ENVIRONMENTAL ASSESSMENT

Windjammer Project

USDA FOREST SERVICE
SIUSLAWS NATIONAL FOREST
HEBO RANGER DISTRICT

Lincoln County, Oregon

April 2005

RESPONSIBLE OFFICIAL:

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Chapter 1  Purpose of and Need for Action

This environmental assessment is written to fulfill the purposes and requirements of the National Environmental Policy Act (NEPA), as well as to meet policy and procedural requirements of the USDA Forest Service. The intent of NEPA, its implementing regulations, and Forest Service policy is to evaluate and disclose the effects of proposed actions on the quality of the human environment. These procedures are meant to improve the quality of decision-making, as well as make the decision-making process more accessible and transparent to the affected public.

Chapter 1 includes information on the history of the project proposal, the purpose of and need for the project, and the agency’s proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

Introduction

In 2003, the Hebo Ranger District initiated the Windjammer Project Environmental Assessment, which analyzed the young managed conifer stands in the vicinity of Ball Mountain to determine if actions are needed to improve watershed conditions and habitat for aquatic and terrestrial species. The project area, shown on the Windjammer Project Map, includes 5,173 acres of National Forest System (NFS) lands.

The project area is contained within the Drift Creek Tier I Key Watershed (4,974 acres) and the South Fork Schooner Creek Non-Key Watershed (199 acres). The legal description for the Windjammer Project Area is Townships 7 and 8 South and Ranges 10 and 11 West, Willamette Meridian, Lincoln County, Oregon.

Proposed Action

The Hebo District Ranger proposes the following actions:

- Within 30 to 48 year old young managed conifer stands, commercially thin about 962 acres. Cable yarding, ground based equipment and horses would be used.
- Create 7 to 10 snags per acre on 222 acres (within units 8, 9, 10 and 13).
- Create 10 snags and 10 down trees per acre, within 30 acres (adjacent to units 2, 5, 11 and 22) in areas occupied by young, dense conifer stands for the purpose of growing larger trees.
- Underplant shade tolerant species on about 185 acres (within units 4, 6, 14, 24, 31 and 33).

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1 Stand: The original clearcut area expressed in acres.
2 Unit: Areas within the stands where different treatments may occur. In this document, units refer to those areas where commercial harvest would occur. The stand locations and associated units are shown on the Windjammer Project Map.
To support the commercial thinning the following are needed:

1. Construct about 0.50 miles of temporary roads. These roads are short segments located on relatively flat ground and would not cross any streams. These roads would be stabilized and closed to public travel after commercial operations are completed or end of current operating season, whichever comes first.

2. Open existing closed temporary and Forest roads, 5.3 miles\(^3\) and 1.1 miles, respectively. To use these roads, some alder trees and brush would be removed from the travelways. No reconstruction is needed. These roads would be stabilized and closed upon completion of harvest operations or at the end of current operating season, whichever comes first.

Complete descriptions of these proposed actions are found in Chapter 2 Alternatives.

**Relationship to Forest Plan and Other Analyses**

This Environmental Assessment is tiered to the Siuslaw National Forest Land and Resource Management Plan (Siuslaw Forest Plan) and Final Environmental Impact Statement (USDA Forest Service, 1990). The Siuslaw Forest Plan was amended by the Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and ROD Attachment A (Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern spotted Owl) (USDA, USDI, 1994), commonly known as the Northwest Forest Plan. Hereafter, the above mentioned plans will corporately be referred to as the Forest Plan.

The proposed actions are designed to meet the Forest Plan Standards and Guidelines. The lands within this project area are allocated to a number of Management\(^4\) and Designated\(^5\) Areas. These land allocations are briefly described below. For more detailed description of each management area or land allocation and standards and guidelines associated with them, refer to the Forest Plan. No Forest Plan amendment is needed.

**Forest Plan Management and Designated Areas**

National Forest System land in the Windjammer Project Area is within the following Management and Designated areas as described in the Forest Plan (ROD, A-5). In general, where land allocations overlap, the more restrictive standards and guidelines apply.

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3 Temporary Road: A road that does not meet the Forest Road criteria. These roads are not intended to be part of the forest development transportation system and not necessary for future resource management.

4 Management Area: An Area with similar management objectives and a common management prescription.

5 Designated Area: Designated Area(s) overlay Management Area(s) and have different management objectives and prescriptions than the Management Area it overlays.
Northern Coast Range Adaptive Management Area (AMA)
The Windjammer Project Area is entirely within the AMA. The emphasis for this area is restoration and maintenance of late-successional forest habitat, consistent with marbled murrelet guidelines (ROD, D-15). The overall objective is to learn how to manage on an ecosystem basis in terms of both technical and social challenges. The primary technical objectives are development, implementation, and evaluation of monitoring programs and innovative management practices that integrate ecological and economic values (ROD, D-1).

Late-Successional Reserve (LSR) Designated Area
The Windjammer Project Area is entirely within the LSR. The LSR goal is protection and enhancement of late-successional and old growth forest ecosystems, which serve as habitat for late-successional and old growth related species. These areas, generally, have larger blocks of late-successional forests. These designated areas include standard and guidelines that direct management actions for the creation and maintenance of late-successional forest conditions. These Standards and Guides are listed in the ROD pages C9-C21. The standards and guidelines that apply to this project include:

- **Management Assessment** (page C-11) — A management assessment should be prepared for each large Late-Successional Reserve (or groups of smaller late-successional reserves) before habitat manipulation activities are designed and implemented.
- **Silviculture** (page C-12) **West of the Cascades**—There is no harvest allowed in stands over 80 years old (110 years in North Coast Adaptive Management Area). Thinning (precommercial and commercial may occur in stands up to 80 years old regardless of the origin of the stands (e.g., plantations planted after logging or stands naturally regenerated after fire or blowdown).
- **Road Construction and Maintenance** (page C-16) — Road construction in Late-Successional Reserves for silvicultural, salvage and other activities generally is not recommended unless the potential benefits exceed the costs of habitat impairment. If new roads are necessary to implement a practice that is otherwise in accordance with these guidelines, they would be kept to a minimum, be routed through non-late-successional habitat where possible, and be designed to minimize adverse impacts. Alternative access methods, such as aerial logging should be considered to provide access in reserves.

Riparian Reserves Designated Areas
These Designated Areas cover portions of both the AMA and LSRs. Riparian Reserves include lands along streams and unstable areas where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply (ROD, B-12). Riparian Reserves cover 3,628 acres in the Windjammer Project Area. The standards and guidelines that apply to this Project are:

- **TM-1** (page C-31) Prohibit timber harvest, including fire wood cutting, in Riparian Reserves, except as described below.
  - **(page C-32)** Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.
Road Management (page C-32)

RF-2. For each existing or planned road, meet the Aquatic Conservation Strategy objectives by:
   a. Minimizing roads and landing in Riparian Reserves.
   b. Completing watershed analyses (including appropriate geotechnical analyses) prior to construction of new roads or landing in Riparian Reserves. These proposed roads would be located in an area covered by the Drift (Siletz) Watershed Analysis, September 1996.
   e. Minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.
   g. Avoiding wetlands entirely when constructing new roads.

Northern spotted owl Reserve Pair Area

The entire Project Area is within a Reserve Pair Area (ROD, D-16). The size of a Reserve Pair Area is at least equal to the median home range for owl pairs in the province. In these Reserve Areas, all suitable habitat in each area is reserved from timber harvest. Suitable habitat is defined by the Siuslaw National Forest as stands of conifer greater than 5 acres in size with trees greater than or equal to 18 inches in diameter at breast height comprising at least 50 percent of the canopy. In these Areas the following may occur:
   • Late-Successional Reserve management standards and guidelines for salvage and other multiple-use activities would generally apply in the suitable habitat portion of the Reserve Pair Area.
   • Allow for management of currently unsuitable areas consistent with Late-Successional Reserve management standards and guidelines for silviculture and salvage. Management of other multiple-use activities in the unsuitable habitat should follow standards and guidelines from current plans and draft plan preferred alternatives, which may allow some activities that would not be consistent with Late-Successional Reserve management standards and guidelines.

Key Watershed

Key Watersheds are Designated Areas that either provide, or are expected to provide, high quality habitat. Tier 1 Key Watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program.

The Windjammer Project proposed actions would occur within the Drift Creek Tier 1 Key Watershed and the South Fork Schooner Non-Key Watershed. The standards and guidelines for Key Watersheds that apply to the Drift (Siletz) Tier I Key Watershed are (ROD, page C-7) are:
   • Reduce existing system and non-system road mileage. If funding is insufficient to implement reductions, there would be no net increase in the amount of roads in Key Watersheds.
   • Key Watersheds are highest priority for watershed restoration.
   • Watershed analysis is required to management activities, except minor activities such as those Categorically Excluded under NEPA (and not including timber harvest).
Other Documents

The Forest Plan requires that several analysis documents be prepared to guide the implementation of the Forest Plan. These include Watershed Analyses, Late-Successional Reserve Assessments and Adaptive Management Guides. These documents provide existing condition information and contain recommendations for attainment of the Forest Plan desired conditions.

Watershed Analysis (WA)

These documents identify important resource and information needs (data gaps), and describe ecological processes and interactions. They are completed before certain ground disturbing activities can be implemented. The Windjammer Project Area is included in the Drift (Siltez) Watershed Analysis (Siuslaw, 1996). The WA, pages 47-49, describes the existing condition of the conifer stands. In summary, about 46 percent of these stands on National Forest System land are in managed stands less than 50 years old. The WA, page 80, identifies four factors that are preventing or inhibiting the development of late-successional characteristics, which is a Forest Plan goal. They are:

1. Fragmentation of mature conifer blocks by managed stands of varying ages.
2. Even aged and often single species composition of managed stands.
3. Isolation of Late Successional Reserves by short rotation timber management.
4. Length of time for development of late-successional characteristics (Stands can be treated in many ways to accelerate growth and development of late-successional structure, but it would take time for these structures to develop.)

Late Successional Reserve Assessment (LSRA)

The Forest Plan requires that a Late-Successional Reserve Assessment (LSRA) be completed for each LSR or group of LSRs before habitat manipulation activities are designed or implemented. “The Late-Successional Reserve Assessment for the Northern Coast Range Adaptive Management Area” was completed January 1998. This Assessment provides a broad scale description of the resources and issues which affect late-successional habitat, describes management objectives and desired future conditions, and provides a context for future decision making. The Assessment includes recommendations for a variety of management activities considered appropriate for achieving the goals of the Forest Plan.

Proposed commercial units 4, 5, 6, 11, 12, 13, 14, 15, 21, 22, 23, 24, 31, and 33 are within the Core Late-Seral Cell i.e. at least 50% of the cell is currently in late-seral stage forest. These are treatment priority 1 i.e. these areas have the best potential for developing large blocks of interior, late-seral habitat and are the highest priority for treatment on the Hebo Ranger District. (LSRA p. 48 and Appendix H)

The remaining commercial units, 1, 2, 8, 9, 10, 17, 18, and 19 fall within the Core Early Seral Cell i.e. less than 10% of the landscape is in late-seral-stage forest. “These areas are the highest priorities for restoration treatments” (priority 3 overall) (LSRA p. 49).
Documents not required by the Forest Plan but developed to provide implementation information and guidance.

Siuslaw National Forest Roads Analysis, 2003 (RA)

On January 12, 2001, the Forest Service issued the final National Forest System Road Management Rule. This rule revised regulations concerning the management, use, and maintenance of the National Forest Transportation System, and requires each Forest to complete a Roads Analysis. The Siuslaw Forest Roads Analysis is designed to provide decision makers with information to develop road systems that are safe and responsive to public needs and desires, are affordable and efficient, and are in balance with available funding for needed management actions. The Forest RA, completed 2003, guides project level road analysis and decisions.

Purpose and Need for Action

Action is needed in the Windjammer Project Area to maintain or improve habitat for aquatic and terrestrial species in the area by accelerating the development of late-successional forest habitat and by improving watershed conditions.

What to do and how it is to be done is framed by two major underlying needs of the Forest Plan. They are:

“The need for forest habitat is the need for a healthy forest ecosystem with habitat that would support populations of native species (particularly those associated with late-successional and old growth forests) and includes protection for riparian areas and waters” (ROD, page 26)

“The need for forest products from forest ecosystems is the need for a sustainable supply of timber and other forest products that would help maintain the stability of local and regional economics on a predictable and long term basis.” (ROD, page 26)

To refine this dual need, an interdisciplinary team reviewed the Windjammer Project Area and identified the existing and desired conditions of the managed stands in the Area. The team identified actions needed to meet or implement changes that would, in the future, meet this dual need and the desired condition. The focus of this review was the conifer stands that are the basis of the late-successional forest including the coarse woody debris and snag habitat.

Existing and Desired Conditions

Existing Condition – Young managed conifer stands

Table 1-1 lists the stand acres on NFS land in the Windjammer Project Area. The managed stands (plantations) were created by clearcutting. The clearcuts were planted with 300 to 700 Douglas-fir seedlings per acre to maximize growth, and then were to be managed through a series of treatments for timber production.
Naturally regenerated Western hemlock dominates portions of many of the stands. Hemlock also tends to dominate the edges of stands where trees outside the original harvest boundary blew down following the clearcut harvest. These blow-down areas were allowed to naturally regenerate with hemlock.

**TABLE 1-1: Managed and Natural Stands in the Project Area on FS Land**

<table>
<thead>
<tr>
<th>Stand Ages</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managed Stand: 30 years and younger</td>
<td>880</td>
</tr>
<tr>
<td>Managed Stand: 31 years and older</td>
<td>1,405</td>
</tr>
<tr>
<td>Subtotal Managed Stands</td>
<td>2,285</td>
</tr>
<tr>
<td>Non-Forest (lake, river, roads, meadow etc.)</td>
<td>138</td>
</tr>
<tr>
<td>Natural Stands</td>
<td>2,750</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>5,173</td>
</tr>
</tbody>
</table>

The young managed stands in the Project Area form rather large, contiguous blocks with relatively narrow strips of older natural stands in-between. This fragmentation of older natural stands has diminished the amount and quality of the late-successional forest habitat. A goal of the Forest Plan is to maintain and develop, or accelerate the development of late-successional forest habitat. Acceleration of the development of late-successional forest habitat would provide connectivity between blocks of existing late-successional habitat, eventually creating large blocks of late-successional habitat.

The stands proposed for treatment currently are thirty to forty-eight years-old. These stands are not complex, diverse stands that would soon achieve late-successional conditions. Desirable components of the stand, such as large-limbed, open-grown trees, may not develop due to stocking levels. The dominant species are Douglas-fir and western hemlock. There is a need in those stands dominated by Douglas-fir to develop a more “natural” mix of hemlock, spruce cedar and alder as appropriate.

The stands are crowded ranging from 174 to 330 conifer trees per acre. They are even-aged and single canopied (the crowns are all about the same height). The trees have little stem taper (the diameter of the trunk doesn’t vary much from top to bottom), few branches over one inch in diameter and small crowns. The denser stands, especially on north-facing slopes or stands dominated by western hemlock have little or no understory vegetation. Areas on south facing slopes dominated by Douglas-fir tend to have a brushy understory, generally dominated by salal. There are varying but minor amounts of western red cedar, Sitka spruce and red alder scattered throughout the stands.

Due to lower growth rates and crowded conditions, these stands are more susceptible to damage from insects or wind than stands with fewer stems per acre. Examination of other stands in the area indicates that wind is the significant disturbance agent. The topography of the area, its
proximity to the coast, and current stand densities increases the probability that an entire stand or stands could be lost in a single disturbance event. Sustained winds during the wet season that occur in the area can cause significant damage to these structurally weak stands. Due to the fragmentation of the late-successional habitat in the Windjammer Project Area, there is a need to develop wind firmness within the managed stands, to minimize stand replacement events.

Swiss needle cast is present in the Douglas-fir at severity levels in the low to moderate range. Swiss needle cast causes the growth of Douglas-fir to slow down and may increase the risk of mortality. A few of the stands have pockets of the root disease *Phyllinus weirii* that are characterized by groups of dead and down Douglas-fir.

**Desired Condition – Young Managed Conifer Stands**

The long-term desired condition is late-successional forest conditions. Late-successional forest characteristics include:

- some large trees (over 40 inches dbh), with large limbs and broken tops;
- multiple canopy layers, with shade tolerant species in the understory;
- forbs and shrubs scattered, in pockets, throughout the stand;
- numerous large snags (over 20 inches dbh);
- down logs in all decay classes;
- reduce the risk of large-scale blowdown.

The short-term desired condition is:

- A more heterogeneous stand with varying tree densities, gaps, and understory conditions.
- Some dominant “wolf” trees in a position to develop large limbs and deep crowns.
- Overall, fewer trees per acre, with improved growth rates on most of the remaining trees.
- Leave some areas untreated to provide stand density diversity.
- Retain some trees exhibiting defects, such as forks, crooks, butt rot, and other deformities to provide habitat niches.
- An overall increase in understory vegetation including shade-tolerant tree species.
- Vegetation in the stands composed of native species.
- Stands developing into a more wind-firm condition.

**Existing Condition – Riparian Reserves**

The Drift (Siletz) Watershed Analysis (page 55) discloses that approximately 50 percent of the stands are characterized as early seral. Human caused disturbance has impacted riparian ecosystems in the area. Plantations and other environments manipulated by man do not provide the range of habitat components (vertical and horizontal structure, large woody debris) needed to support the full complement of riparian-dependent wildlife. The unnaturally high rate of disturbance has increased the amount of alder, especially in riparian areas. Competition with alder will delay re-establishment of conifer, slowing the recruitment of large woody debris and long term stabilization of disturbed areas.

**Desired Condition – Riparian Reserves**

The Drift (Siletz) Watershed Analysis (page 55) identified that stand structure of natural stands within 150 to 300 feet of streams was similar to the Siuslaw description of Spruce-Wet plant associations. Even with the Western hemlock plant associations, the lower order streams had stand structures similar to the Siuslaw description for the Spruce-Moist plant associations. The
Drift (Siletz) Watershed Analysis (page 49) displayed data compiled from plots taken in mature or old growth stands to serve as a yardstick by which to measure the progress of restoring the watershed. The tables displaying this information can be found in the Watershed Analysis in Tables 4.6-7 through 4.6-10. In general, there would be approximately 64 to 102 trees per acre, 7 to 12 hard conifer snags per acre, 4 to 5 soft conifer snags per acre, 16 to 17 hard logs on the ground per acre, and 10 to 18 soft logs on the ground per acre.

**Existing Condition — Coarse Woody Debris (CWD) and Snags**

Coarse woody debris (CWD) is down wood on the forest floor such as logs and stumps. Levels of down wood, in these young managed stands, are highly variable. Down wood plots were taken on 13 of the 22 stands. The down wood pieces measured were at least 12 inches in diameter. Levels varied from a low of approximately 300 cubic feet per acre to a high of 6,000 cubic feet per acre. Most of the down wood is in the form of very large logs which is a legacy from the previous stand. It is in the soft log class, decay classes III through V.

Excerpts from the *Late-Successional Reserve Assessment for Oregon's Northern Coast Range Adaptive Management Area* (LSRA, page 75) below, describe the current condition of CWD.

Large accumulation of CWD, including both snags and down logs, take a long time to develop naturally after a stand replacing disturbance. Due to rapid decomposition rates in the Coast Range most of the CWD from the previous stand is not detectable 100 to 150 years after it reaches the forest floor (Wright 1997). Additionally, at 100 to 150 years CWD accumulations are just beginning to increase as large trees begin to die (Spies and Cline 1998). This results in CWD levels operating on a different cycle than live trees biomass. CWD levels are actually highest early in succession and lowest in mid-seral stands.

Many of the natural 80 to 120 year old stands which would have started to contribute large CWD were harvested in the past 50 years. In commercially thinned stands, most of the suppressed trees (which would have provided CWD as they died) have been removed, snags have been felled for safety concerns, and some of the down wood has been harvested. In clearcuts, most of the live trees have been salvaged or removed as firewood. Some of the CWD was removed from the site during harvest and post harvest treatments (slash burning). Spies and Cline (1988) observed that at least six times more CWD carries over after wildfire in old-growth systems than after logging in old-growth; in addition, the CWD left after logging is smaller and decays faster. Young managed stands will not provide high levels of CWD for at least 150 years after harvest (Wright 1997).

The trees in these stands are generally too small to provide medium to large snags (21 to 48 inches dbh). Snags most commonly encountered in these stands are small trees that have been shaded-out by faster growing trees. The weighted average snag size is 9 inches dbh occurring at an average density of 7 snags per acre. Individual stands varied from zero to 27 snags per acre. Only snags 7 inches dbh and greater were measured. The higher snag densities are associated with root rot and bear damage.
**Desired Condition — Coarse Woody Debris (CWD) and Snags**

Strategies for Achieving desired CWD levels are described in the LSRA, pages 95 through 97. At the landscape scale, recommended CWD levels are not likely to be achieved during a single entry in early or mid-seral stands. Long-term, site specific strategies are necessary to guide current and future entries toward the goal of achieving the desired levels of snags and down wood. The Windjammer Project area proposes to utilize a combination of Strategies 2 and 3. Strategy 2 would be utilized to enhance CWD by creating snags and coarse wood within the thinned units. Strategy 3 would be utilized to enhance CWD by creating snags and coarse wood in the early seral stands that are not thinned.

**Decision Framework**

The Hebo Ranger District has examined possible stand treatments in the managed stands of the Windjammer Project Area and found them to be consistent with the Forest Plan. The decision to be made by the Responsible Official includes:

- Should commercial thinning and other stand treatments be applied to the young managed stands in the Project Area to accelerate development of late-successional forest habitats, as detailed in this environmental assessment?

In this context, the Hebo Ranger District has developed and analyzed the effects of the proposed actions (Alternative 2) and various alternative actions (refer to Chapter 2 and 3). The selected alternative would either be the same as the proposed action, or it would be modified based on one of the other fully evaluated alternatives and on public comments.

**Summary of Scoping**

Information used to identify the issues and develop the alternatives was gathered by a Forest Service Interdisciplinary Team (IDT), from field reconnaissance, District resource maps, local experience and review of comments from the public, Native American tribes, special interest groups, and state and federal organizations. Two methods were used to provide the public the opportunity to comment about the proposed actions:

- Starting in the winter of 2003, the Project has been listed in the Project Update, the Siuslaw National Forest’s Schedule of Proposed Actions (SOPA), which is published and mailed quarterly to a Forest mailing list of interested groups and individuals. No comments were received by this scoping method.

- On September 9, 2003, soon after the project was initiated, the District mailed a project scoping letter to 200 interested individuals, organizations and Native American tribes. In addition, a public notice soliciting comments about the project was published in the Lincoln City NewsGuard newspaper. From this scoping method, the Forest Service received 14 letters. These comments are located in the project analysis file.
**Issues**

The IDT and the Hebo District Ranger responsible official for this project reviewed all of the comments to determine the significant and non-significant issues for this project. An issue is significant based upon the topographic distribution (extent), the length of time the issue is likely to be of interest (duration), or the level of interest or resource conflict (intensity). Significant issues can serve to formulate alternatives, prescribe mitigation measures or analyze environmental effects.

Non-significant issues generally are those that are outside the scope of the proposed action(s), decided by existing law, regulation, Forest Plan or higher level decision, irrelevant to the decision to be made and conjectural and not supported by scientific evidence. Forest Service regulations (1950, chapter 11(3) require that issues that are deemed not significant include a brief statement of why they would not considered significant. For this project, these issues are in the Appendix B, Other Issues section.

**Significant Issue Associated with the Proposed Action**

After review of the both internal (Forest Service) and public comments, one issue, the anticipated impacts of the proposed actions to water quality and aquatic habitat is considered significant. The following discussion of this issue contains an issue statement, which generally describes the cause and effect relationship of implementing the proposed actions, and one or more concerns that detail these cause and effect relationships. Also, for each concern there are one or more elements that are used to quantify or qualify the effects between the fully evaluated alternatives. These estimates of effects are discussed in Chapter 3.

**Impacts to Water Quality/Fish Habitat**

The proposed activities have the potential to adversely impact water quality and fish habitat by increasing sediment in the streams that may be affected by the proposed actions.

**Concern 1**

The amount of sediment that may reach streams could be influenced by: 1) Temporary road construction. 2) Re-opening closed existing temporary and Forest Roads that are revegetated. 3) Use of roads that have a gravel or dirt travelway during wet periods may be become rutted. These ruts may channel sediment into the streams. Downstream aquatic habitat could be damaged if sufficient sediment reaches these streams.

**Elements of the Issue:**

- Miles of new temporary roads.
- Miles of reopened existing closed temporary, 5.3 miles, and 1.1 miles of Forest Roads.
- Miles of existing temporary and Forest Roads with gravel or dirt surfaces used to support commercial harvest operations.

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6 Issue: A point of discussion, debate, or dispute (about environmental effects) regarding the proposed actions.