



Chapter

2

## Proposed Action and Alternatives

### ■ In This Chapter

Proposed action

Alternatives

Alternatives and options  
considered but eliminated

Elements considered but not  
analyzed

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# Proposed Action and Alternatives



**This chapter describes** the proposed action and DNR's proposed alternatives. This chapter also discusses the alternatives considered but eliminated from detailed study, and describes the elements of the environment considered but not analyzed in this FEIS.

## Proposed Action

DNR's proposed action is to develop and implement a forest land plan for the management of state trust lands in the OESF. A forest land plan is a document that defines, for a planning area such as the OESF, *what* DNR wishes to achieve and *how* it will achieve it.

Written for foresters and managers, the forest land plan will include goals, measurable objectives, strategies, and other information necessary to meet policy objectives and manage the OESF on a day-to-day basis. However, **it will not include site-specific information for individual management activities**, for example maps and other information for individual timber sales or engineering drawings for a specific segment of roadway. The plan only provides guidance on how those activities should be implemented.

The forest land plan also **will not be tied to a specific sustainable harvest level**. Instead, it will provide guidance for meeting the sustainable harvest level, whatever the current level happens to be in a given decade.

Along with developing the forest land plan, DNR also will update existing procedures as needed and (under the Landscape and Pathways alternatives) develop a new procedure for salvage of timber after natural disturbance events such as wind and fire. “Procedure” and other management terms are defined in Text Box 2-1.

**Text Box 2-1. Definition of Management Terms, Part 1**

	<p><b>Management approach</b></p> <p>A broad framework for how an area will be managed. Setting aside one area for timber harvest and another for ecological values is one example of a management approach. Another example is integrated management.</p>
	<p><b>Conservation strategy</b></p> <p>Describes how to manage types of wildlife habitat, such as riparian or northern spotted owl habitat. Conservation strategies include objectives and direction on meeting those objectives. DNR’s conservation strategies are presented in the HCP.</p>
	<p><b>Management strategy</b></p> <p>The specific steps that will be taken to implement each component of a conservation strategy or other policy. An example of a management strategy for implementing the multispecies conservation strategy is to protect balds, talus slopes, caves, or other unique habitat features. Writing management strategies is part of developing a forest land plan.</p>
	<p><b>Procedure</b></p> <p>Guidance for foresters completing tasks in the field. For example, a procedure may describe how to identify balds or talus slopes and how to conduct management activities around them. Procedures often are written to implement management strategies.</p>

## ■ Why Does DNR Need to Develop a Forest Land Plan?

DNR needs to develop a forest land plan to meet the policy direction in the HCP and the *Policy for Sustainable Forests*. The HCP states that “DNR expects landscape planning to be part of the process for implementing conservation strategies” in each HCP planning unit, including the OESF (DNR 1997, p. IV.192). The *Policy for Sustainable Forests* states that “[i]n implementing Board of Natural Resources policy, the department will develop forest land plans at geographic scales similar to DNR’s *Habitat Conservation Plan* planning units” (DNR 2006, p. 45).

## ■ What is the Purpose of the Proposed Action?

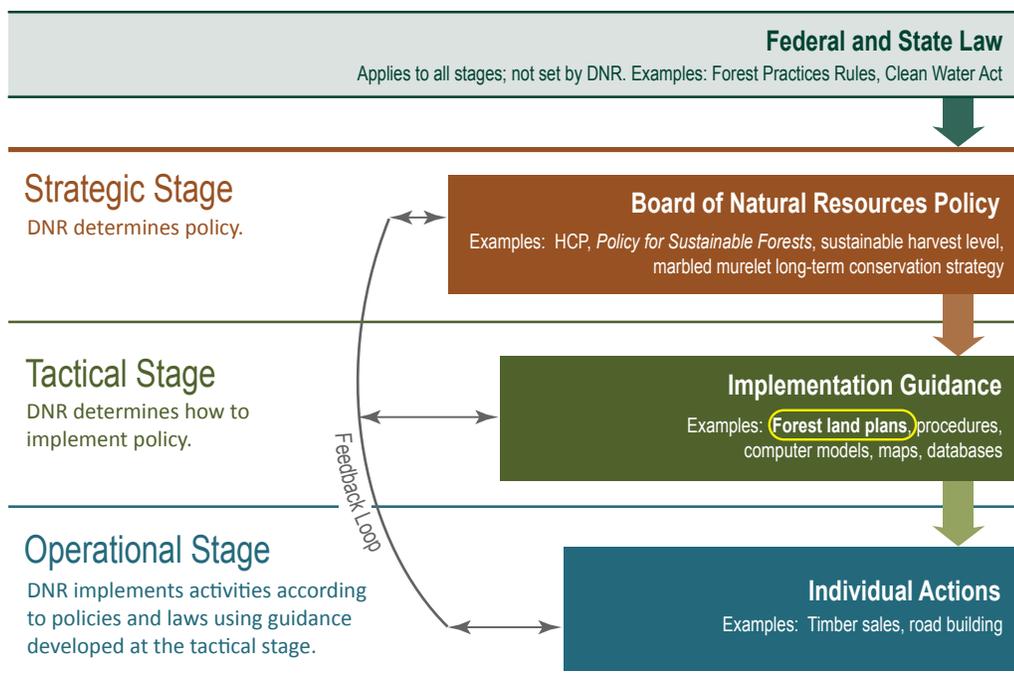
The purpose of the proposed action is to **determine how to implement the management approach and conservation strategies for state trust lands in the OESF de-**

scribed in the HCP while also meeting DNR’s fiduciary responsibility to provide revenue to trust beneficiaries. In the OESF, most revenue is generated through the harvest and sale of timber. DNR’s approach to managing state trust lands in the OESF is “integrated management,” which is described later in this chapter.

## Can DNR Change its Policies Through This Proposed Action?

No. Through this planning process, DNR **cannot change its current policies**. To understand why, it is necessary to understand where forest land planning falls in DNR’s planning process. The process has three stages: strategic, tactical, and operational (refer to Figure 2-1).

Figure 2-1. DNR’s Planning Process



- At the **strategic stage**, DNR develops **policies**. Policies define DNR’s basic operating philosophy, set standards and objectives, and provide direction upon which subsequent decisions can be based. All policies are written in the context of local, state, and federal laws, and are approved and adopted by the Board. Examples of policies include the HCP, the *Policy for Sustainable Forests*, and the sustainable harvest level.
- At the **tactical stage**, DNR determines how it will implement policies developed at the strategic stage. At this stage, DNR develops forest land plans, databases, computer models, maps, procedures, and other tools and guidance. **DNR does not change policies at the tactical stage**, it only determines how to implement them. For example, through forest land planning **DNR does not set or change the sustainable harvest level**. Nor can DNR change the requirements of the HCP conservation

strategies. However, the planning process includes a feedback loop. The information gathered to develop and implement forest land plans and other materials at the tactical stage may be used to inform future policy decisions at the strategic stage.

- Site-specific activities such as individual timber sales are designed at the **operational stage** of planning using the guidance and tools developed at the tactical stage. Management activities must comply with all applicable local, state, and federal laws as well as policies developed at the strategic stage.

SEPA review for agency actions occurs at each stage of planning. Policies are reviewed at the strategic phase, forest land plans are reviewed at the tactical stage, and site-specific projects or actions, such as an individual timber sale, are reviewed at the operational stage, if required, as they are proposed.<sup>1</sup> Therefore, this forest land plan is part of a phased review under WAC 197-11-060 (5)(c)(i).

Not all activities completed in the operational phase require SEPA review. For example, precommercial thinning<sup>2</sup> and tree planting are Class I Forest Practices<sup>3</sup> and so are categorically exempt from SEPA review, as described in RCW 43.21C.037.

## WHAT IF DNR POLICIES CHANGE DURING PLAN IMPLEMENTATION?

DNR recognizes that economic, social, political, and cultural changes over time may result in a change in DNR policies or state or federal laws. DNR also may update its policies as a result of new scientific information. Changes in policy or laws may or may not require an update or amendment to the forest land plan.

For example, DNR has begun the sustainable harvest calculation, the outcome of which will be a new sustainable harvest level for the fiscal year 2015 through 2024 planning decade. Because the forest land plan is not based on a specific harvest level, DNR does not anticipate that the new level will require an update of the forest land plan unless other policies are changed as part of the calculation process. DNR also is developing the marbled murrelet long-term conservation strategy. Once this strategy is approved, DNR will update the forest land plan if and as necessary.

For this FEIS, DNR assumes that policies and laws will not change during the analysis period. In other words, DNR did not analyze future policy changes in this FEIS because it is not possible to predict what those changes would be.

## ■ DNR’s Management Approach

DNR manages state trust lands in the OESF for revenue production (primarily through the harvest and sale of timber) and ecological values (refer to Text Box 2-2 on p. 2-5) through “integrated management.” Integrated management is an experimental management approach based on the principle that a forested area can be managed for both revenue production and ecological values (such as biodiversity) across its length and width. The integrated management approach differs from the more common approach of dividing a forested area into large blocks to be managed for a single purpose, such as

a park managed for ecological values or a working forest managed primarily for revenue production.

## The Role of Active Management

The intent behind integrated management is to actively manage as much of the forested land base as possible to provide both revenue production and ecological values. Active management includes planting trees, managing vegetation, thinning forests, and performing stand-replacement harvests (refer to Text Box 2-3). Each of these “human-influenced disturbance” activities is designed to encourage the development, through natural growth processes, of conditions that support revenue production and ecological values. For example, DNR supports biodiversity (an ecological value) by thinning stands to variable densities, retaining “leave trees,” snags, large logs, and other structural features between one stand-replacement harvest and the next, and otherwise diversifying stand structure across the OESF (refer to “Forest Conditions and Management,” p. 3-25 for a description of harvest methods).

Currently, DNR’s primary stand-replacement harvest technique is variable retention (refer to Text Box 2-3). “Variable retention harvest” will be used in place of “stand-replacement harvest” through the remainder of this FEIS.

### Text Box 2-2. Ecological Values

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Ecological values are defined by DNR as the elements (for example, trees, wildlife, soil, water) and natural relationships between them that are biologically and functionally important to the continued health of the forest ecosystem (DNR 1991). DNR has defined four categories of ecological values for state trust lands in the OESF (DNR 1991).

- **Long-term site productivity:** The ability of an area to support plants and wildlife.
- **Riparian areas and aquatic habitat:** Riparian areas are where aquatic and terrestrial ecosystems interact. Aquatic habitat includes streams and other water bodies.
- **Biological diversity:** The full range of life in all its forms (Washington Biodiversity Council).
- **Ecosystem resilience:** The ability of an ecosystem to recover from disturbance.

DNR’s objectives for northern spotted owls, riparian areas, marbled murrelets, and multiple species contribute to ecological values.

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### Text Box 2-3. Definitions of Management Terms, Part 2

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- **Management activity:** Any activity done on the ground for the purpose of managing state trust lands; examples include road building, road maintenance, and active management of forest stands.
  - **Active management:** Planting trees, managing vegetation, thinning forests, and performing stand-replacement harvests.
  - **Stand replacement harvest:** A timber harvest in which most trees are removed and replaced with a new forest stand. DNR uses a harvest method called **variable retention** in which snags, down wood, and other forest structures are retained at the time of harvest. The forest stand either regenerates naturally or is planted with young trees.
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## ALL AREAS DO NOT CONTRIBUTE EQUALLY

The integrated management approach does not imply that every acre of state trust lands in the OESF must contribute equally to both revenue production and ecological values; nor does it imply that all areas will be actively managed. Instead, DNR actively manages state trust lands in the OESF to the *maximum extent possible* (DNR 2006).

Some areas, due to their physical characteristics or their importance to ecological values (or both), provide more support for ecological values than revenue production. An example is a riparian management zone. Riparian management zones are designated along streams and managed for the objectives of the riparian conservation strategy.

Other areas have been deferred from harvest per DNR policies, such as old-growth forests.<sup>4</sup> The OSEF also includes natural resources conservation areas and natural area preserves, which have been deferred from harvest permanently (refer to Table 2-1). Deferrals will be explained in more detail under “Planning from a Landscape Perspective” later in this chapter.

**Table 2-1. Natural Resources Conservation Areas and Natural Area Preserves in the OESF**

Name	Acres	Features
<b>South Nolan Natural Resource Conservation Area</b>	213	Old-growth coastal forest, forested sphagnum bog, and low elevation sphagnum bog
<b>Clearwater Corridor Natural Resource Conservation Area</b>	2,323	Mature coastal forest, aquatic-riparian habitat
<b>Shipwreck Point Natural Resource Conservation Area</b>	472	Beach, stream, and riparian habitat, and coastal forest
<b>Clearwater Bogs Natural Area Preserve</b>	504	Forested sphagnum bog, low elevation sphagnum bog
<b>TOTAL</b>	3,512	

What makes the integrated management approach unique is that deferrals, riparian management zones, and other areas that provide more support for ecological values are interspersed with more actively managed areas, not located in a single, contiguous block. Through active management and deferrals, DNR promotes the development of a diverse working forest ecosystem in which areas that provide more support for revenue production and those that provide more support for ecological values complement each other. The successful outcome of integrated management should be a functioning, healthy, productive forest ecosystem with conditions ranging from young stands to mature, structurally complex stands, providing quality timber for harvest and habitat for native species across state trust lands in the OESF.

## Management Will Evolve

Integrated management is expected to evolve over time. As DNR implements integrated management, it will intentionally learn how to achieve integration more effectively.

One way DNR will learn is through operational experience. For example, DNR expects its silvicultural systems and harvest methods to evolve over time as this plan is implemented, just as these practices have evolved since the OESF was founded (refer to Text Box 2-4).

In addition, DNR will learn through research and monitoring. DNR conducts research and monitors management activities to gather information about natural systems and how they are affected by management. The HCP requires three types of monitoring: implementation monitoring, used to determine whether conservation strategies are implemented as written; effectiveness monitoring, used to determine whether the implementation of the conservation strategies results in anticipated habitat conditions; and validation monitoring, used to evaluate the cause-and-effect relationships between the habitat conditions that result from the implementation of conservation strategies and the wildlife species the strategies are intended to benefit (DNR 1997, p. V.1).

Information gathered through operational experience, research, and monitoring will be considered for possible adjustments to management through the **adaptive management process**.<sup>5</sup> Changes proposed under adaptive management may range from small adjustments to DNR's procedures to recommendations for a change in policy. Changes to policy, such as altering the objectives of a conservation strategy, would require approval by

### Text Box 2-4. Evolution of DNR's Harvest Methods

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In the 24 years since the OESF was founded, DNR's harvest methods have changed significantly. In the 1980s, DNR was conducting clearcuts, in which all trees were removed. Changes over time include smaller harvest openings; retention of green trees, snags, and down wood; and retention of forests along streams and other sensitive features that often result in harvests with more complex edges (refer to photo, below). Many of the harvest methods developed in the OESF have since been adopted in other DNR planning units. Harvest methods will be discussed in Chapter 3.



the Board and may require consultation with the United States Fish and Wildlife Service (USFWS) and NOAA Fisheries (USFWS and NOAA Fisheries are collectively referred to as the Federal Services). Changes to policy also may require additional environmental analysis and an update to the forest land plan (refer to “What if DNR Policies Change During Plan Implementation?” in this chapter).

Changes to procedures and management strategies are not considered policy and would not require Board approval. Such changes are expected; in an experimental forest, management strategies and procedures are meant to be tested and altered as needed. **The flexibility to change management in response to new information is central to the concept of an experimental forest.**

If DNR proposes any future change to its management of state trust lands in the OESF, DNR will examine the proposal to determine if that change falls within the range of impacts analyzed in this FEIS and whether additional environmental analysis under SEPA may be required.

## ■ DNR’s Management Objectives

DNR’s objectives for managing state trust lands in the OESF are based on the HCP and the *Policy for Sustainable Forests*. The forest land plan must enable DNR to meet these objectives. All objectives must be achieved in the context of integrated management.

### Revenue

**Objective:** Provide a **sustainable flow of revenue** through the harvest and sale of timber.

Each decade, DNR calculates a sustainable harvest level for each of 20 sustainable harvest units, one of which is the OESF. This calculation is done through a planning and environmental review process that is separate from forest land planning.

DNR currently is calculating the sustainable harvest level for each sustainable harvest unit for the fiscal year 2015 through 2024 planning decade. Until those levels have been adopted by the Board, **DNR will continue to operate under the current sustainable harvest level for the OESF**, which is 576 million board feet for the decade.

### Riparian Habitat

**Objective:** Per the requirements of the riparian conservation strategy for state trust lands in the OESF, “protect, maintain, and restore habitat capable of supporting viable populations of salmonid species as well as for other non-listed and candidate species that depend on in-stream and riparian environments” on state trust lands in the OESF (DNR 1997, p. IV.106 through 134).

To achieve the overall objective of the riparian conservation strategy, DNR developed four measurable objectives through careful study and interpretation of the HCP. These measurable objectives are as follows:

- Maintain or aid restoration of the riparian forest’s potential to provide **large woody debris** to the stream channel. Large woody debris recruitment refers to logs, pieces of logs, root wads, or large chunks of wood falling into stream channels. Large woody debris is an important habitat component for fish and other aquatic organisms (Swanson and others 1976, Harmon and others 1986, Bisson and others 1987, Maser and others 1988, Naiman and others 1992, Samuelsson and others 1994).
- Maintain or aid restoration of the riparian forest’s potential to provide **shade** to the stream channel. Stream shade refers to the extent to which incoming sunlight is blocked on its way to the stream channel. Stream shade is considered one of the primary factors influencing stream temperature (Brown 1969). Stream temperature influences water chemistry, which can affect the amount of oxygen present to support aquatic life. In addition, all aquatic organisms have a temperature range outside of which they cannot survive.
- Prevent detectable<sup>6</sup> increases in water quantity (**peak flow**) during storm events. Peak flows can affect stream channels and in-stream habitat because of the large amount and high velocity of water moving through the stream.
- Protect the integrity of riparian forests from **severe endemic windthrow**. Windthrow is the breaking or blowing over of trees in the wind. Endemic windthrow results from peak winds that occur fairly frequently (every five years or less), and is considered severe when it causes a significant loss of riparian function. For example, a loss of half or more of the forest canopy could significantly reduce shade along the stream.

DNR cannot protect the riparian forest from *catastrophic* windthrow, which results from strong peak winds that occur less frequently (more than 20 years between occurrences). Such winds can damage timber across a large area.

DNR focuses on these four measurable objectives because they are thought to be limiting factors in the restoration of riparian habitat. For example, the HCP attributed loss of riparian habitat in part to reduction in stream shade, channel erosion from peak flow, and loss of long-term sources of large woody debris (DNR 1997, p. IV.121). DNR also believes, as a working hypothesis, that by meeting the objectives of the riparian conservation strategy, which focus on a *subset* of riparian functions important to restoring and maintaining habitat, DNR will restore and maintain *all* of the riparian functions and processes necessary to meet the habitat needs of salmon and other riparian-dependent species.

On state trust lands in the OESF, DNR meets these measurable objectives by designating special management areas around streams called riparian management zones. These zones are not harvest deferrals. Rather, they are areas managed to meet DNR’s four measurable objectives for riparian conservation. Riparian management zones also minimize the adverse effects of upland management activities on riparian areas.

The riparian management zone consists of an interior-core buffer, which is adjacent to the stream, and an exterior buffer (where needed) which is adjacent to the interior-core buffer. The width and purpose of the buffers, and the management activities that may be conducted within them, differ under each alternative (refer to “Alternatives” in this

chapter for more information). The riparian management zone also encompasses potentially unstable slopes or landforms that have the potential to deliver sediment and debris to streams.

In addition to the four measurable objectives, DNR also follows current policies, rules, and procedures for the protection of wetlands. By protecting wetlands and meeting the four measurable objectives for riparian habitat, DNR fulfills the commitments of the HCP and meets the requirements of the Clean Water Act (33 U.S.C. §1251 et seq. [1972]) and the Forest Practices Act (76-09 RCW).

The riparian conservation strategy is important to other OESF habitat conservation strategies. For example, marbled murrelets may benefit from the riparian conservation strategy since murrelets are known to nest in large platform-bearing trees that are likely to develop in riparian management zones. In this respect, the riparian conservation strategy forms the basis for an integrated habitat conservation approach for state trust lands in the OESF.

## Northern Spotted Owl Habitat

**Objective:** Per the requirements of the **northern spotted owl conservation strategy** for state trust lands in the OESF, restore and maintain northern spotted owl habitat capable of supporting northern spotted owls on DNR-managed lands in each of the 11 landscapes<sup>7</sup> in the OESF by developing and implementing a forest land plan that does not appreciably reduce the chances for the survival and recovery of the northern spotted owl sub-population on the Olympic Peninsula (DNR 1997, p. IV.86 through 106).

DNR contributes to federal northern spotted owl recovery objectives by providing habitat on DNR-managed lands<sup>8</sup> in the OESF that makes a significant contribution to demographic support, maintenance of species distribution, and facilitation of dispersal.<sup>9</sup> The northern spotted owl conservation strategy sets minimum threshold proportions<sup>10</sup> for the amount of northern spotted owl habitat to be restored or maintained on DNR-managed lands in each of the 11 landscapes in the OESF. The thresholds are based on the 1997 USFWS criteria for incidental take. Incidental take is the taking (harm or killing) of a federally listed wildlife species if such take is incidental to, and not the purpose of, carrying out otherwise lawful activities (DNR 1997). In each landscape, DNR will restore, then maintain:

- Forty percent (by area) of DNR-managed lands as Young Forest Habitat and better (Young Forest or Old Forest).
- At least 20 percent (by area) of DNR-managed lands as Old Forest Habitat.

For a description of northern spotted owl habitat types, refer to Text Box 3-8, p. 3-191 in Chapter 3.



**Northern Spotted Owl**

Photo Courtesy USFWS

Within each landscape, the northern spotted owl conservation strategy is implemented in two phases, the restoration phase and the maintenance and enhancement phase. The restoration phase is the time it takes a landscape to achieve the 40 percent Young Forest Habitat and better threshold. The maintenance and enhancement phase is the period of time between attainment of the 40 percent threshold and the end of the HCP permit period (currently 2067).<sup>11</sup> The Old Forest Habitat threshold can be met in either phase. Because of differences in past management and forest conditions, the length of the restoration phase will differ from one landscape to the next; thus one landscape may be in the restoration phase while another is in the maintenance and enhancement phase.

During the maintenance and enhancement phase, one area of Young or Old Forest Habitat may be harvested (variable retention harvest) after another area matures into habitat, so long as DNR maintains threshold proportions of habitat in the landscape. Thus the location of habitat can shift over time.

## Marbled Murrelet Habitat

**Objective:** Implement the existing HCP **marbled murrelet conservation strategy** consistent with guidance provided in the “Memorandum for Marbled Murrelet Management Within the Olympic Experimental State Forest,” dated March 7, 2013 until the marbled murrelet long-term conservation strategy for state trust lands in DNR’s six Western Washington HCP planning units has been completed and approved (a copy of this memorandum can be found in Appendix F).

## Multispecies Habitat

**Objective:** Per the requirements of the **multispecies conservation strategy** for state trust lands in the OESF, meet HCP objectives for unlisted species of fish, amphibians, birds, and mammals by implementing conservation strategies for riparian areas, northern spotted owls, and marbled murrelets and by implementing additional site-specific conservation measures in response to certain circumstances (DNR 1997, p. IV.134 through 143).

As part of this strategy, DNR will follow current procedures for protection of unique habitats such as talus fields, wetlands, cliffs, and balds and for protection of the species of concern listed in the HCP. Procedures are included in Appendix F.

## Research, Monitoring, and Adaptive Management

**Objective:** Implement a **research and monitoring program** for state trust lands in the OESF in the context of a structured, formal **adaptive management process** (DNR 1997, p. IV. 82 through 85).

These topics were discussed under “DNR’s Management Approach: Integrated Management” in this chapter.

# Alternatives

DNR is proposing three alternatives for this proposed action: the **No Action Alternative**, **Landscape Alternative**, and **Pathways Alternative**, which has been added since the development of the RDEIS. The No Action Alternative represents current management practices. The Landscape Alternative features the use of a forest estate model to assist with planning, automation of the 12-step watershed assessment process in a forest estate model, and a new procedure for salvage of timber after natural disturbance events. The Pathways Alternative is based on the Landscape Alternative but also includes the application of management “pathways” to each landscape. Each alternative is designed to meet the following:

- DNR’s purpose, need, and objectives for this proposal.
- Applicable **federal, state, and local laws**. Examples of applicable federal laws include the Clean Water Act, which established the basic structure for regulating discharge of pollutants into the waters of the United States, and the Endangered Species Act. Examples of applicable state laws include the Shoreline Management Act (Chapter 90.58 RCW), which protects valuable shoreline resources, the Washington Clean Air Act (70.94 RCW), SEPA, and the Forest Practices Act. Certain local laws also affect the management of state trust lands.
- **DNR policies**, including the HCP and the *Policy for Sustainable Forests*.

As implemented on the ground, the alternatives will look similar and have similar environmental impacts, primarily because the alternatives are required to implement, not change, existing DNR policies. Following, DNR describes the key similarities and differences between the alternatives.

## ■ Planning from a Landscape Perspective

Planning from a landscape perspective is a multi-scale approach to planning that was recommended in the HCP as a means of implementing integrated management. This type of planning involves looking at the entire land base at different spatial scales to determine the best means of meeting multiple objectives over time. The methods and tools DNR will use to conduct this type of planning in the OESF differ under each alternative.

## No Action Alternative

Under the No Action Alternative, DNR will conduct planning from a landscape perspective using maps, databases, aerial photos, and other existing tools. Maps and databases will be updated over time to reflect changes such as land transactions, completed harvests, and natural disturbance.

To implement the riparian conservation strategy, DNR will conduct a 12-step watershed assessment at the time of each timber sale, and to implement the northern spotted owl conservation strategy, DNR will use habitat maps. More information on the 12-step process and the northern spotted owl conservation strategies is presented later in this section.

## Landscape and Pathways Alternative

Under both the Landscape and Pathways alternatives, DNR will conduct planning from a landscape perspective using a range of analytical tools. At this time, the tool most central to this planning process is a forest estate model. Forest estate models are powerful, computer-based tools that enable DNR to consider the entire land base at once to find efficient and effective ways to balance multiple objectives.

The forest estate model DNR will use to conduct planning from a landscape perspective after the plan is adopted is referred to as the “tactical model.” The tactical model will be built with information on current conditions, management objectives, and management activities, and an understanding of natural growth processes and how forests respond to management activities. By simultaneously considering all of this information, the model will develop an “optimal solution” of which forest stands to harvest, when, and by what method and which stands to retain across all state trust lands in the OESF over multiple decades to meet objectives for revenue production and ecological values. To develop its solution, the model will consider numerous interrelated factors, such as when a forest stand will be mature enough to harvest, how it may contribute to the objectives of DNR’s conservation strategies, and how it may contribute to revenue production. The model’s solution will be expressed as a harvest schedule, which is a list of the recommended type, locations, and timing of harvests.

The harvest schedule will be used as a *starting point* for selecting an area to harvest, and will be used in conjunction with other tools, databases, and information. **The tactical model and its harvest schedule are only tools; they are not meant to replace on-the-ground observation and decision making. Harvest and other management decisions will be based on field-verified conditions.** Foresters will begin each timber sale by doing an office review and field reconnaissance of the areas recommended by the model for harvest in the current decade. Foresters will consider costs, forest conditions, difficulty in harvesting and extracting the logs, long-term objectives, and numerous other factors. During the timber sale implementation process, sale boundaries suggested by the model may be adjusted to accommodate unmapped streams or other features verified during field reconnaissance. If the recommended timber sale is not feasible, foresters may alter the sale or return to office review to select another area.

The model will be updated periodically and rerun to produce an updated harvest schedule. For example, DNR may incorporate information gathered in the field during timber sales planning. Updating and rerunning the model will help keep DNR on track to meet its objectives and ensure that foresters have the most current information to help them with timber sale planning.

DNR also will use the tactical model to help implement the northern spotted owl and riparian conservation strategies. For example, the 12-step watershed assessment process, automated within the tactical model, will help DNR implement the riparian conservation strategy. Both the riparian and northern spotted owl strategies and how they will be implemented under each alternative will be explained later in this section.

Over time, DNR expects to take advantages of new technology, software, and modeling methods as they are developed. Future changes may range from modification of the tactical modeling framework, to development of an entirely new tactical model using different software and techniques, to replacement of the tactical model with a different type of model or other analytical tools.

## DEVELOPING THE TACTICAL MODEL

To develop the tactical model, DNR anticipates that it will categorize all DNR-managed lands in the OESF as either “operable” or “deferred” to produce a realistic harvest schedule. Operable areas will be fully or partially available to the model for harvest (for example, thinning and variable retention harvest, or thinning only). By contrast, deferred areas will be unavailable to the model for harvest.

Areas deferred from harvest in the tactical model will include old-growth forests and other areas deferred from harvest per current DNR policies. Areas deferred per DNR policies will remain deferred for as long as the policy that deferred them remains in place. Areas deferred in the tactical model also will include permanent deferrals, for example natural area preserves. DNR likely will defer additional areas in the model to represent current management practices and guidance, for example potentially unstable slopes or landforms. DNR has guidance from both the forest practices rules and the HCP on preventing an increase in the frequency and severity of landslides. For those areas, a conservative approach would be to categorize them as deferred in the tactical model with the understanding that management decisions for those areas would be made on a case-by-case basis.

## THE ANALYSIS MODEL

DNR also used a forest estate model to conduct the environmental analysis for this FEIS as well as the DEIS and RDEIS. DNR refers to this model as the “analysis model.” Both models (analysis and tactical) are based on current policies and laws. Refer to Chapter 3 for a description of the analysis model.

## ■ Northern Spotted Owl Conservation Strategy

As explained previously, under the northern spotted owl conservation strategy DNR restores, then maintains threshold amounts of northern spotted owl habitat in each of the 11 landscapes of the OESF. Each alternative differs in the approach and tools DNR will use to implement this conservation strategy.

## No Action Alternative

Under the No Action Alternative, DNR will use habitat maps to help implement the northern spotted owl conservation strategy. To develop these maps, DNR will query its forest inventory database<sup>12</sup> to determine which forest stands currently meet DNR’s

definitions of northern spotted owl habitat. DNR also may use aerial photographs and field surveys to identify additional areas of habitat, particularly Old Forest Habitat. These maps will help DNR track progress toward meeting habitat thresholds in each landscape. Habitat maps will be updated periodically to reflect forest development, natural disturbance, land transactions, and other changes.

## Landscape Alternative

Under the Landscape Alternative, DNR will use the tactical model to help implement the northern spotted owl conservation strategy. As explained previously, the model will develop an optimal solution of which stands to harvest and which to retain over time to meet DNR's management objectives, including threshold proportions of northern spotted owl habitat. Foresters will use the model's recommendations as a starting point for determining where and by what method to harvest forest stands, as described earlier in this chapter. Periodic updates of the model will help DNR remain on track in meeting northern spotted owl habitat thresholds.

## Pathways Alternative

Under the Pathways Alternative, DNR will implement the northern spotted owl conservation strategy using the tactical model as a planning tool, as described under the Landscape Alternative. However, under the Pathways Alternative DNR also will apply management pathways to each landscape. A pathway is a course of action for achieving a set of objectives. For this alternative, those objectives include the following:

- Attain threshold proportions of northern spotted owl habitat in each landscape more quickly when possible.
- Increase habitat patch size where possible.
- Where feasible, create or accelerate habitat development in deferred areas to take full advantage of these areas.

Most pathways involve selecting forest stands as candidates for active or passive management. Active management means selected forest stands will be thinned to create or accelerate the development of northern spotted owl habitat. Passive management means the stand will not be thinned or regenerated (variable retention harvest) for as long as the pathway remains in effect (most likely, until the end of the restoration phase). Forest stands selected for active or passive management under the pathways are referred to as "candidate stands."

To understand how the pathways work, consider the following:

- In one landscape, DNR may find that some forest stands in deferred areas are close to becoming Young Forest Habitat. Those same forest stands may be located near adjacent habitat on federal lands. By thinning these stands, DNR may speed attainment of habitat thresholds in the landscape, shift the location of habitat away from operable areas, and create larger patches of habitat. The pathway for this landscape

would be “select candidate stands of non habitat in deferred areas for active management.” Once the pathway for the landscape was determined, DNR would select specific forest stands within the landscape that are good candidates for thinning.

- In another landscape, some existing stands of Young or Old Forest Habitat may be located in areas that are inaccessible for timber harvest. Those same stands may be located near northern spotted owl habitat on adjacent federal lands, creating opportunities for increasing patch size. The pathway for this landscape would be “select candidate stands of Young or Old Forest Habitat in operable areas for passive management.” Once the pathway for the landscape was determined, DNR would select those specific forest stands within the landscape to be managed passively (not harvested).

Pathways will be selected based on numerous, inter-related factors such as forest conditions, availability of stands suitable for thinning, location of habitat, and percent of the landscape deferred from harvest. Landscapes may have more than one pathway.

Pathways are not the only means by which a landscape will reach threshold proportions of northern spotted owl habitat. In a given landscape, threshold proportions will be met by a combination of the following, depending on the pathway(s) selected for the landscape:

Habitat created through active management or selected for passive management under the pathways,

*plus*

Existing and future Young and Old Forest Habitat the tactical model has selected for meeting threshold proportions.

Pathways will be integrated into the tactical model and reflected in the harvest schedule and other model outputs so foresters know which forest stands have been selected as candidates for active and passive management in the current decade.

## PRELIMINARY SELECTION OF PATHWAYS

As part of developing this alternative for this environmental analysis, DNR defined eight preliminary pathways. Four pathways were defined for attaining the 40 percent Young Forest Habitat and better threshold and four pathways were defined for attaining the 20 percent Old Forest Habitat threshold. DNR then assigned pathways to each of the 11 landscapes and selected candidate forest stands for active or passive management under those pathways. Finally, DNR determined how long each pathway should remain in effect to achieve optimal results. All of this work was done in a post process (outside the analysis model). For a complete explanation of how this work was completed, refer to Appendix A.

At this time, DNR anticipates carrying these selections into implementation. However, pathways are not static. DNR may make adjustments over time due to future land transactions, natural disturbances, changes in forest conditions, information gathered through timber sales planning, and other factors to keep DNR on track in meeting its objectives.

Following, DNR describes each of the eight pathways it defined as part of this environmental analysis process. Pathways are grouped by the major type of management involved. Text Box 2-5 summarizes the pathways for easy reference. The pathways DNR assigned to each landscape are listed in Table 2-2 on p. 2-19.

## Passive Management of Young or Old Forest Habitat

- **Pathway 3:** Select candidate stands of Young or Old Forest Habitat in operable areas for passive management to help meet the 40 percent Young Forest Habitat and better threshold.
- **Pathway 4:** Select candidate stands of Young or Old Forest Habitat in operable areas for passive management to help meet the 20 percent Old Forest Habitat threshold.

Passive management means selected stands will not be scheduled for either thinning or variable retention harvest for as long as these pathways remain in effect. Areas selected for passive management should be those that best enable DNR to meet its objectives.

## Active Management of Non-Habitat

- **Pathway 5:** Select candidate stands of non-habitat in operable areas for active management (thinning) to help meet the 40 percent Young Forest Habitat and better threshold.
- **Pathway 7:** Select candidate stands of non-habitat in deferred areas for active management (thinning) to help meet the 40 percent Young Forest Habitat and better threshold.

### Text Box 2-5. Preliminary Pathways Defined for this Environmental Analysis Process

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#### Passive Management of Young or Old Forest Habitat

- **Pathway 3:** Select candidate stands of Young or Old Forest Habitat in operable areas for passive management to help meet the 40 percent Young Forest Habitat and better threshold.
- **Pathway 4:** Select candidate stands of Young or Old Forest Habitat in operable areas for passive management to help meet the 20 percent Old Forest Habitat threshold.

#### Active Management of Non-Habitat

- **Pathway 5:** Select candidate stands of non-habitat in operable areas for active management (thinning) to help meet the 40 percent Young Forest Habitat and better threshold.
- **Pathway 7:** Select candidate stands of non-habitat in deferred areas for active management (thinning) to help meet the 40 percent Young Forest Habitat and better threshold.

#### Active Management of Young Forest Habitat

- **Pathway 6 (not used):** Select candidate stands of Young Forest Habitat in operable areas for active management (thinning) to help meet the 20 percent Old Forest Habitat threshold.
- **Pathway 8 (not used):** Select candidate stands of Young Forest Habitat in deferred areas for active management (thinning) to help meet the 20 percent Old Forest Habitat threshold.

#### Model's Optimal Solution Pathways

- **Pathway 1:** Allow model to develop its optimal solution without any specific stand selected for active or passive management to meet the 40 percent Young Forest Habitat and better threshold.
  - **Pathway 2:** Allow model to develop its optimal solution without any specific stand selected for active or passive management to meet the 20 percent Old Forest Habitat threshold.
-

Both of these pathways involve thinning non-habitat to create or accelerate development of Young Forest Habitat. In both operable and deferred areas, DNR likely will target non-habitat that would respond well to thinning. For example, DNR may select candidate stands that have many attributes of Young Forest Habitat already but have too many trees per acre to meet habitat definitions. Other considerations in selecting candidate stands include patch size and proximity to existing northern spotted owl habitat on DNR-managed lands or adjacent federal lands. Where opportunities exist, DNR may encourage habitat to develop in deferred rather than operable areas.

Due to budget constraints, DNR anticipates that active management of selected candidate stands will happen gradually over time. Also, not all stands selected as candidates for active management will be thinned. Foresters will evaluate each candidate stand and determine whether and when it can be thinned based on numerous factors such as forest conditions, access, cost, and proximity to other planned harvests. Some thinnings may be non-commercial, in which logs are left on the ground as down wood rather than hauled to market. Non-commercial thinning may be appropriate when the cost of thinning and road building or maintenance exceed potential revenue from the sale, road building to a site is infeasible, or other reasons.

Some of the candidate stands selected for active management may be located on potentially unstable slopes or landforms. For activities in these areas, DNR will follow all applicable laws and rules.

## ACTIVE MANAGEMENT OF YOUNG FOREST HABITAT

- **Pathway 6:** Select candidate stands of Young Forest Habitat in operable areas for active management (thinning) to help meet the 20 percent Old Forest Habitat threshold.
- **Pathway 8:** Select candidate stands of Young Forest Habitat in deferred areas for active management (thinning) to help meet the 20 percent Old Forest Habitat threshold.

These pathways would involve thinning Young Forest Habitat to create or accelerate development of Old Forest Habitat. At this time, DNR does not anticipate implementing either of these pathways. DNR assumes that existing Young Forest Habitat will develop into Old Forest Habitat over time without management intervention. However, DNR may implement these pathways in the future.

## MODEL'S OPTIMAL SOLUTION PATHWAYS

- **Pathway 1:** Allow model to develop its optimal solution without any candidate stands selected for active or passive management to meet the 40 percent Young Forest Habitat and better threshold
- **Pathway 2:** Allow model to develop its optimal solution without any candidate stands selected for active or passive management to meet the 20 percent Old Forest Habitat threshold.

Under these pathways, DNR would not select candidate stands for active or passive management. Instead, DNR would allow the model to develop its optimal solution (expressed as a harvest schedule) without such selections in place.

In some landscapes, selecting candidate stands for active or passive management may not make a substantial difference in meeting objectives. For example, in some landscapes state trust lands may be too interspersed with other ownerships to provide meaningful opportunities for increasing patch size. In others, due to forest conditions, ownership patterns, and other factors, little can be done to speed attainment of thresholds beyond what the model may recommend. Other landscapes may already have threshold proportions of habitat.

**Table 2-2. Pathways in Each Landscape**

Landscape	40 percent Young Forest Habitat and Better pathway	20 percent Old Forest Habitat pathway
<b>Clallam</b>	1 (model's optimal solution)	4 (passive management of Young or Old Forest Habitat, operable areas)
<b>Clearwater</b>	7 (active management of non-habitat, deferred areas)	2 (model's optimal solution)
<b>Coppermine</b>	7 (active management of non-habitat, deferred areas)	2 (model's optimal solution)
<b>Dickodochtedar</b>	1 (model's optimal solution)	4 (passive management of Young or Old Forest Habitat, operable areas)
<b>Goodman</b>	5 (active management of non-habitat, operable areas) <i>and</i> 7 (active management of non-habitat, deferred areas)	2 (model's optimal solution)
<b>Kalaloch</b>	5 (active management of non-habitat, operable areas) <i>and</i> 7 (active management of non-habitat deferred areas)	4 (passive management of Young or Old Forest Habitat, operable areas)
<b>Queets</b>	7 (active management of non-habitat, deferred areas)	2 (model's optimal solution)
<b>Reade Hill</b>	1 (model's optimal solution)	2 (model's optimal solution)
<b>Sekiu</b>	1 (model's optimal solution)	2 (model's optimal solution)
<b>Sol Duc</b>	3 (passive management of Young or Old Forest Habitat, operable areas)	4 (passive management of Young or Old Forest Habitat, operable areas)
<b>Willy Huel</b>	5 (active management of non-habitat, operable areas) <i>and</i> 7 (active management of non-habitat, deferred areas)	2 (model's optimal solution)

## DNR’s Alternatives and the 2006 Settlement Agreement

The 2006 Sustainable Settlement Agreement (PR 14-001-030)<sup>13</sup> limits the amount of harvest that can occur in forest stands that are 50 years old and older (acreage limits are listed in PR 14-004-120; refer to Appendix F). Consistent with the terms of the Settlement Agreement, the restriction on harvesting forest stands 50 years old and older will expire when DNR adopts the final forest land plan for the OESF. The entire Settlement Agreement expires when the Board adopts a sustainable harvest level for the next planning decade (fiscal year 2015 through 2024). DNR currently is completing the sustainable harvest calculation in a separate planning process.

### ■ Riparian Conservation Strategy

Under each alternative, DNR will meet the objectives of the riparian conservation strategy in part by establishing riparian management zones on streams. Riparian management zones consist of an interior-core and exterior buffer.

A key component of the integrated management approach is to tailor management to ecological conditions on the ground to better integrate revenue production and ecological values. For that reason, the width and configuration of the riparian management zone can vary based on the ecological condition of the Type 3 watershed in which the stream is located, the presence or absence of potentially unstable slopes or landforms, and other factors, as will be explained in this section.

The HCP states that DNR would gather information on the ecological condition of Type 3 watersheds through a “12-step” watershed assessment (DNR 1997, p. IV.127) prior to development of a forest land plan for the OESF. The major difference between the alternatives is how this assessment is carried out. Under the No Action Alternative, DNR will perform the 12-step watershed assessment at the time of each timber sale using maps, databases, field assessments, and other means. Under the Landscape and Pathways alternatives, DNR will automate the 12-step watershed assessment within the tactical model. The tactical model performs this assessment for all streams at the same time. These and other differences between the alternatives are explained in the following section.

## No Action Alternative

### INTERIOR-CORE BUFFER

Under the No Action Alternative, interior-core buffers will be designed to protect floodplains and potentially unstable slopes or landforms that could deliver sediment or debris to the stream network.

- **Type 1 through 4 streams:**<sup>14</sup> On these streams, DNR will apply an interior-core buffer that encompasses the floodplain and all potentially unstable slopes or landforms with the potential to deliver sediment or debris to the stream network. The width of

interior-core buffers will vary according to site conditions, such as the width of the floodplain and the size of potentially unstable slopes or landforms, and may be modified per the results of the 12-step watershed assessment process as described later in this section.

- **Type 5 streams on stable ground:** DNR will not apply an interior-core buffer to Type 5 streams on stable ground.
- **Type 5 streams on potentially unstable slopes or landforms:** On these streams, DNR will apply an interior-core buffer that encompasses the stream and the potentially unstable slope or landform.

On *all* streams, regardless of type, DNR will place a 30-foot-wide equipment limitation zone measured outward horizontally from the outer edge of the 100-year floodplain. In this area, equipment use will be limited to protect stream banks.

DNR does not anticipate that harvest activities (variable retention harvest or thinning) will occur inside interior-core buffers under the No Action Alternative.

## EXTERIOR BUFFER

Any stream that receives an interior-core buffer will also receive an exterior buffer (Type 1 through 4 streams and Type 5 streams on potentially unstable slopes or landforms). The exterior buffer will protect the interior-core buffer from severe endemic windthrow. The width of the exterior buffer will be similar to the average widths listed in the HCP: 150 feet for Type 1 through Type 3 streams and 50 feet for Type 4 streams (DNR 1997, p. IV.117). DNR also places a 50-foot-wide exterior buffer on the interior-core buffer of Type 5 streams on potentially unstable slopes or landforms. Together, the interior-core and exterior buffer are meant to maintain and aid restoration of the riparian forest's potential to provide riparian function.

Variable retention harvest will not be conducted in exterior buffers. One thinning harvest is allowed per rotation of the adjacent forest stand.<sup>15</sup> In other words, if the adjacent stand has a 60-year rotation, the exterior buffer can be thinned once during that time. A rotation is the period of time between establishment of a forest stand and a variable retention harvest.

## 12-STEP WATERSHED ASSESSMENT PROCESS

After buffers are designed, DNR will use the 12-step watershed assessment process to determine if, taken together, the interior-core and exterior buffers meet the objectives of the riparian conservation strategy. The 12-step process enables DNR to evaluate stream-side conditions in the context of physical, biological, and land-use influences throughout the watershed (DNR 1997, p. IV.127). Buffers may be adjusted (wider or narrower) according to the results of the 12-step process.

## Landscape and Pathways Alternatives

### INTERIOR -CORE BUFFERS

Interior-core buffers will be designed to protect floodplains and potentially unstable slopes or landforms, maintain or aid restoration of the riparian forest's potential to provide shade and large woody debris to the stream channel, and avoid detectable increases in peak flow.

- **Type 1 through 4 streams:** Interior-core buffers will be applied to all Type 1 through Type 4 streams. Interior-core buffers will be measured outward horizontally from the outer edge of the 100-year floodplain, and the 100-year floodplain and the stream itself will be considered part of the buffer.

The width of the interior-core buffer is expected to be similar to the average buffer widths listed in Table IV.10 in the HCP (DNR 1997, p. IV.123): 150 feet for Type 1 and 2 streams, and 100 feet for Type 3 and 4 streams. The average buffer widths listed in the HCP were the same for every Type 3 watershed and based on the buffer widths proposed in the literature for several key watershed parameters.

These buffer widths are averages, not absolutes because buffer widths will vary based on site-specific conditions. For example, buffers will encompass all potentially unstable slopes or landforms with the potential to deliver sediment and debris to the stream network. The width and shape of the buffer also may be modified per the results of the watershed analysis, as described later in this section.

- **Type 5 streams on stable ground:** DNR will not apply an interior-core buffer to these streams.
- **Type 5 streams on potentially unstable slopes or landforms:** On these streams, DNR will apply an interior-core buffer that encompasses the stream and the potentially unstable slopes or landform.

On *all* streams, regardless of type, DNR will apply a 30-foot-wide equipment limitation zone measured outward horizontally from the outer edge of the 100-year floodplain. DNR also will apply a 25-foot-wide no-harvest zone on Type 1 through 4 streams, measured 25 feet outward horizontally from the outer edge of the 100-year floodplain.

In the interior-core buffer, DNR will allow activities that support the integration of revenue production and ecological values. These activities include precommercial thinning; selective harvest of hardwoods to encourage long-term sources of coniferous woody debris and channel bank stabilization; uniform and variable density thinning of forest stands to promote habitat development and wind-firm trees (trees that are less likely to blow over in the wind); research projects, such as those designed to improve the integration of revenue production and ecological values; and a small amount of variable retention harvest.

DNR will calculate the maximum number of acres of variable retention harvest ("allotted acres") that may occur each decade without impeding riparian function within the interior-core buffers of Type 1 through 4 streams in each Type 3 watershed. Allotted acres are

calculated through the 12-step watershed assessment process, which will be automated within the tactical model. Automating this process eliminates the need to conduct the 12-step watershed assessment on the ground at the time of each timber sale.

In this automated assessment, the tactical model has the following goals:

- To maintain a “non-declining yield” of shade and large woody debris recruitment potential for streams in each Type 3 watershed (refer to photo, right). A non-declining yield means that proposed timber harvests should either prevent a decrease in shade and large woody debris recruitment potential, or lead to an increase in potential over time.
- To prevent detectable increases in peak flow (detectable is defined as a 10 percent or more increase in peak flow). Peak flow is prevented by maintaining a sufficient amount of hydrologically mature forest in each Type 3 watershed. A hydrologically mature forest has a forest canopy that is dense enough to intercept snowfall and often more vegetation to absorb or slow water. Much of the snow caught in the canopy melts and evaporates or sublimates and thus does not reach the stream (Grant and others 2008). Also, trees dissipate heat by long wave radiation, which can melt the snowpack under a forest canopy. These forests contribute less to peak flow during storm events. By contrast, a hydrologically immature forest is young (less than 25 years old) and sparse (relative density less than 25). Peak flow and hydrologic maturity are discussed in more detail in “Riparian,” p. 3-47.

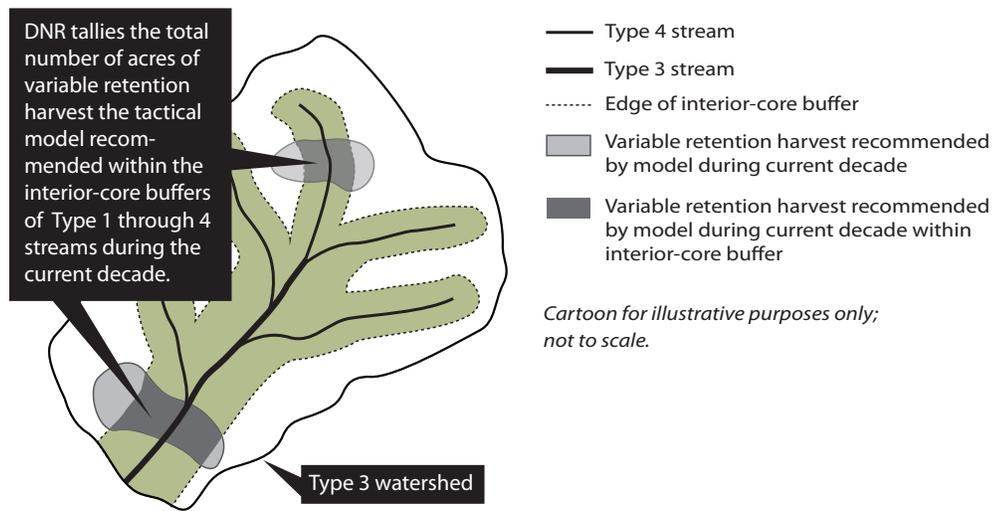


**Large Woody Debris**

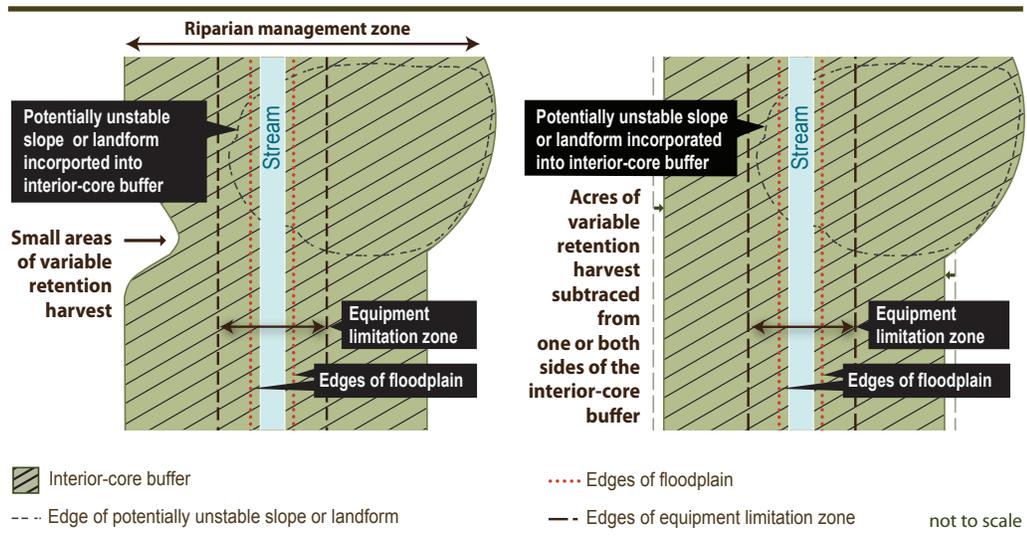
If a harvest can occur in a riparian area without impeding achievement of these goals, the tactical model is free to recommend that harvest as part of its optimal solution, in the context of all other objectives. To calculate allotted acres, DNR will tally the total number of acres of variable retention harvests the model recommends within all of the interior-core buffers of Type 1 through Type 4 streams within each Type 3 watershed in each decade (Figure 2-2 on p. 2-24).

DNR’s foresters may implement these allotted acres of variable retention harvest in a number of ways. They may, for example, extend an adjacent variable retention harvest a small distance into the interior-core buffer. They may subtract those allotted acres from the overall width of the interior-core buffer, or they may do a small hardwood conversion (replacement of hardwood trees with conifers) within the buffer. Figure 2-3 on p. 2-24 shows two examples of how these acres may be implemented within the interior-core buffer. In these examples, the number of acres of variable retention harvest is the same; only the spatial configuration changes. Foresters also may decide not to conduct any variable retention harvest within the buffer. Allotted acres will be placed at least 25 feet away from the outer edge of the 100-year floodplain.

**Figure 2-2. Calculating Allotted Acres of Variable Retention Harvest Within the Interior-core Buffer**



**Figure 2-3. Implementing Variable Retention Harvest Within the Interior-core Buffer: Two Examples**



As harvests are performed, DNR will track the number of allotted acres used to make sure they are not exceeded. Periodically, DNR also will update the number of allotted acres as forest stand conditions change, land is acquired or transferred, new scientific information becomes available, or other changes occur.

## EXTERIOR BUFFERS

Foresters will use a windthrow probability model (Mitchell and Lanquaye-Opoku 2007) specifically designed and calibrated for use on the Olympic Peninsula (along with remote reconnaissance and field assessments as needed) to assess windthrow risk in the interior-core buffer on Type 1 through 4 streams. If there is a risk of severe endemic windthrow, foresters will apply an exterior buffer where needed or reconfigure the shape and orienta-

tion of the harvested edge, distribution of leave trees, or both to reduce severe endemic windthrow risk. If the latter, foresters will rerun the windthrow probability model on the reconfigured timber sale and, if there is still a risk of severe endemic windthrow, apply an exterior buffer where needed.

DNR's analysis has shown that exterior buffers (or reconfiguration of the harvest) will be needed infrequently. Given a 5 percent probability of severe endemic windthrow, DNR predicts that only approximately 1 percent of the interior-core buffers for Type 1 through Type 4 streams across state trust lands in the OESF will require an exterior buffer (or reconfiguration of the harvest). Refer to "Riparian," p. 3-47 for more information.

Where applied, the exterior buffer will extend approximately 80 feet (horizontal distance) from the outer edge of the interior-core buffer. An 80-foot exterior buffer is proposed based on the findings of Lanquaye (2003) that more than 75 percent of windthrow occurs within approximately the first 80 feet of a forest stand, measured from an exposed edge. An exterior buffer of 80 feet is expected to protect most of the interior-core buffer when applied. The wind model calibrated for the OESF (Mitchell and Lanquaye-Opoku 2007) also incorporated these findings.

Management activities in the exterior buffer are designed to produce and maintain forest stands that are wind-firm, robust, and structurally and compositionally diverse. The management activity most likely to occur is thinning.

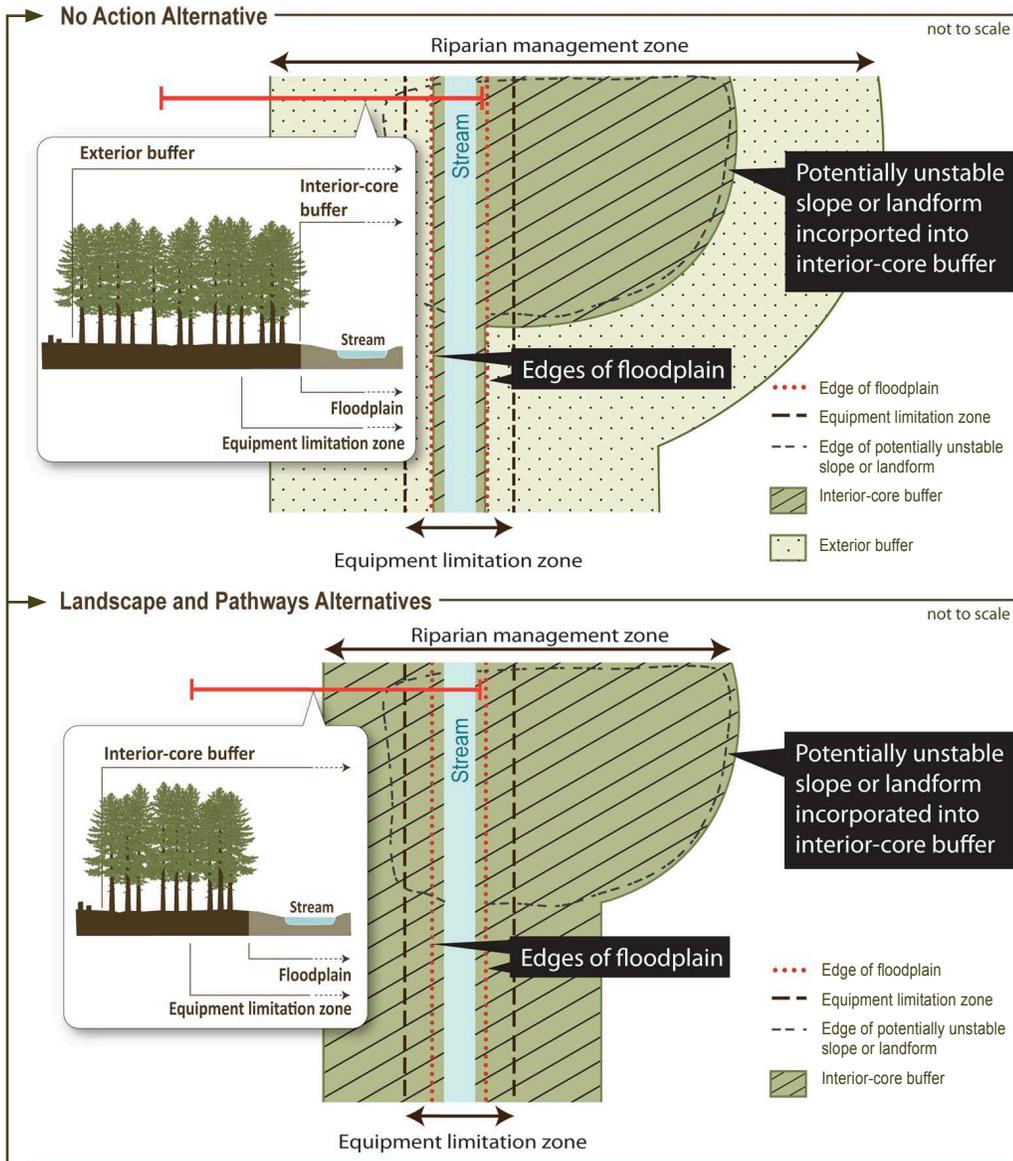
Figures 2-4 and 2-5 on the following pages summarize the on-the-ground differences in how the buffers are applied under each alternative for Type 3 and 4 streams.



Riparian Area in the OESF

**Figure 2-4. Conceptual Drawing Showing Differences Between Buffers as Applied Under the No Action, Landscape, and Pathways Alternatives, Type 3 Stream**

The Landscape and Pathways alternatives are shown without an exterior buffer; DNR anticipates that exterior buffers will be applied infrequently under these alternatives.

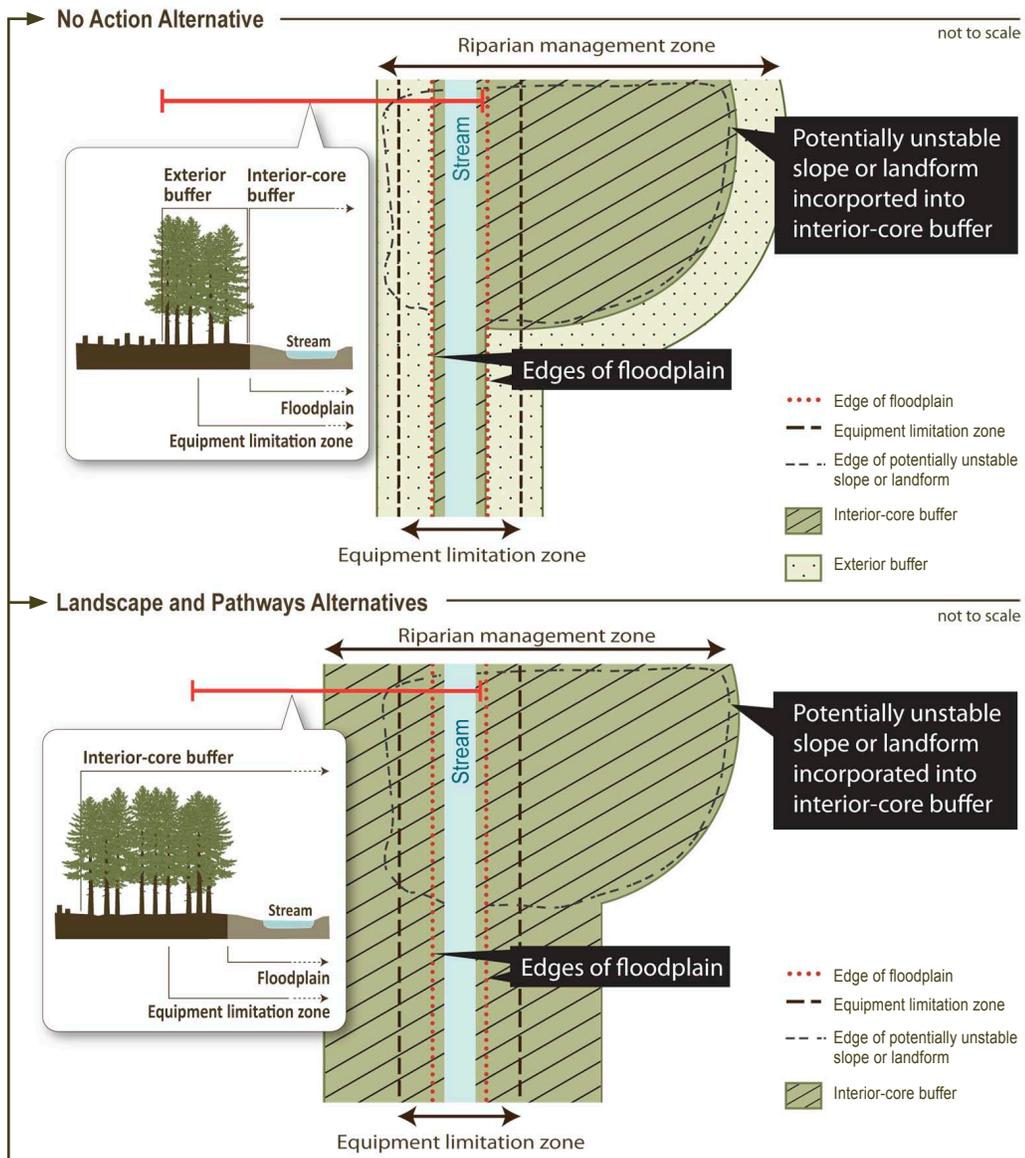


**Comparison of Buffer Widths, Type 1 through 4 Streams**

	No Action Alternative	Landscape and Pathways Alternatives
<b>Type 1 &amp; 2</b>	Interior-core: Floodplain plus potentially unstable slopes Exterior: 150 feet	Interior-core: 150 feet plus floodplain plus potentially unstable slopes Exterior: 80 feet (if needed)
<b>Type 3</b>	Interior-core: Floodplain plus potentially unstable slopes Exterior: 150 feet	Interior-core: 100 feet plus floodplain plus potentially unstable slopes Exterior: 80 feet (if needed)
<b>Type 4</b>	Interior-core: Floodplain plus potentially unstable slopes Exterior: 50 feet	Interior-core: 100 feet plus floodplain plus potentially unstable slopes Exterior: 80 feet (if needed)

**Figure 2-5. Conceptual Drawing Showing Differences Between Buffers as Applied Under the No Action, Landscape, and Pathways Alternatives, Type 4 Stream**

The Landscape and Pathways alternatives are shown without an exterior buffer; DNR anticipates that exterior buffers will be applied infrequently under these alternatives.



**Comparison of Buffer Widths, Type 1 through 4 Streams**

	No Action Alternative	Landscape and Pathways Alternatives
<b>Type 1 &amp; 2</b>	Interior-core: Floodplain plus potentially unstable slopes Exterior: 150 feet	Interior-core: 150 feet plus floodplain plus potentially unstable slopes Exterior: 80 feet (if needed)
<b>Type 3</b>	Interior-core: Floodplain plus potentially unstable slopes Exterior: 150 feet	Interior-core: 100 feet plus floodplain plus potentially unstable slopes Exterior: 80 feet (if needed)
<b>Type 4</b>	Interior-core: Floodplain plus potentially unstable slopes Exterior: 50 feet	Interior-core: 100 feet plus floodplain plus potentially unstable slopes Exterior: 80 feet (if needed)

## ■ Research and Monitoring

### No Action Alternative

Under the No Action Alternative, research and monitoring program will include implementation, effectiveness, and validation monitoring. Research will focus on the key research priorities of the HCP.

### Landscape and Pathways Alternatives

Under these alternatives, the research and monitoring program will be more formal and will include implementation, effectiveness, and validation monitoring. Research will focus on both the research priorities of the HCP and key uncertainties identified during this forest land planning process. Research and monitoring will be implemented in the context of a structured, formal adaptive management process.

## ■ Adaptive Management

In the HCP, adaptive management is defined as a process which provides for ongoing modification of management practices in response to new information.

### No Action Alternative

DNR will continue to implement adaptive management under the No Action Alternative. As information becomes available through research and monitoring, it will be applied, as appropriate, to future management decisions to refine and improve integrated management of state trust lands in the OESF.

### Landscape and Pathways Alternatives

Under the Landscape and Pathways alternatives, adaptive management will be defined as a formal, structured process for continually improving management practices by learning from the outcomes of operational and experimental approaches (Bunnell and Dunsworth 2009). The process will have clearly defined steps. Refer to Appendix F for a draft of the adaptive management procedure.

## ■ Information Management

Information management is the means by which data and information are collected, organized, analyzed, and interpreted for the intended audience and distributed for use in future decision making. Information management provides crucial links between operations, research and monitoring, and planning.

## No Action Alternative

Under the No Action Alternative, information management will focus on day-to-day operations. Data and information will be gathered during timber sale design and other management activities and placed in existing corporate and regional databases or in timber sales documentation such as SEPA checklists. Information gathered through research and monitoring will be distributed in reports.

## Landscape and Pathways Alternatives

Under the Landscape and Pathways alternatives, information management will be focused on implementing and monitoring of the forest land plan. DNR will develop processes and tools to organize, collect, analyze, interpret, and distribute relevant data and information.

- Data and information gathered in the field during timber sales preparation will be incorporated into the tactical model. Outputs from future tactical models runs, such as harvest schedules, will be distributed to foresters for planning future forest management activities.
- Information gathered through research, monitoring, and operations will be assessed for potential changes in management through a formal adaptive management process, as described previously. Similar to the No Action Alternative, information gathered through research and monitoring will be distributed in reports.

## ■ Response to Natural Disturbances

DNR's policy for catastrophic loss prevention states that DNR will, when in the best interests of the trust beneficiaries, salvage forest stands that have been materially damaged by fire, wind, insects, or disease (DNR 2006, p. 32). Until the 2006 Settlement Agreement expires, DNR will continue to follow its current procedure for salvage of down wood following natural disturbances ("Interim Direction for Addressing Blowdown (windthrow) in Northern Spotted Owl Habitat;" refer to Appendix F). The current procedure provides detailed instructions for when and how wood may be salvaged without impacting habitat for northern spotted owls.

## No Action Alternative

Under the No Action Alternative, once the 2006 Settlement Agreement expires DNR will salvage down wood after natural disturbance events on a case-by-case basis, consulting with the Federal Services as needed.

## Landscape and Pathways Alternatives

Under the Landscape and Pathways alternatives, once the 2006 Settlement Agreement expires DNR will follow a new procedure for salvage of down wood after natural distur-

balance events. The new procedure will provide foresters with guidelines for salvage based on the size of the disturbance and other factors. The potential environmental impacts of salvage harvests will be assessed at the time they are proposed.

## ■ Differences Between the Alternatives: a Summary

Table 2-3 summarizes the major differences between the alternatives.

**Table 2-3. Major Differences Between the Alternatives**

Indicators	No Action Alternative	Landscape Alternative	Pathways Alternative
<b>Use of a tactical model to help balance multiple objectives across state trust lands</b>		✓	✓
<b>Application of management pathways, which include active management to create or accelerate development of northern spotted owl habitat</b>			✓
<b>Automation of the 12-step watershed assessment process within a tactical model</b>		✓	✓
<b>Research and monitoring:</b>			
• Focused on HCP priorities only	✓		
• Focused on HCP priorities plus uncertainties identified during forest land planning		✓	✓
<b>Adaptive management:</b>			
• Ongoing modification of management practices as needed	✓		
• Formal, structured process with clearly defined steps		✓	✓
<b>Information management</b>	✓	✓	✓
<b>New procedure for salvage of timber after natural disturbance events</b>		✓	✓

## Alternatives and Options Considered but Eliminated

DNR considered numerous other action alternatives and options but eliminated them from detailed study for a variety of reasons. Following, DNR explains why they were eliminated.

## ■ Biodiversity Pathways

During the scoping process for the 2010 DEIS, Conservation Northwest, the National Audubon Society, the Olympic Forest Coalition, and the Washington Environmental Council (collectively referred to as Conservation Northwest and others) proposed an alternative based on “Biodiversity Pathways,” a concept Conservation Northwest and others discussed with DNR. Carey and others (1996) coined the phrase “biodiversity pathways” to mean the management of forest stands and forested landscapes to conserve biodiversity and generate revenue through the application of silviculture that accelerates the development of structurally complex stands. The alternative proposed by Conservation Northwest and others calls for DNR to practice biodiversity pathway silviculture wherever possible.

In 2004, DNR incorporated biodiversity pathways techniques into the preferred alternative for the fiscal year 2004–2014 sustainable harvest calculation EIS. Called “Innovative Silvicultural Management,” this alternative consisted of existing DNR silvicultural practices, more intensive silviculture, and selected biodiversity pathways techniques: retaining biological legacies at harvest; underplanting widely spaced, site-appropriate coniferous species to supplement natural regeneration of tree and shrub species; thinning to variable densities to encourage development of an understory; and improving habitat by creating snags and felling trees to create structure (DNR 2004). It also included the option to disturb fewer forest ecosystem processes by minimizing site preparation.

DNR wrote a draft silvicultural policy based on the preferred alternative: “General Silvicultural Strategy Applied to Timber Resources Base Available for Sustainable Harvest in Western Washington.” This policy stated “the department will use intensive and innovative silviculture to guide the desired progression of stand development to simultaneously produce trust revenue and create structural complexity” (DNR 2004). The policy described biodiversity pathways as a type of innovative silviculture that could be used to “create, develop, enhance, or maintain forest biodiversity and health” (DNR 2004).

DNR finalized and incorporated the draft general silvicultural strategy into the *Policy for Sustainable Forests* (DNR 2006, p. 46). In this manner, innovative silviculture, which includes biodiversity pathway techniques, became part of DNR’s policy for creating and maintaining structural diversity in all of its HCP units, including the OESF.

Because the final forest land plan for the OESF is required to be consistent with existing policies, the silvicultural strategies suggested by Conservation Northwest and others have already been included in the No Action Alternative, Landscape, and Pathways alternatives. Therefore it is not necessary to analyze biodiversity pathways as a separate alternative.

## ■ Fixed-Width Riparian Buffers

During the scoping process for the 2010 DEIS, Conservation Northwest and others also proposed an alternative under which fixed-width riparian forest buffers and wind buffers would be applied to all Type 1 through Type 4 streams; no watershed assessment would be conducted in conjunction with buffer design. These buffers would be equivalent in

width to those proposed in the HCP (riparian forest buffers listed in Table IV.5, p. IV 58, and wind buffers listed in Table IV.8, p. IV.117). Harvest activities within riparian buffers would be restricted to thinning.

This prescriptive approach (setting specific buffer widths based on stream type without a watershed assessment process) provides little opportunity for learning, which is a key attribute of integrated management. Also, the prescriptive approach was considered and analyzed in the Final (merged) EIS for the HCP (DNR 1998) but was not selected by the Board. Since this approach was considered but not selected in an earlier phase of planning, and was not adopted as policy, fixed-width buffers were not analyzed in this FEIS.

## ■ One-to-One

DNR considered a modification to the Landscape Alternative which would require equal acreages of variable retention harvest and thinning into the future across all state trust lands in the OESF. This modification, called “one-to-one” (one acre of thinning to one acre of variable retention harvest), was based on a commitment in the 2006 Settlement Agreement. DNR used the analysis model to examine this option and determined that one-to-one did not demonstrate an improvement or acceleration in meeting the objectives of the HCP. In addition, DNR found that this option would result in a considerable reduction in revenues because the costs associated with thinning were high and the price of the merchantable timber was low. DNR does not believe this option meets the purpose, need, and objectives for this proposal, which includes meeting HCP objectives and generating a sustainable flow of revenue for the trusts (refer to Chapter 1). Therefore, this modification was not analyzed in this FEIS.

## ■ No Management

DNR used the analysis model to examine a no-management alternative that deferred all state trust lands in the OESF from timber harvesting. According to model results, leaving the forest to grow on its own with no intervention did not demonstrate an improvement or acceleration in meeting HCP objectives and therefore was not considered reasonable. Many acres of state trust lands in the OESF are currently in the Competitive Exclusion stand development stage (refer to Text Box 3-2, p. 3-28 for a description of stand development stages); without intervention, these stands may remain in this stage for decades. In addition, the no-management option does not produce revenues for trust beneficiaries and therefore would violate DNR’s trust mandate. DNR does not believe this option meets the purpose, need, and objectives for this proposal, which includes meeting HCP objectives and generating a sustainable flow of revenue for the trusts. Therefore, this alternative was not analyzed in this FEIS.

## ■ Northern Spotted Owl Habitat Definition

DNR considered an option that would change northern spotted owl habitat definitions for state trust lands in the OESF. However, DNR does not have sufficient scientific

information at this time to identify what, if any, change in definition should occur. Also, a change in the definitions of northern spotted owl habitat would require an amendment to the HCP, which is DNR policy. Since DNR does not change policies through forest land planning, DNR did not analyze this option for the FEIS.

## ■ Non-Integrated Approach

In contrast to DNR's current approach of integrating revenue production and ecological values across state trust lands in the OESF, this alternative would divide state trust lands in the OESF into large areas dedicated to either revenue production or ecological values. This approach, referred to as the "zoned" approach, was examined as an alternative in the 1996 EIS for the HCP but was not adopted as policy. Since the zoned approach was considered but not adopted by the Board in an earlier phase of planning, it was not analyzed in this FEIS. However, the Board may reconsider this alternative in the future.

## Other Elements of the Environment Considered but Not Analyzed

During its public outreach process prior to the development of this FEIS, DNR received comments on recreation, special forest products, visual impacts, land transactions, and cultural resources. However, DNR determined that the environmental impacts associated with these topics were not significant. Therefore, these elements were not analyzed in this FEIS. Following is a brief discussion of these elements.

### ■ Recreation

Unlike other HCP planning units, the OESF is located far from large population centers. Also, population density in the surrounding communities is low (15 to 40 people per square mile).<sup>16</sup> In addition, there are few developed recreational facilities on state trust lands in the OESF. Recreational use is therefore minimal and dispersed. Because of the lack of comments related to recreation, and because the alternatives implement and do not change existing policies regarding recreation, DNR concluded that its alternatives will not affect recreation and public use significantly. Therefore, this topic was not analyzed in this FEIS.

### ■ Special Forest Products

DNR's Olympic Region offers and manages leases for special forest products such as salal, evergreen huckleberry, sword fern, and moss. Permits are mainly issued to local harvesters, but a few large contracts in specific areas are issued to commercial harvesters. Because these special forest products are abundant and widely available throughout state

trust lands in the OESF, DNR's proposed alternatives are unlikely to result in probable significant adverse impacts to these products. Therefore, special forest products were not analyzed in this FEIS.

## ■ Visual Impacts

In accordance with the *Policy for Sustainable Forests*, visual impacts are assessed on a site-specific basis when a timber harvest is designed. On-site mitigation, if needed, is developed at that time. Scoping comments did not suggest that visual impacts resulting from harvesting activities would be significant. Furthermore, mitigation for visual impacts is considered and incorporated at the site-specific stage. DNR's alternatives implement DNR's existing policies on visual impacts. Therefore, visual impacts were not analyzed in this FEIS.

## ■ Land Transactions

The federal Enabling Act of 1889 places restrictions on the disposal and leasing of the granted lands, the most prominent being disposition at public sale for not less than full market value. The state constitution also requires full compensation for the trusts when state trust lands are sold, transferred, or otherwise disposed (DNR 2006).

Financial diversification of state trust lands is guided by DNR's *Asset Stewardship Plan* (DNR 1998). Since these lands are managed for the trusts in perpetuity, the long-term goal is to maintain approximately the same value of the land in order to keep each trust "whole." DNR selectively repositions state trust lands through four different processes: land exchanges, public auctions, direct sales to public agencies, and replacement purchases.

DNR and Green Crow Corporation finalized the Foothills Land Exchange in 2013. A portion of this land exchange is within the OESF. In this exchange, isolated parcels of state trust lands in the Sekiu and Dickodochtedar landscapes were traded for parcels of land owned by the Green Crow Corporation in the Reade Hill and Kalaloch landscapes. This transfer consolidated state trust lands into blocks that are easier to manage for revenue production and ecosystem values. In 2014, DNR purchased 1,720 acres in the Queets Landscape to replace state trust lands that were previously transferred and to acquire productive, working forest land. Because these land transactions affect a small percentage of state trust lands in the OESF, DNR does not believe these land transactions will change the results of this analysis.

At this time, it is not possible to determine what, if any, future land transactions will occur on state trust lands in the OESF. In addition, similar to the preceding elements, existing policy will not be modified through the alternatives. Therefore, land transactions were not analyzed in this FEIS.

## ■ Cultural Resources

The forest practices rules<sup>17</sup> (Title 222 WAC) define cultural resources as “archaeological and historical sites and artifacts and traditional religious, ceremonial, and social uses and activities of affected...tribes.” According to state and federal laws, cultural resources can include the built environment (buildings and infrastructure), places of historical significance (such as where a treaty was signed), artifacts and features providing evidence of human activity, traditional cultural places (such as a peak named in mythology), and historical objects, such as a ship.

The earliest arrival of humans in North America remains a source of academic debate, but people may have colonized the Americas prior to the end of the last glacial episode (Dillehay 2009). Because of changes in the relative sea level, major sites from this era are located offshore, although sites related to hunting, the extraction of stone and other resources, temporary camps, and riverine sites still exist in the OESF.

There are 162 recorded archaeological and historical sites in the OESF. They include four barns listed on the state Heritage Barn Register, seven sites listed on the Washington Heritage Register, and 16 sites listed on both the state and national registers (Kirk and Daugherty 2007). Most of the sites have been inventoried, but their significance and eligibility for national and state registers have not been evaluated.

DNR recognizes the significance of cultural resources, current cultural uses, and historic and archaeological sites and understands that cultural resources cannot be replaced. DNR also acknowledges the importance of government-to-government communications and collaboration with the tribes, as discussed in the Commissioner’s Order on Tribal Relations (DNR 2010).

DNR’s existing procedure for identifying historic sites (PR 14-004-150; refer to Appendix F) discusses the steps required to minimize or eliminate impacts to cultural resources to a non-significant level before an activity can take place on the ground; this procedure will not be changed by this proposal. Because DNR does not anticipate that cultural resources will be significantly impacted by the alternatives, DNR did not analyze cultural resources in this FEIS.

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### Endnotes

1. Site-specific evaluations allow DNR to reconsider all information, make any relevant changes based on localized conditions, and consider mitigation, if appropriate.
2. A precommercial thinning is done to concentrate growth on the more desirable trees. This type of thinning does not generate revenue; trees that are thinned are neither removed from the site nor sold.
3. Operations that have been determined to have no direct potential for damaging a public resource (WAC 222-16-050).
4. Old growth is mature, structurally complex stands of 5 acres and larger that originated naturally before the year 1850. Gene pool reserves are stands of trees that have been deferred from harvest to conserve for the future native genetic material well-adapted to local conditions.
5. Adaptive management is referred to in the HCP as “Systematic Application of Knowledge Gained” (DNR 1997, p. IV.84).

6. DNR defines detectable as a 10 percent or greater increase in peak flow.
7. A landscape is an administrative designation; refer to the introduction to Chapter 3 for more information.
8. DNR uses the term “DNR-managed lands” instead of state trust lands because northern spotted owl habitat in natural resources conservation areas and natural area preserves contributes toward habitat thresholds. While not subject to the HCP, DNR is given credit for the habitat contributions provided by these lands in terms of meeting the conservation objectives of the HCP (DNR 1997, p. I.5).
9. Demographic support refers to the contribution of individual territorial spotted owls or clusters of spotted owl sites to the stability and viability of the entire population (Hanson and others 1993). Maintenance of species distribution refers to supporting the continued presence of the northern spotted owl populations in as much of its historic range as possible (Thomas and others 1990; USFWS 1992). Dispersal refers to the movement of juvenile, sub-adult, and adult animals (northern spotted owls) from one sub-population to another. For juvenile northern spotted owls, dispersal is the process of leaving the natal (birth) territory to establish a new territory (Forsman and others 2002; Miller and others 1997; Thomas and others 1990).
10. The Draft EIS for the HCP (DNR 1996) evaluated individual landscapes to ensure that there was an adequate distribution of owl habitat across the OESF. At the time the HCP was developed, the best available science concluded that 30 to 50 percent habitat at spatial scales from home range to landscapes could support reproductive northern spotted owl pairs (Forsman and Meslow 1985; Bart and Forsman 1992; Carey and others 1992; Lehmkuhl and Raphael 1993; Holthausen and others 1995; Bart 1995). The HCP selected a minimum of at least 40 percent Young Forest Habitat and better (DNR 1997). Bart and Forsman (1992) hypothesized a threshold amount of 20 percent Old Forest Habitat was adequate, based on observations of significantly greater occupancy and productivity by northern spotted owls than areas with less.
11. Although the HCP permit period ends in 2067, the HCP does not require DNR to meet thresholds by that date.
12. The forest inventory database includes information about forest stand structure such as tree height and diameter.
13. Washington Environmental Council et al. v. Sutherland et al. Settlement Agreement (King County Superior Court No.04-2-26461-8SEA, dismissed April 7, 2006).
14. On state trust lands in western Washington, DNR State Lands uses a numerical system (one through five) to categorize streams based on physical characteristics such as stream width, steepness, and whether or not fish are present. Type 1 streams are the largest; Type 5 streams are the smallest. Type 9 streams are “unclassified” and refer to streams that are currently mapped, but lack sufficient data to determine the correct water type. Only Type 1, 2 and 3 streams are considered fish-bearing. DNR and the Federal Services have agreed that the Washington Forest Practices Board Emergency Rules (stream typing), November 1996 meet the intent of DNR’s HCP.
15. Refer to p. IV.117 of the HCP for more information.
16. Refer to <http://www.ofm.wa.gov/pop/popden/default.asp>
17. The forest practice rules were written to implement the Forest Practices Act and have been amended several times since they were adopted in 1974.