North Coquille DM/CT

ENVIRONMENTAL ASSESSMENT
EA: OR125-03-06

Umpqua Field Office
Coos Bay District
Bureau of Land Management

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CHAPTER 1 - PURPOSE OF AND NEED FOR ACTION

Background

The Bureau of Land Management proposes a project to implement conifer thinning, alder conversion, road construction, road decommissioning, coarse woody debris/snag recruitment, and riparian restoration projects. The treatments are for the purpose of improving or restoring habitat within the Late Successional Reserve (LSR) #261 and the Riparian Reserve (RR) land use allocations within the North Coquille Subwatershed and Hudson Creek Drainage. The treatments inside the Riparian Reserve are also to restore the functions of the streamside stands with respect to meeting the objectives for Riparian Reserve. The project also includes thinning, and alder conversion within a portion of the General Forest Management Area (GFMA) land use allocation that is located in the North Coquille subwatershed adjacent to LSR 261. The GFMA land treatments are to meet the District Resource Management Plan (RMP) objectives to supply timber to provide jobs and contribute to community stability, and to meet wildlife objectives for the GFMA that include providing connectivity, habitats, and ecological functions. This environmental assessment (OR125-03-06) will address site specific, direct, indirect, and cumulative effects of the treatments for the proposed project.

The Northwest Forest Plan (NFP) allocated the uses of lands for different primary purposes. Late-Successional Reserves are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems. These lands are to serve as habitat for late-successional and old-growth associated species including the northern spotted owl. Much of the forestland designated as LSR within the southern Oregon Coast Range consists of forest stands less than 80 years of age, and thus is not considered late-successional forest. Silvicultural treatments in managed stands less than 80 years of age offer the opportunity to reduce overstocked density, increase tree species diversity, improve forest structural characteristics, and to add coarse woody debris. Such treatments are likely to result in forest stands that more closely approximate the structure and function of a late-successional forest. Silvicultural treatments can accelerate the development of young stands into multi-layered stands with large trees and diverse plant species, and provide habitat structures that will, in turn, maintain or restore species diversity. As these treated stands age beyond 80 years, secondary structural characteristics (e.g. understory canopy development, large dominant trees) are likely to develop sooner than if no treatments were made. Tappeiner et al. (1997) observed old-growth trees often averaged 20 inches in diameter at age 50 and 40 inches at age 100. This individual tree growth rate is higher than observed in similar aged plantations. Hence, for many forest stands within Late-Successional Reserves of the Oregon Coast Range, treatments such as thinning, snag creation, and coarse woody debris creation can accelerate the attainment of late-successional forest conditions across the landscape.

“Under the Aquatic Conservation Strategy, Riparian Reserves are used to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity of the watershed. The Riparian Reserves will also serve as connectivity corridors among the Late-Successional Reserves.” (NFP S & G’s p. B-13).

The General Forest Management Area (GFMA), designated as Matrix land use allocation in the NFP, is Federal land outside of designated Riparian Reserves, Late-Successional Reserves and special management areas that are available for timber harvest at varying levels.

In May of 1998, an interagency team of specialists from the Bureau of Land Management, U.S. Forest Service, and U.S. Fish and Wildlife Service competed the *South Coast - Northern Klamath Late-Successional Reserve Assessment* (also referred to as the Late-Successional Reserve Assessment) (Interagency, 1998). This document provides guidance for determining which forest stand conditions would warrant silvicultural treatment and what types of treatments would be appropriate to achieve desired forest stand conditions. The Proposed Action and all alternatives described in this environmental assessment have been designed to be consistent with the guidance outlined in the Late-Successional Reserve Assessment.

The Late-Successional Reserve Assessment listed Late-Successional Reserve #261 as a high priority area for management actions based on its large size, key links to the Late-Successional Reserve network, and land ownership pattern. The North Coquille Subwatershed, located partly within Late Successional Reserve #261, and Hudson Creek Drainage were selected as the project area. The Upper North Fork Coquille drainage within the North Coquille Subwatershed is a Tier 1 key watershed, meaning that it has been determined to contribute directly to the conservation of at-risk anadromous salmonids and resident fish species, and has a high potential of responding to restoration efforts. This project is the first proposed density management treatment of LSR land in the North Fork Coquille Watershed and of Riparian Reserve land in the North Coquille Tier 1 Key Watershed.

An interdisciplinary core team within the Umpqua Field Office was given the task to develop a project proposal that will move forest stands toward late-successional conditions as required by the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-growth Forest Related Species Within the Range of the Northern Spotted Owl* (hereafter referred to as the Northwest Forest Plan or NWP) and its *Record of Decision* (Interagency, 1994). The team began prioritizing areas within the North Coquille Subwatershed that would benefit from treatments and contribute to the recovery of Late-Successional Reserve conditions across the landscape. Field analysis of stand conditions within the LSR was completed to develop the appropriate prescriptions for each stand based on historic fire regimes, topography, and stand exam data. The proposed projects described herein, are intended to implement specific management opportunities that were identified within the *North Fork Coquille Watershed Analysis* (NFC WA, USDI-BLM, 2001) and the Late-Successional Reserve Assessment in a manner consistent with the standards and guidelines outlined in existing planning documents described below.

The Bureau of Land Management, in conjunction with other federal agencies, is under direction by the Northwest Forest Plan to conduct watershed restoration projects to aid in the recovery of water quality, aquatic, riparian, and terrestrial habitats. A watershed analysis is required prior to certain management activities within a Key Watershed. The *North Fork Coquille Watershed Analysis* outlined several management opportunities for restoring and enhancing ecosystem conditions. Among the opportunities listed within the analyses were density management treatment, alder stand conversion, road renovation, coarse woody debris/snag enhancement, and in-stream restoration.

Management Objectives

1. Improve LSR, RR, and GFMA stand structure by thinning out excess trees in overstocked stands to enhance the growth and vigor of the residual trees to provide larger and healthier trees for future management objectives while maintaining native species diversity.

2. Replace red alder dominated stands with conifer.

3. Within the LSR and RR maintain and/or restore structural habitat complexity typically found in late-successional or old-growth forests, such as large green trees, large down logs, and snags.

4. Implement recommendations and management priorities contained in the *South Coast - Northern Klamath Late-Successional Reserve Assessment* to: enlarge existing interior late-successional habitat blocks, improve habitat connections between late-successional reserves, maintain and improve connectivity habitat within late-successional reserves.

5. Work towards the goals in the *Western Oregon Districts Transportation Management Plan* by improving problem roads and decommissioning roads not needed for continued resource management.

6. Comply with the Standards and Guidelines in order to ensure consistency with Aquatic Conservation Strategy objectives at the site level.

7. Provide cost effective management that would enable implementation of these management objectives while providing collateral economic benefits to society.

8. Protect and/or restore rare and key habitats (wetlands, cliff habitats, talus habitats, grassy balds or meadows).

9. Provide for habitat restoration projects where appropriate and within the scope of BLM regulatory authority.

Tiering

This EA addresses site specific, direct, indirect, and cumulative effects of this proposal. This EA is tiered to the *Final Coos Bay District Resource Management Plan/ Environmental Impact Statement* (RMP FEIS) and its Record of Decision (RMP ROD) (BLM 1995) that is in conformance with the Northwest Forest Plan (NFP) *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl* (NFP FSEIS, Interagency 1994), its Record of Decision (NFP ROD), and it Standards and Guidelines (NFP S&G's) (Interagency 1994). This EA is also in conformance with the *Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, other Mitigating Measures Standards and Guidelines* (S&M ROD and S&G) (USDA-USDI 2001).

Actions described in this environmental assessment are designed to be in conformance with the Standards and Guidelines in order to insure consistency with the Aquatic Conservation Strategy Objectives listed on page B-11 within the Standard and Guidelines for Riparian Reserves on pages C-31 to C-37 of the Northwest Forest Plan - Record of Decision.

All of the documents are available for review at the Coos Bay District Office of the Bureau of Land Management, during regular business hours. Some of the documents are available at the Coos Bay and North Bend Public Libraries, the Coos Bay District's Internet Home Page at http://www.or.blm.gov/coosbay, and the Oregon State Office of the Bureau of Land Management in Portland, Oregon.

Location of the Proposed Project

The area considered for analysis is located 13 miles northeast of Coquille. Approximately 80% of the proposed project is within the LSR and RR land use allocations, and 20% is within the GFMA land use allocation as designated by the *Coos Bay District Resource Management Plan and Record of Decision.*

The proposed project areas are located primarily in the Moon Creek, Upper North Fork and Little North Fork drainages of the North Coquille Subwatershed. Minor portions overlap into the Hudson Drainage of the Fairview Subwatershed, and into the Alder Creek Drainage of the Middle Creek Subwatershed. The North Coquille Subwatershed, Middle Creek Subwatershed, and Fairview Subwatershed are hydrologic subdivisions within the North Fork Coquille River Watershed. The proposed project is located within Coos County, T26S, R10W, Sections 7, 8, 16, 17, 19, and 30, and T26S, R11W, Section 25, Willamette Meridian. Section 25 is in the GFMA. The other sections are in LSR 261. See Appendix A for General Location Map and Unit Maps.

Proposal

The Umpqua Field Office (UFO) proposes to treat 30-60 year old stands of primarily Douglas-fir and western hemlock in the North Coquille subwatershed within LSR 261, Riparian Reserves, and the adjacent GFMA land in the Moon Creek, Alder Creek and Hudson Creek drainages. The project would thin approximately 1100 acres of primarily conifer stands. About 800 acres would receive density management thinning (DMT) in Riparian Reserves (RR) and Late-successional Reserves (LSR). About 200 acres would receive commercial thinning (CT) in the General Forest Management Area (GFMA). Dense stands would be thinned from below to leave approximately 60-

80 stems per acre by removing primarily the suppressed, intermediate, and smaller co-dominant conifers. Dominant and larger co-dominant conifers would be retained. Individual and patches of red alder would be left uncut in some units and thinned through in other units depending on the unit conditions and stand prescription. All red alders would be cut in one LSR unit to facilitate understory conifer regeneration. Alder stands with only a minor component of conifer, approximately 75 acres, would be converted back to conifer through a combination of regeneration harvest of red alder patches, and cutting alders from around releasable conifers. All trees within the variable-width streamside protection buffers would be reserved as standing trees. If buffer trees must be cut for a yarding corridor they would be left on site for coarse wood. The proposed treatments of the units inside the LSR are designed to restore landscape level patterns observed on historical aerial photos through a combination of different thinning densities and selective retention of red alders based on topographic patterns.

Harvest would be accomplished with a combination of skyline cable, ground based cut-to-length, and helicopter logging equipment depending on road access, steepness of the terrain, and environmental impacts.

New road construction would consist of construction of temporary, semi-permanent roads, or permanent roads depending on management objectives. Road renovation would consist of brushing, grading, and providing adequate drainage to older existing roads. Road improvement would consist of capital improvements such as placing rock surfacing on existing dirt roads or adding culverts. Roads no longer needed for management or that are a problem would be closed or decommissioned.

Snag and down log creation, and in-stream restoration projects would be accomplished where needed to benefit fish and wildlife.

The project would be funded by the sale of excess trees removed from the stands in timber sales tentatively planned for FY 2004.

Watershed Analysis Considerations

- This proposal includes recommendations contained in the North Fork Coquille Watershed Analysis (NFC WA, USDI BLM 2001):
- Restore conifers to sites that supported conifer prior to logging and road construction that are now dominated by red alder.
- On unstable lower slope locations, release of bigleaf maples, and conifers, particularly western redcedars, is desirable.
- Restore the structural integrity of historic riparian vegetation through the use of tree planting, thinning, and species conversion.
- Look for opportunities to decommission, reroute or improve drainage on existing or abandoned roads. Highest priority should be given to streamside and midslope roads.
- To help restore summer low flow patterns, convert red alder stands that came in following harvest of conifers.
- Riparian Restoration: Use conifer release or conifer restoration techniques to reestablish conifers within suitable riparian areas. Conifers have a difficult time establishing and surviving within the natural stream bank disturbance zone. Generally this disturbance zone is within 10-feet of the stream channel for the streams in this project. Therefore, retaining no-cut buffers that are at least 10-feet wide next to the stream channel and reestablishing conifers farther back from the stream outside that zone should help meet short-term objectives using passive restoration and long-term objectives using active restoration. Protection of the stream channel function within the stream bank disturbance zone would be met or exceeded by using a variable width streamside buffer that is at least 20-feet wide as per the recommendation below.
- The NFC WA (Table DM-1) shows the minimum no-treatment forested buffer needed along streams is 20-feet or a width equal to half the tree crown diameter of the streamside trees, whichever is wider. Functionally, the widest forested buffer needed to protect aquatic values is a width equal to half the height of the overstory trees on the site at the time of treatment. These buffers are zones where passive and active restoration strategies are blended to optimize short-term protection with long-term restoration.

Additional information such as timber type maps, topographic maps, aerial photos and stand exams used for this assessment, are in the individual plan folders.

Scoping

A scoping process identified agency and public concerns related to the proposed projects and defined the issues and alternatives to be examined in detail during the environmental assessment process. Scoping for the North Coquille Density Management project was 30 days, from January 15, 2003 to February 14, 2003. The general public was notified of the planned environmental assessment through the publication of the Coos Bay District's *Planning Update* and a Public Notice was published in *The World* newspaper. Scoping letters and/or e-mail were sent to a mailing list of individuals, agencies, and organizations that have requested project notification. Scoping letters were also sent to adjacent landowners to inform them of the project proposals.

See Chapter 5, "List of Agencies and Individuals Contacted"

List of Scoping Respondents
- Oregon Natural Resources Council
- Umpqua Watersheds

Issues Concerning the Proposed Project

1. Forest stands in the LSR are not currently on a trajectory to achieve late-successional and old-growth habitat characteristics. Current stocking levels in the streamside stands will retard attainment of Riparian Reserve objectives associated with large trees, and limit those stands' ability to provide habitat and connectivity for late-successional associated species benefited by the Riparian Reserve land use allocation. Individual trees within managed young-growth conifer stands are developing under greater competition than the conditions that dominant conifers would have grown in naturally regenerated old-growth stands at an equivalent age (Tappeiner et al., 1997). Increased growing space of individual trees has a direct correlation to stand stability and unstable stands are more subject to windthrow (Wilson and Oliver, 2000). Therefore, reducing stand densities is required in order to maintain a growth trajectory and improve stand stability to meet the Late-Successional Reserve and Riparian Reserve objectives.
2. Red alder is the dominant species in some areas of the project that were once dominated by conifers. Without silvicultural treatment the relatively short-lived alder will soon die out leaving brush fields. An opportunity exists to convert these alder areas into conifer to provide for late-successional habitat in the LSR/RR and more productive timberland in the GFMA.

Potential issues identified, and eliminated from further analysis

The potential issues listed below were identified through the public scoping process and inter-disciplinary team discussions. These issues have been resolved with the development of project design features and, within the scope of this project, were not considered issues that would require another alternative.

<u>Issue 1a</u>:
"Consider the cumulative effects of the many thinning projects currently underway or recently completed in this area, including Mother Goose, Tioga DM, Beyer's Way CT on watersheds."

<u>Resolution</u>:
The Mother Goose, Tioga DM, and Beyer's Way CT projects are in the South Fork Coos 5th Field Watershed. The North Coquille DM/CT project is in the North Fork Coquille 5th Field Watershed. Because the South Fork Coos is a separate watershed from North Fork Coquille, activities wholly within one of those watersheds cannot contribute to

the cumulative effect of management activities on the functioning of the other watershed. No new tributary or arterial roads would be built connecting the North Coquille Watershed to any other watershed so there would be no additional effects on any other watershed from road construction associated with this proposed project in the North Fork Coquille Watershed. Cumulative effects resulting from the Proposed Action in this EA and other similar actions in the North Fork Coquille 5th field watershed can be found in Chapter 4.

The main haul roads outside the North Fork Coquille Watershed that would be used under the proposed North Coquille DM/CT project are maintained paved roads. Paved roads present a considerably lower risk of sediment delivery to streams than do natural surface or rocked roads (Washington Forest Practices Board 1993 pg B-25). Road closures completed under the proposed projects would result in a net reduction of BLM roads in the North Fork Coquille Watershed.

Issue 1b:
"Consider the cumulative effects of the many thinning projects on the overall forest structure to make sure the treatments do not homogenize LSRs or Riparian Reserves over a large area with a single silviculture prescription. Reserves should offer a diversity of habitats, similar to a natural forest ecosystem."

Resolution:
Alternative 9, that is the basis of the Northwest Forest, was ranked higher by the EIS Assessment Team, than the other alternatives considered in part because it provided for restoration silviculture in the reserves (USDA; USDI 1994 pg 2-69). The management directions for implementing the Northwest Forest Plan include using silvicultural treatments to bring about an increase in the area providing habitats for late-successional associated species, and providing an increase in the acres of forests capable of providing large wood to streams and streamside areas. The proposed project is consistent with these management directions. The cumulative effects of applying density management treatment to multiple units would be to both increase the total area of late-successional habitats, and decrease the structural contrasts between the treated stands and existing late-successional forests in order to produce a cumulative increase in the area of contiguous interior late-successional habitats (Harris 1984 pg 109-111). The density management treatments would reduce the acres of closed-canopy stands with limited understory development. However, no wildlife species in the project area are unique to those conditions (Hayes et al. 1997).

The proposed treatments for the LSR and Riparian Reserves are covered in the prescription section later in this document. The proposed treatments range from heavy thinning to light thinning, and are designed to assist restoration of landscape scale diversity based on patterns visible on historic aerial photos, and based on observations inside late-successional stands.

Issue 2:
"Do not convert hardwood stands to conifer that were not historically conifer stands."

Resolution 2:
Examination of historic aerial photos show the areas proposed for red alder conversion to have supported conifer stands before they were logged. These aerial photos show stands of conifer that had not been cut at the time the 1950 aerial photos were taken on the sites of some of the proposed alder conversion units. The photos also show conifer seed trees occupying the proposed alder conversion sites that had been logged before 1950. Those aerial photos also show extreme logging associated disturbance on the sites of some proposed alder conversion units.

Issue 3:
"For the hardwood stands that were previously conifer, please don't use a heavy hand in converting them. Please don't, for instance, do a regeneration harvest. Smaller openings should be tried first. Make sure all existing conifer seedlings and saplings are released. Then, where there is a need for more conifers, take out only small groups of hardwoods. Opening up large parts of the forest to regeneration harvests will promote noxious weeds, deprive the soils of the nitrogen fixing capabilities of alder, reduce wildlife habitat, increase peak flows, increase solar exposure to streams, increase soil compaction, and other degrading effects."

Resolution 3:

In 1995 the Coos Bay District initiated several pilot hardwood conversion projects to restore conifers in alder dominated streamside sites. Those projects employed alternative methods to convert the alder stand to conifer rather than the conventional approach of using the clearcut method of stand regeneration followed by planting Douglas-fir. Instead, gaps were created by girdling alders. District people planted the shade tolerant species western redcedar and western hemlock under the girdled alders. The conifers were tubed to protect them from animal damage and the site received follow-up vegetation control treatments targeting salmonberry. Initial survival was very good. However, seven years after planting many of the planted trees are about 2 to 2.5 feet tall, which is little more than the height of the trees when they were planted. Some of these trees have died. The best conifers are about 4-feet tall, which is less than half the height of similar aged seedlings growing in the sun. Most of the girdled alders have died and fallen to the ground. The branches of the alders next to the treated areas now completely arch over the gaps reducing the light reaching the forest floor to pretreatment levels. On-site observations indicate the alder crowns would be capable of closing over a 60-foot wide gap. The prognosis is conifer growth rates will continue to decline and additional conifers will die barring a disturbance that creates new gaps. Girdling more alders is no longer an option because of concerns about creating an overhead safety hazard for employees and contractors working in the unit, and for the public traveling the adjacent roads. Given the relative size of the alders compared with the conifers, cutting the alders would bury the conifers with debris, and would break or crush the conifers. In contrast, vigorous conifer regeneration is now growing on other alder conversion project sites, on the District, where all the alders were removed except those left in the streamside protection strips. This experience is not unique to the Coos Bay District. Emmingham and coauthors (2000) evaluated 34 riparian restoration projects done by the Forest Service and BLM in the Coast Range. They found active management of both overstory and understory vegetation competition was essential for an alder conversion project to be successful. Emmingham and coauthors (2000) concluded that it is pointless to attempt restoration of conifers in areas where other resource values will preclude an aggressive approach to establishing conifer dominance. Based on observations and discussion by Emmingham and coauthors (2000), a minimum gap width of 166 feet is needed to establish conifers. Even so, the alders’ lateral branch growth would reduce the effective gap size of that size or opening by more than a third within a few years. Removing only a portion of the red alders from a conversion site leaves an alder seed source that can necessitate repeated entries to release the planted conifers from competition.

Table 1-1 below shows the initial consideration for red alder treatment, including units dropped, that is based on field reviews, information known about red alder and the Coos Bay District's experience with red alder treatments. The Proposed Action for red alder treatment was based on these observations.

Table 1-1: Initial Observations and Recommendation of Alder Treatment Areas

EA Unit No.	Acres	Initial Recommendation of Alder Treatment Areas
21	3	Analyze for alder conversion
39H	7	Analyze for alder conversion
1H (NW area)	2	Analyze for alder conversion
1H (NE area)	3	This area dropped from the project because it has sufficient free to grow conifer.
1H (SW area)	5	This area now incorporated into the surrounding thinning unit. It supports sufficient releasable conifer that would become established upon cutting the competing alders during the thinning operation.
1H (SE area)	6	Part of the area not suitable for conversion because it is an old landing that would be used again in this project as a helicopter landing. The rest of the area dropped because the treatable area would be too narrow to provide sufficient light for the long-term survival and growth of conifer seedlings.
2H (W area)	5	Analyze for alder conversion
2H (N area)	2	Analyze for alder conversion
2H (NE area)	26	This area is a mosaic of conifer and alder patches. Converting the alder patches at this time could create problems for laying out logical regeneration harvest unit boundaries in the GFMA part of this area 20 years in the future. Consider both converting this area and/or incorporating this area into the surrounding thinning unit if a logical layout is not feasible.
2H (SE area)	5	This area is a mosaic of conifer and alder patches. Converting the alder patches at this time would create problems for laying out logical regeneration harvest unit boundaries in this area 20 years in the future. Incorporate this area into the surrounding thinning unit.
41AH	2	This unit incorporated into thinning unit 41A. It supports sufficient releasable conifer that would become established upon cutting the competing alders during the thinning operation.
43H (N area)	5	Analyze for alder conversion
43H (S area)	2	Analyze for alder conversion

The project design features, implementing BMPs, and following the Standards and Guidelines in the Northwest Forest Plan and District Resource Management Plan would reduce the risks of introducing noxious weeds, exposing streams to direct sunlight, and compacting soils.

Removing the alders from the proposed conversion sites would remove that source of nitrogen fixation. However, the eventual restoration of late-successional stands would restore conditions favorable for nitrogen fixing lichens that use conifer substrates and asymbiotic nitrogen fixation in wood debris. Both of these mechanisms provide a low but constant input of nitrogen resulting in large amounts of fixed nitrogen over the hundreds of years that a late-successional/old-growth forest occupies the site (Hicks; Harmon 2002). Site index measurements of the thinning/density management units show much of the land in the project area is already highly productive. Bormann and coauthors (1994) noted that on nitrogen rich sites with deep highly-weathered soils, the soil acidification associated alder stands may result in soil nutrients being leached deep into the soil profile out of reach of plant roots thus degrading ecosystem productivity. The soils would not be deprived of nitrogen fixing capabilities beyond that of other conifer systems within the same watershed or that was present prior to human intervention and the altering of conifer vegetation to other vegetation systems.

Removing the red alder from the proposed conversion areas in the reserves would remove habitats associated with disturbed systems and replace them with conifers that have the potential of eventually supplying habitats for species associated with late-successional conditions. While current forest practices favor conifers, the historic inventories indicate the abundance of red alder has increased 20-fold since the 1920s (Niemiec et al 1995). Red alder would not be eliminated from the project area. Red alders would be retained along streams. Also alders would either be reserved from cutting or included among the species marked for retention in all but one of the proposed thinning/ density management units. Red alders would naturally regenerate in the parts of the heavy thinned units where some or all red alders are retained (observation at Cataract Thinning, Siuslaw NF). These alders would remain until they are shaded out by the expansion of the overstory tree canopies (Miller; Murray 1979).

Reducing the amount of red alder in Riparian Reserves would have little effect on peak flows and solar radiation. Alders are a deciduous hardwood species that shed their leaves and undergo a period of "dormancy" in the winter. The process of photosynthesis and subsequent need for transpiration does not exist for red alder during the months when peak flows occur. In this climate regime it has been established that peak flows occur during the winter months after the antecedent moisture conditions are satisfied (NFC WA 2001, Ch. 4 p. 9). Following timber harvest, studies have shown that peak flows during fall and spring periods are likely to increase primarily due to reductions in transpiration and interception losses following harvest (Jackson and Van Haveren 1984). Rather these increases in peak flows are attributed to levels of coniferous losses rather than hardwood species. The small reduction in the amount of alder is not considered a peak flow issue.

In contrast, low stream flows occur from July to October and are characterized by extremely low base flows and, occasionally, dry stream channels. The loss of deciduous hardwoods, such as red alder adjacent to stream channels can increase solar radiation inputs during the summer months when alders still have leaves. However, in order for any additional input of solar radiation to streams there must be a flow of water in the streams. The majority of the streams in the project area are intermittent or ephemeral channels with established no treatment buffers to reduce any short-term effects from re-establishing conifers. These streams respond to storm events and expansions of variable source areas during prolonged periods of precipitation. During the summer the streams are usually dry or have discontinuous pools, thus do not contribute to stream temperatures increases in the lower main stem. As designed the proposed project would reduce the risk to perennial channels from increased solar inputs by reserving variable stream buffers to maintain shade along channels to be treated and thus is not considered an issue.

The limited amount of roads and the harvest methods in the project would not appreciably increase soil compaction as it is well below amounts allowed in the Coos Bay District ROD as proposed so it is not considered an issue.

<u>Issue 4</u>:
"Road construction, even temporary roads, creates permanent effects like cutbanks. Roads would require cutting larger trees within the R/Ws that would not otherwise be cut. Helicopter logging should be considered, especially in reserves. ORV use could increase on temporary roads that are improperly blocked after completion of operations."

<u>Resolution</u>:
New road construction would create cutbanks; however, the impacts should be negligible because the new roads would be located mainly on ridge tops away from riparian areas. Helicopter logging would be used in those areas where the impacts of new road construction would exceed the benefits, where road construction is infeasible, or where there are excessively high road construction costs.

New road construction has been limited to approximately 1.0 mile.

Experience has shown that closure of temporary roads can be accomplished to prevent ORV access. Limitation of new road construction would limit ORV impact problems.

<u>Issue 5</u>:
"Thinning heavily and then fertilizing stands could create bear problems that could subsequently require killing bears for damage control."

<u>Resolution</u>:
The ID Team doesn't consider this an issue of concern. Previous thinning areas within the Umpqua Resource Area have not resulted in any subsequent bear damage. Fertilization is not planned with this proposal.

Issue 6:
"Leaving only 1or 2 snags per acre should be explained, as this is inconsistent with other projects that leave up to 12 snags per acre."

Resolution:
The numbers of Douglas-fir trees greater than 12 inches dbh (diameter breast height) that would be killed to meet immediate snag and down wood recruitment needs should be 3 trees per acre or less. This may be inconsistent with the number of other snag and down log treatments on other projects in other areas that may have different objectives or environmental conditions. However, there is evidence that more than 3 dead trees per acre could increase the risk of building up Douglas-fir bark beetle populations (Hostetetler; Ross 1996). The ID Teams proposed project design is to reserve existing snags and limit new additional dead trees to 3 per acre to reduce the chance of bark beetle buildup. See the section titled "Project Design Feature - Wildlife Trees, Snags, Down Wood" in Chapter 2.

Actions That May Result From This Analysis

Based on the analysis provided in this environmental assessment, the BLM Field Manager for the Umpqua Field Office, Coos Bay District, may decide whether to proceed with thinning in the LSR and GFMA land use allocations, with conifer restoration of alder stands in the LSR and GFMA, and with other habitat treatment projects as described in Chapter 2.

The Field Manager must also determine if the selected alternative would or would not be a major Federal action significantly affecting the quality of the human environment. If the Manager determines it would not significantly affect the quality of the human environment, then the manager can prepare and sign a Finding of No Significant Impact (FONSI).

If the Manager determines that the selected alternative would significantly affect the quality of the human environment, then the projects must either be dropped, modified or an Environmental Impact Statement (EIS) and a Record of Decision (ROD) must be prepared and signed before the North Coquille Density Management project can proceed.

CHAPTER 2 – ALTERNATIVES INCLUDING THE PROPOSED ACTION

NO-ACTION ALTERNATIVE

Under this alternative, the project area would receive no treatment in the foreseeable future. There would be no thinning to reduce densities in overstocked stands. There would be no restoration of conifers on sites currently occupied by red alder stands. Proposed road construction, improvement, renovation, or decommissioning would not occur.

PROPOSED ACTION - Thin overstocked conifer stands; convert red alder stands back to conifer through a combination of conifer release and conifer regeneration.

Project Treatment Acres and Location

The Proposed Action units totaling approximately 1054 acres are located in Township 26 South, Range 10 and 11 West, Willamette Meridian, as shown in the table below. This is in the North Coquille subwatershed, with some overlap into the Hudson Creek and Alder Creek Drainages. The Project area is approximately 10 miles northeast of Coquille, Oregon.

Table 2-1: Summary of Project Area and Locations

Sale Name	No. of Units	Est. DMT/CT Acres	Est. Conifer Restoration Acres	Total Acres	Township	Range	Section
Fruin Moon DMT	11	403	7	410	T. 26 S.	R. 10 W.	7,8,16,17,19
Moon 25 Thinning	13	590	54	644	T. 26 S. T. 26 S.	R. 10 W. R. 11 W.	19,30 25
Project Total	**24**	**993**	**61**	**1,054**			

Project Design Feature - Prescriptions

General Description of Silvicultural Treatments

The Proposed Action is to implement timber harvest activity to treat approximately 1054 acres of BLM administered lands. This action would include: commercial thinning (CT) of conifer stands in the General Forest Management Area (GFMA), density management thinning (DMT) of conifer stands in the Late Successional Reserve (LSR) and Riparian Reserves (RR), and regeneration harvest (RH) of red alder stands for restoration back to conifer stands in the LSR, RR, and GFMA. Alders competing with releasable conifers would be cut in all land use allocations. The treatments would be implemented and funded through timber sales tentatively planned for fiscal year 2004. The proposed density management thinning/commercial thinning units vary in size from 11 to 280 acres. See Table 2-2 below for more details.

Table 2-2 below summarizes the acres by land use allocation and silvicultural treatment. The conifer restoration portion of this action would occur on approximately 9 red alder patches that vary in size from 2 to 22 acres and total about 61 acres.

The unit numbers in Table 2-2 and other tables in this document correspond to stand exam unit numbers. Unit 41 was split as 41A and 41B respectively between Moon 25 Thinning and Fruin Moon DMT. The “H” after a unit number refers to an alder conversion unit within the thinning unit.

Units 1 and 2 are located within the GFMA and RR land use allocations with 316 and 168 acres respectively. Units 17 through 43 are located in the LSR land use allocation with a total of 570 acres. The LSR overlaps RR acres.

Table 2-2: Estimated Acres of Thinning and Conifer Restoration by Land Use Allocation

Sale Name	Unit No.* **	Thinning			Conifer Restoration			Total Unit Acres
		LSR	RR	GFMA	LSR	RR	GFMA	
Fruin Moon DMT	17	11	9	0	0	0	0	**20**
	18	22	17	0	0	0	0	**39**
	19	26	9	0	0	0	0	**35**
	20	68	31	0	0	0	0	**99**
	21	5	6	0	0	0	0	**11**
	22	40	26	0	0	0	0	**66**
	23	17	7	0	0	0	0	**24**
	38	12	11	0	0	0	0	**23**
	39	9	34	0	0	0	0	**43**
	39H	0	0	0	5	2	0	**7**
	41B	28	15	0	0	0	0	**43**
Sale subtotal		**238**	**165**	**0**	**5**	**2**	**0**	**410**
Moon 25 Thinning	1	0	73	84	0	0	0	**157**
	1H(2)	0	0	0	0	2	6	**8**
	2	0	80	200	0	0	0	**280**
	2H(4)	0	0	0	0	13	26	**39**
	41A	72	46	0	0	0	0	**118**
	42	14	6	0	0	0	0	**20**
	43	11	4	0	0	0	0	**15**
	43H(2)	0	0	0	5	2	0	**7**
Sale subtotal		**97**	**209**	**284**	**5**	**17**	**32**	**644**
PROJECT TOTAL		**335**	**374**	**284**	**10**	**19**	**32**	**1,054**

* Unit numbers correspond to stand exam unit numbers units.
** Unit number followed by H refers to alder unit. (2) indicates number of multiple alder units

Table 2-3 projects post-harvest stand data if thinning prescriptions were applied in 2004. Stand Projection System (SPS) modeling was used to project post-harvest data. Prescriptions are based on thinning to a post-harvest number of conifer trees per acre to reach an RD level at or below self-thinning. The prescriptions used baseline pre-harvest stand data from Table 3-1 in the Affected Environment chapter.

Table 2-3: Comparison of stand data prior to thinning versus post-harvest thinning using SPS modeling.

Sale Name	Unit	Ac.	Conifer trees/ac. (average)		Conifer DBH (average)		Conifer BA		Conifer RD	
			Pre-harvest	Post-harvest	Pre-harvest	Post-harvest	pre	post	pre	post
Fruin Moon DMT	17	20	287	80	11.0	14.5	191	92	58	24
	18	39	183	80 SW 60 NE	12.5	16.0 16.6	157	111 89	44	38 22
	19	35	184	60	13.1	17.4	174	98	48	23
	20	99	211	80	12.2	16.6	177	118	52	29
	21	11	Confr/RA	80	~12	~15	NA	NA	NA	NA
	22	66	216	80 SW 60 NE	12.1	16.7 17.6	168	120 101	49	29 24
	23	24	270	80	10.3	15.1	157	99	49	25
	38	23	169	80	11.2	15.1	116	99	35	25
	39	43	299	60	10.6	16.1	183	87	57	22
	39H	7	Alder	NA	NA	NA	NA	NA	NA	NA
	41B	43	233	60	11.7	18.0	179	110	58	26
Moon 25 Thinning	1	157	156	60	16.7	21.6	263	154	57	33
	1H(2)	8	Alder	NA	NA	NA	NA	NA	NA	NA
	2	280	151	80	16.3	19.2	220	159	49	36
	2H(4)	39	Alder	NA	NA	NA	NA	NA	NA	NA
	41A	118	233	60	11.7	18.0	179	110	58	26
	42	20	221	80	11.1	14.3	150	89	59	24
	43	15	218	80	11.9	16.7	178	124	52	30
	43H(2)	7	Alder	NA	NA	NA	NA	NA	NA	NA
TOTAL		**1,054**								

H indicates alder stand
(4) indicates # of multiple units
BA = Basal Area of conifer stems (sq. ft. per acre at DBH)
DBH = Diameter Breast Height
RD = Relative Density (BA per acre divided by the square root of the average diameter) See Table 2-4

Commercial Thinning Prescription (CT)

Commercial thinning is a harvest practice applied to conifer stands intended to redistribute the growth potential of a stand to individually selected trees. In a commercial thinning, surplus trees are removed from the site and used for commercial wood products. The standing trees left on the site can then take advantage of the increased growing space resulting in a concentration of wood production on those remaining trees (Smith 1962 pg 29). In commercial thinning, the decisions of when and how much to thin, and which thinning technique would be used are based on stand development objectives and market conditions at the time of the thinning The conifer volume, but not the hardwood volume, cut from the GFMA counts toward meeting the Allowable Sale Quantity (ASQ) as described in the RMP.

The thinning technique that would be applied to the stands on GFMA land in this project is commonly called "thinning from below." Other names for this technique include low thinning, ordinary thinning, and German thinning (Smith 1962 pg 64, 65). The GFMA stands would be thinned from below by cutting the overtopped, intermediate, and the smaller co-dominant Douglas-firs and red alders. Other species of conifers and hardwoods may be retained to provide species, spatial and structural diversity. All alder trees would be cut in areas where there are releasable conifers that are now or will attain merchantable size within the next 20-years. The Douglas-firs and red alders that would be left are the dominant trees and the larger co-dominant trees. They would be distributed across the site so as to rapidly capture the growing space made available by the thinning. The leave trees would be those trees with the largest crowns, and the largest diameters relative to the other trees in the immediate area of each leave tree. Approximately 60-80 trees/acre would be left in the overstory; however, the prescription for individual stands will vary depending on stand age and initial density. The prescribed trees per acre and tree spacing would coincide with a Relative Density (RD) of approximately 35. This post treatment relative density would leave a stand that fully occupies the site and would be considered a light thinning (Hayes et al. 1997). Post treatment canopy closure would be greater than 60%

Relative Density (RD) is the Basal Area (stem area at dbh) per acre divided by the square root of the average diameter. Relative density (RD in Table 2-4 below) expresses the density of the trees relative to a theoretical maximum density. RD increases for a given number of trees per acres as stem diameters increase. RD decreases for a given stem diameter if the number of trees per acre decrease. Stands with an RD 55 are at the lower threshold of imminent competition mortality and have small live crowns that cover only the upper 30-35% of the stem. An RD of 35 is considered full site occupancy. As depicted in Table 2-3, all stands in the project area exceed this density. A site with an RD of 25 to 35 is considered less than fully occupied and capable of understory development (Hayes et al. 1997). Stands with an RD 15 are just at the threshold of crown closure and have massive live crowns reaching all of the way down to the ground. The stands being considered for commercial thinning are overstocked and are in or are approaching the stem exclusion phase of stand development that results in poor vigor and mortality.

Table 2-4: Relative Density

Relative Density	Stand Condition
15	Crown Closure
25	On set of competition
35	Full site occupancy
40	Self thinning, Maximum gross production
55	Mortality

Density Management Thinning Prescription (DMT)

Density management, in the context of the proposed projects managing LSR and Riparian Reserves, is also a thinning applied to immature stands to redistribute the growth potential. Density management differs fundamentally from conventional commercial thinning in that the intent of treatment is to redirect the stand development trajectory to provide desired stand structural conditions and habitats. The thinning technique that would be used is thinning from below by cutting the overtopped, intermediate, and the smaller co-dominant Douglas-firs. In some units, red alders would also be thinned from below, and additional alders would be cut where they are competing with releasable conifers. Other species of conifers and hardwoods would be retained to provide species, spatial and structural diversity. The Douglas-firs, and in some units red alders, that would be left are the dominant trees and the larger co-dominant trees distributed across the site so as to rapidly capture the growing space made available by the thinning. The leave trees would be those trees with the largest crowns and the largest diameters relative to the other trees in the immediate area of each leave tree. A variety of techniques would be used to provide near term and future canopy gaps that would add to the overstory and understory diversity. Generally, conifer trees greater than 20 inches in diameter would be reserved from harvest.

The LSR units in the proposed projects have either been pre-commercial thinned or had a pre-commercial thinned character when they were young. Consequently, these stands should tolerate a moderate or heavy initial thinning entry with a low risk of blowdown. Moderate and heavy thinning is proposed to obtain rapid sustained diameter growth. Tappeiner and coauthors (1997) observed old-growth trees often averaged 20-inches dbh at age 50 and 40 inches at age 100. This individual growth rate is higher than observed in plantations today. By running stand development simulations, Tappeiner coauthors (1997) found 31 to 46 trees per acre at age 20-years resulted in the better fit to observations made in old-growth stands with respect to the estimates of total densities and densities of the larger diameter classes. Franklin and Hemstrom (1981) noted that old-growth stands can be in an open grown condition during their first 40-years and sufficiently open to allow successful establishment of shade intolerant trees for 100 years. This suggests that old-growth stands developed with low density, regenerated over time, and had little inter tree competition. The implications are that well-stocked plantations and young well-stocked wild stands are not on the same stand development trajectory followed by the old-growth stands currently on the landscape.

Setting these young stands on a trajectory to develop into old-growth would require a disturbance of sufficient intensity to increase growing space to allow attainment of large diameter trees that in turn can eventually become large diameter snags and down wood. Ideally, the trees that would compose the future old-growth stand would be about 20-inches dbh by stand age 50 years and many would be 40 inches dbh by stand age 100 years. The disturbance would also need to provide a number and size of gaps between overstory trees to allow establishment of a younger understory stand of tolerant tree species and to facilitate development of deep multi-layered canopies. The rarity of Coast Range old-growth with close-spaced annual rings lain down during the first 50 to 100 years suggests either extensive repeated fires reduced the seed sources; (Franklin; Hemstrom 1981) or, well-stocked to overstocked conditions early in the life of a stand may not be conducive to long life and development into old-growth. While the reasons are not known, it is possible that well-stocked 20-year old stands rarely survive to become old-growth because they are at greater risk of blowdown during extreme storms (Oliver; Larson 1990, pg. 83) or their high canopy continuity facilitates spread of crown fires compared with stands that were understocked at a young age. Young Douglas-fir stands are particularly susceptible to fire during their first 75 to 100 years. Alternately, partial burns could account for the low stocking condition and age ranges observed by counting and measuring old-growth tree rings (Franklin; Hemstrom 1981).

Prescription for EA Units in T26S, R10W, WM., all of which are Riparian Reserve and/or LSR land use allocation: Some stands in the density management portion of the proposed project would be thinned to 60 trees per acre while others would be thinned to 80 trees per acre (Table 2-3). Retaining 60 to 80 trees per acre would insure that there is sufficient stocking to eventually produce fully stocked old-growth conditions with sufficient additional trees for both near term and future snag and down wood recruitment. Since the pre-treatment relative densities for these stands varies from stand to stand, thinning to a tree/acre target rather than a single RD target results in a range of post-treatment relative densities from RD 22 to RD 30. Thinning to a RD of 25 and less is a heavy thinning, whereas thinning to a RD of 35 or more is a light thinning (Hayes et al 1997). This range of thinning intensities creates a range of growing space levels for the leave trees and a range of light levels reaching the understory plants on the forest floor across the project area. Thinning stands down to 35 RD and less would provide more growing space than is typically left following a conventional commercial thinning where stands are commonly thinned to a relative density between RD 35 and RD 45.

The prescription for units in T26S, R10W, to restore landscape scale diversity to more closely match the descriptions above, includes:

- Thin north facing slopes to a lower stocking level than the south facing slopes. This would result in the trees on the north facing slopes having larger crowns than trees on the south slopes. Also, observation shows thinning to a wide spacing, combined with normal post treatment random mortality, tends to create a more coarse-textured canopy than thinning to more a conservative spacing.
- Retain or thin through red alder patches except in EA unit 19. The alders are more common on the north facing slopes and near draws and less common on the south facing slopes and ridges. When these alders eventually die they will leave canopy gaps increasing the canopy texture roughness on the north aspects and lower slopes. Unit prescriptions to either retain all alders or to thin through the alders depends on whether there is a need to release conifers in the larger alder patches.
- Generally, cluster recruitment of snags and down wood on north aspects to create or enlarge canopy gaps. Generally, distribute recruitment of snags and down wood on south facing slopes. However, recruiting snags and down wood in clusters on south facing ridge lines would appropriately add to the restoring landscape level diversity by emulating the appearance of small burns.
- Leave streamside protection strips of red alders to meet hydrologic and aquatic objectives, and to contribute to landscape level diversity.

Prescription for the Riparian Reserve lands proposed for density management treatment in Section 25, T26, R.11W, W.M.:
The trees in the Riparian Reserve in this section are older and larger than those in the Riparian Reserve in T26S, R10W. The larger the average tree in a stand, the fewer trees per acre needed for that stand to meet a given RD. Unlike most all the land within T26S, R.10W in this proposed project, the stands in Section 25, T26S, R11W, were not pre-commercially thinned. Therefore, a conservative thinning entry is called for to avoid unduly increasing the risk of blowdown. Thinning the Riparian Reserve inside EA Unit 1 to approximately 60 trees per acre would result in a RD of 33, and thinning the Riparian Reserve in EA Unit 2 to approximately 80 trees per acre would result in an RD of 36. The prescription to restore landscape scale diversity to Riparian Reserve stands in T26S, R11W, includes:

- Thin the red alder along with the Douglas-fir retaining the dominant and larger co-dominant red alders. Cut all red alders in those locations where they are competing with releasable conifer. The alders are more common on the north facing slopes and near draws and less common on the south facing slopes and ridges. When these alders eventually die they will leave canopy gaps increasing the canopy texture roughness on the north aspects and lower slopes.
- Generally, cluster recruitment of snags and down wood on north aspects to create or enlarge canopy gaps. Generally, distribute recruitment of snags and down wood on south facing slopes.
- Leave streamside protection strips of red alders to meet hydrologic and aquatic objectives, and to contribute to landscape level diversity.

Conifer Restoration in upland LSR and GFMA

Conifer restoration is a series of treatments designed to replace a red alder stand with a conifer stand. Red alder would be converted on those alder stands growing on sites where conifer stands had been previously harvested (NFC WA, Appendix: Vegetation and Disturbance Processes, p. 9). Refer to Table 2-5 for the red alder prescriptions by unit.

The Coos Bay District of the Bureau of Land Management is guided by Timber Resources - Management Actions / Direction- Matrix (General Forest Management Area and Connectivity / Diversity Blocks) to "Plan harvest of marketable hardwood stands in the same manner as conifer stands….. Where hardwood stands became established following previous harvest of conifers, plan to re-establish a conifer stand on the site" (RMP ROD p. 53). Also, "Plan and implement silvicultural treatments inside Late-Successional Reserves to be beneficial to the creation of late-successional habitat" (RMP ROD p. 19).

Red alder stands would be cut and removed either in conjunction with the thinning operations, or as separate conifer restoration units. Removal of the red alder is necessary to establish conifers, which cannot survive in the shade of an alder canopy. After harvest the units would receive site preparation treatment and would be planted with conifers. Red alder stands that comprise too small an area to let enough light in to grow conifer would not be converted to conifer. The prescription for conifer restoration in upland LSR and GFMA includes:

- Reserve scattered individual healthy conifers that are dominant or can respond to release (releasable conifers are those conifers with height-to-diameter ratios of 100 or less that have a live-crown to tree height ratio of 30 or greater (Emmingham et al 2000 p. 22).
- Thin small dense clumps of conifer occurring within some of the red alder stands to improve growth and vigor of the more dominant trees.
- Remove red alder as a part of site preparation to obtain planting spots for conifers. Protection of the larger conifers that will respond to release (less than 40 trees per acre) is important, however, density management of clumps of conifers should occur conforming to levels of the nearby commercial thinning prescriptions.
- Retain existing coarse woody debris.
- Additional site preparation, in order to be able to plant sufficient quantities of conifers and increase their chance of survival, may be needed depending on post-harvest site conditions. The most effective method(s) should be used to achieve desired goals, of protecting existing conifers, coarse woody debris and setting back undesirable vegetation. Options include: slash concentration burning, machine/hand piling/burning, and chainsaw scalping. Broadcast burning is possible if other desired conditions can be maintained or adverse effects mitigated.

Conifer Restoration in the Riparian Reserve

Refer to Table 2-5 for the red alder prescriptions by unit. The following is a summary of the recommendations to restore conifers to the riparian areas:

- Removal of red alder is proposed, except those alder retained to provided shading and bank stability in the streamside buffer. This action is needed to provide plantable spots for the conifers as well as providing a means to fund conversion. Conifer density management would be concurrent with this activity.
- Site preparation may be necessary to set back anticipated vegetative competition.

Table 2-5: Prescriptions for Silvicultural Treatment

EA Unit	Ac.	Land Use Alloc.	Silvicultural Treatment	LSR Texture Objective	Overstory Conifer Target	Red Alder Treatment And Gap Creation
1	157	GFMA	Commercial Thinning	N.A.	60 tpa	Thin alders.
1H (2)	8	GFMA	Conifer Restoration	N.A	Leave good conifer	Cut all alder except those needed for stream protection.
2	280	GFMA	Commercial Thinning	N.A	80 tpa	Thin alders.
2H (4)	39	GFMA	Conifer Restoration	N.A	Leave good conifer	Cut all alder except needed for stream protection.
17	20	LSR	Density Mgt.	Rough	80 tpa	Retain all alders.
18	39	LSR	Density Mgt.	Rough NE aspect Smooth SW aspect	60 tpa NE 80 tpa SW	Thin alders or cut to release conifer.
19	35	LSR	Density Mgt.	Rough with gaps	60 tpa	Cut all alder except those needed for stream protection.
20	99	LSR	Density Mgt.	Rough	80 tpa	Thin alders or cut to release conifer.
21	11	LSR	Density Mgt.	Rough	80 tpa	Thin alders or cut to release conifer.
22	66	LSR	Density Mgt.	Rough NE aspect Smooth SW aspect	60 tpa NE 80 tpa SW	Thin alders or cut to release conifer.
23	24	LSR	Density Mgt.	Smooth	80 tpa	Retain all alders.
38	23	LSR	Density Mgt.	Smooth (rough texture already in place on N. facing slope)	80 tpa	Thin alders or cut to release conifer. Canopy gaps are provided by brush in the draws.
39	43	LSR	Density Mgt.	Rough	60 tpa	Thin alders or cut to release conifer.
39H	7	LSR	Conifer Restoration	N.A.	Leave good conifer	Cut all alder except needed for stream protection. Plant with conifer.
41A	118	LSR	Density Mgt.	Rough	60 tpa	Retain alders and alder patches < ¼ acre. Thin alder or release conifer if patch > ¼ acre.
41B	43	LSR	Density Mgt.	Rough	60 tpa	Thin alders or cut to release conifer.
42	20	LSR	Density Mgt.	Smooth	80 tpa	Retain alders and alder patches > ¼ acre. Thin alder or release conifer if patch > ¼ acre.
43	15	LSR	Density Mgt.	Smooth	80 tpa	Cut alder to release conifer.
43H (2)	7	LSR	Conifer Restoration	N.A.	Leave good conifer	Cut all alder except needed for stream protection. Plant with conifer.
	1,054					

Survey and Manage/Special Status Species

Guidelines for management for any special status species or Survey and Manage species would be implemented either under the *Record of Decision for the Survey and Manage Final Supplemental Environmental Impact Statement* (USDA-USDI. 2003) or under the *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (USDA-USDI. 2001), whichever is in effect at the time the Proposed Action would be implemented. Management recommendations would be implemented to maintain local persistence of special status species, or Survey & Manage species. Management guidelines include S&M category A, B, C, D, E sites. If certain S&M fungi species requiring protection are encountered incidentally while surveying for bryophytes, lichens, or vascular plants, the known site would be protected using known site management recommendations developed by interdisciplinary team on the Coos Bay District (See "Applications of Known Site Management Recommendations for Survey and Manage Nonvascular Species on the Coos Bay District"). These recommendations are based on criteria for protection of such sites as required by the Northwest Forest Plan.

Project Design Feature - Harvest Methods

1. In areas that could be harvested with ground-based equipment, generally slopes less than 35%, a cut-to-length harvester and forwarder would be required. Cut-to-length equipment would be required to travel on slash deposited by the harvester to avoid exposed mineral soil and to minimize the number of passes to the greatest extent possible. To the extent practical, some old existing skid trails would be utilized as forwarder roads and have multiple passes as the primary travel path. A cut-to-length harvester and forwarder would not be permitted to travel through riparian areas such as stream channels or wetlands.
2. A crawler tractor/skidder could be used in conjunction with road construction to skid logs within the road construction right-of-way.
3. Trees in skyline cable yarding corridors would need to be cut to facilitate operating a cable yarding system. Trees in thinning areas would be directionally felled to the lead of cable yarding corridors.
4. Trees that must be felled within the no-harvest stream channel buffer to provide cable yarding corridors would be felled toward the stream channel and retained on site to provide bank armoring and coarse woody debris.
5. Trees in thinning units would be required to be limbed, topped, and cut into log lengths not exceeding 40 feet prior to yarding.
6. Conventional falling with chain saws may be limited from March 31 to July 1 to reduce bark damage during high sap flow.
7. Within safety standards, harvest trees would be directionally felled away from roads, posted boundaries, orange painted reserve trees, riparian areas, and snags.
8. Generally, terrain > 35%, or terrain inaccessible to a cut-to-length harvester/forwarder, would be designated as skyline cable logging areas. In cable yarding areas, a skyline cable system with 75 feet lateral yarding capability and one-end log suspension would be required.
9. Skyline corridors would be required to be a maximum of 12 feet wide. The location, number, and width of cable yarding corridors would be specified prior to yarding, with natural openings used as much as possible. Distance between skyline corridors would be required to be a minimum of 150 feet apart at the unit edge where feasible. Skyline corridors would be required to be perpendicular to streams as much as possible to minimize the length of the stream where logs would cross.
10. Where feasible, the skyline corridors would be spaced to avoid creating small clearings that would occur from multiple corridors extending out radially from landings.
11. Lift trees and intermediate supports would be required where needed to help attain desired log suspension.
12. Cable yarding may be restricted between March 31 and July 1 to minimize damage to residual trees during periods of high sap flow.
13. Hauling on dirt-surfaced roads would be allowed only between June 1 and October 15 unless dry conditions extend the hauling season.
14. A helicopter would be required to yard logs in those areas where road access is not economically infeasible, or where stream protection or other protection needs preclude the use of ground-based and cable logging systems.

The following table shows the estimated harvest system acres for the project.

Cut-to-length harvester/forwarder	150 acres	(14%)
Skyline cable	844 acres	(80%)
Helicopter	60 acres	(6%)

Some areas have gentle slopes and could be harvested with either a cut-to-length/forwarder system or with a skyline cable system. The road and landing construction acres are included in the unit acres and could be completed with ground-based equipment such as crawler tractors, skidders, or cut-to-length systems. Some areas are inaccessible without extensive road construction and are planned for helicopter yarding.

Table 2-6: Estimated Harvest System acres:

Sale Name	Unit No.	Cut-to-length harvester	Skyline cable	Helicopter	Unit Acres
Fruin Moon DMT	17	0	20	0	20
	18	0	39	0	39
	19	15	20	0	35
	20	30	69	0	99
	21	0	11	0	11
	22	0	66	0	66
	23	0	24	0	24
	38	10	13	0	23
	39	10	33	0	43
	39H	0	7	0	7
	41B	0	43	0	43
Moon 25 Thinning	1	41	116	0	157
	1H(2)	4	4	0	8
	2	30	190	60	280
	2H(4)	0	39	0	39
	41A	0	118	0	118
	42	0	20	0	20
	43	5	10	0	15
	43H(2)	5	2	0	7
TOTAL		**150**	**844**	**60**	**1,054**

Project Design Feature - Areas Reserved from Harvest

1. The no-harvest buffer areas adjacent to streams in the conifer thinning units would be variable to protect stream banks, unstable areas, inner gorges, floodplains, and streamside riparian vegetation. The leave trees in the thinned stands next to the variable width no-harvest buffer would augment the steam bank buffer by providing shade and protection against erosion. Stream buffers could be expanded on a site-specific basis to provide additional stream protection, as identified by resource specialists. Expanded no-harvest buffers may include, but are not limited to, such places as fish bearing streams, wetlands, and unstable areas. The variable buffer width would be 20 feet or greater as recommended by the North Coquille Watershed Analysis for protecting stream bank stability.
2. The no-harvest buffer width adjacent to streams in *conifer restoration units* would be adjusted on a site-specific basis. Functionally, the widest forested buffer needed to protect stream channel function is a width equal to half the height of the overstory trees on the site at the time of treatment (NFC WA, Ch. 16, p. 20). The necessary buffer width to provide adequate stream shading would be determined by resource area hydrologists. Buffer width would depend on stream size, aspect, existing vegetation, and local topography. A no-harvest buffer width would be derived from predicting existing shade patterns at sites along each stream reach, then measuring or estimating the distance of shade-providing trees.
3. Where S&M species discovery sites occur, in or adjacent to unit boundaries, high priority sites would be managed in accordance with appropriate guidelines.
4. Boundaries, spur roads, landings, and yarding corridors would be designed to avoid and protect large residual trees whenever possible.
5. Snags would be reserved from cutting except those that must be felled to meet safety standards. Any snags felled or accidentally knocked over would be retained on site.
6. All existing down logs in Decay Classes 3, 4, and 5 would be reserved from cutting and removal.
7. Within conifer restoration units, releasable conifers would be reserved from cutting.
8. Within thinning units retain scattered bigleaf maple, myrtle, and minor species of conifers. Within conifer restoration units, individual large bigleaf maple and myrtle would be reserved for habitat diversity provided

that it is compatible with establishing a conifer stand. Stump sprouted maples and myrtles that are reserved would be cultivated to encourage large single stem trees.

9. At least 10 percent of the project area would be left un-thinned as a recommended desired condition in the *South Coast-Northern Klamath Late-Successional Reserve Assessment.* (1998, p. 82).

<u>Project Design Feature - Site Preparation and Burning</u>

General Fuels Treatment for All Project Areas

1. <u>Falling</u>: Directional falling away from all project area boundaries, mainline roads or roads not planned for closure or decommissioning, property lines, and managed known sites for S&M species would be required.
2. <u>Landing Pullback</u>: Require landing pullback from around all cable landings prior to the removal of equipment. Material should be placed on top of the existing landing. Pullback any material that results from sweeping debris off of the landing.
3. <u>Landing and Roadside Hazard Reduction</u>: Fire hazard reduction measures would be done on all landings and along roads within the project area that are not identified for closure or decommissioning after harvest operations.
    - If a ground based processor is used, ensure that, as much as is possible, the operator falls trees away from roads to reduce the necessity for and amount of roadside hazard reduction measures.
    - Hand or machine pile all slash ½” to 4" in diameter within 20 feet each side of those roads within harvest areas not identified for closure or decommissioning after harvest.
    - Cover piles of slash with black plastic.
    - Landing piles resulting from logging operations would be burned during late fall and winter months. Piles would need to be located a sufficient distance away from leave trees to minimize scorching when burning.

Alder Conversion Project Areas

<u>Site Preparation</u>

Anticipated post-harvest fuel loadings for regeneration harvest units would require some form of fuels treatment to prepare the sites for planting. Multiple site preparation options exist based upon anticipated post-harvest site conditions. The most appropriate and effective method or combination of methods would be used to: (1) prepare the site for planting at approximately 9' x 9' spacing or 530 trees per acre, (2) reduce the amount of or retard the re-establishment of competing vegetation, (3) reduce hazardous fuels (Table 2-7).

<u>Hand /Machine Piling and Burning</u>

Existing undesirable vegetation (brush, undesired non-commercial hardwoods, prostrate and damaged conifers) would be slashed during or after harvest. Then all slash ½” to 4" in diameter would be hand or machine piled. Piled slash would be covered with black plastic and burned during the fall or early winter months. Machine piling would be an acceptable option on units where slope and soil conditions allow for operation provided project design features are met. Jackpot/swamper burning would be an allowable substitute for hand piling where fuels are unevenly distributed in spotty but heavy concentrations. Jackpot/swamper burning involves covering heavy fuel concentrations with plastic and then burning those areas during the fall/early winter months. Swampers would attend to the burning and create additional planting spots as needed by throwing (swamping) additional slash from the surrounding area into the burning concentrations. Additional saw work would be done as needed to facilitate swamping.

<u>Broadcast Burning</u>

Hand or aerial ignition would be done on units under spring-like conditions provided other desired conditions can be maintained. Hand fire lines would be constructed to mineral soil with water bars on the exterior of unit boundaries. One hundred percent mop up of burned areas would be required.

Table 2-7: North Coquille DM/CT Site Preparation Prescriptions

Unit No.	Unit Total Acres (No. of sub-Units)	Treatment(s)
1H	8 (2 units)	Hand or Machine pile, cover & burn
2H	39 (4 units)	Hand pile, cover & burn
39H	7 (1 unit)	Hand pile, cover & burn
43H	7 (2 units)	Hand or Machine pile, cover & burn
	61 (9 units)	

Fire Facilities

Improvements to the existing concrete helicopter pond located in T26S, R10W, Section 30, would be made by removing trees along the flight path and renovating the road access. This would enhance safety clearances for the ingress and egress of emergency fire suppression helicopters and improve the road access for fire engines and water tenders. The helicopter pond treatment would involve the cutting and removal of marketable conifer and hardwood trees from areas around the pond. Unmarketable trees and brush located in the area to be cleared around the helicopter pond would be cut, piled, covered with plastic, and burned at a suitable time. Renovation on the 26-10-30.7 road would consist of brushing, grading, addition of maintenance rock where needed, and ditch line maintenance.

Project Design Feature - Fisheries/Aquatic Resources

1. Within safety standards, all harvest trees would be directionally felled away from riparian areas. Trees that must be felled within the no-harvest buffer to provide cable yarding corridors would be felled toward the stream channel and retained on site to provide bank armoring and coarse woody debris.
2. After completion of yarding, one co-dominant conifer tree per 100 feet of stream length would be felled from the Riparian Reserve into the streams in Units 39 and 41B. The felled trees would remain on site to provide short-term large woody debris.
3. Logs would be cable yarded away from all streams whenever possible. In areas where this is not possible consideration would be given for leaving patches of un-thinned forest to increase habitat diversity. This may be practical in areas such as points where Riparian Reserves intersect near stream confluences, or in areas where damage to stream, riparian buffer, or existing habitat features would be excessive in relation to the potential benefits to be gained from the thinning operation.
4. When yarding across live streams, logs would be fully suspended so that the logs would clear both stream banks.
5. Hauling on dirt-surfaced roads would be restricted between October 15 and June 1 unless dry conditions extend the hauling season.

Project Design Feature - Soil

1. A cut-to-length harvester and forwarder would be permitted only when soil moisture content is below the 25% plastic limit, typically mid-summer to early fall. Based on review of plastic limits of the probable soils within these units, a maximum operational allowable moisture content will be 25% as measured by the Authorized Officer using a “Speedy” moisture meter or an equivalent method. Soil moisture above 25% would require the discontinuation or limitation of ground-based operations in order to prevent excessive compaction to the soils and/or destruction of the soil column. Ground based operations with a cut-to length harvester/forwarder would require ample slash under the operating equipment so as not to expose mineral soil. Repeated passes over lateral trails would be kept at a minimum. Existing compacted skid roads would be utilized to the extent practical.

Project Design Feature - Wildlife Trees, Snags, Down Wood

1. Design or relocate boundaries, spur roads, landings, and logging corridors to avoid and protect large residual trees and snags whenever possible.
2. In units that allow the purchaser to select the trees to be removed, the contractor should be made aware of options that could benefit wildlife from individual tree selection. This would include leaving trees that contain bird or mammal nests. This would include nests or cavities that may be currently in use or have been previously used by birds or mammals. The contractor should also be allowed to leave low value trees that have damaged tops or other abnormalities that may provide a valuable wildlife habitat component, while having little effect on the results of the thinning operation.
3. Within safety standards, all trees would be directionally felled away from snags.
4. The numbers of Douglas-fir trees greater than 12 inches dbh that would be killed to meet immediate snag and down wood recruitment needs would be three trees per acre or less. This would limit the risk of building up Douglas-fir bark beetle populations (Hostetetler; Ross 1996). These trees would be recruited from the LSR and RR. Additional trees would be topped by cutting, blasting or girdling selected trees at approximately mid-crown. This would allow rot columns to start in these live trees. Trees topped at mid-crown would eventually die providing additional snag recruitment while avoiding an immediate pulse of mortality that could increase the risk of Douglas-fir bark beetle build-up.
5. Douglas-fir snags and down wood would be recruited from among the lower half of the diameter classes of the leave trees. Selecting trees from this range would provide some near term habitat benefit without delaying attainment of snags greater than 24 inches dbh in the future. Killing the largest trees in the stand would have the deleterious effect of eliminating the trees best adapted to the site. Snags would be created from cutting, blasting or girdling selected trees below the lowest live branch. Fresh blowdown trees and snags resulting from logging damage inside the units would be counted toward meeting the down wood recruitment targets if they meet or exceed the size requirements.
6. Conifer inoculation with heart rot fungi would facilitate recruitment of suitable trees for primary cavity excavators decades into the future. The fungi that would most likely be injected into the trees selected to provide future cavity habitat are *Phellinus (Fomes) pini* commonly called white speck or red ring rot, *Fomitopsis officinalis* commonly called quinine conk, and *Fomitopsis (Fomes) pinicola* commonly called redbelt conk. Other heart rot fungi may be considered based on recommendation of people doing research on snag creation with fungi, mycologists and forest pathologists. Inoculation would be accomplished post harvest with a procurement contract.
7. Forgo near term recruitment of new Douglas-fir snags and down logs near known laminated root rot centers.
8. Modify timing and extent of snag and down log recruitment in units with recent blowdown or units near recent blowdown.
9. The estimated numbers of trees that would be recruited for snags and down wood are shown in Table 2-8.
10. The pond adjacent to Unit 19 would be protected with a one site-potential-tree buffer (220’feet) to avoid changing the micro-climatic conditions of the area.

Table 2-8: Estimated Amount of Snag and Down Wood Recruitment

EA Unit No.	Acres	Material to Recruit	Top conifers below live crown	Top conifers mid-crown [1]	Down wood recruitment [2]	Total conifers/ ac to be recruited under timber sale
17[3]	20	DF/ ac dbh range	0	0	3 12-14	3
18	39	DF/ ac dbh range	1 15-16	1 15-16	2 12-16	4
19	35	DF/ ac dbh range	0	1 15-18	3 13-17	4
20	99	DF/ ac dbh range	1 15-16	1 15-16	2 15-16	4
21	11	DF/ ac dbh range	0	1 15-16	3 12-15	4
22	66	DF/ ac dbh range	1 15-17	1 15-17	2 12-17	4
23	24	DF/ ac dbh range	1 15-16	1 15-16	2 12-16	4
38	23	DF/ ac dbh range	0	1 15-16	3 12-16	4
39	43	DF/ ac dbh range	1 15-16	2 15-16	1 12-16	4
41B	43	DF/ ac dbh range	1 16-18	1 16-18	2 12-18	4
1	73[4]	DF/ ac dbh range	0	2 18-20	2 18-20	4
2	80[4]	DF/ ac dbh range	0	2 16-20	2 16-19	4
41A	118	DF/ ac dbh range	1 15-18	1 15-18	2 15-18	4
42[3]	20	DF/ ac dbh range	0	0	2 12-14	2
43	15	DF/ ac dbh range	1	2 15-16	2 12-16	5

[1] These trees would not immediately die, and so would not count in the near-term CWM levels.
[2] Includes trees to be felled every 100 feet of stream length into or over streams in units 39 and 41B.
[3] Delay snag recruitment until trees reach a larger size.
[4] Riparian Reserve

Project Design Feature - T&E Species

1. Units within ¼ mile of a northern spotted owl core area would require seasonal restrictions from March 1 through June 30.
2. Helicopter and cable logging units with all-season access within ¼ mile of either an occupied site or un-surveyed suitable habitat for marbled murrelets may require seasonal restrictions from April 1 through August 5 and daily timing restrictions from August 6 through September 15. Daily timing restrictions allow any potentially disturbing activities to occur only from 2 hours after sunrise to 2 hours before sunset.

3. Helicopter use would not be allowed within ½ mile of an occupied owl or murrelet site or un-surveyed suitable murrelet habitat during seasonal restrictions and daily timing restrictions.
4. If Sensitive, Threatened, or Endangered plant and animal species are found in the sale units, management guidelines for the species will be implemented. Timber sale contracts would include a special provision that includes management guidelines for: T&E species, occupied marbled murrelet sites, federal proposed, federal candidate, Bureau sensitive or State listed species protected under BLM Manual 6840, and active raptor nests.

Table 2-9 below summarizes the seasonal restrictions and daily timing restrictions of each unit for various harvest operations.

Table 2-9: Seasonal Restrictions

- Seasonal Operating Restrictions for NSO and MAMU are based on disturbance only, no suitable habitat removal
- Daily Timing Restriction (DTR) for marbled murrelets work would occur no earlier than 2 hours after sunrise and no later than 2 hours before sunset. Restrictions are mandatory unless stated otherwise.

Activity	**Reason for Restriction**	**Unit or road work affected**	**Restricted Dates**	**Dates Restrictions in Effect**											
				J	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Road renovation, improvement, construction	Erosion Sedimentation	Road work with exposed soil	Rainy season, generally Oct. 15 - June1	>	>	>	>	31					15	>	>
Conventional tree falling	Tree bark damage	All units	April 1 thru June 30				1	>	30						
Cut-to-length harvester and forwarder	Tree bark damage.	Moon 25 CT 1,2	April 1 thru June 30				1	>	30						
	Potential soil damage in rainy season	Moon 25 CT 1,2	Soil moisture exceeds 25% plastic limit	Primarily rainy season, depending on soil moisture											
Cable yarding	Tree bark damage	All cable units	April 1 thru June 30				1	>	30						
Hauling on dirt roads	Potential road surface damage in rainy season	All units with dirt surface haul roads	Oct. 16 thru June 30	1	>	>	>	>	30				16	>	31
Tree falling, Yarding, Snag/CWM creation, In-stream projects	NSO nest or activity center within 0.25 mile of project	Units 17,18,23	No activity March 1 thru June 30			1	>	>	30						
			Extend thru Sept 30 if late nesting							>	>	30			
	Unsurveyed suitable MAMU habitat within 0.25 mile of unit	Some units or portions of units	No activity April 1 thru Aug. 5, then apply DTR until Sept. 16				1	>	>	>	5				
Tree falling, Yarding, Snag/CWM creation, In-stream projects	Occupied MAMU habitat within 0.25 mile of unit	Units 22,23	No activity April 1 thru Aug. 5, then apply DTR until Sept. 16				1	>	>	>	5				

Activity	Reason for Restriction	Unit or road work affected	Restricted Dates	Dates Restrictions in Effect											
				J	F	M	A	M	J	J	A	S	O	N	D
Road construction Road renovation Road decom (does not include blasting)	NSO nest or activity center within 0.25 mile of unit	Unit 23	No activity March 1thru June 30. (Recommended restriction)			1	>	>	30						
	Occupied MAMU habitat within 0.25 mile of unit	Unit 22,23	From April 1 thru Aug 5 apply DTR. (Recommended restriction)				1	>	>	>	5				
Helicopter use (does not include burning)	NSO nest or activity center within 0.5 mile of unit.	N.A.	No flights over/near nest stand Mar. 1 thru June 30 at a minimum*			1	>	>	30						
	Occupied or un-surveyed suitable MAMU habitat within 0.5 mile of unit.	Portions of units 1 & 2	No flights over habitat April 1 thru Aug. 5, then apply DTR thru Sept. 15				1	>	>	>	5				
Blasting (road or quarry work or habitat creation work)	NSO nest or activity center within 1.0 mile of project	N.A.	No activity Mar. 1 thru Sept. 30			1	>	>	>	>	>	30			
	Un-surveyed MAMU habitat within 1.0 mile of unit	N.A.	No activity April 1 thru Aug. 5, then apply DTR thru Sept. 15				1	>	>	>	5				
	Occupied MAMU habitat within 1.0 mile of unit	N.A.	No activity April 1 thru Sept. 15				1	>	>	>	>	15			
Burning Site prep	NSO nest or activity center within 0.25 mile of unit	N.A.	No activity Mar. 1 thru June 30* (Recommended restriction)			1	>	>	30						
Burning Site prep	Occupied MAMU habitat within 1.0 mile of unit	N.A.	From April 1 thru Aug 5 apply DTR (Recommended restriction)				1	>	>	>	5				
All Potentially Disturbing Activities	Bald Eagle active nests, roosts or habitual perches within 400m or 800m line-of-sight of unit**	N.A.	From Jan 1 thru Aug 31 for nests and perches November 15 thru Mar 15 for roosts	1	>	>	>	>	>	>	31				

* Restriction may be extended to September 30 based on site specific conditions

** No known eagle nest trees, perch trees, roost trees, or potential perch snags may be cut within 500 m of nests or roosts, no suitable habitat may be cut within 400 m of nests or roosts.

Project Design Feature - Noxious Weed Management

Roads will be brushed prior to any harvest or road construction activities to help prevent the spread of existing noxious weeds.

1. To prevent the introduction and spread of noxious weeds during the contract period, machinery and equipment would be washed prior to entering contract areas.
2. To help prevent the introduction or spread of noxious weeds, vehicles and equipment would be required to stay on road and landing surfaces, except equipment specifically designated to operate off of roads and landings (e.g. mechanical harvesters).
3. Any broom species or gorse on existing roads on BLM land used within this project area, would be treated manually, mechanically, or chemically prior to road construction or harvest activities. Treatments will allow for safe vehicle use while limiting contact with weeds/seeds.
4. To reduce the chance of noxious weeds becoming established, bare soil areas from landing and road construction would be mulched and seeded with native plant species, if available, and fertilized. If native seed is not available, bare road surfaces would be seeded with an approved District seed mix.

Project Design Feature - Roads

Access

Access to units for log hauling would be from existing asphalt roads, rock surfaced roads, or dirt surface roads. Some of the roads would require renovation or improvement. Construction of new rock surface or dirt surface roads and roadside landings would also be required to access some of the proposed units. Existing roads are controlled by BLM, or BLM has rights to use existing roads or construct roads under reciprocal road right-of-way agreements.

New Road Construction

New road construction would consist of approximately 1.0 miles of dirt or rocked surface roads and landings, constructed on or near ridge top locations. New roads would be designed and constructed utilizing proven methods of cut and fill slope soil stabilization. New roads would be single lane with turnouts. Some landing construction would consist of expanding or creating wide spots on existing roads to facilitate safe yarding and loading of logs. Cable and cut-to-length system landings are typically about 1/4 acre in size including the existing roadbed. No new roads or new landings would be constructed in Riparian Reserves. Some of the roadside landings to be constructed on or adjacent to existing roads would be in the upland portion of the RRs. All road construction would be required to be completed in the dry season. The new roads designated for closure as shown in the tables below would be decommissioned within a year after operations are completed. See Tables 2-10a and 2-10c below for summary and detail information respectively. Information regarding new road construction in the Upper North Coquille Tier 1 watershed can be found below in Table 2-10d. To reduce the chance of erosion on bare soil areas, new landing and road construction would be mulched and seeded with native plant species, if available, and fertilized. If native seed is not available, bare road surfaces would be seeded with an approved District seed mix.

Road Renovation/Improvement

Road renovation would consist of returning existing roads back to their original standard of construction. It could include clearing brush and/or trees along roadsides, cleaning or replacing culverts, restoring proper drainage of the road surface, grading, or other light maintenance. Road improvement would consist of raising the current standard of a road with some capital improvements to a higher standard. Improvements may include but are not limited to: adding culverts, surfacing existing dirt roads or adding rock to existing rocked roads. Rock surfaced roads would allow cable harvesting and hauling during the wet season. Road renovation or improvement would be required in the dry season for activities requiring soil displacement, such as culvert installation or replacement. See Tables 2-10a and 2-10b below for summary and detail information regarding road renovation/improvement.

Specific Roads:

- Road 26-11-25.0: Proceeding easterly from the Moon Creek Road, the 25.0 road would need a stream crossing. This is not a fish-bearing stream and has a tributary area of approximately 75 acres. Depending on grade, a 4 to 5 foot diameter culvert should suffice for the 100-year storm design. Some fill material would be needed and there are numerous locations further south along the road where the existing roadbed could be improved by excavating material for this fill.

- Road 26-10-20.0: The existing road crosses a headwall. Less than 100 feet of the roadbed would be widened to permit passage where a slide has removed the downhill edge of the travel surface to leave a virtually vertical 5-10 foot high slope, albeit for a very short section of the road. The existing width is 14 feet at this location but heavy vehicles would be at risk without some widening. The cut bank is primarily solid rock excavated at a steep slope. Some ripping of the rock may be possible, but excavation of the remaining common material should provide enough width for adequate passage. Renovation of the road would include a provision for a subsurface drain or other method of eliminating the ditch to gain width as well.
- Road 26-11-24.1: Jurisdiction is private. Bank slough (less than 100 cubic yards) and blocked cross drain culverts in 2 locations would be removed. Culverts would be replaced as they are completely plugged and show signs of damage. Erosion control devices at both outlets would be necessary.
- Road to Unit 41B: The proposal includes a section of road between 25 and 30 percent for less than 500 feet, ridge top construction. This is preferable to the alternative of side hill construction to access the landing location.

Road Maintenance

Existing roads would be maintained during the life of the project to minimize road drainage problems and possible road failures. Maintenance on BLM controlled asphalt and rock surfaced roads would be performed by BLM road maintenance crews. Maintenance on other rock surfaced roads and dirt surfaced roads would be required by the contractor. Maintenance may include but is not limited to: grading to remove ruts, removal of bank slough, placement of silt trapping straw bales, and adding gravel lifts where needed, such as stream crossings and soft spots in the road surface.

Dirt roads and landings would receive seasonal preventative maintenance prior to the onset of winter rains each year prior to the contractor leaving the project area during non-hauling periods. Seasonal preventative maintenance may include, but is not limited to cross ditching, removing ruts, mulching, and barricades.

Seasonal Restrictions

Road and landing construction, road renovation/improvement, and decommission would be required in the dry season to protect streams.

Road Closure/Decommissioning

After harvesting is completed, all of the new construction roads, and 6.4 miles of renovated or improved rock and dirt surface roads, under BLM control, would be decommissioned. Water barring, sub-soiling, pulling in-stream culverts, and seeding and mulching would be required as needed to reduce potential erosion and to help restore the natural hydrologic flow. Decommissioned roads would also be barricaded to prevent vehicle passage. The net reduction in road miles, due to decommissioning newly constructed and existing roads, would be 6.4 miles. See Tables 2-10a and 2-10c below for summary and detail information respectively regarding road decommissioning.

Tables 2-10a through 2-10e below show proposed new roads, existing roads to be improved or renovated, and roads to be closed. The table showing renovation does not include culvert replacement on blacktop roads.

Table 2-10a: Road Summary: New Road Construction, Improvement/Renovation, and Proposed Road Closures

Sale Name	proposed new roads		existing roads		
				closure miles	
	construction miles	closure miles	renovation or improvement road miles	data base roads	non data base roads
Fruin Moon DMT	0.3	0.3	8.3	2.1	0.0
Moon 25 Thinning	0.7	0.7	6.4	1.2	3.1
TOTAL	**1.0**	**1.0**	**14.7**	**3.3**	**3.1**

There would be a **net decrease of 6.4 road miles** in the North Coquille subwatershed after the roads listed above are decommissioned. 1.0 - (1.0 + 3.3 + 3.1) = - 6.4

Table 2-10b: Renovation/improvement and closure of existing BLM roads

Sale Name	existing roads proposed for use	proposed renovation or improvement	miles	proposed closure miles	
				data base roads	old roads not in data base
Fruin Moon DMT	26-10-17.0	Renovate rock surface	2.0	-	-
	26-10-17.1	Renovate rock surface	0.6	-	-
	26-10-08.4	Renovate rock surface	0.2	-	-
	26-10-17.6	Renovate rock surface	0.2	-	-
	26-10-17.7	Renovate rock surface	0.1	-	-
	25-10-30.0E	Renovate rock surface	0.7	-	-
	26-10-09.0	Renovate rock surface	1.2	1.2	-
	26-10-17.3	Improve rock surface	0.2	0.2	-
	26-10-20.0	Renovate rock surface	1.6	-	-
	26-10-19.1	Renovate rock surface	1.2	-	-
	26-10-19.6	Renovate rock surface	0.2	0.7	-
	1 spur U-20	Renovate rock surface	0.1	-	-
Moon 25 Thinning	26-11-25.1	Renovate rock surface	0.3	-	-
	26-11-25.0	Improve dirt surface, rock	0.6	1.2	-
	1 spur U-42	Renovate rock surface	0.1	-	0.1
	2 spurs U-1	Renovate dirt surface	0.7	-	0.7
	3 spurs U-1	Improve dirt surface, rock	0.2	-	0.2
	26-10-19.2	Renovate rock surface	0.5	-	-
	26-10-30.2	Renovate rock surface	1.2	-	-
	26-10-30.4	Renovate rock surface	0.2	-	-
	26-11-25.2	Renovate rock surface	0.3	-	-
	26-11-25.3	Renovate rock surface	0.2	-	-
	3 spurs U-2	Renovate dirt surface	0.7	-	0.7
	6 spurs U-2	Improve dirt surface, rock	1.0		1.0
	2 spurs U-41A	Improve dirt surface, rock	0.4	-	0.4
TOTAL			**14.7**	**3.3**	**3.1**

Table 2-10c: Proposed New Road Construction, road closures, and landings

Proposed Sale Name	Unit	New Roads			Landings			
		New construction miles	**Surface type**	**closure miles**	**No. of new constructed landings**	**No. of new landings in RR**	**Roadside landings w/ minimal (1) or no construction**	**Roadside minimal landings in RR (2)**
Fruin Moon DMT	17	0.0		0.0	0	0	3	0
	18	0.0		0.0	0	0	3	0
	19	0.0		0.0	0	0	4	0
	20	0.1	rock	0.1	3	0	12	6
	21	0.0		0.0	0	0	0	0
	22	0.0		0.0	0	0	10	2
	23	0.0		0.0	0	0	6	0
	38	0.0		0.0	0	0	11	4
	39	0.0		0.0	0	0	10	4
	39H	0.0		0.0	0	0	1	0
	41B	0.2	dirt	0.2	2	0	1	4
Moon 25 Thinning	1	0.3	rock	0.3	8	0	42	6
	1H(3)	0.0		0.0	1	0	2	3
	2	0.1	rock	0.1	4	0	47	0
	2H(4)	0.1	rock	0.1	0	0	7	4
	41A	0.0		0.0	0	0	22	1
	42	0.2	rock	0.2	2	0	8	2
	43	0.0		0.0	0	0	3	0
	43H(2)	0.0		0.0	0	0	3	0
TOTAL		**1.0**		**1.0**	**20**	**0**	**194**	**34**

(1) Minimum construction may consist of widening a turnout or cutting into cut bank to gain some extra width on a road
(2) Landings in Riparian Reserve areas (based on GIS) are on ridge tops or in upland portions of Riparian Reserves

Summary information regarding road renovation or improvement in the Upper North Coquille Tier 1 drainage can be found below in Table 2-10d.

Table 2-10d: Roads in Tier 1 Drainage: New Construction, Improvement/Renovation, Road Closures

Sale Name	proposed new roads		proposed use of existing roads			
	construction miles	closure miles	renovation or improvement roads*	miles	closure miles	
					data base roads	old roads not in data base
Fruin Moon DMT	0.1	0.1	26-10-17.0	2.0	-	-
			26-10-17.1	0.6	-	-
			26-10-08.4	0.2	-	-
			26-10-17.6	0.2	-	-
			26-10-17.7	0.1	-	-
			25-10-30.0E	0.7	-	-
			26-10-09.0	1.2	1.2	-
			26-10-17.3	0.2	0.2	-
			26-10-20.0	1.6	-	-
			spur U-20	0.1	-	-
Moon 25 Thinning	0.0	0.0		0.0	0.0	0.0
TOTAL	**0.1**	**0.1**		**6.9**	**1.4**	**0.0**

There would be a **net decrease of 1.4 road miles** in the Upper North Coquille Tier 1 drainage after the decommissioning roads is completed: 0.1 - (0.1 + 1.4 + 0.0) = - 1.4

Table 2-10e: Summary of Road Closures (new roads from Table 2-10c are shown in *italics*)

Sale Name	**Existing rock or dirt surface roads used & new roads used**	**Road surface upon completion of sales**	**Miles used**	**proposed closure miles**		**Remarks**
				data base roads & new roads	**old rds not in data base**	
Fruin Moon DMT	26-10-17.0	Rock	2.0			
	26-10-17.1	Rock	0.6			
	26-10-08.4	Rock	0.2			
	26-10-17.6	Rock	0.2			
	26-10-17.7	Rock	0.1			
	25-10-30.0E	Rock	0.7			
	26-10-09.0	Rock	1.2	1.2		
	26-10-17.3	Rock	0.2	0.2		
	26-10-20.0	Rock	1.6			
	26-10-19.1	Rock	1.2			
	26-10-19.6	Rock	0.2	0.7		
	spur U-20	Rock	0.1			
	New roads	Rock	0.1	0.1		
	New roads	Dirt	0.2	0.2		
Moon 25 Thinning	26-11-25.1	Rock	0.3			
	26-11-25.0A,A1	Dirt, rock	0.6	1.2		
	1 spur U-42	Rock	0.1		0.1	
	4 spurs U-1	Dirt	0.7		0.7	
	1 spur	Rock	0.2		0.2	
	26-10-19.2	Rock	0.5			
	26-10-30.2	Rock	1.2			
	26-10-30.4	Rock	0.2			
	26-11-25.2	Rock	0.3			
	26-11-25.3	Rock	0.2			
	10 spurs U-2	Dirt	1.7		1.7	
	2 spurs U-41A	Dirt	0.4		0.4	
	New roads	Rock	0.0			
	New roads	Dirt	0.7	0.7		
TOTAL			**15.7**	**4.3**	**3.1**	

CHAPTER 3 - AFFECTED ENVIRONMENT

Physical and Geographic Characteristics

The project area is located approximately 15 air miles southwest of North Bend, Oregon, in the Pacific Coast Range. The legal descriptions are Section 25, T26S, R11W, and Sections 7,8,16,17,19,30, T26S, R10W, Willamette Meridian. The proposed treatment area of approximately 1054 acres is located in the North Coquille subwatershed within the North Fork Coquille 5th field watershed. The elevation of the project units ranges from 600 to 1800 feet. The steepness varies from gentle to steep, with slopes ranging from 0 to 80 percent.

Vegetation

Past Management

The 1950 aerial photos of the late-successional forest in the project area show the stands on the ridge tops and south facing slopes to be well stocked and to have very uniform canopies. The uniformity and density on the south slopes cause the tree crowns there to be 65% to 80% of the crown sizes seen on the north aspects, based on measurements made on aerial photos. When there are large openings, they are associated with blowdown, root rot pockets, and non-forest ground. In the mature stands, there is open space between the crowns that is the result of the crown abrasion during high winds. On the ground observations showed that space allows enough light to reach the forest floor to support a moderate to a dense brush layer on most sites.

The forest canopies of the late-successional forest on the north facing slopes and in the draws have a rougher texture than south facing stands as seen on the aerial photos. This is due to several factors. There are more gaps in the canopy. The overstory canopy closure is in the 40% to 70% range. As viewed from the ground, the openings in the canopy sit over brushy areas (typically vine maple or salmonberry) or areas that were likely to have been occupied by red alder when the stand was younger. The areas just back from the margins of the gaps are often occupied by redcedars, western hemlock and sometimes bigleaf maple. Little conifer regeneration exists elsewhere in the stand except where disturbance has freed up growing space. There is a more pronounced differentiation of the Douglas-fir into crown classes, and a greater variation in crown lengths when compared with Douglas-fir on the south facing slopes. This information is from the Managing for Landscape Level Diversity appendix to the North Fork Coquille Watershed Analysis (USDI BLM 2001).

All stands proposed for treatment regenerated following a single entry clearcut or a dual entry of seed tree cut with subsequent residual overstory removal. The stands have been managed primarily for timber production. Some have received active management with silvicultural treatments such as pre-commercial thinning, brush control, and fertilization to enhance growth and vigor. The conifer stands are dense because they were either not pre-commercially thinned, or have grown substantially since being pre-commercially thinned to a point where the stem exclusion stage of development has been reached. Some of the stands have received little or no silvicultural treatment beyond planting, aerial seeding, or preparing the site for natural regeneration. The stands with a predominance of alder were the result of reforestation failures, or logging and road related disturbances, as evidenced by historical aerial photographs and the presence of conifer stumps.

Conifer Stands

The conifer stands in the Proposed Action range from approximately 30-60 years old and were established either by planting, aerial seeding, natural regeneration or a combination of these. Tree diameters average between 11 and 17 inches in diameter breast height (DBH). Douglas-fir (*Pseudotsuga menziesii*) is the dominant tree species comprising upwards of 80% of many of these stands. Other species include: Western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), grand fir (*Abies grandis*), red alder (*Alnus rubra*), Oregon myrtle (*Umbellaria californica*), bigleaf maple (*Acer macrophyllum*) and bitter cherry (*Prunus emarginata*). Approximately 94% of the project acres are overstocked conifer stands and the remaining 6% are predominantly red alder stands. Table 3-1 below shows stand information based on data from stand exams in the proposed project area.

Table 3-1: Stand Data as of 2001

Sale Name	Unit	Acres	Stand Age	Conifer Trees/ac Average	Conifer DBH Average	BA	RD	Remarks
Fruin Moon DMT	17	20	30	287	11.0	191	58	
	18	39	29	183	12.5	157	44	
	19	35	30	184	13.1	174	48	
	20	99	34	211	12.2	177	52	
	21	11	35	Similar to Unit 20	~12	NA	NA	clumpy conifer and alder mix
	22	66	32	216	12.1	168	49	
	23	24	30	270	10.3	157	49	
	38	23	33	169	11.2	116	35	
	39	43	36	299	10.6	183	57	
	39H	7	36	NA	NA	NA	NA	Alder stand
	41B	43	41	233	11.7	179	58	
Moon 25 Thinning	1	157	53	156	16.7	263	64	Alder mixed in
	1H(2)	8	53	NA	NA	NA	NA	Alder stand
	2	280	36-53	151	16.3	220	54	Alder mixed in
	2H(4)	39	36-53	NA	NA	NA	NA	Alder stands
	41A	118	36-42	231	11.7	179	58	
	42	20	32	221	11.1	150	59	
	43	15	32	218	11.9	178	52	
	43H(2)	7	25-32	NA	NA	NA	NA	Alder stands
TOTAL		**1,054**						

Red Alder Stands

The area proposed for alder conversion (conifer restoration) is in the western hemlock-salmonberry plant associations (Hemstrom, Logan 1986). Disturbance factors contributing to red alder stands growing where conifers once grew include heavy ground disturbance due to ground based logging systems, road construction with wide right of ways, or unchecked vegetative competition after conifer planting. Prior to harvest activities, red alder, a native species, was present in the watershed but was associated with bare soil areas created from stream bank scouring, natural slumps or slides, or flood plains.

Red alder is relatively short lived with a maximum age of approximately 130-years (Newton; Cole 1994) and is often in association with salmonberry. Salmonberry can reproduce by seed as well as by layering, basal sprouting, and rhizomes. Seed can be dormant in the soil for many years, perhaps decades, creating a large seed bank (Jensen et al. 1995). In the juvenile stage red alder is one of the fastest growing trees in the Pacific Northwest. Red alder is the only tree that consistently outperforms salmonberry height growth. Consequently, the salmonberry associations often support stands of red alder with a few widely spaced conifers and a dense shrub understory (Hemstrom, Logan 1986). In the absence of a disturbance, the alder stand with a salmonberry understory will become a brushfield when the alders die (Cole and Newton 1994). Salmonberry brush fields are a “climax community” that are incapable of contributing coarse woody debris to the uplands or riparian areas. Trees cannot establish in a salmonberry brush field without a disturbance that frees growing space (Emmingham, Hibbs 1997; Hemstrom, Logan 1986) as cited in (Emmingham et al 2000).

The red alder stands are shown as conifer restoration units in Tables 1-1 and 2-2. The red alder unit numbers are followed by the letter H in the tables. The alder vary from 4 to 20+ inches dbh. Douglas-fir, western hemlock, and hardwood species such as bigleaf maple, Oregon myrtle, and tanoak are present in varying degrees as scattered clumps or as individual trees within the alder stands. The clumped or scattered individual conifer trees within the alder stands can vary from dominant overstory to suppressed understory. Often conifers that are almost above the canopy will have difficulty growing above the red alder canopy because the wind causes the stiff lateral alder branches to whip the individual conifers, thus damaging and breaking off the terminal buds (Weirman, Oliver 1979). What little Douglas-fir existed, has died. Western hemlock tends to persist in the understory, but is substantially overtopped by the alder. The western hemlock will probably die due to suppression. Salmonberry is about 70% of the ground cover.

The current conifer stocking is below minimum standards to have enough quality conifers with necessary attributes to meet objectives for Riparian Reserves. It is too low to develop old-growth characteristics as defined by Franklin and co-authors (1986).

Understory, Survey and Manage Plants, and Special Status Plants

The understory vegetation is usually sparse, especially toward the center of these units where little light reaches the forest floor. The primary shrub species include: rhododendron (*Rhododendron macrophyllum*), salal (*Gaultheria* shallon), vine maple (*Acer circinatum*), Oregon grape (*Berberis* nervosa) and evergreen huckleberry (*Vaccinium ovatum*). The primary forbs species include oxalis (*Oxalis oregana*), evergreen violet (*Viola sempervirens*) and sword fern (*Polystichum munitum*).

Large class 3, 4 & 5 logs and stumps on the forest floor can be quite abundant in some units. These structures generally provide excellent habitat for a diverse array of bryophyte and lichen species particularly when they are uncharred from past post-harvest slash burning. Lichen diversity is often very low in these stands due to limited light. Lichens typically are more abundant on the edges of these stands, in riparian areas where there are hardwood components, and in areas where there are canopy gaps and sunlight can penetrate the lower canopy and forest floor.

Fungi quantity and diversity is often fairly high in these closed canopy stands. Even though there aren't any documented occurrences of special status fungi within the proposed project area, habitat is present for many species. Fungi require a wide range of habitats including dead and down coarse woody debris, undisturbed soils, and suitable host species that are prevalent within most of units. They also provide many ecosystem roles including decomposition of coarse woody debris, making nutrients available for many other species that depend on woody debris as a substrate, and helping hold soil together.

The Umpqua Resource Area botanist report identifies S&M species and Special Status Species that require surveys. It includes plant species that are known or suspected to occur in the project area. This determination is based on the proposed project overlapping the known or suspected range of a species as well as the likelihood that potential habitat is present. Potential habitat is determined by aerial photographic interpretation and review of information on each species habitat requirements. Surveys will not be conducted for species whose known or suspected habitats do not overlap with the project area.

Survey Methods: Field surveys for S&M Category A&C plant species (vascular plants, lichens & bryophytes and BLM special status species including Bureau Sensitive and Bureau Assessment species), are completed according to approved survey protocols. These typically involve using the intuitive controlled method where high likelihood habitats are surveyed more intensively than other areas within the project (Whiteaker et al., 1998, USDI 1998, Derr et al. 2002). Survey routes, dates of survey, and any suspected sites will be flagged in the field and recorded on data sheets and topographic maps.

Some surveys completed before March 3, 2003 were done prior to release of the 2002 Annual Species Review (See BLM Instruction Memorandum No. OR-2003-050). Pre-disturbance surveys are not required for some of the bryophytes and lichens previously surveyed in the analysis area under the S&M SEIS. As of March 2003, the 2002 Annual Species Review removed *Platismatia lacunosa* (Category C, S&M lichen) from the S&M list.

Surveys for lichens and bryophytes (nonvascular) were completed by August 2003.

Field Results
As of August 2003 the following S&M species have been located:
Ramalina thrausta (S&M lichen, category C). The management guidelines were implemented.
See Table 3-2 below.

Table 3-2: Survey and Manage Field Results

SPECIES	STATUS	Number of Sites	UNIT #
Ramalina thrausta	Category C	2	17
Ramalina thrausta	Category C	1	18
Ramalina thrausta	Category C	1	19
Ramalina thrausta	Category C	3	20
Ramalina thrausta	Category C	5	21
Ramalina thrausta	Category C	9	22
Ramalina thrausta	Category C	5	23
Ramalina thrausta	Category C	3	38
Ramalina thrausta	Category C	2	39
Ramalina thrausta	Category C	2	41
Category A, B, C, D, E require management. Category F does not require management. Survey field data field forms are available in the North Fork Coquille botanical file folder.			

Port-Orford-Cedar
Port-Orford-Cedar is not known to be present on BLM land in or adjacent to the proposed harvest units or along the haul routes for the proposed units.

Noxious weeds
Various noxious weed species are present throughout the proposed project area including brooms, thistles, Himalayan blackberries, and tansy ragwort. The broom species have been treated a number of times in this area and mature plants are currently absent. Tansy ragwort is managed under the control of biological agents. Thistles and Himalayan blackberries are well distributed.

Fire

What is known about the fire history specific to the North Coquille sub-watershed is somewhat limited. There is some evidence that shows the sub-watershed was at one time extensively covered by stands with a uniform overstory of conifer. This uniformity is likely attributable to a large catastrophic stand replacement fire(s) that occurred before the mid-18th century (1754). Smaller fires of low to high severity occurred from the mid-19th and early 20th centuries and were typically limited to ridge top locations. There is little evidence of any natural or human caused wildfires in the lower slopes of the sub-watershed since the mid-18th century stand replacement fires. Modern fire suppression has all but eliminated natural fire from the sub-watershed landscape. Recent harvest activities on nearby private and BLM lands have received site preparation or fuels treatment following harvest operations that prepared the site for reforestation by reducing fuel/slash loadings and to reducing or retarding the establishment of competitive non-commercial species. The kinds of site preparation most commonly used are broadcast burning, hand or machine piling and burning, and herbicide application. The resulting effects are stands that are uniform and densely stocked, with uniform texture and generally lacking structural diversity.

Many of the project areas have a history of intensive use by the public for recreational activities, primarily hunting, and these activities often occur during periods of high fire danger. Therefore, post-harvest fuel loadings may require some form of treatment for hazard reduction and to improve sites for planting by reducing logging slash and competing brush and hardwood vegetation.

Existing water sources on private and BLM lands, while present, are limited in the proposed project areas. One developed site, the North Fork Ridge waterhole is located in the southeast corner of the proposed project area. Most other sites are pump chances in streams recharged during the wet season by intermittent stream flows or by rain. Typically, these sites are used for prescribed fire holding and mop up activities and for emergency fire suppression. Use of these sites may be limited or restricted because of the potential to affect proposed/listed fish or water quality.

Geology and Soil

Geology
The project areas are located in the Tyee sedimentary basin. The stratigraphies include members of the Tyee Formation. All of the units are sedimentary sandstone, siltstone, and mudstone, exhibiting characteristics attributed to the Tyee Formations.

Associated hazards of the Tyee Formations, and those similar in lithology, include: rapid erosion, flash flooding, rapid mass movement, and stream bank erosion. The type of failure is determined by steepness of slope, angle of stratigraphy dip, a combination of stratigraphy type, moisture, and disturbance. Certain units of the project have been mapped with an 8° dip, however, not all geologic structures have been mapped.

Multiple fault systems are located throughout the project area, however, they do not appear to disturb Quaternary deposits. Therefore, it can be assumed that the majority of these fault systems have not been active during the Quaternary deposition, ranging from 2.0 million years before present to present.

Soil
The soils within the project are derived from the Tyee and similar formations. They include:

- Milbury-Bohannon-Umpqua Association,
- Preacher-Blachly Association,
- Preacher-Bohannon loam,
- Umpcoos-Rock Outcrop Association

The highest percent of area compaction exists in the Moon 25 Thinning, with 5.41 percent of the sale acreage showing compaction. This is 6.59 percent below the maximum area of allowable compaction of 12 percent (BLM, 1995). TPCC classifications, with the appropriate management directives, have been applied to this project. The range of maximum allowable soil moisture for ground-based operations is 25 percent to 40 percent, based on the plastic limits of individual soil members.

Hydrological Condition

The project analysis area is primarily dispersed across three drainages of the North Coquille Subwatershed (REO 6th Field 171003050501) with a small overlap into the Fairview Subwatershed (REO 6th Field 171003050503). These subwatersheds drain the northern part of the larger North Fork Coquille (REO 5th Field 1710030505) Watershed. The proposed units are contained mostly within the Moon Creek, Little North Fork Coquille, and Upper North Fork Coquille drainages. However, approximately 132 acres are in the Hudson Creek drainage of the Fairview subwatershed and 14 acres in the Alder Creek drainage of the Middle Creek subwatershed. The Upper North Fork Coquille drainage has been given special status as a Tier 1, Key Watershed. Watershed in this hydrologic section refers to the 5th field, North Fork Coquille Watershed.

Stream Flow
The North Fork Coquille Watershed depicts typical characteristics of the southern Oregon Coast Range. Precipitation arrives mostly in the form of rain and drives the interaction between the amount, intensity, and distribution of rainfall events corresponding to annual yield, peak flows, low flows, and groundwater levels of the watershed. The general flow regime of the analysis area is rapid runoff due to a high drainage density, low bedrock permeability, coarse textured and shallow soils, and steep topography. According to GIS data, the watershed has a

drainage density of 7 miles of stream per square mile; however, about 78% of this drainage density consists of 1st and 2nd order intermittent upland tributaries. Consequently, stream channels in the project area are generally headwater, steep cascading and step-pool channels confined by hill slopes, which may experience periods of either, extremely low flow, or dry entirely.

Table 3-3: Miles of stream by stream order

SUBWATERSHED	MILES OF STREAM BY STREAM ORDER*						
	1	2	3	4	5	6	TOTAL
North Fork Coquille	154	61	32	13	17	0	277
Fairview	129	40	21	8	16	8	222
TOTAL (miles)	283	101	53	21	33	8	499

Much of the statistical data regarding the characteristics of the project area has been documented within the North Fork Coquille Watershed Analysis (2001). From 1960 to 1980, the average annual precipitation ranged from about 80 inches near the northeast boundary of the watershed to less than 60 inches around the mouth of the North Fork Coquille River (Froehlich *et al.* 1982). About 80% of the precipitation falls from October to March, with half occurring between November and January. A BLM precipitation gage in lower Cherry Creek, near McKinley, Oregon, at an elevation of 600 feet recorded an average annual rainfall of 57 inches from 1985 to 1993. Average dry season precipitation (May -September) at this site for the same period was 0.28 inches (Coos County Water Resource Department Records 1994). Winter rainfall can continue for several days and intense rain periods can produce 4 to 6 inches of rain in 24-hours (Townsend *et al.* 1977, p. 33).

The correlation of peak flows in the watershed, being largely dependent on the duration and intensity of rainfall, has been well documented (NFC WA 2001, Ch. 4 p. 9). It has been established that high flows will occur during the winter months after the antecedent moisture conditions are satisfied. In contrast, low stream flows occur from July to October and are characterized by extremely low base flows and, occasionally, dry stream channels. Land management practices from past timber harvests in the watershed may have contributed to the de-synchronization of flow magnitudes and timing in some streams.

Occasionally arctic air meets an offshore flow, producing snow. Snow events lasting more than a few days in the Coast Range are rare, thus, consequent rain-on-snow events are equally rare. Timber harvest in the transient snow zone (TSZ) may have the potential to increase peak flows. The TSZ is defined as land between 1800 and 5000 feet in elevation. Higher than normal peak flows can occur as a result of warm-rain-on-snow events in the TSZ (Harr and Coffin, 1992). Timber harvest can provide openings where snow accumulates. Warm-rain-on-snow events can melt this increased snow pack quickly and create higher than normal flows; however, only about 3.4 percent of the watershed, and none of the area including proposed project is located above 1800 feet in elevation. Portions of the area may receive occasional snow, but the quantity and duration of accumulation do not normally produce rain-on-snow effects on water yield (NFC WA 2001, Ch 4. p. 1).

Water Quality

The Oregon Department of Environmental Quality (ODEQ) determines water quality standards for each water body in the state. Water bodies that do not meet water quality standards are placed on the states' 303(d) list as Water Quality Limited (ODEQ 2002). These standards are designed to protect each water body for its most sensitive beneficial use (Miner *et al*. 1996, p. 1). The most sensitive beneficial uses of surface water in the watershed are habitat for resident and anadromous fish or other aquatic life and water contact recreation.

High water temperatures and elevated fecal coliform levels are the primary non-point source pollutants of surface water in the watershed (ODEQ 2002). Both high temperatures and excessive fecal coliform can cause severe impacts on aquatic life, particularly fish and invertebrate reproduction. Since the 1998 listing, four of the watersheds' tributaries have been de-listed, while only three reaches of the main stem North Fork Coquille remain listed as Water Quality Limited by ODEQ (see table below).

Table 3-4: Summary of 2002 303(d) Listing - stream miles in the North Fork Coquille Watershed				
STREAM	**LOCATION**	**PARAMETER**	**SEASON**	**RIVER MILES**
North Fork Coquille River	Mouth to Middle Creek	Fecal Coliform	Winter/Spring/Fall	19
North Fork Coquille River	Mouth to Middle Creek	Temperature	Summer	19
North Fork Coquille River	Middle Creek to Little North Fork	Temperature	Summer	25

Stream Temperature
The main stem of the North Fork Coquille is listed for exceeding the 17.8˚ C (64˚ F) temperature standard during summer (ODEQ 2002). The elevated stream temperatures are primarily due to a lack of stream shading, a high width to depth ratio and/or low summer flows (Moore and Miner 1997).

The seasonal variation plays an important role. The water temperatures are cool during the winter months, but may exceed the State standard in the summer months when solar radiation is at its highest. The loss of shade allows an increase in solar radiation at the stream surface. A high width/depth ratio allows more surface area to be impacted by solar radiation per volume of water. Lower flows contribute to elevated stream temperatures since the change produced by a given amount of heat is inversely proportional to the volume of water heated (Brown 1983). There are some reaches of streams in the proposed project area that may be subject to these conditions. Other perennial streams in the watershed may also have elevated summer temperatures and potentially contribute to high temperatures in reaches of the North Fork Coquille River and its tributaries.

Stream temperature surveys were conducted on various streams in the North Fork Coquille Watershed. These surveys were used for analysis in a Water Quality Restoration Plan (WQRP) in order to meet the 303(d) of the 1972 Federal Clean Water Act (North Fork Coquille River WQRP, 2001). Some units in the Proposed Action are adjacent to surveyed sites on public lands along perennial streams. They include portions of the upper North Fork Coquille River, Little North Fork Coquille, and Moon Creek. These sites are either adjacent or in close proximity to the proposed project units. These sites all meet the standard seven day moving average of daily maximum temperatures (17.8˚ C). Based on the results of the WQRP, most reaches on federally administered lands are at or near maximum shade values for drainages in the North Fork Coquille with little potential for improvement in average shade conditions.

Sediment
Natural and management related erosion processes are capable of introducing sediment to stream channels. According to Townsend *et al.* (1977, p. 33), "landslides such as debris avalanches and slumps which produce debris and sediment in the streams" are commonly associated with intense winter storms. Most sediment is delivered to the stream channel by gravity and flowing water. Primary sediment sources include landslides, stream banks and roads. There are no streams currently listed by ODEQ as impaired by excess fine sediment in the watershed.

Management induced increases in sedimentation are most often the result of the construction of poorly designed forest roads and improper maintenance. Forest roads can be a major contributor of fine sediment to streams (Reid, 1981; Reid and Dunne, 1984). For example, delivery to the drainage network may be increased by down cutting of ditch lines and by erosion of unprotected road surfaces from overland flow. Landslides can occur when road drainages are concentrated on unstable or erosive slopes.

The watershed, including the proposed project area, has roads with one or more of the above concerns. Several roads proposed for renovation, in particular roads No. 26-10-20.0, 26-10-09.0, and 26-10-17.3, have bank sloughs, plugged culverts, and inadequate ditch drainage. Management recommendations for the watershed include decommissioning, maintaining, or improving roads to reduce their detrimental effects. The Upper North Fork Coquille Drainage is a Tier 1, Key Watershed. Management recommendations for Upper North Fork include reducing the existing road mileage (RMP ROD, pp. 7-8). Average road density in the watershed is about 4.8 miles per square mile. Road density in the Upper North Fork, Tier 1, is about 4.5 miles per square mile. Several existing roads associated with the proposed project show evidence of surface erosion, inadequate drainage, inadequate stream crossings, or unstable cut-banks and fill slopes. Some of these roads are likely causing an increase in sediment delivery to their respective drainage networks.

Fecal Coliform
The North Fork Coquille River is listed from its mouth to Middle Creek, about 19 miles, for elevated levels of fecal coliform (bacteria). Elevated levels of fecal coliform in the lower portion of the North Fork Coquille River are not likely to be created by forest management, or affected by the proposed project, and will not be discussed further in this analysis.

Channel Condition and Large Wood
The North Fork Coquille, Moon Creek and other streams in the project area are deficient in large wood and have down cut to bedrock in several reaches. Removal of large wood by fisheries biologists in the previous decades has allowed increased stream velocities to continually scour stream channels and remove substrate during high flows. Judging from its position in the watershed and present riparian condition, streams in the proposed project area have historically been influenced by the presence of large wood to help reduce stream energy, maintain the sediment regime, and contribute to floodplain development.

A study of a similar subwatershed, Middle Creek, in the North Fork Coquille (5th Field 1710030505), illustrates the conditions of the North Coquille and Fairview Subwatersheds, which contain the units of the project. Approximately 42.8 miles of stream surveys were conducted in the Middle Creek Subwatershed by Oregon Department of Fish and Wildlife (ODFW 2001) between 1994 and 1999. Results of the surveys show that most stream reaches surveyed had a “desirable” volume of woody material. Most of the surveyed reaches, however, had a lack of key pieces of large wood that can serve to reduce stream energy, capture substrate, stabilize streambeds and banks, aggrade the stream channel and reestablish a connection with the floodplain. Large key pieces of wood trap other woody material that would likely be washed downstream. “Key” pieces were defined as those greater than 60 cm (24 inches) in diameter and greater than 10 m (32 feet) long. Only about one mile or 2.4% of the reaches surveyed were found to have “desirable” numbers of key pieces (>3 pieces/100 m of stream). Approximately 35.4 miles or 82.7% were found to be in the “undesirable” category (<1 piece/100 m of stream). ODFW defines “desirable” and “undesirable” habitat conditions based on values of surveys from other forested reference areas (ODFW 1999, p. I- 47).

The North Coquille Subwatershed is similar to Middle Creek Subwatershed because most riparian areas have been harvested in the past and the potential for recruitment is assumed to be lacking. ODFW stream surveys in Middle Creek found conditions for potential recruitment of large wood to be “undesirable” in most reaches surveyed. Riparian conifers greater than 20 inches in diameter were inventoried in an area 100 feet from both sides of the channel. “Undesirable” conditions were defined as stream reaches with less than 150 of these trees per 1000 feet of stream length. Approximately 42.5 miles or 99% of the reaches surveyed were found to have “undesirable” numbers of these larger trees that could contribute large wood to the stream channels.

Fisheries and Aquatic Habitats

Characterization

All timber sale units analyzed in this EA are contained within the North Fork Coquille 5th field watershed. Portions of these units extend across three 6th field watersheds (North Coquille, Fairview, and Middle Creek) and five 7th field stream drainage systems (Moon Creek, Upper and Little North Fork Coquille River, Hudson Creek, and Alder Creek). Many of the streams contained within the proposed harvest units are 1st and 2nd order headwall/upper slope streams which have ephemeral and intermittent channels. All of these small channels are non-fish bearing. Many are frontal tributary streams that flow directly into the major drainage streams.
With only two exceptions, the main 7th field streams are the only fish bearing streams. The exceptions are Gatewood Creek which has cutthroat trout in the lower .25 miles and an unnamed tributary to the Little North Fork Coquille River in Unit #38 where cutthroat trout were found. Only units 1, 2, and 38 are directly adjacent to or

include fish bearing reaches of Moon Creek and the Little North Fork Coquille River. Fish distribution does not extend into small 1st and 2nd order headwall and upper slope streams. The extent of fish distribution in 3rd and 4th order channels is limited by natural stream channel barriers such as steep gradient cascades and falls.

In the late 1950's a series of steep cascades in the upper North Fork Coquille River, impassable to all fish species with the exception of steelhead trout at high stream flow, was modified to allow migrating fish to pass upstream. Coho salmon were planted upstream of this site and are now well established and thriving in those accessible reaches of the upper North Fork Coquille River and major tributaries.

Units 1 and 2 that fall within Section 25 of T26S, R11W are classified as Matrix lands and all other units fall within Late-Successional Reserve classification. Units 17, 18, 19, 20, 21, 22, and 23 are within the Tier 1 Key Watershed portion of the North Fork Coquille River.

Special Status Fish Species

There are two important special status anadromous salmonid species present in the five drainages of the North Coquille DM/CT area. The Oregon Coast Coho salmon (*Oncorhynchus kisutch*) is federally listed as a "threatened" species. The Oregon Coast winter steelhead trout (*Oncorhynchus mykiss*) is classified as a "candidate" species by the National Marine Fisheries Service. Both species are found in portions of the mainstem Moon Creek, Upper and Little North Fork Coquille River, Hudson Creek, and Alder Creek.

On January 23, 2003, the U. S. Fish and Wildlife Service was petitioned to list four lamprey species for threatened or endangered species status. Three of the lamprey may be found in the North Fork Coquille River watershed. Pacific lamprey (*Lampetra tridentata),* currently on the State of Oregon vulnerable species list, and Western Brook lamprey (*Lampetra richardsoni*) are likely found in the North Fork Coquille River watershed including Moon Creek, Upper and Little North Fork Coquille River, Hudson Creek, and Alder Creek, while the presence of River lamprey (*Lampetra* ayresi*)* is undocumented. Due to their ability to adhere to and traverse steep rocky cascades and falls, these lamprey species could be distributed further into stream channels above the upper limits of anadromous fish.

Fall chinook (*Oncorhynchus tshawytscha)* are seasonally distributed in the watershed in the mainstem North Fork Coquille River up to Steelhead Falls and in the lower reach of Moon Creek. The Oregon Coast cutthroat trout (Oncorhynchus clarkii clarkii) is widely distributed throughout the watershed and are frequently found in perennial streams above barriers to anadromous fish. A complete list of fish species inhabiting the watershed can be found in the Fork Coquille Watershed Analysis (NFC WA USDI BLM2001).

Fish Distribution

Unit #39 contains a portion of the upper Little North Fork Coquille River that is a fish bearing stream. The stream reach within this unit is approximately 0.25 miles above the known upstream limit of anadromous fish including Oregon Coast coho salmon and Oregon Coast steelhead trout. This unit has one existing rocked road that crosses this stream channel. The culvert at this crossing is a low gradient pipe that is slightly perched. The culvert is undersized which likely creates a velocity barrier to the upstream movement of adult and juvenile resident cutthroat trout as well as other aquatic organisms.

Units #1, #2, and #38 are adjacent to fish bearing stream reaches. Unit #38 is adjacent to the known upstream extent of anadromous fish presence in the upper Little North Fork Coquille River. The small east to west flowing unnamed tributary contains resident cutthroat trout for a short distance. Units #1 and #2 are adjacent to the known upstream extent of fish in Moon Creek. Unit #1 is north of Moon Creek and Unit #2 is entirely south of Moon Creek.

All of the other units including the interior portions of Units #1 and #2 contain tributary stream channels that are not fish bearing streams. These non-fish bearing tributary streams range from small intermittent to perennial streams, and from steep headwall channels to low gradient spring-like seeps. Although they may not contain fish, all tributaries drain directly or indirectly into downstream fish bearing streams.

Stream Features and Functions

Stream channels within the proposed project area extend to portions of three 6th field watersheds but they have similar features and functions. The area covered is steep and heavily weathered to a deeply dissected and forested landscape. The analysis area has a dendritic drainage pattern with a density of 6.9 stream miles/square mile. The three 6th field watersheds contain 656 miles of 1st and 2nd order streams, 119 miles of 3rd and 4th order streams, and 56 miles of 5th order streams.

Fish Habitat

Moon Creek Drainage
An aquatic habitat survey was conducted on mainstem Moon Creek from the mouth upstream for a distance of 4.1 miles in June 1994. A portion of this habitat survey identified as Reach #3 and Reach# 4 are adjacent to Unit #1, which is on the north side of Moon Creek, and Unit #2 which is on the south side of Moon Creek. No aquatic habitat surveys have been conducted on tributaries of Moon Creek within Units #1, #2, #41, #42, or #43. A fish survey was conducted by ODFW to determine the up-stream extent of fish presence. They identified this up-stream extent to be approximately 0.25 miles below the failing log bridge on the 25.0 road. Habitat suitable for fish exists above this identified fish limit and resident cutthroat trout are suspected to inhabit this reach but have not been verified above the upper limit identified by the ODFW for Moon Creek.

The habitat survey indicated that woody material is in the good range for the number of pieces and volume within Reach#3, but poor for Reach #4. The number of key pieces found in each reach is poor. Pool numbers are fair in Reach #3 but deep pools are lacking, while Reach #4 has very poor pool habitat.

Even though Moon Creek has a history of stream cleaning, the large amount of large woody material in Reach #3 is probably the result of the past delivery of wood to Moon Creek from hillslope processes. Terraces with associated woody material occur at the junctions of north facing tributary channels and Moon Creek. The road on the north side of Moon Creek has blocked recruitment of large wood from entering the channel from the north tributaries. Much of the woody material in Moon Creek is class 3-4 with little recruitment of new conifer. The lack of large woody material in Reach #4 may result from past stream cleaning and the lack of high gradient tributary streams.

A higher pool frequency and complexity in Reach #3 is probably the result of the greater number of pieces and volume of large woody material, while the lack of pool habitat in Reach #4 reflects the poor number of pieces and volume of wood in the channel.

All of the stream channels within Units #1 and #2 are 1st and 2nd order tributaries of Moon Creek. These tributaries are the source and transport avenues of large woody material for future delivery to Moon Creek, especially the steep south side tributaries. Many of these tributary streams originating in Unit #1 have a lower average gradient, are less prone to hillslope processes, and have roads that may block the transport of large wood.

Field review of several Moon Creek tributary streams was done during the wet season. Because of heavy rain amounts during this time most collection channels were flowing. Because of their small drainage area and channel width, these streams are likely to be ephemeral or intermittent channels during the summer low flow period. Very little Class 1-2 wood is present throughout these channels. Most of these channels are incised and contain pieces of Class 3 wood, some of it very large in size. Where stable, this wood acts to maintain a step/pool feature which stores substrates in the channel. Many of these channels have low gradient reaches followed by long steep entrenched channel reaches and are controlled by geological features or stored coarse woody material. These channels, if not bisected by mid-slope roads, are likely to deliver substrate and large wood to downstream reaches through hillslope failures once streamside trees reach appropriate size.

Hudson Creek Drainage
Approximately 136 acres of Unit #2, #2H and #41A fall within the Hudson Creek drainage. Streams within these units drain the southern portion of Unit #2 and the western part of Unit #41A. They are small intermittent non-fish-

bearing streams that flow into fish-bearing reaches of Hudson Creek. No quantitative or qualitative aquatic habitat surveys have been conducted on these smaller non-fish bearing streams. The most recent aquatic habitat survey conducted on Hudson Creek was done in 1994. The Hudson Creek aquatic habitat survey does not reflect stream channel or aquatic habitat conditions in ridgetop/headwall reaches of these sale units therefore Hudson Creek habitat features will not be summarized. Tributary stream channels most closely reflect the description of tributary streams under the Moon Creek heading.

Alder Creek Drainage

Approximately 18 acres of Unit #41A falls within the Alder Creek drainage. All of these acres are along the northern most ridgetop of the Alder Creek drainage. Several aquatic/fishery habitat surveys have been conducted in Alder Creek, with the most recent being done by ODFW in 1994. No quantitative or qualitative aquatic habitat surveys have been conducted in the headwater tributaries of Alder Creek found within Units 41A and 41AH. The Alder Creek aquatic habitat surveys do not reflect stream channel or aquatic habitat condition of the headwall reaches of these sale units so Alder Creek habitat features will not be summarized.

Tributary stream channels most closely reflect the description of tributary streams under the Moon Creek heading. Any headwater stream reach found in the small amount of acres in Unit #41A are approximately a half mile above fish bearing reaches of Alder Creek.

North Fork Coquille River

An aquatic habitat survey was conducted on the North Fork Coquille River in 1997. It was conducted from the confluence of the Little North Fork Coquille River upstream to a barrier falls in the headwaters (survey Reaches 1-3). Reach #1 contains the North Fork Coquille River from this confluence to the mouth of Gatewood Creek (fish-bearing in the lower 0.25 miles). Units #17 to #22 can all be found on north facing slopes through this survey reach. This habitat survey does not reflect habitat conditions in the small non-fish bearing 1st to 3rd order streams that flow out of these units, but the mainstem North Fork could be influenced by these units through hillslope processes in the future. Tributary streams within units in this watershed are very similar to tributary streams described under the Moon Creek heading. All of the stream channels within Units #17 to #22 are 1st to 2nd order tributaries of the North Fork. A short length of an unnamed 3rd order tributary stream exists in Unit #20. Many of these tributaries are the source and transport avenues of large woody material for future delivery to the North Fork Coquille River.

Little North Fork Coquille River

Units #38, #39, and #41B are within the Little North Fork Coquille River drainage. A short reach of the mainstem Little North Fork is contained within Unit #39. The headwater reach of an upper tributary stream system is contained within Unit #39 and #41B. Unit #38 contains 2 small 2nd order tributaries and is adjacent to the known upstream extent of Oregon Coast steelhead trout. This unit is also within 0.5 miles above the known upstream extent of Oregon Coast coho salmon. Resident cutthroat trout are found in the mainstem Little North Fork Coquille River within Unit #39 above the road #26-10-19.1 crossing and to the point where the river turns east and out of the unit.

There is no current aquatic habitat survey for the upper reaches of the Little North Fork Coquille River. Aquatic habitat in this reach lacks coarse woody material which may be the result of past harvest related stream channel cleaning. Recruitment of large wood comes from buffered reaches or adjacent un-harvested units. Older habitat surveys indicate many reaches of stream channel contain large amounts of logging debris. This logging debris has become incorporated into the riparian zone and stream channel and provides some stability.

General Description of Small 1st to 3rd Order Tributary Streams

There is a wide range of channel types among these small streams. Most of this variation is a result of channel gradient, aspect, and position on the landscape, all of which to some extent guide channel function. The degree to which these channels have been impacted by past forest management is also a factor in how they currently function. Most of these channels are quite steep, however there are some low gradient water collection areas drained by seep streams. On landscapes where soils are deep stream channels tend to be incised. Logging debris, generally in advanced stages of decomposition (Decay Class 3-4) is present quite often in large amounts in stream channels or the riparian zone. Much of this wood is very large in size and takes a variety of forms including large diameter logs and huge rootwads. Very little Class 1-2 wood is present throughout these channels. Much of this wood in the stream and immediate riparian zone has evidence of being charred. This wood has helped to stabilize riparian zone and streambank soils. Where stable, this wood acts to maintain some hydrologic function and creates a step/pool feature which sorts and stores substrate in the channel. Many of these channels have low gradient reaches followed by long steep entrenched channel reaches and are controlled by geological features or stored coarse woody material. Steep gradient channels can contribute CWM and substrate to downstream fish bearing channels in the future through active hillslope processes.

Habitat Restoration Projects

In recent years there has been a cooperative effort by ODFW, the Coquille Watershed Association, BLM, and private individuals and timber companies to improve and restore various components of in-stream and riparian habitats missing from the North Fork Coquille River watershed.

Recently, in-stream restoration projects including fish passage culverts have been completed on the upper North Fork Coquille River, Moon Creek, Blue Creek, Alder Creek, Middle Creek, Honcho Creek, Hudson Creek and many other tributary streams.

Wildlife

Species

Threatened and Endangered Wildlife Species Occurrence

The North Fork Coquille Watershed Analysis 2nd addition provides a general description of wildlife species and habitat conditions in the watershed. Site-specific information on wildlife and habitat in the project area is provided below.

Northern spotted owl (threatened)

The project area is a mix of land allocations including GFMA, Riparian Reserve and Late-Successional Reserve (LSR 261). The entire area is located in the North Coquille 5th field analysis area. As of 2001 there were a total of 9 northern spotted owl (*Strix occidentalis caurina*) sites on lands managed by the BLM within the North Fork Coquille Watershed Analysis area. Two of these sites are located on matrix land and the remaining 7 sites are located in the LSR. Additional owl sites are located on private land within the watershed.

There are four northern spotted owl sites whose home range radius, 1.5 miles for the Oregon Coast Range province, overlaps the project area. Two of these locations, the North Fork Coquille and Lower North Fork sites, are adjacent to proposed treatment units. Alder and Hudson Creeks are located approximately 1 mile from proposed treatment units. Table 3-5 displays the current habitat condition for these sites.

Table 3-5: NSO Sites in Project Area

Site Name	Master Site Number	Percent suitable habitat within 1.5 miles	Land allocation of site
Alder Creek	0547	28	LSR
Hudson Creek	2324	3	Matrix
Lower N.F.Coquille	2326	6	LSR
N.F. Coquille	0545	40	LSR

Hudson Creek, Alder Creek and Lower North Fork Coquille are both below the 40% threshold of suitable habitat within 1.5 miles. The U.S. Fish and Wildlife Service use the 40% threshold to determine the long-term site viability. Sites below this mark are considered to be marginally viable.

Spotted owl monitoring within the North Fork Coquille Watershed has been ongoing from 1976 to the present. Monitoring reached its peak during the late 80's to the mid-90s. The four spotted owl sites located in the project area were last monitored in 1994. The current status of these sites is unknown.

The entire project area is located in Northern spotted owl Critical Habitat Unit (CHU) 60, except units in Section 25. Currently, none of the proposed treatment units provide suitable roosting/foraging or nesting habitat, but all the proposed units provide spotted owl dispersal habitat.

Within the watershed there is an estimated 10,626 acres of suitable spotted owl nesting/foraging habitat managed by the BLM based on stands greater than 80 years old. The majority of this habitat is located in the late-successional reserve portion of the watershed. An additional 10,832 acres provide dispersal habitat in the watershed.

Marbled Murrelet (threatened)

The North Fork Coquille Watershed provides an estimated 9,540 acres of suitable marbled murrelet (*Brachyramphus marmoratus*) habitat. There are a total of 9 known sites, 7 located in matrix and 2 located in the LSR. There is one site located near the eastern portion of the project area. The North Fork Coquille site was located in 1996. All units in the project area are within ¼ mile of unsurveyed suitable habitat or an occupied site except portions of unit 1, 2, and 2H.

Currently, none of the proposed treatment units provide suitable habitat for marbled murrelet. Stands in the project were planted from 1962 to 1974. Average stand height is 94 feet for dominant trees. Overstory trees in adjacent murrelet habitat average 220 feet. Trees in the project area have tight compacted crowns with small limbs that do not support marbled murrelet nesting structure.

American Bald Eagle (threatened)
There are no known American bald eagle (*Haliaeetus leucocephalus*) locations in the watershed. The proposed treatment units do not provide suitable roosting, perching or nesting habitat for bald eagles.

Survey and Manage Species

Pre-disturbance surveys are no longer required for Survey and Manage wildlife species in the Umpqua Resource Area, however known sites of the Oregon megomphix (*Megomphix hemphilli*) and high priority sites for red tree vole (*Phenacomys longicaudus*) are to be managed. There are no known sites for either species within the proposed treatment area.

Big Game (Deer and Elk)

The proposed treatment area consists of closed canopy stands that provide little to no forage value and moderate hiding/thermal cover value. Quality forage habitat in the project area is restricted to areas of recent disturbance on private land. Evidence of deer and elk is present in all units, particularly in areas with moderate slopes that provide resting locations.

Other Wildlife Species

The proposed treatment area consists of conifer plantations that range from 29 to 41 years of age. The stands are typical even-age second growth with a high canopy closure and low structural diversity with little to no shrub/herbaceous layer. This habitat provides primary feeding/breeding habitat for approximately 36 species of wildlife. An additional 92 species of wildlife are known to use this habitat type secondarily for feeding/breeding (Brown, 1985). Expected species that may use this habitat type include large mammals such as the American black bear, coyote, bobcat and mountain lion. Smaller mammals include porcupines, squirrels, chipmunks, skunks, bats and mountain beaver. Numerous species of songbirds, including neo-tropical birds, may be present in the project area. Surveys have not been conducted for amphibian species, but potential habitat exists for numerous species including red-legged frog, clouded salamander, foothill yellow legged frog, torrent salamander and western toad.

The proposed treatment includes converting red alder stands back to conifer stands. Red alder is a pioneering hardwood often located in disturbed sites in the coast range. The role that red alder plays as wildlife habitat has received little attention (Hibbs 1994). Species known to be associated with red alder include white-footed voles, beaver, and Dunn's salamander (Hibbs 1994).

The complete list of wildlife species that may be located in this habitat type can be located in the Final Coos Bay District Resource Management Plan and Environmental Impact Statement (RMP FEIS) Volume II, Appendix T. This list also provides the status of each species. There are several special status species that may occur in the proposed treatment units. This list includes species recognized as Bureau Sensitive and Bureau Assessment categories. An explanation of the categories may be found in the footnote following Table 3-32 in the RMP FEIS, Volume I.

Habitat

General Wildlife Habitat Types

General wildlife habitat types that are present in the project area include mid-seral, and closed sapling-pole stand conditions as identified in Brown (1985, Appendix 6). The BLM portion of the watershed contains 16,740 acres of similar habitat. Structurally the stands are very homogenous in regards to tree species, stand age, tree size and stand density. The overstory is dominated by Douglas-fir with smaller inclusions of western hemlock and western red cedar. Red alder is the primary hardwood species present, but small amounts of big-leaf maple and Oregon myrtle are also present. Canopy closure is near 90+% in all the proposed treatment conifer stands. Herbaceous/shrub layers are for the most part absent from the conifer stands, though some stands do contain evergreen and red huckleberry, vine maple, rhododendron and sword fern. Old-growth conifer residuals are absent from the proposed treatment stands, though old-growth forest and residuals are often adjacent to these stands.

Special Habitats

A rock bluff and associated talus/boulder field is located in Unit 19. The bluff has numerous small caves, cracks and crevices. The rock outcrop is forested above and below the bluff. Seasonal water dripping off the face provides a unique habitat for many species compared to the surrounding area.

A small pond of approximately 0.5 acres, generally less then 1 foot deep, and containing several down logs is located adjacent to Unit 19. Plants in the pond include sedges, rushes and emergent aquatic vegetation. This area provides a unique habitat not present elsewhere in the project area. Species expected to use this pond include red-legged frog (*Rana aurora*), northwest salamander (*Ambystoma gracile*) and rough-skinned newts (*Taricha granulosa*). Deer and elk activity appears to be high in the area.

Key Habitat Features

Snags

Proposed treatment areas are the result of clearcut harvest methods conducted in the 1960s and early 1970s. Harvest objectives at the time resulted in the removal of all snags. Stands in the project area are beginning to go through the stem exclusion stage when small snags are starting to develop. Current snag levels were gathered during the stand examination of the project areas. Snags provide breeding habitat for 76 species and feeding habitat for 19 species (Brown 1985, Appendix 13). Special status species that utilize snags include: American bald eagle, northern pygmy owl, pileated woodpecker, purple martin, western bluebird, silver-haired bat, fringed myotis, long-eared bat, long-legged bat, American martin and Pacific fisher (FRMP, Appendix T).

Coarse Wood
Coarse wood levels in the project area are low, primarily consisting of decay class 3 and 4. The main source of coarse wood is cull logs left behind after the original harvest. In addition, small pockets of root rot have resulted in a few widely scattered pockets of down logs. Like snags, coarse wood provides habitat for a myriad of species (Brown, 1985, Appendix 13).

Recreation

The project area offers opportunities for adventure driving, hiking, primitive camping, big game hunting, and other dispersed recreational activities. The use of forest access roads for recreation remains essential in this region because of steep terrain and BLM checkerboard ownership patterns. There are no designated BLM recreation sites within or close to the project area.

Cultural Resources and Native American Religious Concerns

The project area is within the Oregon Coast Range, an area with relatively few known extant cultural resources. Previous archaeological survey has indicated that the relatively steep slopes predominant in this project area have little or no potential for discovering these resources. Settlement locations, whether prehistoric or historic, are likely to be located on relatively flat bottomland, not part of this project area. Possible historic resources related to past logging may be present throughout the area.

The North Fork Coquille River drainage is part of the aboriginal territory of the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians. A records check was performed for survey units. Results did not reveal any known cultural resource localities within project units. Reconnaissance level archaeological field survey was conducted in several localities of relatively flat ground within project units. Most areas were along ridge tops, but small mid-slope terraces above the Little North Fork Coquille River also were examined. Cultural resources were not observed during this survey.

Solid and Hazardous Waste

Household debris has been found along Road No. 26-10-19.2 that accesses Units 42 and 43. This solid waste site has been screened for hazardous waste material. None was found.

Special Management Areas

Wilderness Areas - There are no Wilderness Areas in or near the project area.
Roadless Areas - The project is not located in any portion of a roadless area inventoried during the RARE II process, or in a non-inventoried roadless area > 1000 acres.
Wild and Scenic Rivers - There are no Wild or Scenic Rivers in or near the project area.
Areas of Critical Environmental Concern (ACEC) - The project area does not include any ACECs, nor are there any ACECs that are located near the project area.

Environmental Justice

The proposed project area is not known to be used by, or disproportionately used by, Native Americans, and minority or low-income populations for specific cultural activities, or at greater rates than the general population. This includes their relative geographic location and cultural, religious, employment, subsistence, or recreational activities that may bring them to the proposed project areas.

CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

This chapter is organized by resource and describes the expected impacts to the resource as they relate to the alternatives.

Cumulative Effects Considerations

Cumulative impacts are impacts that result from past, present, or reasonably foreseeable actions that can be incremental. Below is a table showing recent past, present, reasonably foreseeable actions in the North Fork Coquille 5th field watershed including the Fruin Moon DMT and the Moon 25 Thinning as proposed in the North Coquille DM/CT.

Table 4-1: Cumulative Timber Sale Activity in the North Fork Coquille 5th Field Watershed

Sale Name	Sale Status	EA No.	Thinning Acres	Regeneration Acres	New roads (mi)	Net Roads (mi) + or -
Old Man's Road CT	Sold FY2002	OR125-00-22	114	12	0.8	-2.7
Cherry Creek CT	Planned FY2003	OR125-00-22	109	30		
Fruin Moon DM	Planned FY2004	OR125-03-06	400	10	1.0	-6.4
Moon 25 Thinning	Planned FY2004	OR125-03-06	590	54		
Cox Creek DM	Planned FY2004	OR125-03-10	290	30	0.2	-1.0
Total			**1,503**	**136**	**2**	**-10.1**

Critical Elements with No Impacts

Analysis of the No-Action Alternative and the Proposed Action has shown no impacts on the following critical elements of the human environment:

1. Areas of Critical Environmental Concern (ACEC)
2. Farm lands, prime or unique
3. Flood Plains
4. Wild and Scenic Rivers
5. Wilderness values

Impacts on Vegetation, including Sensitive Species

No-Action Alternative

Conifer Stands

Direct Impacts

As the trees grow and fully occupy the site, competition for growing space results in competition mortality. At the individual tree scale, intense competition would reduce resources available for diameter growth, for root and foliage expansion or replacement, and for providing protective systems for resisting insect and disease attacks. Trees experiencing intense competition stress allocate less food to diameter growth than to height growth resulting in increased height to diameter (H/D) ratios. This increases the risk of snap-out or blow down during wind events (empirical studies summarized by Wilson; Oliver 2000).

Indirect Impacts

Closed canopy stands allow little light to reach the forest floor. With reduced light, the less shade tolerant herbs and shrubs die out first. As competition for light in the overstory increases, nearly all the plants in the herb and shrub layer die. This is the stem exclusion stage of stand development (Oliver; Larson 1990, pgs. 146-147) and is the successional stage with the lowest species richness (sources summarized by Harris 1984, pgs. 59-64 and displayed by Harris in figures 5.10-5.13). Understory tree recruitment and herb and shrub layer reinitiation would begin later than in thinned or understocked stands.

Well stocked unthinned stands would remain longer in the stem exclusion stage of stand development compared with a thinned or understocked stand. Consequently, the unthinned stands would produce more snags, but most of those snags would be too small to provide habitat for cavity nesters. Snags and down wood produced through competition mortality in young stands are from the lower crown classes in areas of dense stocking. Some snags recruited toward the end of the stem exclusion phase may be large enough to serve as roosting and nesting habitat for the small to medium size cavity dwellers. However, Carey et al. (1999) observed that suppression mortality in conifers does not contribute materially either to the provision of cavities or gap formation. Small snags usually do not have top rot (or cavities) and do not remain standing very long. They do contribute to the coarse wood debris on the forest floor for a relatively short time before decaying. Large snags and large diameter down wood are recruited by factors other than suppression mortality. After the self-thinning phase, most mortality will be due to factors other than growing space, such as windthrow, lightning, disease, and fire (Peet and Christensen 1987).

Cumulative Impacts

The no treatment alternative would put these stands on a development trajectory that would be very different from the pattern followed by stands that developed into the old-growth condition found in the Coast Range today. Whereas the candidate stands for thinning are well stocked to overstocked, research suggests that individual trees that survived to become old-growth experienced relatively low competition when young (Tappeiner et al. 1997; Poage 2000). The higher stocking levels in the candidate stands for thinning would retard attainment of late-successional forest characteristics in that the higher competition slows attainment of large tree diameters and subsequent large snag and down wood diameters, as shown in Table 4-2 below. The higher stocking also translates to a general lack of the stand openings and gaps necessary for recruiting understory trees and associated multi-canopy structural complexity. Barring a moderate severity disturbance, the no-treatment alternative would delay attainment of habitat used by late-successional forest associated species. The delay may exceed 200 years depending on the site and the attribute. This assumes high-density stands can survive to be more than 200 years old. Although producing old-growth is not a stated objective for the Riparian Reserve, research by Tappeiner and coauthors (1997), and Poage (2000) suggests that dense stands in the project area have a low probability of surviving to become 250 years old or older for attaining the functions of the Riparian Reserve and late-successional forest associated habitats in the long term.

Red Alder Stands

Direct Impacts

The alder stands would continue to grow until the trees are about 90 years old followed by a rapid decline shortly thereafter. Few live alders will remain by stand age 130 years (Newton; Cole 1994). Conifers would be present if the conifers had established either before the alders or if the conifers established in sizeable gaps between alders (Newton et al 1968). In the absence of a disturbance, additional conifers are unlikely to become established under a fully stocked alder stand. Existing understory conifers are at risk of competition related mortality until they emerge above the alders. This usually occurs about when the alders near their maximum height at stand age 40-years (Newton; Cole 1987); however, storm winds whipping the stiff alder branches about can break off the terminal buds or damage the leaders of the understory conifers keeping many conifers from emerging above the alders even after the alders have reached their maximum potential height (Kelty, 1986; Wierman; Oliver 1979).

<u>Indirect Impacts</u>
Understory vegetation would respond to changes in the overstory condition. As the stand ages, canopy gaps would form allowing the existing understory vegetation to increase in vigor. As the alder component of the stand breaks up, more light reaches the forest floor allowing the shrub layer to become very vigorous (Oliver; Larson 1990, pgs 252-259).

The alders would continue to fix nitrogen during the life of the stand; however, Newton and coauthors (1968) reported that nitrogen fixation reaches equilibrium with soil nitrogen in about 20 years, and additional contribution of fixed nitrogen is small thereafter. Healthy pure alder stands typically fix 100 to 200 kg/ha/yr (Binkley et al. 1994), with reported ranges from 24 to 300 kg/ha/yr (Miller et al. 1979). The increased nutrient capital would generally result in increased volume yields in future rotations of conifers; however, alders planted back on site that had previously supported an alder stand would exhibit reduced growth due to the higher soil acidity. This is because one generation of red alder can change the acidity of the underlying forest soils by as much as 50 years of acid rain (research note on page 9 of the April 1991 Journal of Forestry). Bormann and coauthors (1994) noted that,

> *"On nitrogen rich sites with deep, highly weathered substrates, a negative feedback may develop to reduce growth of pure alder stands and the potential productivity of subsequent ecosystems. Further additions of organic matter and nitrogen lead to the production of H^+ ions that are not countered by plant uptake or weathering. Production of nitrates leaches released cations deep into the profile."*

In other words, on nitrogen rich sites with deep highly weathered soils, the soil acidification associated alder stands may result in soil nutrients being leached deep into the soil profile out reach of plant roots thus degrading site productivity for some species.

Under certain circumstances, the nitrogen enrichment of infertile sites by red alder may lead to reduced species diversity. A decrease in species diversity with an increase of site productivity is a well documented pattern in plant ecology (sources cited in Wedin 1992).

<u>Cumulative Impacts</u>
After 130 years, and assuming no disturbance of sufficient intensity to free growing space, those alder stands without a conifer component, but with a salmonberry shrub layer, would become brushfields. Trees cannot establish in a salmonberry brush field without a disturbance that frees growing space (Emmingham; Hibbs 1997; Hemstrom; Logan 1986; Newton; Cole 1994). Salmonberry brush fields are "climax communities" that are unable to contribute coarse wood to the streams. These sites, that had previously supported a late-successional conifer and mixed stands, are currently not on a trajectory to develop late-successional forest attributes. This would also result in the non-attainment of some of the additional habitat area and connectivity benefits that the Riparian Reserve was intended to provide for certain terrestrial late-successional forest associated wildlife species (NFP S & G's, p. B-13).

After 130-years, the alder stands with a conifer component will transition into a low-density conifer stand with large individual trees (Stubblefield; Oliver 1978, Newton; Cole 1987). Without disturbance, a well-established shrub layer under the low-density conifer stand can preclude recruitment of understory trees thus delaying attainment of the structural complexity associated with late-successional forests. An underburn, either natural or prescribed fire, could set back the shrub layer facilitating understory tree recruitment; however, that event carries a risk of loss of the overstory trees because the overstory trees would be predominately fire intolerant hemlocks and red cedars with few fire tolerant Douglas-firs (sources summarized by Minore 1979). These sites would develop some attributes associated with late-successional forest but would lack others. Stands with a disproportionate number of western hemlocks would be at higher risk of loss to fire. The low-density conifer stands would have only a limited ability to contribute large wood to the stream channel and forest floor and a limited capacity to provide shade to the stream when compared with moderate to well-stocked conifer and mixed stands.

Vascular Plants in Conifer Stands

<u>Direct and Indirect Effects</u>
The conifer stands would remain densely stocked with very little light reaching the forest floor. As a result, there would be less shrub cover in the understory than if the stand were thinned (Bailey & Tappeneir 1998). There would be no negative impacts to special status or S&M botanical species as a result of leaving the proposed project area in

its present condition. The young stand of Douglas-fir would continue to follow successional stages that are typical of forests in the western hemlock/Douglas-fir vegetation zone.

Cumulative Effects
Dense canopy cover in the young stands would continue to limit vascular plant growth. Understory shrub and herb cover would be very low in most stands except were occasional gaps occur in the stands due to natural events such as blowdown.

Nonvascular Plants in Conifer Stands

Direct and Indirect Effects
The conifer stands would remain densely stocked with very little light reaching the forest floor. Hotspots for macrolichen diversity in young conifer stands include gaps, hardwoods, wolf trees, and old-growth remnant trees (Neitlich & McCune 1997). No additional gaps would be created in the stands and macrolichen diversity would be greatest in areas with hardwoods, "wolf" trees, and remnant old-growth trees.

Openings within young dense managed stands should favor bryophyte abundance (Rambo & Muir 1998). If stands are not opened up, bryophyte abundance would remain low except in areas where coarse woody debris, forest gaps, and hardwoods exist. These factors are an important source of bryophyte richness and abundance (Rambo & Muir 1998).

There is limited data available on the effects of forest management as related to fungi richness and abundance. Many species of fungi form mycorrhizal connections with the surrounding vegetation. Sometimes there will be up to eight species of fungi attached to one tree or shrub. This symbiotic relationship benefits both organisms, through the exchange of nutrients, water and protection. Trees and shrubs potentially would not develop as well in the absence of exchange between mycorrhizal fungi and woody vegetation. Mycorrhizal fungi are most active in the upper soil and humus layers. They are sensitive to increases in soil temperature, soil compaction, and the erosion that can accompany forest harvest (Molina et al. 1993). As plant species composition changes during forest succession, the fungus communities undergo change (Molina et al. 1993). Since plant-species composition would not be altered, and the present fungal community would not be disturbed, the current species association would likely persist.

Cumulative Effects
Areas with coarse woody debris, forest gaps, and hardwoods would continue to host the greatest diversity of bryophytes (Rambo & Muir 1998).

Vascular Plants in Alder Stands

Direct and Indirect Effects
The red alder in the conversion areas range in age from 30 to 60 years of age and are dominated by red alder. Myrtle is also a major component of some stands. Most of the alder conversion units have red alder that falls into the mature range. As the overstory canopy begins to deteriorate, it would allow more sunlight to reach the forest floor. These stands would continue to have an understory dominated by shrubs that would increase with the breakup of the alder overstory (Hibbs et al. 1994).

Non-Vascular Plants in Alder Stands

Direct and Indirect Effects
Canopy gaps, remnant old-growth trees, "wolf" trees and hardwood are primary areas of macrolichen diversity in forested stands (Neitlich & McCune 1995). As these stands mature they begin to breakup (Hibbs et al. 1994), which creates gaps in the canopy. The current conditions would thus remain favorable for macrolichen diversity.

Bryophyte abundance is lower in dense stands and positively correlated with canopy gaps, percentage of hardwoods, and incident solar radiation (Rambo & Muir 1998). Since these stands are primarily mature alder stands with frequent canopy gaps, conditions would remain good for bryophyte abundance.

There is limited data available on the effects of forest management as related to fungi richness and abundance. Mycorrhizal fungi are most active in the upper soil and humus layers, and are sensitive to increases in soil temperature, soil temperature, soil compaction, and the erosion that can accompany forest harvest (Molina et al. 1993). Since plant-species composition would not be altered, and the present fungal community would not be disturbed, the current species association would likely persist.

<u>Cumulative Effects</u>
Lichen and bryophyte diversity would change in correspondence to changing light levels and plant species composition. Canopy gaps, remnant old-growth trees, "wolf" trees and hardwoods would continue to be the primary areas of macrolichen diversity (Neitlich & McCune 1995). Areas with coarse woody debris, forest gaps, and hardwoods would continue to host the greatest diversity of bryophytes (Rambo & Muir 1998).

Noxious Weeds

There would be no direct impacts to noxious weeds from the No-Action Alternative. Indirect impacts to noxious weeds could result from continued and increased shading, competition, and lack of overall disturbance. There should be a decrease of mature plants in these conditions. The cumulative negative impact of noxious weeds should decline with time where shading, competition, and lack of disturbance are greater than 80 years. Many weed seeds are viable for decades. Seeds of broom species may remain viable for 80+ years. The longer they remain in the soil the greater chance for loss of viability, thus resulting in a decrease of the potential weed presence and population that could result from any future disturbance.

Port-Orford-cedar

There is no known Port-Orford-cedar within any of the harvest units in the Proposed Action or their associated haul routes. There is no effect on Port-Orford-cedar or spread of the root rot fungus, *Phytophthora lateralis*, by selection of the No-Action Alternative.

<u>Proposed Action</u>

Conifer Stands

<u>Direct Impacts</u>
Thinning would increase the growing space for the trees left on the site. As the trees increase photosynthetic surface foliage area to take advantage of the growing space, more food becomes available for the leave trees to maintain or increase crown length and volume, root mass, diameter growth, and to produce the pitch and protective chemicals used by the trees to ward off insect and disease. As shown in Table 4-2 below, the heavier the thin the sooner the stand would produce a given average stand DBH; however, at some point there is no increase in individual tree growth.

<u>Indirect Impacts</u>
An effect of more rapid average stand diameter growth is the treated stands would be able to produce large diameter snags and wood debris sooner than unthinned fully stocked stands. Compared with unthinned stands, thinning would prolong the survival of residual understory trees in the treated units. Understory trees retained in the heavy thinned units would persist longer than those understory trees retained in moderate or lightly thinned units. Moderate intensity thinning would simulate modest and temporary development of understory vegetation. Heavy intensity thinning would favor the establishment and growth of conifer seedlings, shrubs, and hardwoods (Hayes 1997). Variations in the stands due to microsite conditions, uneven applications of past treatments, non-uniform

execution of the marking prescription, and gaps created by logging corridors and by injury to residual trees would produce variations in the treated stands with respect to the amount of light that reaches the forest floor.

Cumulative impacts

At the stand scale, thinning would decrease the time each stand is in the stem exclusion stage thus moving each stand more rapidly into the understory reinitiation stage of stand development. Thinned stands would produce larger diameter snags and down wood sooner than if the stands were left unthinned. At the landscape scale, the attainment of greater species diversity, multi-canopy structure, larger average tree size, and larger snags and down wood would reduce the contrast between the treated stands and remnant mature and late-successional stands. The treated stands inside the Riparian Reserves would contribute to the ability of those stands to provide connectivity and habitat for certain late-successional forest associated species across the landscape (USDA-USDI 1994, pg B-13). The landscape level prescription to manage for the variation in conifer canopy characteristics, as seen on historic photographs, and for the distribution of canopy gaps, that are thought to be the result of past alder occupation, would emulate the appearance of the forest prior to timber harvest.

From a research paper by Bailey and Tappeiner 1998, " Newton and Cole 1987 demonstrated that thinning dense stands can encourage development of overstory structure similar to that of old-growth forests described by Franklin and Spies (1991), with concomitant benefits for species associated with older forests (McComb et al., 1993). Thinning young stands may also stimulate development of understory structures characteristic of old-growth forests through a combination of: (a) stimulating tree regeneration in the understory; (b) increasing the survival and growth of suppressed and intermediate trees, both of which would lead to a multi-story stand; and (c) fostering the development of diverse shrub layers."

Table 4-2: Projected Age that Stands Would Attain Desired Tree and Snag Diameters following Thinning as Compared to No Treatment for a Range of Representative Sites

Category, EA Unit No., Site Index (Kings 50) Age when data collected, & Thinning age	**Post thinning conifer stocking**	**Post thinning relative density**	**Thinning intensity**	**Age when stand attribute attained, assuming no subsequent treatments or disturbances***			
				Ave. green tree DBH			**Ave. newly dead tree dbh > 24 inches *****
				>20 inches **	**>24 inches *****	**32 inches *******	
Lowest SI	Thin to 60 conifer/ac	RD 22 post thin at age 32	Heavy thin	47 yrs	57 yrs	117 yrs	67 yrs
EA Unit 18	Thin to 80 conifer/ac	RD 28 post thin at age 32	Moderate thin	47 yrs	67 yrs	157 yrs	77 yrs
SI 107	Thin to 100 conifer/ac	RD 33 post thin at age 32	Moderate thin	57 yrs	77 yrs	197 yrs	97 yrs
27 yrs old thin at 32 yrs	No thin (183 conifer/ac 183 total trees/ac)	RD 44 at age 27 RD 49 at age 32		67 yrs	117 yrs	>207 yrs	207 yrs
Average SI	Thin to 60 conifer/ac	RD 22 post thin at age 32	Heavy thin	47 yrs	57 yrs	77 yrs	57 yrs
EA Unit 38	Thin to 80 conifer/ac	RD 27 post thin at age 32	Moderate thin	47 yrs	57 yrs	97 yrs	67 yrs
SI 146	Thin to 100 conifer/ac	RD 31 post thin at age 32	Moderate thin	47 yrs	67 yrs	117 yrs	87 yrs
27 yrs old thin at 32 yrs	No thin (168 conifer/ac 168 total trees/ac)	RD 35 at age 27 RD 42 at age 32		57 yrs	77 yrs	177 yrs	157 yrs
Median SI	Thin to 60 conifer/ac	RD 18 post thin at age 36	Heavy thin	51 yrs	61 yrs	101 yrs	81 yrs
EA Unit 42	Thin to 80 conifer/ac	RD 24 post thin at age 24	Heavy thin	61 yrs	71 yrs	131 yrs	91 yrs
SI 153	Thin to 100 conifer/ac	RD 28 post thin at age 36	Moderate thin	61 yrs	81 yrs	171 yrs	101 yrs
31 yrs old thin at 36 yrs	No thin (221 conifer/ac 298 total trees/ac)	RD 59 at age 31 RD 64 at age 36		91 yrs	161yrs	>201 yrs	>201 yrs
Highest SI	Thin to 64 conifer/ac	RD 26 post thin at age 37	Moderate thin	42 yrs	52 yrs	92 yrs	62 yrs
EA Unit 41	Thin to 84 conifer/ac	RD 31 post thin at age 37	Moderate thin	52 yrs	62 yrs	102 yrs	72 yrs
SI 161	Thin to 104 conifer/ac	RD 35 post thin at age 37	Light thin	52 yrs	72 yrs	131 yrs	92 yrs
32 yrs old thin at 37 yrs	No Thin (233 conifer/ac 293 total trees/ac)	RD 58 at age 32 RD 66 at age 37		72 yrs	102 yr	>202 yr	171 yrs

Notes:
* Ages and diameters from Stand Projection System (SPS) projection of stand exam data collected following BLM stand exam protocol (USDI 1995)
** 20-inches is the average diameter of trees that survived to become old-growth when they were 50-yrs old (Tappeiner et al 1997).
*** 24-inches is the minimum diameter for
A snag suitable for a pileated nesting tree (sources summarized in Neitro et al. 1985).
Minimum diameter piece considered as a key piece by ODFW for aquatic inventory purposes.
**** 32-inches is the minimum diameter Douglas-fir fitting the definition of old-growth (Franklin et al 1986).

Red Alder Stands

<u>Direct impacts</u>

The alder stands, on sites where merchantable conifer stands had been previously harvested, would be replaced by new conifer stands. Site preparation following alder cutting would increase the number of plantable spots. The new stands on sites supporting hardwood species other than alder would have a hardwood component and would likely develop into a mixed stands.

<u>Indirect impacts</u>
Overtopped conifers that are capable of responding to thinning and are not crushed during falling operations would go through a period of shock until their shade needles are replaced by sun needles, and their crowns expand to where there is sufficient photosynthate production to begin rapid growth. Depending on extent and duration of suppression this could take years. Conifers not capable of releasing would either die of shock or fail to regain epinastic control. Unreleasable conifers with height-to-diameter ratios greater than 100 would likely fall over due to either the structurally weak condition of the skinny boles or the inability of the small root systems, typical of extremely suppressed trees, to hold the tree up (Oliver; Larson 1990 pg 84-88). Conifers that do release would contribute to the structural diversity of the new stand.

The removal of the alder component would increase the growing space for the vegetation left on the site and the new plants that subsequently seed in or are planted on the site. Following alder cutting and site preparation, the herb and shrub layer plants that escaped disturbance, and species on the site before treatment that can regenerate from stump sprouts, root suckers, rhizomes, root crowns, or other asexual means, would rapidly recolonize the site. Logging debris would provide a pulse of fine and coarse woody material to the forest floor. The decomposing logging debris would also add organic matter to the soil and release nutrients for recycling.

<u>Cumulative impacts</u>
Alder conversions across the landscape would restore forest type patterns more typical of a landscape undisturbed by conventional timber harvest practices. This would increase the habitat area and connectivity that benefit certain late-successional forest associated species, and by that meeting one of the intended functions of the Riparian Reserve (USDA-USDI 1994, pg B-13). Alder conversions would increase the amount of habitat used by the wildlife species associated with conifer and mixed species stream side stands, and decrease the amount of habitat used by species associated with the alder dominated sites. Site level reestablishment of conifers next to small and medium sized streams reaches would provide those reaches with sources of large durable wood that can provide in-stream structure. Reestablishing streamside conifers that have greater height growth potential than alders would in time result in more shade above wider channels than the stream side alders can provide.

At age 120, as per Stand Projection System (Version 2.0 Applied Biometrics 1988) computer stimulations, the conifer restoration stands should have at least 30 to 40 large trees per acre, with additional shade tolerant conifer species that have naturally reproduced in the understory. Average diameter at breast height of the large trees should be approximately 30 inches or greater.

Vascular Plants in Conifer Stands

<u>Direct and Indirect Effects</u>
Many of the density management thinning units have a dense canopy cover with little light reaching the forest floor. Canopy cover has a strong influence on the cover of shrubs light reaching the forest floor (Klinka et al. 1996). Thinning young Douglas-fir stands may hasten the development of multistory stands by recruitment of conifer regeneration in the understory as well as by enabling the survival of small overstory trees and growth of advanced understory regeneration (Bailey & Tappeneir 1998). Richness, frequency, and cover of some herbaceous species and most species groups, including exotics, are also greater in thinned stands than in unthinned stands (Bailey & et al. 1998). Thinnings have been a management tool used to produced late-successional characteristics, however, even-spaced thinnings do not produce patchy, diverse understories that foster the development of late-seral forest characteristics, and they lack biological legacies including large live trees, down wood, and tree and shrub diversity (Carey 1996). Variable-density thinning would occur to some extent throughout the proposed project through retention of myrtles, bigleaf maples, and alders in some stands, retention of scattered minor conifer species, and by varying thinning by aspect.

<u>Cumulative Effects</u>
A more open canopy in thinned stands would increase vascular plant growth. Thinning dense conifer stands may result in higher availability of water and mineral nutrients through formation of “root gaps” (Parsons et al. 1994).

Non-Vascular Plants in Conifer Stands

Direct and Indirect Effects

Conventional commercial thinning appears to have little effect on the epiphytic macrolichen communities in young stands (Peterson & McCune 1998). The proposed thinning may promote epiphytic macrolichen diversity in areas where gaps are left in the current overstory, as very few gaps are currently present. This effect in the thinned stands may not be long-lived in those stands thinned to within the relative density range applied in convention thinnings (EA units 1, 2 and the southwest facing slopes in unit 18). In these stands the canopies would fill in rapidly and by the eighth year would have conditions approximating those in the unthinned stands (Chan & Cole 2002). Oregon myrtle and bigleaf maple trees would be retained in the thinning units; however, as shown on Table 2-5, the treatment of alders would vary from retention of all alders to cutting only the alders that are competing with conifers to cutting all alders except those in streamside and wet land protection areas. This could help maintain or increase macrolichen diversity. On the other hand, removal of hardwood trees such as red alder (*Alnus rubra)* would likely decrease macrolichen diversity and could offset some of the positive effects of leaving wolf trees and remnant old-growth trees. Also, variation in stand conditions is important in providing for organisms and also fosters development of late-seral forest characteristics. For example, variable-density thinning, which includes retention of remnant trees, canopy gaps, and islands of unthinned vegetation, increased richness of several macrolichen groups, old-growth and hardwood associates, as well as generalists, over even-spaced thinnings (Muir et al. 2002). Unit to unit differences in post thinning relative density would provide landscape scale variability. Retention of conifer species other than Douglas-fir, and retention of myrtles and bigleaf maples, unthinned patches of alders in some units, and trees in stream and wetland protection areas would provide some density variation within the units.

Thinning and opening the canopy of young, dense, managed stands should favor bryophyte abundance (Rambo & Muir 1998). Retention of hardwood species during thinning operations would contribute to a more abundant and diverse bryophyte community (Rambo & Muir 1998). In addition, retention of coarse woody debris in managed stands provides a variety of decay classes for some species and retention of remnant old-growth trees will ensure a continuing supply of coarse woody debris to the forest floor (Rambo & Muir 1998). The immediate effects of thinning may affect the structure of coarse woody debris on the forest floor through physical damage such as abrasion or breaking the wood debris into smaller pieces; however, down wood and snag recruitment would add new coarse woody debris in the units where recruitment is proposed. Larger dominant "wolf" trees and remnant old-growth trees are normally left in the thinning units and if present, would provide a future supply of coarse woody debris. On the other hand, removal of hardwood trees such as red alder would likely decrease bryophyte diversity. According to Muir et al. 2002, thinning contributes to an immediate decline in bryophyte cover by damaging existing shrubs since their study shows that bryophyte cover appeared to be the greatest on older shrub stems. These effects are not expected to be long term.

There is limited data available on the effects of forest management as related to fungi richness and abundance. One common species of ectomycorrhizal fungi, chantrelle (*Cantharellus cibarius*), was found to fruit in significantly lower numbers following thinning (Pilz et al. 2002). The declines were greatest in the most heavily thinned stands. It is possible that as the trees resume vigorous growth, and the forest canopy closes, that this species will begin to fruit at the same levels it did prior to the thinning but further studies need to be done to verify this (Pilz et al. 2002).

Cumulative Effects

Light level changes to the forest floor would be relatively short lived, between 5 and 8 years. The canopies of the stands thinned to a relative density of about 35 or higher would fill in rapidly and by the eighth year would have conditions approximating those in the unthinned stands (Chan & Cole 2002). The canopies of trees thinned to lower relative densities would also grow laterally filling the gaps between crowns; however, canopy closure would take longer and the canopies of those trees are unlikely to close to the point where there is insufficient light to support shade tolerant green plants on the forest floor. Canopy gaps, hardwoods, "wolf" trees, and old-growth remnant trees would continue to be areas that would best promote the majority of epiphytic macrolichen (Neitlich & McCune 1997). A slightly higher abundance of forage lichens would occur in thinned stands (Muir et al. 2002) than unthinned stands. However, in their comparison of thinned stands versus unthinned stands, it was discovered that the total species richness was lower in thinned stands. In summary, macrolichen communities in thinned stands

differed from those in old-growth stands and landscape-level hotspots, yet were comparatively similar to unthinned young-growth stands.
Areas with coarse woody debris, forest gaps, and hardwoods would continue to host the greatest diversity of bryophytes (Rambo & Muir 1998); however, thinning could contribute to a decline in bryophyte cover on shrub stem (Muir et al. 2002). Their study shows that bryophyte cover appeared to be the greatest on older shrub stems and damage to shrubs during thinning may lower bryophyte abundance.

Vascular Plants in Alder Stands

Direct and Indirect Effects
The existing understory vegetation would be mechanically affected during logging, yarding, and site preparation activities; however, the change in species richness and composition, total cover, and individual species frequency and cover would be indistinguishable after 50 years. (Oliver 1981).

Non-Vascular Plants in Alder Stands

Direct and Indirect Effects
Lichen and bryophyte species abundance would drop dramatically and pioneer species such as green algal-foliose lichens would slowly re-colonize the new conifer plantation.

Mycorrhizal fungi are most active in the upper soil and humus layers. They are sensitive to increases in soil temperature, soil compaction, and the erosion that can accompany forest harvest (Molina et al. 1993).

Cumulative Effects
Lichens grow slowly and disperse slowly (Bailey 1976). There is a strong correlation between the biomass of lichen species and forest age (Neitlich 1993). As the conifer stand becomes established, the lichen biomass would slowly increase (Neitlich 1993). In the newly thinned stands, hotspots for macrolichens would include gaps, hardwoods, “wolf” trees, and any old-growth remnant trees (Neitlich & McCune 1997).

Bryophyte richness is significantly higher in old-growth than young stands (Rambo & Muir 1998). As the young conifer plantation became established, bryophyte abundance would be lower in dense stands and positively correlated with canopy gaps, percentage of hardwood, and incident solar radiation (Rambo & Muir 1998). As plant-species composition changes during forest succession, the fungi communities undergo change (Molina et al., 1993). The existing fungal community would change in relation to this change in plant species composition and an early seral fungal species mix would replace the mature red alder fungi species composition.

Noxious Weeds

Direct impacts
The spread of noxious weeds would be mitigated by use of BMPs as described in the Project Design Features in Chapter 2.

Indirect impacts
Ground disturbance creates habitat preferred by noxious weeds and/or disturbing existing seedbeds. The chances of new weed species being introduced are mitigated through Project Design Features. Weeds that grow from existing seedbeds or introduced seed would be treated under follow up silviculture treatments or weed control contracts.

Cumulative impact
The spread of noxious weeds should be similar to current level of conditions or there could be a reduction in weed presence and densities. This would occur because of BMPs, follow-up silviculture treatments and weed control contracts, and from the length of time between additional treatments or harvest. As weeds are shaded they die out, and the longer the shading the more likely the seedbed will die.

Port-Orford-cedar

There is no known Port-Orford-cedar within any of the proposed harvest units or along any of the proposed haul routes and therefore no direct, indirect or cumulative impacts to the species. There is no effect on Port-Orford-cedar or the spread of the root rot fungus, *Phytophthora lateralis*, by selection of the Proposed-Action Alternative.

Impacts on Air Quality, Forest Fuels and Fire

No-Action Alternative

Direct Impacts
Under the No-Action Alternative, no "direct" short-term consequences to the fuels and fuel loadings of the proposed project areas will occur. No short-term impacts to air quality would occur.

Indirect Impacts
An indirect consequence to the No-Action Alternative would be resulting stagnating stand conditions with associated mortality over time resulting in a long-term build up and accumulation of dead or dying fuels both ground and aerially disposed. These conditions will make the stands more susceptible to a damaging wildfire and would hamper fire control efforts during a catastrophic fire event.

Cumulative Impacts
Stand densities, characteristics and composition that would make the stand more naturally fire resistant would not be realized thus hampering the attainment of LSR and ACS goals.

Proposed Action

A standard special provision would be included in the contract to require compliance with applicable Oregon State Fire Laws. Disposal of slash through various burning methods would require compliance with the Oregon Smoke Management Plan.

Direct Impacts
Under this alternative, there would be a short-term increase in fine fuel loadings and a short-term increased risk of ignition probability within the harvest areas. Increased human activity associated with the Proposed Action may increase the possibility of human caused wildfire.

Indirect Impacts
Harvest activities, including hardwood conversion, would create openings in the project areas that may mimic openings caused by naturally occurring fire that are excluded from this environment. The proposed harvest activities would present a unique opportunity to re-establish stand diversity and texture that more closely resembles the species composition and disposition that would occur if natural fire were still present on the landscape. Thinning dense and stagnating stands may reduce the long-term vulnerability of the stand to a damaging wildfire by removing or reducing fuel loadings that contribute to extreme fire behavior. The proposed treatments may facilitate fire suppression activities by providing safer access and egress for firefighters as well as for counter-firing opportunities in the event of an extreme fire occurrence.

Smoke from any prescribed fire activities would contribute to minor short-term increases in particulate matter in the surrounding airshed. All prescribed fire activities would be conducted in compliance with the Oregon Smoke Management Plan, (OAR 629-43-043).

Cumulative Impacts
Stand densities, characteristics and composition that would make the stand more naturally fire resistant may be achieved at an accelerated rate by implementation of the Proposed Action. No cumulative affect from smoke is

expected to occur as the frequency and quantity of slash burning would be limited by the Oregon Smoke Management Plan.

Impacts on Geology and Soil

No-Action Alternative

Geology

Direct and Indirect Impacts
The No-Action Alternative would have negligible direct and indirect impact on the existing geologic condition. Continued development of the natural system would not impact the underlying stratigraphy except within the context of geologic time frames. Large-scale landslides would not be impacted by this alternative.

Cumulative Impacts
The No-Action Alternative would have no measurable cumulative impacts on existing geologic conditions. Continued development of the natural system would not impact the underlying stratigraphy except within the context of geologic time. Large-scale landslides would not be impacted by this alternative. Geomorphology of the area will continue to have the current influences of the current road systems. Landslides and debris flows are part of a natural system and will continue at the present rate.

Soil

Direct and Indirect Impacts
This alternative would have minimal impact on existing soil conditions. No additional operational disturbance would occur to soils.

Within the project area, BLM Road 26-11-25.0 has been heavily rutted from flowing surface water. The runoff has the potential to deliver fine sediment to a stream system. On BLM Road 26-11-24.1, the culverts are partially plugged, with drainage occurring within the roadbed. On BLM Road 26-10-20.0, there is an existing road failure and potential road failure at culvert crossings. On BLM Roads 26-10-9.0 and 17.3, culverts are partially plugged, with drainage occurring within the roadbed. Some portions are heavily rutted with flowing surface water, with potential delivery to a stream system. Under the No-Action Alternative, these existing conditions would persist.

Cumulative Impacts
Slow decompaction of historically impacted soils would also continue with natural processes such as root growth, animal burrowing, accumulation and development of an O-Horizon, etc. Through time, these processes may return the soils to a pre disturbance condition. Roads 26-11-25.0, 26-11-24.1, 26-10-9.0, 26-10-17.3 and 26-10-20.0 could result in cumulative increases of sediment mobilization and delivery to fluvial systems.

Proposed Action

Geology

Direct and Indirect Impacts
This Proposed-Action Alternative would have minimal direct and indirect impacts on existing geologic conditions. Project activities would not have short or long-term impacts to the local geology. Large-scale landslides would not be impacted by this alternative. The removal of select trees should not decrease slope stability, as the root systems would be intact.

With the use of existing road systems and the minimal amount of new road construction (1.0 mile) on ridgetops, impacts to the geologic structure of the area is not expected.

Cumulative Impacts

This alternative would have no known cumulative impacts on existing geologic conditions. Project activities, likewise, would not have short or long-term impacts to the regional geology. The frequency of large-scale landslides would not be impacted by this alternative. The removal of select trees should not decrease slope stability as the root systems will be intact.

Soil

Direct and Indirect Impacts

Cut-to-length harvest operations may create compaction of exposed mineral soils; however, if the harvesting is done as proposed, with machines traveling on windrowed slash, there should be no definable compaction damage. It should be noted that, according to Allen (1997), the use of slash under skidding does not eliminate compaction. However, studies have shown that such techniques may reduce the degree and depth of compaction. Also, to minimize passes to the greatest extent, yarding roads would utilize existing compacted skid roads for main pathways. Allen (1997) further states that existing compacted routes are not further compacted by additional passes of equipment. If compaction were avoided, there would be no reduction in surface water infiltration or subsurface water movements.

Cable logging will create temporary surficial ground disturbance by movement of soil; however, the effect would be temporary, with vegetation, especially in a thinned open canopy system, reclaiming the impacts within one to a few growing seasons.

Road construction along slopes may create minor soil failures; however, the maximized use of existing road systems and the minimal amount of new road construction (1.0 miles) for this alternative reduce the possibility of these impacts. As stated earlier, the road construction will impact less than the limit placed by the RODRMP (BLM, 1995).

Some soil erosion from cutbank sloughing and from the road surface can be expected, especially from heavy rains during the first winter following construction, harvest and site preparation activities. It is not anticipated that these sediments would enter the streams, due to the location of the roadbeds. Surface erosion generated during the harvest, road and landing construction would migrate very short distances before being filtered by duff and woody materials. Seeding and mulching of the bare soils would minimize the impacts created by road and landing construction.

Renovation of existing roads would consist of roadside brushing, reshaping, and restoring the surface where necessary, maintaining or improving drainage structures, and applying rock surface where needed. Currently low- or no-maintenance roads used in harvest operations would be upgraded to current standards. The installation of water bars and removal of culverts would be included as part of road decommissioning after harvest.

Cumulative Impacts

The upper six inches of old skid roads within the timber sale units have partially recovered from previous timber sale activity. On the old skid trails, trees have begun to seed in and a duff layer of ½" to 1½" has developed on the surface. A fragipan ranging from approximately one to five inches below ground surface is still present in old skid trails. Subsoiling of the old skid roads is not recommended because of the potential for residual root damage to occur to trees that have grown adjacent to the skid trails.

Because fragipans and roadbeds are still present, compaction is still present. Renovation of existing road systems would not increase compaction. Therefore, there would be no cumulative increase of soil compaction. Loss of water infiltration into the soil would be localized. Surface water would be transferred to immediately adjacent areas for infiltration that should not result in a cumulative impact.

Cut-to-length operations will not cumulatively impact soil compaction, surface water infiltration, or subsurface water movements.

Impacts on Hydrological Conditions

No-Action Alternative

Stream Flow

Annual yield, low flows, and peak flows would be unaffected by maintaining present forest conditions.

Water Quality

(a) Stream Temperature

Stream temperatures on the North Fork Coquille or the tributaries of the proposed project area would not be affected by the No-Action Alternative. Riparian shade would continue to increase on those reaches that have not yet matured to their potential condition. In the long term, however, dense second growth stands in Riparian Reserves would continue to grow at a slower rate than if thinned. This would result in unfavorable height to diameter ratios that would increase the risk of blowdown (Smith 1962, p. 422), and subsequent exposure of the stream to solar heating. Lowered summer flows from dense stands of alder in riparian areas would potentially continue to cause elevated summer temperatures.

(b) Sediment

Existing roads identified as likely adding fine sediment to streams would continue to do so.

Channel Condition and Large Wood

Trees within Riparian Reserves in the proposed project area would continue to grow; however, the trees in dense second growth stands would grow at a relatively slow rate due to competition for limited sunlight, nutrients and water. Future recruitment of large woody debris in terms of amounts, longevity and functional capabilities would be diminished due to reduced growth in overstocked riparian stands. Riparian areas and adjacent uplands dominated by alder would continue to prevent growth of conifers that could potentially contribute large wood to stream channels. Large wood is a critical element for maintaining proper channel function.

Proposed Action

Commercial Thinning and Density Management

Current vegetative age class distribution indicates 25.7% of BLM lands in the North Fork Coquille watershed are in the 0-30 year old age class based on 1997 GIS derived data (NFC WA 2001, Ch. 5 p. 4). Information on age class for private lands was unavailable. Approximately 2.8% of BLM lands or 1.0% of the watershed would be thinned under this action.

Stream Flow

(a) Annual Yield

Thinning may have the potential to temporarily affect annual water yield. Removing vegetation should make more water available for stream flow and/or additional groundwater storage. It is common in western Oregon for evapotranspiration losses to be in excess of 25" annually. Site conditions determine how much evapotranspiration will actually occur and it depends on slope, aspect, soils, type of vegetation, and climatic conditions.

Research has shown a temporary, until re-growth, increase in water yield following harvest in many cases. The largest increases in annual water yield occur in the fall and spring, when maximum differences in water storage exist (Harr 1976); however, responses have been proportional to the amount of vegetation removed.

Much of the research on the effects of timber harvest on water yield was done by studying the effects of harvesting entire small watersheds and involved treatments that went from ridge top to creek edge. Little research has been done in the Pacific Northwest looking at the effects of partial cuts, thinnings, patch cuts, or the effect of clearcutting while retaining streamside buffers, on water yields. In an overview of several studies, Satterlund and Adams (1992, p. 253) found that "lesser or non-significant responses occur ... where partial cutting systems remove only a small portion of the cover at any one time." Where individual trees or small groups of trees are harvested, the remaining trees will generally use any increased soil moisture that becomes available following timber harvest.

Research has also shown that the effects of harvest on annual yield are short-lived. Harr (1979) found that the re-growth of shrubs and small trees commonly returns rates of evapotranspiration to pre-logging levels within about five years, while Keppeler and Ziemer (1990) found that water yields returned to near pre-logging condition within a range of 1-8 years following harvests. Jackson and Haveren (1984) estimated that annual yield would return to pre-harvest levels within 5-15 years in the Coast Range.

Since the proposed thinning involves only partial cutting in about 1% of the North Fork Coquille watershed, about 990 out of 98,500 acres, no measurable increase in water yield is expected to occur. In addition, any potential effects on water yield from the proposed thinning and density management thinning would be reduced gradually over time (5-15 years) as the remaining trees in thinned stands increase their growth rate and uptake of nutrients and water.

<u>(b) Low Flows</u>
Studies have shown that low flows may be affected by timber harvest. One report, which synthesized results from six paired watershed studies, showed that relative increases in summer flows were initially high after harvest but were eliminated within a few years due to re-growth of vegetation (Harr 1983). Another study showed that base flows can actually decrease below pre-harvest levels if more consumptive riparian species occupy near-stream areas (Hicks et al., 1991). This condition may be occurring presently due to the large number of alder and overstocked conditions within many of the previously harvested stands; however, there is no historical data to verify changes in low flow levels within the watershed.

Low flows may initially increase following thinning in the proposed project area, but the effect is expected to be short lived (5-10 years) and would be immeasurable beyond yearly variance. Even so, any increase in low flows would be beneficial to fish during the summer when temperatures are high. One objective of the proposed project is to replace alder, a more consumptive species, with conifer in riparian and adjacent upland areas. This has the potential to increase summer low flows.

<u>(c) Peak Flows</u>
Following timber harvest, studies have shown that peak flows during fall and spring periods are likely to be increased primarily due to reductions in transpiration and interception losses following harvest (Jackson and Van Haveren 1984); however, fall and spring peak flows are generally considerably smaller than the larger peak flows that typically occur during large storms in winter. The intense rainfall that occurs in winter, when soils may be near saturation, can overwhelm any changes in evapotranspiration due to timber harvest (NFC WA 2001, Ch. 4 p. 9). Rothacher (1973), Harr (1976), Jackson and Haveren (1984), and others found that major high flows were not significantly increased after timber harvest in the low elevation Coast Range.

Water Quality

<u>(a) Stream Temperature</u>
Density management thinning in Riparian Reserves has the potential to increase stream temperature by temporarily creating openings in the canopy and reducing shade. Shade from trees near the stream channel is important for reducing direct solar radiation and therefore stream temperatures. However, the proposed project incorporates design features to minimize canopy openings adjacent to stream channels. These design features include no-harvest buffers adjacent to all streams to maintain the canopy directly over flowing water. Also, the project design would retain a minimum of 60 trees per acre outside of the no-harvest buffers while minimizing the number and size of cable yarding corridors. Thus, the proposed density management thinning would have a negligible effect on stream temperature.

No-harvest buffers would be established for all streams within and adjacent to proposed units. No trees would be harvested that are located within 20 feet of a stream bank, or within 20 feet of an identifiable topographic break near the stream bank (generally, the top of the inner gorge), within 20 feet of a floodplain, or within 20 feet of the streamside edge of vegetation, whichever is greater. The minimum 20 foot no-harvest area could be expanded on a site-specific basis, if necessary, to provide additional protection in specific areas identified by resource specialists, such as, areas of instability. The no-harvest buffers would maintain existing canopy closure directly over the stream channel.

Cable yarding corridors will be necessary in some of the proposed units to access trees across stream channels. The proposed project is designed to minimize the number and size of these corridors. Skyline corridors would be required to be a maximum of 12 feet wide. The location, number, and width of cable yarding corridors would be specified prior to yarding. Distance between skyline corridors would be required to be a minimum of 150 apart at the unit edge where feasible. A total of approximately 101 yarding corridors with a maximum of 12 feet in width are planned for approximately 2.5 miles of stream within the project units. This equates to one corridor for every 132 feet of stream or 91 feet of corridor width per 1000 feet of stream. The BMPs as defined in the Coos Bay District Resource Management Plan is 250 feet or less per 1000 feet of stream (RMP ROD, p. D5).

In general, canopy closure in the thinned areas outside no-harvest buffers would be maintained at 60% or above. This level would help maintain shade height and density. It is estimated that canopy closure would approach pre-thinning density in about 8-10 years. Thinning would result in more favorable height to diameter ratios that would reduce the risk of blow-down (Smith 1962, p. 422), and subsequent exposure of the stream to solar heating.

<u>(b) Sediment</u>
Some short-term localized soil displacement may occur as a result of soil disturbance from felling, yarding, and ground-based equipment operations. The no-harvest areas, as described above, are intended to function as stream protection buffers to avoid impacts to aquatic resources from harvest activities. These buffers would assist in maintaining riparian vegetation composition, shading, and bank stability. The no-harvest buffers of a minimum of 20 feet in width would be sufficient to protect stream banks because this is about the maximum distance (half the crown diameter) that adjacent root systems contribute to bank integrity. The no-harvest areas would also provide an adequate filter strip since most forest soils in the Pacific Northwest have very high infiltration capacities and are not effective in transporting sediment by rain splash or sheet erosion (Dietrich et. al. 1982).

As described above, the proposed project includes thinning within Riparian Reserves using cable systems. In units where yarding is required through the no-harvest areas adjacent to streams, logs would be fully suspended to protect stream banks. There should be no increase in sediment delivery if logs are fully suspended above stream channels containing water. Where full suspension is not feasible, operations will occur during the dry season. In addition, trees that are felled within the no-harvest buffer to provide yarding corridors will be dropped toward the stream channel to provide bank armoring and coarse woody debris.

Channel Condition and Large Wood
Density management in Riparian Reserves would increase tree growth rates in the area most likely to contribute large wood to stream. Providing large wood to streams is an important component in meeting Aquatic Conservation Strategy objectives. Thinning second growth stands located within the Riparian Reserves ensures greater growth and larger tree size in a shorter time period than would occur without thinning. Thinning to 120 trees per acre would allow 20+" live trees to be available as large wood for interaction with the streams 10-40 years sooner, depending on site class. Thinning to the same density would allow 20+" dead trees to be available 40-90 years sooner (NFC WA 2001). Faster growth rates are due to an increase of available light, nutrients and water for the remaining trees. This should allow the trees within the Riparian Reserves to develop at a rate consistent with the thinned upland stands.

Restricting thinning of second growth stands in the Riparian Reserves would create a situation where the largest trees are furthest from the stream channel with less chance of interacting with the stream.

Trees felled for skyline cable corridors that are within the no-harvest area would be retained on site for coarse woody material. An additional conifer for approximately every 100 feet of stream channel in units 39 and 41A would be felled into the streams and would remain on site.

The recruitment of large woody debris is an integral part of watershed recovery and restoration of aquatic habitat. Large wood contributed to the channel from Riparian Reserves would provide several benefits to channel function and water quality. Large wood can serve to capture substrate, reduce stream energy, aggrade the stream channel, and re-establish a connection with the floodplain. Aggradation of the channel also has the potential to raise the water table, increase floodplain water storage and increase summer stream flows. Increased summer flows would contribute to lower stream temperatures.

Density management thinning in Riparian Reserves would benefit intermittent as well as perennial streams. One purpose of the Riparian Reserves is to maintain the structure and function of intermittent streams (USDA & USDI 1994, p. B-13). Large wood captures and stores sediment and is critical in maintaining step-pool morphology in many small headwater streams. Research showed as much as 15 times the annual sediment yield stored behind wood in Idaho streams and between 100 to 150 years of average annual bedload stored behind wood debris in steep tributary streams in northern California (Megahan 1982; Keller *et al.* 1995, both cited in Curran 1999). A recent study by Curran (1999) found that spill resistance from step-pool reaches contributed 90% of the friction that slows water velocity in some western Washington headwater streams. Stored wood has the potential to delay flow from these tributaries during storm events and reduce peak flows downstream.

Alder Conversion

Approximately 61acres of alder would be removed and replanted with conifer species as a result of the proposed project. Alder conversion would occur within the same units as thinning and density management operations.

Stream Flow

Approximately 0.2% of BLM and .06% of the entire watershed would be converted from alder to conifer. The effects of proposed alder conversion on stream flow would be similar to those discussed under density management above; however, the following differences between treatments would apply. The conversion of red alder stands to conifer should have no effect on peak flows but would increase low summer flows when photosynthesis demands are a factor. Alder is a deciduous species and the process of transpiration does not take place in the winter after its leaves have fallen.

A paired watershed study by Hicks et al. (1991) indicated that hardwoods that re-grew in the riparian area after logging used more water during the process of photosynthesis than conifers. Examination showed that August flows 3-18 years after harvest were 25% lower than pre-harvest levels. Therefore, it is expected that low flows would be increased when alder is replaced by coniferous species. An increase in summer low flows would alleviate solar heating and may provide cooler temperatures to the stream. However, at the scale of the proposed project, the effect would probably be immeasurable at the 7th field drainage level. Alder conversion is not necessarily a factor during the winter months when peak flows are more likely to occur. Therefore, the effect of converting alder to conifer on stream flow is more pertinent to an increase in summer low flow rather than peak flows in the winter as it enters a period of dormancy.

Water Quality

The effects of proposed alder conversion on water quality would be similar to those discussed under density management above; however, as noted above, conversion of alder to conifer stands has the additional potential to increase summer low flows. Increased stream flow in summer would help reduce stream temperatures during the most critical period, although, changes at the 7th field drainage level would probably be immeasurable. In the long term, taller conifers in the riparian area would be more effective than alder in providing shade for wider stream channels and would also help reduce stream temperatures.

The no-harvest buffer width adjacent to streams in red alder conversion units would be adjusted on a site-specific basis. A buffer width necessary to provide adequate stream shading during the summer months would be determined by resource area staff depending on stream size, aspect, existing vegetation and local topography. The method used would be similar to the system devised by Brown (1973).

Channel Condition and Large Wood

As discussed, large wood is a critical component for stream function and aquatic habitat in the watershed. Most of the riparian zone surveyed by ODFW in the proposed project area was found to have a lack of large conifers and is dominated by smaller hardwoods. Conversion of alder stands to conifer in riparian and upland areas would create a greater potential for future recruitment of large wood to stream channels.

New Road Construction

Approximately 1.0 mile of new road would be constructed to access the proposed units. The new road construction would be outside of the Riparian Reserves except for some areas above 1st order, intermittent draws, which are within 220 feet of ridge-tops. These roads would incorporate design features to minimize erosion and sediment transport into the channel network. These BMPs (RMP ROD pp. D3-D4) may include, but are not limited to, construction during the dry season, avoiding fragile or unstable areas, minimizing excavation and height of cuts, end-haul of waste material where appropriate and provision for adequate road drainage. All of the newly constructed roads will be fully decommissioned when project activities associated with each road are completed. Full decommissioning, as defined by the *Western Oregon Districts Transportation Management Plan* (USDI-BLM, 2002, p. 18), may include, but is not limited to, sub-soiling or tilling, construction of adequate water bars, stabilizing fill areas, re-vegetation and blocking access with a suitable barrier. There would be an overall reduction of 6.4 miles of road as a result of the Proposed Action.

Stream Flow

It is well documented that roads have the potential to increase peak flows (Beschta 1978, Wemple et al. 1996). Roads with cut-banks have been known to intercept subsurface flows and divert water directly into the drainage network. As a result, roads can serve to extend the drainage network and can potentially increase peak flows by delivering water from their ditch lines to stream channels at a faster rate than a non-roaded landscape.

The proposed new roads would have negligible effect on flows if the proposed design features are followed. Ridge-top roads have a low potential for diverting flows. The construction practices noted above would encourage any drainage from the road surface to infiltrate into the soil profile and not connect or add to drainage from the existing road system. This would reduce the likelihood of a potential change in the magnitude or timing of stream flow.

Peak flows have also been shown to increase when 12% or more of a watershed is occupied by roads or other compacted surfaces (Harr 1976); however, existing roads in the watershed and proposed project area do not approach this level. The compacted area created by the proposed roads would have a negligible effect on peak flows, due to their temporary status for use in harvest and subsequent decommissioning when project activities are completed.

Water Quality

Roads have the potential to increase sediment delivery to stream channels; however, Reid and Dunne (1984) and others have found the amount of sediment produced by a road is highly variable and is depending on the location, amount of use, surface type and other factors. They measured 130 times the sediment coming from a heavily used road compared with an abandoned road, and a paved road yielded less than 1% as much sediment as a heavily used gravel road. Also, it should be noted, the road drainage network must be connected to a stream channel in order to deliver sediment-laden runoff. Heavily used roads with poor surfaces that are adjacent to a stream channel have the highest capacity to deliver sediment and reduce water quality.

The one mile of proposed new road construction (road table 2-10c) is located on or near ridge tops and it will incorporate design features such as avoiding fragile or unstable areas, minimizing excavation and height of cuts, end haul of waste material where appropriate, and construction during the dry season. The roads would be designed to quickly route surface flow across the road prism, and any potential sediment-laden surface water should quickly infiltrate into forest soils.

All new construction, dirt roads, and landings would be seasonally maintained prior to winter rains if they are to be used the following year. Seasonal maintenance may include, but is not limited to, providing adequate water bars, mulching with wood chips or straw, and seeding with a District approved erosion control seed mix. The roads should not increase sediment delivery to stream channels and they would have little potential to affect water quality.

Road Renovation/Improvement

Approximately 8.3 miles of road associated with the proposed project would be renovated and maintained for future use (road table 2-10b). BMPs that would be used for the proposed road renovation (RMP ROD, pp. D3-D4) may include, but are not limited to, surfacing with rock, improving stream crossings, correcting erosion problems from ditch lines and cross drains, restoring out-slope or crown sections, and stabilizing cut-banks and fill slopes. These improvements to existing roads would reduce their potential to alter flow magnitude and timing or to deliver sediment to the drainage network.

There are several roads, e.g. the 26-10-20.0, the 26-10-09.0, and the 26-10-17.3, where the proposed renovation would resolve road drainage problems by reducing the erosion and sediment delivery that currently exist. Maintenance of existing roads would also assist in reducing future erosion based on the Proposed Action as described in Chapter 2. These are cost effective actions that would work toward the goals in the *Western Oregon Districts Transportation Management Plan* (USDI-BLM, 2002).

Road Closure/Decommissioning

Approximately 7.4 miles of new and renovated roads would be used and then fully decommissioned at completion of proposed project activities (road table 2-10e on page 36). Full decommissioning may include but is not limited to sub-soiling or tilling, construction of adequate water bars, stabilizing fill areas, re-vegetation and blocking access with a suitable barrier. Decommissioning of these road sections would eliminate the potential to alter flow magnitude and timing and the potential to deliver sediment to the drainage network.

Haul Routes

Most of the haul routes are paved, and this virtually eliminates the potential for sediment delivery to streams during transport of logs. Sediment delivery to streams from gravel surface roads would be minimized or eliminated through the use of silt fencing and/or straw bale barriers, removal and relocation of trapped sediment to stable upland areas, gravel lifts to stream crossings and dry season hauling.

Impacts on Fisheries and Aquatic Habitats

Riparian zones comprise the interface between terrestrial and aquatic habitat. The amount and condition of in-stream habitat features that benefit fish and aquatic life can be directly linked to several key habitat related functions of riparian zones and riparian vegetation. These functions include, but are not limited to, shading, streambank stabilization, controlling sediment movement, contributing coarse woody material, and contributing/retaining organic litter (Spence et al. 1996). Since approximately 37% (see Table 2-2) of the acres treated would come from the Riparian Reserve under the proposed alternative, a focus of this analysis will be on the impact management treatments would have on these 5 riparian related functions and their present and future contribution to aquatic habitat.

Design features are established for all management actions in order to prevent or reduce management related adverse alterations of aquatic habitats, or to improve aquatic habitats. Implementation of project design features and RMP directed BMPs would decrease the chances of direct and indirect adverse impacts to these habitats and their associated species, or would improve or restore aquatic habitats.

No-Action Alternative

Special Status Fish Species

Federal action that may affect listed species is limited to routine road maintenance. Natural landscape features that contribute to the formation and maintenance of riparian and aquatic habitat features would not be altered. There would be no direct or indirect impact to any life stage of federally listed Oregon Coast coho salmon; federal candidate Oregon Coast steelhead and Oregon Coast cutthroat trout; or any petitioned lamprey species.

Aquatic Habitat/Fisheries Habitat

This alternative would produce the highest number of future down logs in the riparian zone and stream channels through suppression mortality. This down wood material would be small in diameter, tree diameters currently average 11 to 17 inches, and since it would be standing dead for a number of years, it would provide limited durable structure for in-channel function. In the event of near-term natural hillslope processes such as landslides and debris avalanches, these logs would be of little value as structure to larger fish bearing channels downstream.

Logging debris and large relic logs that were left on site in riparian zones and streams would decompose long before being replaced by newer CWM of a large size. The stand trajectory, including the Riparian Reserves, set by the No-Action Alternative would result in a delay in attaining late-successional forest characteristics and the attainment of Class 1-2 large CWM for many decades (see Table 4-2).

Under the No-Action Alternative, these untreated units will continue to provide a high degree of the shade necessary to maintain cold water to on-site streams, which is then available to fish bearing streams downstream. Many of the 1st to 3rd order streams would continue to function at risk, in part due to a deficiency of large durable CWM recruitment for in-channel structure and function. In the long term, dense second growth stands in Riparian Reserves would continue to grow at a slower rate than if thinned. This would result in unfavorable height to diameter ratios, which increases the risk of blowdown and subsequent exposure of the stream to solar heating (Wilson; Oliver 2000).

There would be no management related benefits with the No-Action Alternative. Riparian zone and in-stream restoration would be passive. Naturally occurring hillslope and streamside processes would continue to provide structural components to stream channels in irregular pulses. The long-term positive benefits that result from the attainment of old-growth forest habitat characteristics through management thinning in the Riparian Reserve would be significantly delayed. High density forest stands, if left to grow at current stocking levels, would remain suppressed for decades. The large size coarse woody material required to achieve and to maintain proper functioning conditions in riparian zones and aquatic habitats would also be suppressed for decades.

In-stream Restoration – Stream Crossing Repair and Culvert Replacement

Direct, short and long term positive impacts to stream function, and aquatic/fishery habitat would not occur as a result of forgoing restoration opportunities. The restoration of the collapsed log culvert crossing site in upper Moon Creek and the replacement or removal of the failing culvert on the unnamed tributary to Moon Creek would not occur unless an alternate funding source was found. The opportunity for whole conifer trees to be cut and dropped into and over stream channels in Units #39 and #41B would not occur.

Riparian Functions

Shading

Without thinning or catastrophic natural events, stream channel canopy cover would be maintained in a nearly closed condition for several decades. Very little reduction in canopy cover would occur as dominant overstory trees out compete intermediate and suppressed trees and subsequently grow into their canopy space. Overstory crowns would eventually expand while suppression mortality would create small openings in the canopy. There would be a significant delay of several decades in the development of a diverse forest structure in Douglas-fir dominated riparian stands. The development of an understory shrub layer, which can be an important shade component of 1st to 3rd order streams, would also be significantly delayed. Stream water temperature would likely be maintained at ambient levels through these units.

Without the occurrence of flood or hillslope process related disturbance, the canopy cover in alder dominated riparian areas would eventually be reduced to a salmonberry and shrub dominated riparian zone. On very small streams, approximately 3 feet or less wide, adequate shade to maintain cool water temperatures could be provided by overhanging shrubs; but on larger streams, sunlight could reach the channel and could raise water temperatures. The development of an overstory canopy composed of shade tolerant cedar and hemlock would be extremely slow to develop or may not occur at all. Subsequently, these sites may not be capable of maintaining ambient water temperatures at some time in the future.

Streambank Stabilization

The root system of streambank trees bind bank soils and floodplain substrate in place. Streambank trees within one-half crown width distance from the stream are the primary contributors to streambank stability in the absence of an understory shrub layer.

High density stands dominated with Douglas-fir would maintain good streambank stability for a time. Since light is limited in these stands, understory plant cover and the root systems they provide would be minimal.

Hardwood dominated streambanks have an adequate amount of light penetration to form a dense understory and ground cover. Streambanks in this condition would likely have good stability.

Sediment Movement

Sediment movement in the form of soil creep across the riparian forest floor is negligible undisturbed conditions. Some areas of these dense Douglas-fir stands have minimal forest floor vegetation but the dense forest litter and CWM act to intercept sediment. The tight canopy cover would intercept and reduce the energy produced by heavy rains which could mobilize soil particles.

Alder dominated sites generally have high levels of forest floor vegetation and dense forest litter which would reduce rainfall energy and function to intercept the movement of sediment across the forest floor. Fallen trees and entrapped leaf and branch litter reaching the channel can function to retain sediment.

Coarse Woody Material

The delivery of coarse woody material to the stream channel and riparian zone would continue at the present rate under the No-Action Alternative. The average tree size across all proposed thinning units is 11 to 17 inches in diameter. Under existing stocking levels, the growth rate of individual trees is expected to decline. Suppression mortality, especially within the units with the highest tree densities, would continue to be a source of small coarse woody material delivery to the riparian zone and stream channels.

Under the No-Action Alternative, future recruitment of coarse wood is likely to be small trees that are less desirable for in-stream structure. A tree recruited into the stream channel may have been standing dead for many years before falling and would be in a state of advanced decomposition. It would likely break into short and less functional lengths upon falling. In most small streams, a live blowdown tree averaging 13 inches in diameter would provide some structural function to the riparian zone and channel; however, durability would be considerably less than a "key" piece (24" X 33'). Attainment of "key" piece size wood for delivery to the riparian zone and stream channel through natural mortality is unlikely before the stand reaches nearly 200 years old.

In alder dominated stands, salmonberry brush fields would dominate the site as red alder matures and dies. Under disturbance free conditions, few conifer trees would become established in these salmonberry brush fields. Small numbers of shade tolerant conifer species may become established but they would not thrive under a dense shrub layer. The attainment of "key' piece size riparian zone and durable in-channel coarse woody material is not expected from these sites.

Organic Litter

Most organic litter contribution to the stream channel and riparian zone occurs within one half tree height away from the stream. Un-thinned stands with high tree density would contribute the highest amounts of organic litter in the short term. The rate and amount of organic litter recruited to the stream channel and riparian zone would be maintained under the No-Action Alternative. In conifer dominated stands the litter is mainly composed of needles, twigs, and branches and is contributed throughout the year. In hardwood dominated stands, organic litter is composed of leaf and twig matter and is delivered seasonally.

Proposed Action

Special Status Fish Species

Nearly all treatments under the Proposed Action occur upstream from present fish distributions. All stream channels, including those in units #1, #2, #38, and #39, would include variable width no-harvest buffers between treatment areas and stream channels holding fish. Establishment of design features and the use of BMP's would minimize or eliminate potential impacts to riparian zone functions and aquatic habitats. It would prevent measurable amounts of sediment from being transported downstream to coho and steelhead bearing streams or critical habitat. The replacement of failing culverts on Moon Creek tributaries and restoration of a old stream crossing on Moon Creek could have a slight negative short-term impact on aquatic habitat. Elsewhere, no negative impacts are expected for critical habitat or any life stage of federally listed Oregon Coast coho salmon or "special status" Oregon Coast steelhead.

Long-term cumulative benefits are expected within the sub-watershed as late-successional characteristics develop. This desired future condition within the Late-Successional Reserve and Riparian Reserves would contribute toward proper functioning conditions of riparian and aquatic ecosystems. Additional in-stream restoration efforts are expected to continue on both public and private lands within these drainages.

Density Management/Commercial Thinning and Helicopter Pond Maintenance

Stream Shading

There is little risk of raising stream water temperatures above ambient levels in any stream as a result of the proposed forest management treatments. Thinning would maintain an average minimum canopy cover of 60% throughout the thinned portion of the Riparian Reserve. This canopy would provide enough shade and cover to bolster the effectiveness of the variable, 20 foot minimum no-harvest buffer in providing the shade necessary to maintain ambient stream water temperature. Many of these streams have east/west orientation and surrounding topographic features would provide additional stream shade across many of the units. A large percentage of these streams are dry during the summer season; therefore, stream shading of these dry streambeds has no effect on water temperature downstream.

Portions of Units #1 and #2 are adjacent to the fish bearing reach of Moon Creek. Approximately 0.25 miles of the upper reach of the Little North Fork of the Coquille River that flows within Unit 38 has resident cutthroat trout. Units #1 and #2 have an average conifer tree height of approximately 135 feet and an average of 153 trees per acre and a dense canopy of mature alder in the riparian zone. Unit #39 has an average tree height of about 96 feet and an average of 300 trees per acre with a scattered alder canopy in the riparian zone. Fish bearing streams are generally larger and present a slightly greater risk of elevating stream water temperature through forest management than do smaller 1st to 3rd order stream channels. The average active channel width for this reach of Moon Creek is 10 feet and for the upper fish bearing reaches of the Little North Fork Coquille River is approximately 8 feet in width. Increases in stream water temperature are closely related to an increase in direct sunlight to the stream surface. A variable no-harvest buffer width depending on stream size, aspect, existing vegetation, and local topography, would be applied. An average minimum canopy cover of 60% or greater would remain in the thinned portion of these riparian zones adjacent to the buffer. This 60% canopy cover would bolster the effectiveness of the variable width no-harvest buffer. These buffers would also assist in maintaining stream bank stability, including vegetation composition.

Within Units #1H, #2H, #41A, #43H, and #43 upstream of the fish bearing reaches of Moon Creek, alder dominated areas within the Riparian Reserve would receive treatments ranging from conifer release to alder conversion and conifer plantings. The vegetative canopy over this reach of Moon Creek would not be reduced by thinning or alder conversion; therefore, there would be no increase in direct sunlight. The variable width no-harvest buffer integrated with topographic shading would serve to ensure adequate canopy cover remains to shade the active stream channel and maintain ambient stream water temperatures.

The reach of the Little North Fork Coquille River that passes through Unit #39 only contains cutthroat trout and is approximately five feet average width. Alder is a relatively minor component in along the streambanks compared to the alder dominated stands adjacent to Moon Creek. The management prescription focuses on conifer thinning to achieve mature forest characteristics; however, where alder is dominant on a conifer site, the management treatment would favor conifer. A post-treatment minimum 60% canopy cover and the application of the variable width no-harvest buffer on this stream channel would be sufficient to provide adequate shading to maintain ambient stream water temperatures.

On the smaller streams, an increase in side light penetration may benefit the development of minor tree and shrub species in the riparian zone or at streamside. Overhanging streamside tree and shrub development would provide additional shade to these channels.

Streambank Stabilization

Streambank stability would remain at the current condition because of the implementation of the variable width no-harvest stream buffers that would require retention of streambank trees. Streambank stability would actually increase in the long term since reduced vegetative competition and increased growing space would result in a more vigorous forest stand adjacent to the stream channel as well as more understory shrub diversity and root mass.

Streambank stability on small streams would increase as side light penetration would help the development of minor tree and shrub species. Increased root mass and strength would bind soils and armor banks.

Controlling Sediment Movement

Exposing mineral soils in areas where soil could enter stream channels would be minimized by the use of BMP's for timber harvest on all areas. The implementation a variable width no-harvest buffer for all stream channels would act as a barrier preventing any mobilized soil from being transported from the forest floor to stream channels. A direct or indirect increase in the sediment load of stream channels above background levels would not occur from commercial thinning /density management activities; therefore, impacts to fish and fish habitat is not expected.

Contributing Coarse Woody Material

The mechanisms of delivery of coarse woody material to stream channels and riparian zones would not be affected under the Proposed Action. Conducting commercial thinning /density management based from below in the Riparian Reserve and implementing the variable width no-harvest stream buffers would result in a reduced rate of coarse woody material delivery to both the stream channel and the riparian zone. This would result in a reduction in the total number of trees available for recruitment to the riparian zone from the thinned areas; however, with added time to grow, these thinned units would attain a larger size tree at a faster rate, and trees that die in the thinned stands would have larger average diameters than trees that die in un-thinned stands of similar age. Competition mortality would continue to occur from the interior of the buffer and provide down wood. Surviving trees from the interior of the buffers would remain suppressed and retain a small size for many decades.

Attainment of an available "key" piece size log for delivery to the stream channel and the riparian zone as a result of natural mortality from the un-thinned buffer is unlikely before the stand reaches 190-200 years old. A 20 inch or greater diameter sized tree could be obtainable from a thinned Riparian Reserve conifer forest 10-20 years after the treatment of a 40 year old stand. Random mortality on thinned sites could produce a 24-inch snag anywhere from age 70 to 160 years depending on thinning treatment and site potential.

A small 1st to 2rd order stream channel would derive some functional benefits from a smaller average size log. Sediment routing and storage, surface and ground water retention, energy dissipation, and channel complexity can be obtained from a steady supply of down wood created through suppression mortality in small 1st and 2nd order streams. The smaller sized coarse woody material could be supplied to the riparian zone and stream channel from the mortality within the no-harvest buffer. Larger size trees would become available in the future to these small streams from the thinned areas as the growth of trees here exceeds those of the buffer. Growing large trees, site loading, in the upper areas of steep headwater delivery streams can help restore components of the Aquatic Conservation Strategy and provide future large wood to downstream aquatic habitats.

The input of coarse woody material to a stream channel would not only act as fish habitat where fish are present, but also can provide stable complex components that contribute to channel function similar to that described in Bisson et.al. (1987). The periodic felling of streamside conifer trees from the larger size classes into stream channels can help replace the decomposing existing legacy logging debris until thinned units grow trees large enough to provide a large log to the channel.

Organic Litter

As most organic litter contribution to streams comes from within ½ tree height away from the stream, contribution of organic litter to the riparian zone and stream channel may be slightly reduced from thinned areas due to the removal of harvested trees in the short term. In the long term, an increase in tree and branch growth and understory shrub growth may increase the amount and diversity of organic litter available in the riparian zone and stream channel.

Within the no-harvest buffer, suppression mortality is expected to continue. In the long term, shrubs would contribute to the diversity and timing of the organic litter component that aquatic invertebrates process. In riparian zones dominated by hardwoods, leaf litter, as well as twigs and branches, would continue to be provided to the stream channel.

Alder Stand Treatments/Conversions

Management treatments would be applied to alder stands to achieve habitat diversity related goals. Treatments include alder retention, alder thinning, cutting alder to release conifer, and alder conversion prescription where all alders would be cut and conifer would be planted. In all cases a variable width no-harvest buffer would be applied to protect aquatic resources where available.

Stream Shading

There is a slightly higher risk of affecting stream temperature from an alder conversion than from a thinning. The treatment involves cutting and removing all alder in order to apply silvicultural methods to ensure re-establishment of conifer trees. Many sites have scattered suppressed conifer trees that would be retained and they would provide some shade to the streams. All streams within and adjoining units where alder conversion treatments are to be applied would receive a variable width no-harvest buffer. This variable width no-harvest buffer can equal approximately 30% to 50% of the existing tree height or more in width. The alder canopy within these buffers would provide shade over stream channels while the typical dense shrub and herbaceous understory cover would provide a high degree of shading over small stream channels. Many of these alder treatment sites have topographic shading.

Streambank Stabilization

There is an extremely low risk of reducing streambank stability on any stream channel from the proposed alder management actions within these units. No streambank trees are proposed to be cut within alder conversion treatments; therefore, streambank stability is likely to remain at present levels.

Controlling Sediment Movement

Under typical alder dominated riparian conditions, a dense shrub and herbaceous cover as well as duff layering exists in the understory. This will provide sediment filtering where exposed soil is present in these units. It is unlikely that soil will reach stream channels through the buffers of alder treatment units.

Contributing Coarse Woody Debris

Red alder is incapable of providing durable coarse woody debris in this environment. On alder dominated sites, especially those disturbed by previous forest management, conversion would be the most suitable vegetative treatment to restore conifer. Without applying conversion management, a salmonberry/shrub brush field can result when the red alder dies. Little to no conifer or red alder establishment would likely occur in the salmonberry brush fields without conversion.

Large red alder logs could function as coarse woody material in stream channels or riparian zones of small streams, but for a much shorter duration than conifer. A red alder log will decay much more rapidly than a conifer log of the same size. Submerged red alder lasts slightly longer as coarse woody material; however, average channel size and water depth precludes continuous wetting of most fallen red alder. It is desirable to replace red alder with longer lasting and more durable conifer species on appropriate sites within the Riparian Reserves and the riparian zone. Without re-establishment of streamside conifer, blowdown of mature conifer and hillslope processes will become the primary source of coarse woody material recruitment to stream channels. Mature conifer trees adjacent to the riparian zone are a more reliable source of coarse woody material than the less frequent debris flow events.

It is necessary to provide growing space for successful conifer re-establishment. All streams in units where alder conversion treatments are to be applied would receive a variable width no-harvest buffer of a minimum 20 feet. Cutting all the red alders on the conversion sites would reduce the red alder seed source and reduce the risk of losing the conifer regeneration from competition for sunlight. The variable width buffer on stream channels is an important design feature for protecting the stream and riparian zone functions until newly established conifers are large enough to meet those needs, especially if next to fish bearing streams. Any existing class 3 or 4 coarse woody material can provide some channel function during re-establishment of conifers.

Depending on their crown ratio and leader control, suppressed conifer trees within these units could benefit from release after a few years time. Most of the releasable conifers are small, and a few are just reaching a height that tops the existing red alder. Once released, these suppressed trees have a size advantage over planted conifer but would be unlikely to provide key piece sized coarse woody material in the short term. Some existing dominant and co-dominant conifer are widely spaced and could contribute some coarse woody material in the short term.

Organic Litter

In hardwood dominated stands, organic litter is composed of leaf and twig matter from the overstory trees as well as the understory shrub component. In alder conversion stands, a reduction of leaf and twig matter may be expected in the riparian zone over the short term because of the reduction of the number of trees and periodic shrub and brush cutting treatments. This shrub maintenance would reduce total litter production, but would ensure that nearly all of the plant growth is converted to litter. Litter production by shrubs would decline as the converted conifer stand enters the stem exclusion stage, but would increase following thinning or another disturbance that opens the overstory canopy.

Litter directly contributing to the stream channel may only be slightly reduced in the short term. The buffer, composed of hardwoods and understory shrubs, would contribute litter directly to the stream for the life of the hardwoods. The shrub layer at streamside could persist and contribute litter after the red alder have been eliminated. In the long term on small channels, canopy closure would reduce light and reduce leaf litter contributions but would increase needle, twig and cone contributions.

Yarding Corridors

Stream crossing yarding corridors would be used to avoid the environmental and economic costs of building the additional roads that otherwise would be needed to access multiple ridges for direct uphill yarding. At some locations, tail holds and intermediate supports would be needed to obtain the full-log suspension desired over stream channels.

An estimated 50,980 feet of non-fish bearing stream channel is contained within the units of this sale and approximately 101 yarding corridors over these stream channels would be needed to thin these units. This would create approximately 1,212 feet (2.4%) of overstory gap over this estimated 50,980 feet of ephemeral, intermittent, and perennial stream channel. Approximately 1,389 feet of resident cutthroat trout stream channel is contained and buffered within harvest unit #39. This unit would not require any yarding corridors over the channel.

Design features require that the yarding corridors widths remain small and not more than 250 feet of yarding corridor be allowed within any 1,000 feet of stream channel. At a maximum of 12 feet in width, these corridors average approximately 91 feet per 1,000 feet of stream channel. It is unlikely that individual corridor gaps would reduce stream shade enough to raise ambient stream or seep water temperatures. Cumulatively, there would be no yarding corridors over fish bearing streams, and one yarding corridor per 132 feet of any stream channel.

Stream Shading

Harvest would be accomplished primarily by cable yarding logs uphill away from stream channels to established landings or general roadside landings. Cut-to-length ground-based harvesting and helicopter harvest systems would not require stream crossing corridors. Each cable yarding corridor (up to 12 feet wide) would create a small gap within the overstory canopy. Individual gaps may allow sunlight to penetrate to the stream channel for short periods of the day during the summer season; however, approximately 98% of these stream channels have no flowing water in the late spring, summer, or fall. Corridor trees cut from the no-harvest buffer would be dropped on or over the stream channel and left on site. These trees would provide short-term shade over the stream, as well as structure for stream function. These overstory gaps would also be partially shaded by topographic features, the thinned conifer stand, and the no-harvest buffer trees.

Streambank Stabilization

Where cable yarding occurs through no-harvest buffers on live streams, logs would be fully suspended to protect streambanks. Trees cut from the stream crossing yarding corridors within the no-harvest buffers would be dropped across the stream channel and left on site. These trees cut from the no-harvest buffers would act to armor streambanks, minimize streambank erosion, and would provide coarse woody debris. Where full suspension is not feasible over intermittent or ephemeral channels, yarding will occur only during the dry season.

Sediment Movement

Very little exposed soil and soil mobilization is expected to result from the clearing and use of yarding corridors in riparian zones. Corridors in riparian zones that do not require stream crossings would have no mechanism to directly contribute sediment to stream channels because of the filtering capacity of the no-harvest streamside buffer. No direct, indirect, or cumulative impact to fish and aquatic life or their habitat is expected.

Where yarding corridors are required across stream channels, stream crossing corridors would have the trees cut from within the variable no-harvest buffer area left on the site to act to armor the ground and streambanks.

Yarding corridors over non-fish bearing streams are not expected to deliver sediment to stream channels. Since no yarding corridors would cross any fish-bearing stream, no soil is expected to directly enter a fish-bearing stream as a result of using a yarding corridor. No direct, indirect, or cumulative impact to fish and aquatic life or their habitat is expected.

Coarse Woody Material

Coarse woody material would slightly increase in the short term on approximately 1,212 feet of stream channel as the project design requires that corridor trees within the no-harvest buffer be cut and left on site. Trees would be dropped toward the stream channel when cut. Large coarse woody material recruitment potential could be slightly reduced due to cutting corridor trees that, if left to grow, could reach greater size and possibly reach a stream channel. Trees on the edge of corridor gaps may slightly benefit from the additional sunlight the gaps provide and may potentially contribute a larger tree as stream channel or riparian zone structure in the future.

Organic Litter

Yarding corridors would contribute short-term organic litter to stream channels and riparian zones. Yarding corridors would reduce streamside tree density in about 2.4% of the stream channel area. Though felled trees would cease to function as a future source of organic litter as a result of being cut, increased light levels would increase the crown growth of residual trees and understory shrubs to produce and contribute organic litter over time.

Road Construction/Improvement/Renovation/Haul Routes

A total of 15.7 miles of road construction, renovation, or improvement is proposed. Approximately 4.3 miles of road decommissioning is proposed. No new road construction would occur in Riparian Reserves. A small number of trees may need to be removed within the Riparian Reserves as a result of road renovation, improvements or decommissioning actions including, replacing or removing culverts, at stream channel crossings.

Stream Shading

No measurable reduction in stream shade or increase in water temperature is expected from road construction, renovation, or improvement. No reduction of riparian zone vegetation or stream shade is expected along haul routes. Ambient stream water temperature in streams crossing or paralleling haul route roads would not be affected.

Streambank Stabilization

Design features and BMP's are established to minimize streambank erosion and stabilize streambanks at road/stream intersections. No reduction of riparian zone or streambank vegetation or loss of streambank stability would result from road construction, improvement, renovation or use of any haul routes.

Controlling Sediment Movement

Design features and BMP's are established to minimize streambank erosion and stabilize streambanks at road and stream intersections. Applying the design features and BMP's would prevent or minimize soil loss and the transport of sediment to stream channels where road renovation, improvement, or decommissioning actions occur at stream crossings.

No sediment is expected to enter any stream channel resulting from the construction, improvement, renovation or use of any haul routes. Primary haul routes are all paved roads. Secondary haul routes are generally well-maintained gravel all weather roads or would be upgraded to this status.

Contributing Coarse Woody Material

Proposed actions are confined to the road prism or clearing limits of new construction. There is no opportunity for the coarse woody material along roads to contribute to stream habitat.

Organic Litter

A small number of riparian trees may need to be removed as a result of road renovation, improvements or decommissioning actions including replacing or removing culverts. No measurable reduction of organic litter production or contribution to stream channels or riparian zones is expected to occur from road management actions.

In-Stream Restoration

Coarse Woody Material Placement

Coarse woody material already present in these stream channels would continue to provide habitat structure and diversity for channel maintenance functions. The proposal for cutting approximately 1 tree per 100 feet of stream over approximately 1 mile of streams in Units #39 and #41B would result in a net increase of coarse woody material. These channels are downcut and the placement of cut trees on the channel may result in spanner logs over the streams. When cut trees do reach these small stream channels, stream flow could be deflected to cause a slight amount of bank erosion on poorly vegetated streambanks. On reaches of exposed streambank a small amount of bank erosion is expected near cut trees but the sediment/turbidity derived from flow deflection should be transported only a short distance downstream before being sorted and deposited by in-channel processes at downstream structure. No sediment is expected to reach downstream to areas of coho and steelhead critical habitat. In addition, trees cut at stream crossing corridors would also contribute toward channel maintenance and function.

Stream Crossing Restoration and Culvert Replacement

Two failing stream crossings would be treated under this timber sale. One crossing is located on Moon Creek between Units #1H and #2H. This site is approximately 1/3 of a mile above a point identified by the ODFW as the upper limit of fish distribution on Moon Creek. It is a collapsing log-type culvert with associated road fill material. The road crossing at this site would no longer be needed and the site would be restored by physically removing the fill material and crossing logs. Streambank soil would be contoured and stabilized and the crossing logs would be used to armor the streambanks and reduce streamflow energy through this site. Since this site is a relatively short distance above the known upstream distribution limit of fish, removal could benefit fish passage in the future if the range of fish extends upstream.

Another crossing is an undersized culvert that is partially blown out on a non-fish bearing tributary of Moon Creek within Unit #1. This site is approximately one half mile above fish distribution. Since the crossing at this site is needed for forest management, a properly sized culvert would replace the existing culvert. Any fill material needed for this culvert replacement would be borrowed from the fill removed from the Moon Creek crossing restoration.

Even with BMP's and other project design features, this crossing restoration and culvert replacement could result in a short term pulse of a small amount of soil reaching the stream. It will also temporarily expose 50 feet of streambank soil at each site that could bleed small amounts of fine soil into the stream. A one-time pulse of sediment into the channel would be expected to be transported downstream during high winter flows. Degradation of water quality from turbidity and fines would not likely be measurable above background levels, but could reach downstream fish bearing reaches before being sorted by in-channel processes. Potentially, a small direct impact to fish from turbidity could occur, though is not likely to be measurable or observable, and any impact would occur within the first wet season after culvert restoration. These short-term impacts are not expected to adversely impact any fish species. Vegetative cover is expected to re-establish completely within one growing season.

Aquatic Conservation Strategy Consistency Determination

The Aquatic Conservation Strategy (ACS) provides landscape scale objectives for restoring and maintaining the ecological health of watershed and aquatic ecosystems contained within them on public lands. The components of the Aquatic Conservation Strategy, as introduced in the NFP ROD are:

- A network of Key Watersheds. These Key Watersheds provide refuge areas critical for maintenance and recovery of at-risk stock of anadromous and resident fish.
- Riparian Reserves where riparian dependent resources receive primary emphasis and where special standards and guidelines apply.
- Watershed analysis would be used to evaluate geomorphic and ecological processes operating in specific watersheds. The watershed analysis should enable watershed planning supportive of ACS objectives. Watershed analysis provides a basis for monitoring and restoration programs, and is the foundation for delineating the Riparian Reserves.
- Watershed restoration is an integral part of a program to aid the recovery of fish habitat, riparian habitat, and water quality. "The most important elements of a restoration program are (1) to control and prevent road-related runoff and sediment production, (2) to improve the condition of riparian vegetation, and (3) to improve habitat structure in stream channels."

The strategy would protect salmon and steelhead habitat on federal lands managed by the Forest Service and Bureau of Land Management within the range of Pacific Ocean anadromy (NFP S & G's, p. B-9). Given that ACS provides landscape scale objectives, the appropriate scale for evaluating the consistency of individual and groups of projects with the ACS is the watershed corresponding with the "fifth-field" hydrologic unit code (HUC) as defined in the "Federal Guide for Ecosystem Analysis at the Watershed Scale[1]." The proposed projects are all within the North Fork Coquille 5th Field Watershed (HUC# 1710030505)

The intent of the ACS is to maintain and restore aquatic habitats and the watershed functions and processes within the natural disturbance regime by prohibiting activities that retard or prevent attainment of ACS objectives. The primary emphasis of the Standards and Guidelines for Riparian Reserves is restoration of the ecological processes and stream habitats that support riparian dependant organisms.

[1] Reference November 9, 1999 Regional Ecosystem Office memorandum concerning Northwest Forest Plan Requirements for ACS consistency determination.

This conservation strategy employs several tactics to approach the goal of maintaining the "natural" disturbance regime, but it is not possible to provide for the complete recovery of aquatic systems on federal lands within the range of the northern spotted owl within the next 100 years, and full recovery may take as long as 200 years.

The Northwest Forest Plan Standards and Guidelines for Key Watersheds, Riparian Reserves, watershed analysis, and watershed restoration are the mechanisms for implementing The Aquatic Conservation Strategy Objectives. Consequently, meeting the Standards and Guidelines would meet the Aquatic Conservation Strategy at the landscape scale.

ACS OBJECTIVE 1 - *Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.*

The projects involve commercial thinning and alder conversions on Matrix, Late-Successional Reserve, and Riparian Reserve land use allocations (LUAs). Measures would be taken when implementing the projects to assure the maintenance and restoration of watershed and landscape features as described in the Project Design Features section of this EA. Course wood and snags would be retained in the project units and additional down wood would be provided at yarding corridors and along selected stream channels. The increased spacing created by thinning would release minor conifer species, thereby increasing overall stand diversity and providing long-term habitat for riparian and aquatic-dependent species (Tappeiner 1999). The development of larger trees and a diverse understory is expected to provide greater benefits to more species (Chan et al. 1997).

No new road construction would occur within riparian areas. Because many of the newly constructed roads would be temporary, and additional existing roads would be fully decommissioned following project completion, road density in the project area would be decreased following completion of activities. Creation of yarding corridors through Riparian Reserves would result in only minor gaps in the overstory canopy and not degrade the Riparian Reserve (i.e. the Riparian Reserve system would continue to provide adequate shade, woody debris recruitment, habitat protection and connectivity). The design features proposed for the projects are expected to maintain and not retard or prevent attainment of the elements outlined in ACS objective 1.

ACS OBJECTIVE 2 - *Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.*

No new roads or culverts would obstruct routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species. The density management thinning and alder conversion projects would retain the dominant conifer in both the Riparian Reserves and upland areas, and spatial and temporal connectivity would be maintained.

The proposed projects would meet the objectives stated in the Coos Bay District Record of Decision and Resource Management Plan of having less than 12% compaction within the harvested areas. Use of ground-based logging systems would be limited to broad, gently sloping upland areas. Some localized soil displacement and soil compaction can be expected, but would not be likely to affect riparian areas. No net increase in compaction is expected from ground-based logging methods, and the existing condition in regards to compaction would be maintained. No known refugia would be affected by the proposed projects. The Proposed Action is consistent with and would not retard or prevent attainment of ACS objective 2.

ACS OBJECTIVE 3 - *Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*

In the vicinity of the proposed treatment areas, the physical integrity of the aquatic systems would be maintained within the Riparian Reserve network. Incorporation of design features described in the EA would avoid impacts to stream bank and existing bottom configurations. Where thinning and alder conversions occur within Riparian

Reserves, a minimum of 20-foot no-harvest buffers would be maintained along all stream channels, and the trees within the buffers would remain on site. The no-harvest buffers would be wider than 20 feet to provide shade when necessary. The width of the no-harvest buffers would be based on site-specific topographic position and aspect. Full suspension of logs would occur over stream channels where possible, and if not, yarding operations would be restricted to the dry seasons.

Ground-based logging within the density management thinning stands would occur on broad, gently-sloping ridge tops well outside of riparian areas. The project design features would maintain or improve, and would not retard or prevent attainment of the elements outlined in ACS objective 3.

ACS OBJECTIVE 4 - *Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities*.

The proposed projects are not likely to have a measurable effect on water temperatures or turbidity levels, or result in the release of hazardous materials. The variable width no-harvest buffers, retention of the dominant trees, and post-thinning canopy closure of at least 60% should be sufficient to prevent temperature impacts. Full-log suspension over non-fish bearing streams would prevent damage to stream banks such that no erosion or sedimentation would occur during wet periods of the year. Where full-log suspension is not feasible, one-end suspension would be required and yarding would be limited to the dry season.

If haul occurs on gravel-surface roads during the wet seasons, sediment filters would be located in ditchlines to prevent road-generated sediment from entering aquatic habitats. Road related construction and improvement work involving earth-moving equipment would be accomplished during the summer months.

Refueling of gas or diesel-powered machinery would not occur in close proximity to stream channels. Mechanisms would be in place to respond quickly to the incident to avoid contamination of a waterway. The design features incorporated with the Proposed Action are expected to maintain and not retard or prevent attainment of the elements outlined in ACS objective 4.

ACS OBJECTIVE 5 - *Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.*

Implementation of Best Management Practices (RMP ROD) and other project design features should prevent any measurable increases in turbidity and fine sediment levels outside of the natural range of variability (see discussion for ACS objective #4 above). Design features would minimize or eliminate road generated sediment delivery to streams along the gravel surface portions of the haul routes. Design features should also prevent sedimentation or turbidity increases that would measurably affect the sediment regime during replacement of culverts on small streams. Portions of the project areas considered at high landslide risk would be protected as part of the Riparian Reserve network, and would not influence the timing, volume, rate or character of landslide events. The elements outlined in ACS objective 5 would be maintained. Implementation of project design features would not retard or prevent attainment of this ACS objective.

ACS OBJECTIVE 6 - *Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.*

The hydrology of the area is driven by precipitation in the form of rain. The area may occasionally receive snow, but the quantity and duration of the snow does not normally produce rain-on-snow events. The projects would affect the hydrology of the streams and tributaries within the project areas for a period of 5-8 years; minor increases in the annual yield, low flows, and the spring and fall peak flows are expected due to the increase in the amount of water available because of the removal of vegetation and the corresponding reduction in evapo-transpiration losses during the spring and fall. However, these increased spring and fall peaks are still considerably smaller than the peaks that typically occur during large winter storms. Therefore, the increase in peak flows would not have a detrimental effect, and increases in annual and low flows may be beneficial because more water would be available during the critical low flow season. Peak, summer, and annual flows are expected to remain within the range of natural variability for these stream types at both the 5th field and site level scales. Implementation of project design features would not retard or prevent attainment of this ACS objective.

ACS OBJECTIVE 7 - *Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.*

The Proposed Action would maintain the current Riparian Reserve network on federally administered lands. The timing, magnitude, variability, and duration of floodplain inundation would be maintained in the short and long term at both the site and 5th field watershed scales. Areas that are not currently connected with the floodplain would likely remain disconnected in the short-term and possibly in the long-term. No change in the timing, variability, and duration of floodplain inundation outside the range of natural variability is anticipated (see ACS objective #6). No meadows or wetlands occur within the project units. Implementation of project design features would not retard or prevent attainment of this ACS objective.

ACS OBJECTIVE 8 - *Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.*

The current Riparian Reserve network would be maintained on BLM administered lands. The Proposed Action would not alter any streamside vegetation that would be expected to influence stream temperature at the site or 5th field watershed scales in the short or long term. Thinning in the Riparian Reserves would release minor conifer species, increase overall stand diversity, and provide shading and surface litter. The development of larger trees and a diverse understory is also expected to provide greater benefits to more species. By maintaining the Riparian Reserve network, adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion and bank erosion, channel migration, and coarse woody debris recruitment are expected to be maintained on federal lands. No wetlands occur within the proposed harvest units. Implementation of project design features would not retard or prevent attainment of this ACS objective.

ACS OBJECTIVE 9 - *Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.*

On a broad scale, the NFP provides for the maintenance and restoration of habitat to support well-distributed populations of riparian-dependent species, primarily through the Late-Successional Reserve and Riparian Reserve networks. Other NFP components that further contribute to this goal include designation of Key Watersheds, mitigation measures for Survey and Manage Species, maintaining 15% of all watersheds in late-successional forest condition, retaining 25-30% late-successional forest in Connectivity blocks and retention of northern spotted owl 100 acre core areas and marbled murrelet occupied sites on Matrix lands.

The Proposed Action would maintain all NFP land use allocations and management standards within the North Fork Coquille River watershed, including the Riparian Reserve network. This would result in the protection of habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species in the short- and long-term. The proposed projects would be consistent with and will not retard or prevent attainment of the elements of ACS objective 9.

Impacts on Wildlife

<u>No-Action Alternative</u>

Habitat - Conifer Stands

Under the No-Action Alternative, stands in the project area would continue in their current development trajectory. Due to high stand densities, late-successional habitat development would be delayed in comparison with the action alternative. It is expected that stands would continue through a series of suppression mortality stages before dominant trees would fully express. A single story canopy with a narrow size and age range would continue to dominate the stand. Vertical stand complexity would remain relatively unchanged over the next several decades. Individual tree crown development would continue to be narrow, with small branches. Understory tree recruitment would be delayed in comparison to the action alternative. The herbaceous/shrub layer would show little development until such time that the stand opens up through competition or disturbance.

Stand projection simulations suggest that it will take unthinned stands 200 years to produce large diameter forest structure associated with late-seral stands (NFC WA 2001, Ch. 14, pg. 16). In contrast, Tappeiner et al. (1997) found that many Coast Range old-growth stands developed under low stocking densities and developed large diameter trees capable of providing large structure by the time those trees were 50 years old.

Some species associated with mid-seral stands would continue to utilize the project area, and would benefit from the delay of late-successional conditions. Hayes (2001) found that unthinned stands of similar age and structure maintained species such as the Pacific-slope flycatcher (*Empidonax difficilis*) and golden-crowned kinglet (*Regulus satrapa*). Though some species are more common in dense, unthinned stands, no species are known to depend on this development stage (Hayes et al. 1997).

Habitat - Alder Stands

Under the No-Action Alternative, alder would continue to grow on the site until approximately 90-years of age. At this time, stand mortality would increase as alder reaches the upper limit of its lifespan. As the canopy opens up through mortality, the understory would be released and would increase in vigor. Depending on the species of vegetation in the understory, habitat in the long-term would range from salmon berry brushfields, to low-density conifer stands with large individual trees. Species associated with brushy conditions, such as the spotted towhee (*Pipilo erythrophthalmus*) would benefit from the increase in habitat.

Snags/Coarse wood

The current trajectory of snag and coarse wood development would continue. Snags and coarse wood recruited would primarily come from the suppressed crown classes and would be generally smaller than the dominant overstory trees. As suppression mortality continued, there would be an increase in species associated with this habitat as flushes of snags and coarse wood become available. Species utilization depends on the size of the material, stage of decay, as well as amount on the landscape. Primary cavity excavators such as the pileated woodpecker (*Dryocopus* pileatus) utilize a variety of size snags for foraging, but generally utilize larger snags for nesting. Due to tree size, most of the snags and coarse wood in the project area, would provide foraging substrate, but would not provide nesting habitat except for the smallest of cavity nesting species.

Longevity of the wood would be short due to the overall size of the material and swiftness of decay. Development of large snags and large pieces of coarse wood would be delayed in comparison with the action alternative.

Helicopter pond maintenance

The stands adjacent to the helicopter pond would continue to grow. The usefulness of the pond as a helicopter-dipping source would decrease. The forested habitat around the pond would continue through the stages as described in the paragraph on habitat.

Road decommissioning/reconstruction/construction

Road densities in the watershed would remain the same.

Species

Northern spotted owl
Under the No-Action Alternative, stands in the project area would continue to provide dispersal habitat. Late-successional conditions would be delayed due to the high level of tree stocking

Marbled murrelet
The project area currently does not support suitable habitat for murrelets and it would remain in this condition for well over 100 years. Stands development trajectory would remain different than that which occurred in old-growth stands that currently provide suitable murrelet habitat. This is largely due to the high stand densities associated with even-aged management.

American bald eagle
Habitat for the bald eagle is not located in the project area. Under the No-Action Alternative, development of suitable eagle habitat would be relatively slow. Stands development trajectory would remain different than stands that currently provide eagle habitat. This is largely due to the high stand densities associated with even-age management.

Big game species
Moderate hiding and thermal cover would remain in the proposed project area. Forage would remain low in the project area. No disturbance from harvest or road work would occur. Road densities in the watershed would remain at their current levels.

Cumulative Effects

There would be no local level cumulative impacts to the No-Action Alternative.

Proposed Action

Habitat - Density Management/Commercial Thinning

It is anticipated that the proposed action would have long-term impacts to late-successional habitat in the LSR and RR by accelerating the development of structurally complex stands of large trees with large branches and deep crowns. Hayes et al., (1997) describes the benefit of late-successional stand structure to certain species of wildlife: large crowns provide additional nesting for birds and foraging habitat, large diameter branches provide nesting platforms for species like marbled murrelets and large trees are an important component in spotted owl habitat.

In addition to the increase of late-successional stand structure, there would be an increase in light levels reaching the forest floor. The light would increase understory development and tree recruitment, leading to an increasingly complex forest structure preferred by old-growth forest obligates. Also the additional light would enhance the herbaceous/shrub layer, providing an increase in forage for deer and elk in the project area.

Other expected long-term outcomes of the project include larger snags and coarse wood. Eventually, mortality through competition would return to the project area, leading to the demise of individual trees. These larger snags would provide nesting, perching and foraging habitat for a wide variety of species (Johnson et al, 2001).

Habitat - Alder Conversion

Prior to the last major disturbance, from timber harvest or road building, the red alder sites were dominated by conifer. Alder has become establishment at these sites since 1962 or later due to the failure of conifer reforestation. The prescription in the project area varies from stand to stand. Some stands would have all red alder removed while other stands would have red alder retained. The end product would be a mixture of varying habitats across the project area.

The removal of red alder and the reestablishment of conifers would have positive long-term benefit to species associated with late-successional conifer forest habitat. Due to the limited amount of conifer restoration opportunities, the overall benefit for older forest obligates is limited.

The reduction of red alder may lead to a decrease in species associated with this habitat type. One species associated with riparian/alder habitat is the white-footed vole (*Arborimus albipes*) (Maser et al., 1981). This species is recognized by the State of Oregon as a species of concern. Gomez (1992) trapped white-footed voles in 5 habitat types: conifer shrub, sapling-pole conifer, sawtimber conifer, old-growth conifer and deciduous forest. The majority of captures were in deciduous forest, followed by shrub-conifer and sapling pole. Voth et al. (1983) examined fecal pellets and stomach content and determined at least 33 plant species were utilized as food. The leaves of four deciduous plants, including red alder, composed 57% of the fragments identified. Though the species has been located in a variety of habitat types it is most often captured in riparian habitats. The decline in alder may lead to a local decrease in white-footed vole population on the Federal lands in the area.

Helicopter Pond Maintenance

Approximately 1 acre of closed sapling/pole would be removed to allow for more open flight path for helicopters using the pond for fire suppression. Due to the overall scale of this habitat type located within this watershed and surrounded watershed there are no appreciable negative effects to wildlife populations to this portion of the project.

Road Decommissioning/Reconstruction/Construction

The 6.4 miles of proposed road decommissioning is expected to improve the quality of habitat in the project area by reducing dispersal barriers for some species. Road decommissioning would lead to a long-term reduction in road-associated disturbance for a variety a species ranging from spotted owls to elk.

Approximately 1 mile of temporary new road construction is proposed. These roads would be decommissioned post project. Negative effects to wildlife would consist primarily of temporary disturbance due to an increase in traffic on the new roads. Because these effects would be temporary and the amount of construction limited, the overall negative effects are judged to be minor.

It is anticipated that the 14.7 miles road renovation/improvement would lead to an increase in disturbance to the project area. Approximately 3.5 miles of road scheduled for renovations are currently not passable by vehicles. Renovated roads that are currently not drivable would have the same effects described for new road construction but the effects would be longer term for those roads that are not closed after harvest.

The effects of the road decommissioning, temporary construction, and renovation would lead to an overall reduction in the road density in the watershed of 6.4 miles. The decrease in road density would improve habitat effectiveness for big game in the planning area. Decreasing traffic may lead to fewer disturbances to elk and deer.

Species

All Actions – Consultation: The draft “Biological Assessment for the Cox Creek and Fruin Moon Density Management Thinning,” which includes the Moon 25 Thinning, assesses the impacts of the Proposed Action on northern spotted owls, marbled murrelets, bald eagles, northern spotted owl critical habitat, and marbled murrelet critical habitat pursuant to the Endangered Species Act of 1973, as amended. The proposed project is determined to “may affect, not likely to adversely affect” these species due to disturbance. The project would not be implemented until the U.S. Fish and Wildlife Service issues a letter of concurrence.

If additional activities are found that could affect listed species, formal consultation with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) will be required before award of any timber sale or implementation of the activity. Where appropriate, mandatory terms and conditions would be implemented.

Northern Spotted Owl

The proposed treatment would not result in the removal of suitable roosting/foraging/nesting habitat for the northern spotted owl. The treatment area currently provides dispersal habitat for northern spotted owls. After treatment, it is estimated that the thinned, more open stands would still have a canopy closure greater then 60%. This habitat would continue to provide dispersal habitat.

The intent of the project within the LSR is to hasten the development of late-successional forest. Expected outcomes include accelerated tree growth, increased crown depth, and increased stand complexity. In the long term, it is anticipated the project would improve habitat conditions for northern spotted owls.

Proposed treatment units 17, 18 and 23 are within ¼ mile of spotted owl centers (North Fork Coquille and Lower North Fork sites). A seasonal restriction from March 1 to June 30th would be applied to these units to avoid disturbance to nesting owls.

Marbled Murrelet

The proposed project would not result in the removal of any habitat for the marbled murrelet. The intent of the project is to hasten the development of late-successional forest within the LSR. Expected outcomes include accelerated tree growth, increased crown depth, and increased stand complexity. In the long term, it is anticipated the project would improve habitat conditions for marbled murrelets within the LSR land use allocation.

Overstory trees in the treatment area average about 95 feet in height, less then half the height of adjacent un-entered stands that average 220 feet. Due to the height difference, there is very little interaction between crowns of the proposed treatment units and adjacent un-entered stands. It is anticipated that the proposed thinnings would not decrease existing murrelet habitat.

American Bald Eagle

The Proposed Action would not result in the removal of suitable bald eagle roosting, perching, or nesting habitat. The proposed action may accelerate the development of late-successional forest that would benefit the bald eagle in the long-term.

Survey and Manage Species (S&M)

There are no anticipated effects to S&M wildlife species in the project area.

Big Game (Deer and Elk)

Due to the increase in light reaching the forest floor, there would be an increase in the herbaceous/shrub layer. This would provide forage for deer and elk. This increase would have the highest nutritional value in the first few years following the disturbance and would slowly decrease as the overhead canopy increases. As the canopy closes in again the forage value would be low again (Brown 1985).

The loss of hiding and thermal cover would naturally be mitigated by the remaining un-entered older forest stands surrounding the project area. The treatment areas would return to high quality hiding and thermal cover in approximately 20 years as the understory develops.

Other Wildlife Species

A number of species are associated with closed sapling/pole habitat, but none are known to be exclusively associated with this stage of forest development (Hayes et al. 1997). The most vulnerable species to the Proposed Action includes those with limited dispersal capabilities. Amphibians as a group tend to have small home ranges and a limited ability to move across the landscape. The proposed action may lead to loss of some individual frogs (red-legged, foothills yellow legs, western toad and Pacific tree frog) and salamanders (Dunn's, western redback, clouded, torrent, ensatina, and northwestern) through direct morality during yarding operations. This effect is short term and populations of these species are expected to quickly recover. After the action is completed, the area would still provide suitable habitat for all these species. The action would not lead to an overall population decline in the watershed.

Most mammals in the project area generally have greater dispersal capabilities then amphibians. Elk, bear, bobcats, etc. would most likely temporary leave the area due to disturbance. Smaller mammals such as the white-footed vole and mountain beaver (*Aplondontia rufa*) that have fewer capabilities for movement may have individuals lost during the harvest. Post action, the project area would have suitable habitat for both of these species; though there would be less alder for the voles to use as forage.

Key Habitat Features

<u>Snags</u>

The desired future condition of snags is outlined in the *South Coast-North Klamath Late-Successional Reserve Assessment* (1998). The LSRA states "stands would have at least 5 snags per acre greater than 20 inches in diameter and 16 feet tall on north facing slopes and at least 3 snags per acre greater than 20 inches in diameter and 16 feet tall on south facing slopes."

The creation of snags is a balance between providing enough snags to meet current needs, providing a sustainable amount of snags through time to meet future needs, and limiting the number of dead trees that may attract stand damaging levels of Douglas-fir beetles following timber harvest operations. Outbreaks of these beetles could affect the stand trajectory by killing reserve trees intended to provide future large trees, thus delaying late-seral/old-growth conditions. The goal of the project is to meet this balance by providing snags without jeopardizing the long-term goals for the LSR and Riparian Reserve.

In general, the stands in the project area do not have trees large enough to meet the snag/coarse wood desired future conditions as identified in the LSRA; however, snag and coarse wood development is recognized as an important part of the project. EA Table 2-8 displays the units where snag and coarse wood development is planned. The intent of this action is to supply these key habitat features to meet ecological function, while considering stand age/development.

It is anticipated that within the LSR and Riparian Reserve portion of the project, additional snag and coarse wood development would most likely occur later. In the long term, it is expected that increases in individual tree growth would provide potential snag/coarse wood that is larger in size and that would provide better habitat for some wildlife species, such as cavity-nesting birds and salamanders.

Approximately 10% of the project area has been reserved from treatment. This would help provide for small snags and coarse wood in the short short-term through suppression mortality.

All snags in the project area are reserved from cutting; however, the proposed harvest would lead to the loss of some snags due to workers safety and facilitating harvest operations. The loss of these snags would lead to a local decrease in available foraging/nesting habitat for some species; however, several species of cavity nesters respond positively to thinning, even with snag loss. Hagar (1996) found that hairy woodpeckers (*Picoides villosus*) and red-breasted nuthatches (*Sitta canadensis*) increase after thinning despite lower snag densities. It is postulated that this increase may be due to an increase in available forage from tops and branches.

The proposed actions would create snags in all units in the project area, except Units 17 and 42, to provide for short-term needs. Table 2-8 displays the proposed number of snags per acre in each unit. It is anticipated that the trees would begin to become useful snags in 5 years. Increases in snags in the project area would benefit some of the 53 species that utilize snags (Brown, 1985).

Coarse wood

Coarse wood located in the project area would remain on site and would be disturbed as little as feasibly possible. In addition, the project proposes to create coarse wood. Table 2-8 displays the amount of coarse wood being proposed per acre by unit. Increases in coarse wood would likely be used in the short-term by species such as the clouded salamander (*Aneides ferreus*) that utilizes down logs. It is anticipated that the increase in the growth of trees reserved from harvest would eventually provide a long-term source for large coarse wood in the project area.

Cumulative Effects

Implementation of the proposed action would not have any appreciable negative impacts to any wildlife species, including those listed as threatened or endangered. While the proposed action would reduce existing canopy density, it would in the long run lead to more complex forest structure including larger trees with larger crowns. While alder conversion would modify existing conditions in the immediate area, it is anticipated that restoration of conifers to these site would have a long-term benefit to species associated with late-successional forest conditions.

Past management activities from county, state, federal, and private land managers in the North Coquille watershed have altered the historic condition from a landscape dominated by a structurally complex older forest, to a forest dominated by managed stands. The Proposed Action would begin to reverse this trend, modifying a relatively simple forest structure and restoring them to a trajectory toward late-successional habitat.

The majority of remaining older forest in the North Fork Coquille watershed occurs on public lands managed by the Bureau of Land Management. Reasonable foreseeable action on public land managed by the Bureau of Land Management includes additional thinning projects to promote greater structural diversity and greater habitat complexity on the LSR land allocation. Forested stands located on the Matrix land allocation would be managed primarily for timber production.

Reasonable foreseeable actions on private land include even-age stands managed in short-term rotation ages for maximum timber production. It is unlikely that private land would contribute substantially to maintaining older forest biota on their landscape.

It is anticipated that 15,686 acres of closed sapling/pole forest habitat and associated biodiversity would remain in the BLM managed portion of watershed post harvest. Stand recovery rates would vary depending on current stand condition, but for the majority of the proposed project it is anticipated that stands would recover to provide older forest conditions in 20-50 years.

Impacts on Recreation

No-Action Alternative

There are no developed recreation sites in or near the project area. There are no impacts to dispersed recreation sites or to dispersed recreation travel as a result of the No-Action Alternative.

Proposed Action

The proposed action could result in short-term impacts to dispersed recreation site use and to recreational driving. There could be delays in recreational travel for up to 20 minutes on several BLM roads during harvest operations; however, these delays are only expected to cause only a minor inconvenience. Undeveloped roadside camping areas such as landings, truck turnarounds, etc., used primarily for hunting could be blocked by logging equipment for several weeks at a time.

Impacts on Cultural Resources and Native American Religious Concerns

No-Action Alternative
There would be no disturbance to cultural resources nor would there be Native American religious concerns if this alternative is adopted.

Proposed Action
It is not expected that cultural resources would be affected by the Proposed Action. The two tribes with interests in this area are the Confederated Tribes of Coos, Lower Umpqua and Suislaw Indians and the Coquille Tribe. They are routinely sent notification of proposed forest projects and avenues for them to express any concerns are in place. It is not anticipated that there are any Native American religious concerns with the Proposed Action.

Impacts on Solid and Hazardous Waste

No-Action Alternative
Continued dumping along Road 26-10-19.2 could occur resulting in further accumulation of household debris.

Proposed Action
Under the Proposed Action, Road No. 26-10-19.2 would not be blocked after operations. Additional dumping of solid waste materials could continue to occur.

Activity resulting from the Proposed Action would be subject to State of Oregon Administrative Rule No. 340-108, *Oil and Hazardous Materials Spills and Releases,* which specifies the reporting requirements, cleanup standards and liability that attaches to a spill or release or threatened spill or release involving oil or hazardous substances. In addition, the Coos Bay District Hazardous Materials Contingency Plan and Spill Plan for Riparian Operations apply when applicable to operations where a release threatens to reach surface waters or is in excess of reportable quantities.

Impacts on Environmental Justice
Because there is no known use of the project area by Native Americans, minorities, or low-income populations, there is reasonable certainty that there would be no direct, indirect or cumulative impacts to these groups.

Native American Grave Protection and Repatriation Act (43 CFR Part 10; IM OR-97-052) Notification Requirements would be followed. If any potential cultural materials are encountered during the project, all work in the vicinity will stop and the District Archaeologist will be notified at once.

CHAPTER 5 - List of Agencies and Individuals Contacted

The general public was notified of the planned EA through the publication of Coos Bay District's semi-annual *Planning Update*.

Two adjacent landowners were contacted during the scoping process:

Menasha Corporation
Plum Creek Timber Lands LP

The following public agencies and interested parties were notified with e-mail scoping letters:

Coast Range Association
Umpqua Watersheds
Development Division of State Lands
Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians
Oregon Natural Resources Council
Hugh Kern
Division of Land Conservation and
Many Rivers Group of Sierra Club
Carl Barnett (Pacific Corp)

The following public agencies and interested parties were notified with hard copy scoping letters:

John Muir Project
Southern Oregon Timber Industry Association
Klamath-Siskiyou Wildland Center
Donald Fortenot
Association of O&C Counties
Coquille Indian Tribe Oregon
Natural Resources Council
Rogue Forest Protection Agency
Douglas Timber Operators
US Small Business Association
Kalmiopsis Audubon Society

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