporarily withdrawn from the production land base in order to preserve future management options or help prevent future listings of species as threatened or endangered.

Review and update DSL and ODF roles, responsibilities, and procedures dealing with mineral and energy resource assessment and prospecting and mining permit applications involving state forest land.

It will be necessary to review and update joint DSL/ODF roles, responsibilities, and procedures to ensure that they are fully aligned with all of the resource goals and strategies addressed in this FMP. The review should cover a broad array of issues, including:

- CSFL and BOFL management mandates and guidelines.
- Procedures and responsibilities for reviewing permit requests, setting royalty rates, resolving resource conflicts, and developing reclamation strategies.
- Administration of issued permits.
- Energy and mineral resource assessment and data sharing opportunities with the DSL and DOGAMI.
- Update of the existing DSL/ODF Rock and Mineral Sales Interagency Agreement.

Fish and Wildlife

The sustainable forest ecosystem management strategies described in this chapter are intended to result in functional habitat conditions for native species using forested habitats in the central Oregon Coast Range. The following components of the sustainable forest ecosystem management strategies are expected to address the habitat needs of fish and wildlife species in the Elliott State Forest:

- Maintain a diversity of stand types across the landscape, representing early, intermediate, and advanced structure stages of development, and provide these stand types in a functional arrangement through a combination of active management and conservation areas as described in the sustainable forest ecosystem management strategies.
- Maintain riparian habitats and protect streams and other aquatic systems through application of standards to maintain RMAs as described in the sustainable forest ecosystem management strategies.
- Maintain key structural components in managed stands by retaining snags, logs, and live trees as described in the sustainable forest ecosystem management strategies.

Monitoring and adaptive management, as described in Chapter 6, will be used to test these assumptions.

In addition, the following strategy applies.

Protect endangered, threatened, and candidate species by following procedures for complying with the state and federal ESAs.

ODF will follow internal policies and procedures for complying with the state and federal ESAs, unless an ITP is granted for an HCP. Additional fine-filter strategies for state and federal listed species and other species of concern would be described in the HCP.

Land Base and Access

Land Base

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.

This strategy addresses Land Base Goal 1 by minimizing the amount of forest land used for management infrastructures and other resource developments. Roads, landings, rock quarries, or other developments are necessary to manage forests effectively. However, planners must ensure that each proposed development is designed to appropriate specifications. Planners should develop and analyze an array of alternatives, and choose specifications that accurately reflect management objectives and site-specific constraints.

Follow the procedures in ORS 197.180 and OAR 660-30, 660-31, and the ODF's State Agency Coordination Program, OAR 629-20, to ensure that land use programs and activities are consistent with Statewide Land Use Planning Goals and compatible with acknowledged county comprehensive plans and land use regulations.

All state agencies must comply with the Statewide Planning Goals by ensuring that land uses are compatible with acknowledged local government comprehensive plans and land use regulations. The ODF's State Agency Coordination Program and OAR 629-20 describe the procedures to be followed. Counties with state forestland within their boundaries review and comment on the compatibility of the FMP with their comprehensive land use plans.

The procedures in OAR 629-20 will also be followed to ensure that other levels of forest planning are compatible with acknowledged county plans and land use regulations. Other levels of forest planning include the district IP, transportation plan, AOPs, and land acquisitions through sale or exchange.

Continue with an active land exchange and acquisition program when favorable consolidation opportunities occur.

The ODF will actively pursue beneficial land acquisition and exchange opportunities as a means of increasing management efficiency and economic values, and to enhance forest

resource values. This will be carried out in accordance with State Land Board and BOF policies and OARs.

The Coos District will develop a land acquisition and exchange plan that identifies potential consolidation and divestment opportunities. In carrying out this strategy, the district will review and update acquisition and exchange opportunities, establish priorities, and implement specific transactions by following procedures and reviews as outlined in State Land Board and BOF policies and rules.

Develop and implement land survey plans to establish and/or reestablish state forest boundaries necessary to meet management activity needs.

Established property corners and posted property lines are an essential part of the forest infrastructure. They help to identify land ownership and confirm locations of management activities, which in turn helps to achieve efficient conservation of state forest land (Land Base Goal 1). Many property corners and lines for state forestland have already been established as part of the required work for past timber sales and other stand management activities. However, a significant number of property corners and lines must still be established and posted to meet broader resource management and public access needs, as well as future timber harvest needs. The establishment of property corners and lines will also aid in the development of accurate GIS land ownership overlays.

To work toward completing land surveys, the Coos District will determine the total survey workload remaining, set survey priorities in relation to planned forest management activities, and develop survey project proposals. The survey proposals may use a combination of ODF personnel, cooperative agreements with adjacent landowners, and service contracts.

Access

Develop a database and GIS overlay of the road and trail network to use for planning and tracking purposes.

Many management activity plans are dependent on or affected by roads, including timber and special forest product sales, road improvement and maintenance plans, fire suppression access, fish and wildlife habitat issues, public access, and recreation management. It is important to have accurate information about existing and planned road and trail networks in order to meet access system and resource management needs. The conversion of this information into a GIS overlay will help planners use it most efficiently.

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 FPA.

It is essential to provide forest access for fire protection, management activities, and public use. To minimize potential effects from forest roads and trails, the district will use a variety of techniques to match specific access needs.

Road and trail system management will be accomplished in accordance with the processes and standards described in the *Forest Roads Manual* (Oregon Department of Forestry 2000) and the *Draft Recreation Design Standards and Management Guidelines* (Oregon Department of Forestry 1999).Consult and coordinate with adjacent landowners concerning possible road sharing opportunities to avoid unnecessary duplication of road systems.

Avoiding duplication of road systems will help to achieve Access Goal 2. The Coos District will continue to consider using adjacent landowner roads that provide better access for management activities. The district will reciprocate road use with other landowners on equal terms, where this exchange is appropriate and would reduce the overall road density on the landscape.

Plants

The sustainable forest ecosystem management strategies will provide the foundation for protecting biodiversity, and will meet the habitat needs of most plant species native to the Elliott State Forest. The following components of the sustainable forest ecosystem management strategies are expected to address the habitat needs of fish and wildlife species on the Elliott State Forest:

- Maintain a variety of seral stages, stand structures, and stand sizes across the landscape by implementing the sustainable forest ecosystem management strategies. These include the landscape management and forest health strategies. The goal of "providing habitats that contribute to maintaining or enhancing native plant populations at self-sustaining levels" is achieved through the general biodiversity approach that is implemented through the sustainable forest ecosystem management strategies. The overall result of these strategies will be a diversity of native plant communities across the landscape.
- Protect riparian vegetation during forest operations by applying aquatic and riparian strategies. Plants that grow in riparian areas have important roles in wildlife habitat, hydrology, and nutrient cycling. Riparian features such as trees and understory vegetation are protected to maintain the biological and hydrologic functions of these areas.

In addition, the following strategies apply:

Protect endangered, threatened, candidate, and species of concern by following procedures for complying with state and federal ESAs for plants.

Special procedures were developed to manage individual species and habitats whose needs are not adequately addressed through the general strategies for plants. These procedures specifically address plants that are classified as endangered, threatened, candidate, and species of concern. These procedures are found in the document, *ODF State Lands Program—Procedure for Complying with Federal and State ESAs for Plants* (Oregon Department of Forestry 1995b). Detailed information about these plants is provided in Chapter 2 under the heading "Plants."

Contribute to statewide efforts to reduce the quantity and range of invasive, non-native plant species.

The ODF will apply IPM principles to address incidences of noxious weeds on state forest land, and will cooperate with other agencies and landowners in cooperative efforts to address such problems. The ODF will take steps to ensure that management activities are not contributing to existing or new invasions of these plant species. This will include vegetation management efforts to control such species on state forestland, and the use of weed-free seed in re-seeding projects on state forest lands.

Recreation

Provide recreational opportunities that are consistent with the current activities on the forest.

- Provide dispersed and undeveloped recreation opportunities such as hunting, fishing, camping, viewing, and other activities that are compatible with active forest management.
- Manage recreational use to minimize adverse effects on other resources, such as water quality.
- Manage recreational use to accommodate a wide variety of existing uses while minimizing conflicts among user groups.
- Determine the feasibility of making improvements to existing recreation sites.

Provide interpretation and education opportunities on the forest as staffing permits.

- Assist schools and other organizations in providing resource management education for children by the use of tours, field trips, and classroom discussions.
- Provide tours for the public and other groups.

Maximize efficiency and diversify funding of recreation management through development of partnerships with user groups, neighboring landowners, and other agencies.

- Continue to participate with Coos County Bikeways and Trails Partnership or other partnerships to plan and develop trails in the Elliott State Forest.
- Cooperate with the BLM in hiking trail construction on state land adjacent to the Loon Lake Recreation Area.
- Supplement available recreation opportunities within the region, rather than duplicating existing services.

Scenic Resources

The scenic resource strategies recognize that landscape aesthetics are a public resource, and forest management activities such as timber harvest and road construction can affect the visual quality of the landscape.

The visual management strategy for the Elliott State Forest will be applied at both the landscape and stand level, and will be compatible with other resource goals and values. A full range of silvicultural activities will be considered in managing areas where visual quality is important.

Manage identified areas for visual sensitivity in accordance with ODF's Land Management Classification System consistent with the purpose for CSFLs.

Areas have been identified that are sensitive to visual effects from management activities. These are areas adjacent to, or seen from major highway corridors designated as visually sensitive by the FPA or areas with established, high public use vistas.

A full array of silvicultural treatments, harvest methods, and logging systems will be considered for use when planning operations in these areas. These methods include various degrees, combinations, and shapes of regeneration harvesting, patch cuts, commercial thinnings, and partial cuts.

Some visually sensitive areas, in which timber harvest would significantly impact visual quality, will be managed so that the growing and harvesting of trees and other incompatible resource uses will be secondary to the visual values.

Soils

The sustainable forest ecosystem management strategies provide an overall framework for maintaining long-term soil productivity, as well as other resource values. The additional strategies below describe some specific practices by which soils will be protected during forest management activities.

Comply with FPA requirements for soil protection.

Specific actions that implement this strategy are detailed in AOPs. Timber sale operators must comply with the OARs and sale contract provisions that address the protection of soils during harvesting operations.

Minimize management-induced slope movements by obtaining geotechnical assistance.

Timber sale planners will obtain assistance from geotechnical specialists in designing roads and harvest units. This input is based on interpretive geology and the use of soil and rock mechanics principles. It provides the rationale for hazard and risk assessment and mitigation in forest land management decisions. Geotechnical hazard and risk assessment is the best available tool for predicting the likelihood of inducing slope movements through land management activities. The use of geotechnical analysis in

management decisions makes it possible to minimize the number or magnitude of management-induced soil movements, and to protect other resources.

This strategy will be achieved through application of the processes and standards for hazard and risk assessment, and geotechnical specialist review as described in Aquatic and Riparian Strategy 6—Slope Stability Management.

Maintain quantities of organic material in the soil (duff and litter).

- Limit the number and acres of broadcast slash disposal burns. When broadcast burning is necessary, it will be conducted under conditions that minimize effects to soil and organic materials. Factors to consider include, but are not limited to, amount, spatial distribution, flammability of fuels, weather conditions, and topography.
- During timber harvest, apply harvesting practices that minimize disturbance to the duff, litter, and soil layers, except where it is desired to scarify the soil for efficient tree regeneration. To the extent possible, retain harvesting residue (limbs, tops, and cull logs) while avoiding the creation of unacceptable fire hazards.

This strategy recognizes the importance of maintaining duff and litter as components of the soil. Organic matter increases soil fertility, retains moisture, retards rainfall runoff and erosion, and adds to long-term soil productivity. Limbs, cull logs, and duff also contribute to biodiversity by providing habitat for many species of animals.

Special Forest Products

Special forest products include a variety of plant products other than timber that are collected or harvested for personal or commercial purposes. In the Elliott State Forest, permits have been issued for the collection of sword fern, salal, huckleberry, firewood, burls, and cascara bark. These products produce little commercial value, and program development and management will be minimal. The following strategies will be used to manage special forest products in the Elliott State Forest:

Manage the commercial demand for special forest products through a permitting and fee system.

Brush leases are the primary commercial special forest product in the Elliott State Forest. Approximately 11 leases are active at all times during the year. Forest managers currently charge $30 for a year's use of 320 acres, generating a total of at least $600 annually. Fees are charged for commercial woodcutting permits; however, only a few commercial permits have been issued when large amounts of firewood were available. There has been little commercial interest in the collection of mushrooms and cones.

Manage the public demand for non-commercial special forest products through a free use permit system.

Firewood generated from timber sales is the main special forest product that generates public interest in the Elliott State Forest. Approximately 500 free use woodcutting permits, which allow firewood to be cut for personal use, are granted to the public each year. Little interest exists for the collection of mushrooms or other products, primarily because steep slopes make collection of these products difficult.