U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT
BUTTE FALLS RESOURCE AREA

ENVIRONMENTAL ASSESSMENT
for
TRAIL CREEK

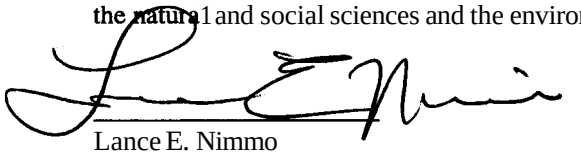
Project Name/Number: OR-110-02-05

Project Location:

Willamette Meridian, Jackson County, Oregon

Project Lead: John Bergin, Forester
EA Preparation: Jean Williams, Environmental Coordinator

This Environmental Assessment for Trail was prepared utilizing a systematic interdisciplinary approach integrating the natural and social sciences and the environmental design arts with planning and decision making.

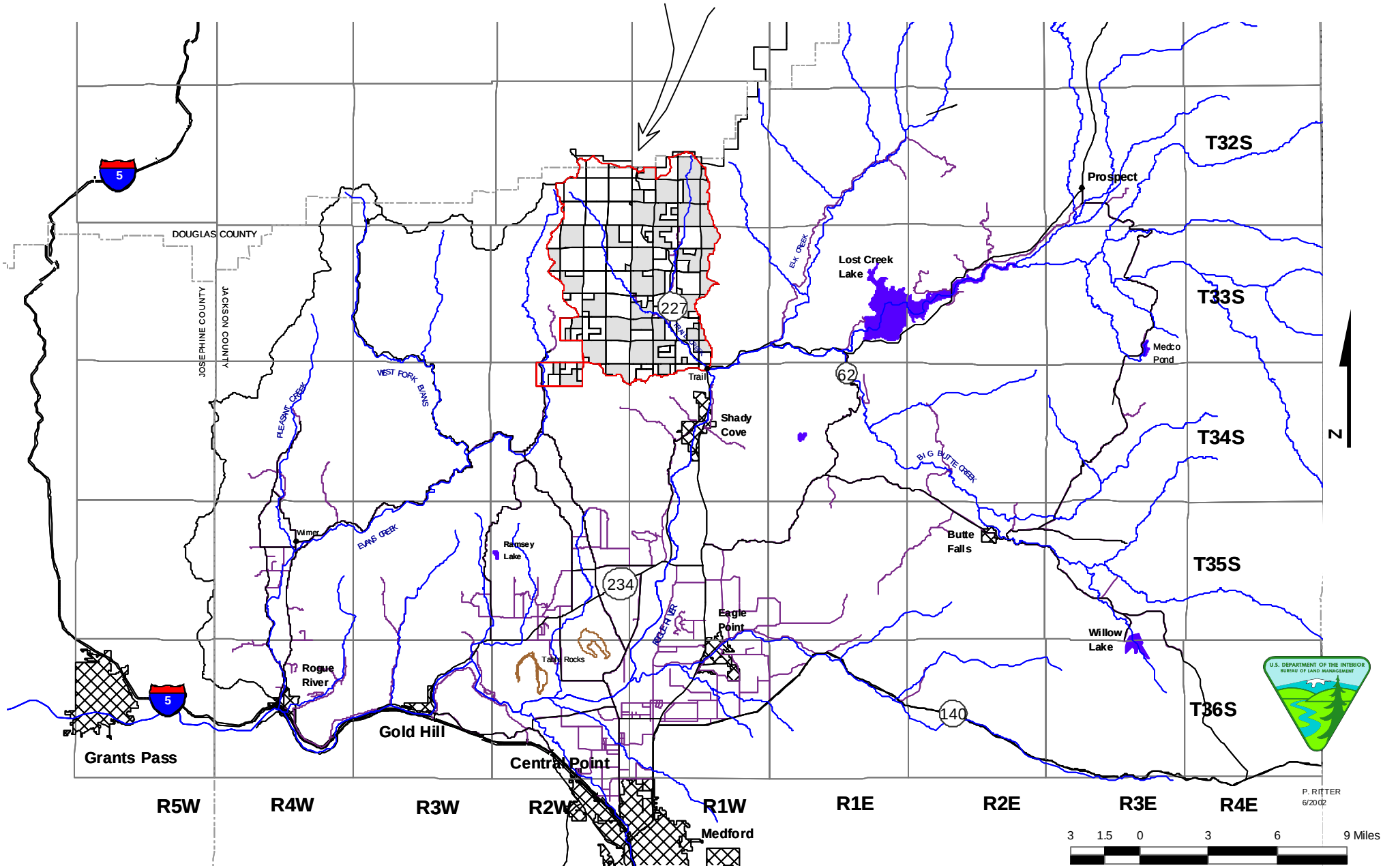


Lance E. Nimmo
Butte Falls Field Manager

Date: June 21,2002

The Environmental Assessment was made available for public review on June 21,2002

BUREAU OF LAND MANAGEMENT
Butte Falls Resource Area
General Vicinity Map
TRAIL CREEK E.A. PROJECTS



INTRODUCTION

The Butte Falls Resource Area (BFRA) proposes to implement forest management activities and restoration projects in the Trail Creek Watershed. The proposed projects include timber harvest, hazardous fuels reduction, road projects (ie road surfacing, decommissioning etc.) and replacing undersized culverts for fish passage. The total analysis area is 35,000 acres in size. BLM manages 14,681 acres (42%) of the analysis area; private industry manages 10,160 acres (29%); Forest Service manages 4,360 acres (12%); state of Oregon manages 79 acres (<1%); the remaining 6,026 acres (17%) are private non-industrial lands. Timber harvesting, understory reduction and road projects, would occur within Matrix and Riparian Reserves as designated in the Record of Decision for the Northwest Forest Plan Environmental Impact Statement (SEIS/ROD) p 7. All projects are located on public lands administered by the BLM and Forest Service. (See map 1 for project location.)

I. PURPOSE OF AND NEED FOR ACTION

The purpose of th is Environmental Assessment (EA) is to analyze the effects of harvesting timber, reducing existing high stand densities and hazardous fuels within forested stands and road related projects (e.g., road upgrades, road closures) from this analysis area. The proposed actions would meet the goals and objectives of the Medford District Resource Management Plan (RMP) by contributing to the District's decadal Probable Sale Quantity while providing a healthy forest ecosystem with habitat that supports populations of native species and includes protection for riparian areas and water bodies. In addition, the proposed action is designed to meet objectives addressed in the Trail Creek Watershed Analysis such as timber stand improvement, forest health, fire hazard reduction and terrestrial and aquatic habitat improvement. These recommendations have been incorporated into project proposals presented in this EA.

Forest Health

In the Trail Creek watershed forest conditions are variable. Many stands have more trees than the site can sustain and need treatments to reduce density levels. The increasing risk of mortality is from insects, disease and/or wildfire. Canopy closures greater than 60% and existing ladder fuels within these stands create high fire hazard and potential for sustained crown fires. Some riparian reserve acres are in this condition and proposed treatments are designed to help promote growth of existing large trees, encourage growth and recruitment of large trees from the understory and create more open understory to reduce fire hazard in the stand. Without treatment, the long term stability of these forested lands and their resiliency to disturbance will remain at an undesirable level. Other stands are declining in vigor due to changes in stand composition. Treatments are designed to reduce this decline and reestablish a healthy vigorous forest stand. In the design of this proposal there is a need to provide adequate habitat and connectivity for late-successional dependant species.

Aquatic Habitat & Roads

Table 3-5 in the Trail Creek Watershed Analysis shows that roads are the single greatest source of management related delivered sediment in the watershed. Factors contributing to road sediment delivery include, long contributing road lengths between cross drains, unsurfaced or lightly surfaced roads and relatively high road and stream densities. Roads left in these conditions will continue to erode and contribute to sedimentation to the stream system. Many of these roads may not be needed for access in the long, or short term and should be considered for decommissioning to aid in reducing road related sedimentation.

Hazardous Fuels Reduction

The proposed projects are located in T33S, R1W, sections 5, 7, 17, and 31; T33S, R2W, sections 23, 25, and 35; T35S, R2W, section 3 and 4. The objectives of the proposed projects are to treat natural stands that are currently in an overstocked condition and reduce hazardous fuels accumulation, which occurs naturally, or from harvest activities. The project goals are to utilize fire or simulate fire effects in the ecosystem as a disturbance agent, and reduce the risk and consequences of unwanted wildland fire to wildland urban interface areas identified as high risk communities.

The proposed projects target an area comprised of one main vegetative community; the mixed conifer plant association that includes hardwoods and conifers. This EA analyzes the expected impacts of

the proposed project to the major plant association.

Fuels treatments will consist of multiple entries designed to reduce existing fuel loadings over time to levels that would approximate natural levels. Initial treatments such as understory thinning, hand piling and hand pile burning of the existing hazardous fuels allow for the utilization and reintroduction of fire through controlled prescribed burns. In order to accomplish the objectives of hazardous fuels reduction, treatments would focus on:

- Reduction of hazardous fuels in the Wildland-urban interface areas identified as Communities at Risk
- Treatment of slash resulting from harvest activities.
- Reduction in understory densities and ladder fuels to decrease fuel continuity which decreases the fire spread potential between lowland and upland areas.

Density Management and Fuel Hazard Reduction Within Riparian Reserve Areas

The objective is to thin areas of the stand to promote the development of late successional stand characteristics within the Riparian Reserve, faster than the natural biological progression most stands follow, with minimum short-term adverse impacts while meeting Aquatic Conservation Strategy Objectives (ACS) ROD (pg. 11-17 and Trail Creek WA, pg 4-17). Fuel hazard reduction objectives are designed to reduce fuel amounts and the risk of catastrophic fires (Trail Creek Watershed Analysis (WA), pg 4-8).

Forest stands within the Riparian Reserve have been evaluated and identified for density management and fuel hazard reduction. Other potential stands were evaluated but did not meet strict Riparian Reserve criteria or were withdrawn as a result of other resource conflicts. The stands identified for density management are characterized by an even-aged, closed canopy, mid-seral stage lacking biological and structural complexities represented in late successional and old growth stands. Canopy closure within the Riparian Reserve ranges between 90 to 100%, resulting in high levels of shade except for small openings and recent gaps. Stands identified for fuel hazard reduction, or a combination of density management and fuel hazard reduction are characterized by an uneven-aged stands with closed canopy, or partially opened canopies. In addition, the stands are mid or early-seral, lacking biological and structural complexities.

Three action alternatives were developed for this project. A description of these alternatives can be found in Chapter II of this document.

Projects Objectives

Produce a sustainable supply of timber and other forest commodities that provide jobs and contribute to community stability (Medford Record of Decision and Resource Management Plan pg. 38)

Provide connectivity (along with other allocations such as riparian reserves) between late- successional reserves. (Medford Record of Decision and Resource Management Plan pg. 38)

Provide habitat for a variety of organisms associated with both late-successional and younger forests. (Medford Record of Decision and Resource Management Plan pg. 38)

Decrease ground fuels, ladder fuels and canopy closures to reduce risk of running crown fires and increased fire growth potential. (Trail Creek Watershed Analysis pg 4-5, 4-6)

Control existing infestations and discourage the spread of non-native and noxious weeds throughout the watershed. (Trail Creek Watershed Analysis pg 4-6)

Upgrade selected stream crossings to meet 100-year flood standards. (Trail Creek Watershed Analysis pg 4-8)

Consider decommissioning roads to improve hydrologic and riparian function. (Trail Creek Watershed Analysis pg 4-9)

Promote growth of forests within Riparian Reserves to reach late-successional characteristics. (Trail Creek

Watershed Analysis pg 4-9)

Manage the transportation system to minimize sediment delivery to streams. (Trail Creek Watershed Analysis pg 4-12, 13)

Provide for fish passage at designated fish bearing stream crossing, to increase habitat accessibility. (Trail Creek Watershed Analysis pg 4-13)

Maintain and protect BLM Sensitive, Survey and Manage, and Threatened and Endangered Species. (Medford District RMP pg 50-51, S&M ROD)

A. Conformance With Existing Land Use Plans

The proposed timber harvest and restoration projects are in conformance with the BLM land use plans for the subject areas. The proposed projects are consistent with management objectives for public lands identified in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (SEIS), approved April 13, 1994, the Record of Decision and Resource Management Plan for the Medford District (RMP), approved June 1995, the Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standard and Guidelines, (S&M ROD), approved January 2001, and the Land and Resource Managment Plan for the Umpqua National Forest, approved 1990.

All of the acreage (2,760 acres) proposed for treatment have been identified as Matrix or Riparian Reserve. As defined in the SEIS (page C-39) and the RMP (pages 38-40), Matrix lands consist of those federal lands outside of the six categories of designated reserve areas in which most timber harvest would be conducted according to standards and guidelines.

B. Relationship to Statutes, Regulations, and Other Plans

The proposed action and alternatives are in conformance with the direction given for the management of public lands in the Medford District by the Oregon and California Lands Act of 1937 (O&C Act) and the Federal Land Policy and Management Act of 1976 (FLPMA). The BLM is directed to manage the lands covered under the O&C Act for permanent forest production under the principles of sustained yield. BLM is also required to comply with other environmental and conservation laws, such as the Endangered Species Act of 1973 and the Water Pollution Prevention and Control Act, while implementing the mandates given by FLPMA and the O&C Act. The proposed action and alternatives are in conformance with these laws.

This environmental assessment (EA) is being prepared to determine if the proposed action and any of the alternatives would have a significant effect on the human environment, thus requiring the preparation of an Environmental Impact Statement (EIS) as prescribed in the National Environmental Policy Act of 1969. It is also being used to inform interested parties of the anticipated impacts and provide them with an opportunity to comment on the various alternatives. Further, the EA is being used to arrive at a final project design to meet a variety of resource issues.

The EA is being used to provide the decision maker, the Butte Falls Resource Area Field Manager, and the USFS Tiller Ranger District's Ranger the most current information relating to these projects upon which to base a decision.

C. Decisions to be Made Based on the Analysis

The Butte Falls Resource Area Field Manager and Tiller's District Ranger must decide if the impacts of implementing the proposed action or the alternatives would result in significant effects to the human environment, thus requiring that an EIS be prepared before proceeding with the proposed action as prescribed in the National Environmental Policy Act of 1969.

The field manager must decide if the BLM would harvest trees, close roads, Density Management treat Riparian Reserves, and replace a culvert for fish passage.

The District Ranger must decide if the BLM would fully decommission Forest Service Road FS 3206 in T. 32S., R.2W., Section 35.

If the decision maker's should decide to select one of the action alternatives, the analysis in this EA would be used to help determine where harvesting and other landscape treatments could occur.

D. Summary of Scoping Activities

Scoping letters were sent to adjacent landowners and interested publics. The letter requested comments concerning issues that would be addressed in the EA. In addition, one public meeting was held to gather and disseminate information on the proposed projects. For further clarification on the responses received, they are on file in the Butte Falls Resource Area, Medford District BLM. Following is a list of substantive issues/concerns that were received:

★ Soils concern; soil productivity, soil erosion, and slope stability

★ Uniqueness of low elevation old growth stands.

★ Reduction of water flow in Trail Creek

★ Consider riparian thinning in Section 17

★ Concern about the magnitude of the proposed project.

★ Cumulative impact; past harvest activities

★ Logging slash and smoke concerns

★ Level of NEPA assessment (EA vs EIS)

E. Issues Identified Through The Scoping Process To Be Analyzed In This EA

The issues identified through the initial scoping effort and through the interdisciplinary team process are listed below. Indicators or measurements that are suggested, are used to compare how the alternatives address the issues. Chapter II contains a comparison summary of the alternatives and their response to the issues.

Issue 1: Forest Health - Dense Forest Stands and Declining Stand and Tree Vigor

●The primary forest health concern within the Trail Creek Watershed is overstocked stands. High stand densities (overstocking) reduces individual tree vigor and growth, which subsequently produces less vigorous stands. Reduced stand vigor, results in stands that are more susceptible to insect and disease problems than stands at normal stocking levels. Reducing stocking levels within the Trail Creek watershed would improve stand vigor and health, while reducing the concerns of forest diseases, insects, and stand replacing wildfires.

Indicators for measuring this issue are:

- Acres receiving silvicultural treatment
- Change in the number/density of trees per acre
- Change in growth of timber stands after treatment

Issue 2: Soil stability and soil productivity in fragile (pyroclastic) soil types

●The Medford District RMP/EIS and the Trail Creek Watershed Analysis have identified fragile soils in portions of this watershed. The physical properties of these soils (high amounts of shrink-swell clays) makes them highly susceptible to compaction from mechanical equipment with subsequent productivity losses and slope instability with associated high sediment production rates.

Indicators for measuring this issue are:

For Soil Productivity:

- In Regen units on pyroclastic soils, the amount of acres tilled (ripped) in existing compacted soil areas.
- Amount of acres where designated skid trails are implemented.

For slope stability and sediment production:

- Miles of road improvements, closures or decommissioning.
- Amount of new roads constructed in unstable areas.
- Amount of acres of regeneration harvest (SGFMA) in identified fragile areas.

Issue 3: Coho Salmon Critical Habitat

Coho salmon, listed as "threatened" under the Endangered Species Act, are present in several streams within the Trail Creek watershed. Critical habitat for coho has been designated by National Marine Fisheries Service as those streams which currently or historically supported coho salmon. In addition, the Oregon Department of Fish and wildlife has designated the West Fork of Trail Creek as a Core Habitat Area. This habitat has been degraded over time by land use practices such as road building, conversion of riparian areas to agricultural use, water withdrawals for domestic and irrigation purposes, removal of large woody debris from streams, and riparian timber harvest. Efforts to

improve this habitat will address the following issues:

● **Stream Sedimentation**

Indicators for measuring this issue are:
- Miles of road renovated
- Miles of road improved
- Miles of road decommissioned
- Miles of road fully decommissioned

● **Riparian Health**

Indicators for measuring this issue are:
- Acres of thinning for stand improvement
- Acres treated for fuels hazard reduction
- Miles of road decommissioned within Riparian Reserve
- Retention of canopy cover at 60 % or greater
- Diameter size and spacing of leave trees
- Amount of ground disturbance within the Riparian Reserve

● **Fish Passage Barriers**

Indicators for measuring this issue are:
- Number of barriers removed on fish-bearing streams

● **Lack of Spawning/Rearing Habitat**

Indicators for measuring this issue are:
- Number of instream structures installed to retain spawning gravel
- Increase in pool frequency

● **High Stream Temperatures**

Indicators for measuring this issue are:
- Reduction in width/depth ratios
- Increased stream canopy cover
- Decrease in average summer stream temps

Issue 4: Wildland-Urban Interface (WUI)

●Portions of the Trail Creek Project area meet the criteria for Communities at Risk as identified in the Federal Register. Areas that are identified as "at risk" are at increased risk from destructive large scale wildfires. In most cases these risks are created by years of fire suppression and naturally increasing fuel loadings (thick understory vegetation). All treatments that occur under this project would be designed to mitigate damage from unwanted wildland fire.

Indicators for measuring this issue are:
- Acres of hazardous fuels reduction treatment
- Change in fuel model- Reduction in fuel loading, flame lengths and fire intensities
- Increased firefighter capabilities to suppress fire during initial attack

Issue 5: Water Quality and Quantity

Water quality and quantity conditions in the Trail Creek watershed are generally in moderate to poor condition. Water quality and quantity parameters that have been documented as in poor condition are temperature, sedimentation, and flow modification during low flow conditions. Most of the Trail Creek watershed has streams that pass through low elevation, non-forested areas that have little potential for shade and therefore high stream temperatures. The Trail Creek Watershed Analysis shows that roads are the single greatest source of management-related delivered sediment in the watershed. The Watershed Analysis also states that water withdrawals for domestic use and limited pasture irrigation uses occur along the main stem of Trail Creek and the West Fork, and low flows may be critically low in some years.

● **Sedimentation from roads**

Indicators for measuring this issue are:
-Road density
-Stream crossing density
-Miles of road renovated, improved, partially decommissioned or fully decommissioned

● **Maintain current water quantity conditions**

Indicators for measuring this issue are:
- anticipated degree of change in low and peak flows

CHAPTER II
ALTERNATIVES

A. Introduction

This chapter describes the proposed three action alternatives. In addition, a "No Action" alternative is presented to form a base line for analysis. This chapter also outlines projects mitigation which is designed into the alternatives. The mitigation or Project Design Features (PDFs) are included for the purpose of reducing or eliminating anticipated adverse environmental impacts. Analysis supporting the inclusion of PDFs can be found in the appendices of this EA and Appendix D and E of

the RMP.

The Butte Falls Resource Area has developed these action alternatives to achieve the project objectives identified in the Trail Creek Watershed Analysis (refer to pages 4-1 to 4-25). After receiving comments from the public through the scoping process, the alternatives were developed by a team of resource specialists. The Trail Creek Watershed Analysis provided information that was used in the development of these alternatives.

This chapter summarizes the consequences of the alternatives. The selected alternatives are described by the issue and how the alternative would affect the key issues.

B. Alternative Considered But Eliminated
An alternative addressing special protection of Critical Habitat for the Northern Spotted Owl was considered but eliminated based on the following information:

The US Fish and Wildlife Service (FWS) designated Critical Habitat for the Northern Spotted Owl on 15 January 1992. Portions of the proposed Trail Creek timber sale are within critical habitat - a perceived conflict. The Northwest Forest Plan (May 1994) did not address special protection for critical habitat, since recovery management for the spotted owl was to hinge on establishment of a network of late successional reserves (LSRs), which overlapped 70% of the critical habitat. The Forest Plan also maintains dispersal habitat via wider riparian management zones, and a network of 100 acre owl cores and extended rotation Connectivity Blocks.

In response to lawsuits focused on FWS shortcomings in tracking "taking" of spotted owls and their habitat in recent years, FWS released a report (26 June 2001) detailing a current baseline summary and evaluation. The report reiterated that the intent of owl recovery in the Forest Plan was being met. "The redundancy of function between critical habitat and the Forest Plan reduces the significance of adverse effects to CHUs on this species, ..." Thus it is permissible to consider timber sale treatments in critical habitat outside the LSRs.

C. ALTERNATIVE 1--NO ACTION
Under the "No Action" Alternative no vegetation management including fuel hazard reduction projects would be implemented; there would be no road renovation or closures, no fish passage improvement, or pump chance repair.

D. ALTERNATIVE 2
The intent of this alternative is to achieve the goals, objectives, and desired future condition for the timber stands as specified in the Northwest Forest Plan and the Medford District Resource Management Plan. On Matrix lands, emphasis is placed on maximizing commodity production of the timber resource and reducing existing fire hazard conditions. Treatment of the Riparian Reserves are designed to develop late-successional stand characteristics and reduce wildfire hazard. This alternative is also intended to reduce road related sedimentation by improving existing road conditions and decommissioning of roads no longer needed for access. This alternative includes the projects described below:

2a) Vegetation Management
The overall scope of this action alternative covers approximately 2,492 acres. This action consists of five general treatment methods:

1. Commercial thinning/Density management treatment is proposed on 986 acres. The treatment consist of harvesting individual small trees and remnant mature overstory trees declining in vigor from dense stands in order to redistribute growth to vigorous dominant and co-dominant trees. A 40 - 60% canopy closure would be retained on lands available for commercial harvest.

2. Selection harvesting treatment is proposed on 16 acres. The treatment removes individual or small groups of trees from all diameter classes. Stand densities would be reduced, freeing up site resources (water and nutrients) for the remaining trees. A 40% canopy closure would be retained. Planting of conifer seedlings would occur in poorly stocked areas following harvest.

3. South General Forest Management Area, (SGFMA), treatment is proposed on 273 acres. The treatment consist of retaining a minimum of 16-25 trees per acre 20 inches d.b.h or larger. Exceptionally vigorous understory trees free of insects and disease or damage would be

retained. All other trees would be removed producing in a residual canopy closure of approximately 25-40%. Planting of conifer seedlings would occur following harvest.

4. North General Forest Management Area, (NGFMA), treatment is proposed on 129 acres. The treatment consist of retaining a minimum of 6-8 trees per acre 20 inches d.b.h or larger. Exceptionally vigorous understory trees free of insects and disease or damage would be retained. Canopy closure would be approximately 10-15%. Planting of conifer seedlings would occur following harvest.

5. Understory reduction treatment is proposed on 1311 acres. The treatment consist of reducing the number of smaller individual trees up to 12 inches d.b.h. from dense conifer stands through thinning. In site specific cases, individual trees up to 14 inches d.b.h. may be removed to provide for release of pine species. Within 300 feet of natural openings only trees less than 8" d.b.h. would be cut in order to retain dense canopy closures for wildlife purposes. Treatments would reduce crown fire potential through removal of ladder fuels as well as enhance growth in younger stands. Canopy closure would be approximately 60% following treatment. The understory reduction treatment will be achieved through the following methods.

a. Utilize a slash buster for understory thinning of vegetation such as brush, small diameter conifers (8" DBH or less) and hardwood species. The primary objective is to thin dense understory vegetation thereby reducing ladder fuels. There are two secondary benefits associated with this treatment. The first is to reduce moisture competition to produce a healthier more vigorous stand of trees. The second benefit is to increase wildlife forage. The slash buster treatment would occur within the tractor logged units on slopes that average 35% or less and in natural stands or plantations. In some areas this would eventually be followed by a low intensity under burn. About 382 acres are included in this treatment proposal.

b. Understory thin utilizing chainsaws to manually reduce hazardous fuels. This consists of manually slashing understory vegetation with chainsaws. Selected leave trees would be pruned six to eight feet above the ground, to reduce potential for torching in the event of a fire. Hardwood trees would be left and included within the spacing guidelines. In some areas the resulting slash would be ground up by the slash buster and left on site as mulch. This would cover about 603 acres. On other sites where the ground is unsuitable for the slash buster to operate the slash will be hand piled and burned during the wet season when the risk of an escaped fire is low. This would cover about 326 acres. In some areas these treatments may eventually be followed by a low intensity under burn. These treatments would be used in timbered stands that have a dense stagnant understory. The objective of this treatment is to improve conifer growth and vigor and reduce the fire hazard potential of the treated units.

On approximately 50 -100 acres all cut material would be removed from the stand. Slash would be removed with machines less than 11.5 feet in width and exerting a ground pressure of 8psi or less. Removed material would be utilized as: chips to replenish nutrients and add structure to the soil of nearby forest roads targeted to be obliterated/decommissioned; poles/post; firewood and other possible forest products.

c. As a follow up treatment, a mosaic (small pieces) of low intensity prescibed burn would occur in some stands where fuel profiles are low enough over the majority of the area to allow this treatment. This would occur in some timber sale units and understory reduction units. Some hand slashing of vegetation may occur in brush pockets prior to burning. In areas where the primary fuel bed is comprised of dead fuels (both natural and slash) spring burns would occur. These stands would have low fuel loading of material that is between 3 and 16 inches in diameter. Without the presence of these fuels little soil heating would be expected to occur. Burning in the spring, larger fuels would contain more moisture thereby lessening the potential for coarse woody debris to be consumed. Some under-burning would occur within the Riparian Reserves on intermittent streams. About 700 acres would be considered for this treatment.

Density Management and Fuel Hazard Reduction within Riparian Reserves

Riparian Reserves that are appropriate for density management and consistent with ACS objectives have been identified on approximately

157 acres.

Sections identified for density management within the Riparian Reserve include:
T.32 S., R. 1W., Sec 19, 21, 29, 31, 32, 33
T.33 S., R. 2W., Sec 23 and 35
T.33 S., R. 1W., Sec 10, 15, and 29
T.34 S., R. 1W., Sec 1

The density management silviculture prescription designed for the surrounding stand would be the basis for treatment within the Riparian Reserves.

The following additional design criteria would apply within the Riparian Reserve:

- No density management (tree selection) would occur within approximately 50 feet of the stream channel to minimize potential erosion, to minimize the direct impacts of stream shade or canopy cover, and to reduce the risk of slumping of unstable ground. Treatment may occur from 50 feet to 170 feet of the stream.
- Target suppressed and co-dominant trees that are tightly spaced for thinning.
- Maintain canopy closure at 60% or greater.
- Retain largest diameter size class of trees and all dominant trees.
- Trees harvested within Riparian Reserves would be cable yarded from existing roads or helicopter yarded.
- Directional fall and pull harvested trees away from (perpendicular to) stream channels where possible.
- No roads, temporary spurs, or skid trails would be developed within Riparian Reserves

Fuel hazard reduction is the primary treatment proposed in a number of riparian reserves. The objective of the fuel treatment prescription is to identify and treat Riparian Reserves that are over-stocked and a high fuels hazard. Provide strategic areas where the likelihood of crown fires would be reduced during wildfires, target areas near homes and structures, and protect riparian ecosystems from catastrophic change. Under certain climatic and topographic conditions, stream draws on the lower and middle third of the mountain may act as fire pathways and channel wildfire up a mountain slope. The fuels reduction prescription would remove small non-commercial seedlings, saplings and poles and reduce the amount of ground fuels, ladder fuels and risk of catastrophic fires. A secondary benefit to the riparian ecosystem is the reduction of competition from typically over-stocked conifer under-story with the likely benefit of retaining a more vigorous and healthy over-story.

Sections where fuel treatments would occur within the Riparian Reserve include:

T.33 S., R. 2W., Sec 23 and 35
T.33 S., R. 1W., Sec 17
T.34 S., R. 1W., Sec 1 and 3

2b) Roads and Landings
(See Attached Road Objectives Map)
Operator Spur Construction - Ten operator spurs are needed for access, a total of 1.2 miles of length. After harvesting, the spurs would be fully decommissioned.

Road Renovation - This consists of work to be performed on the road prior to its use. The work includes, but is not limited to, blading the road surface, ditching, cleaning or enlarging catch basins, flushing corrugated metal pipes (CMP), removing brush near the inlet or outlet of pipes, cleaning inlet and outlet end of pipes, and removing brush, limbs, and trees along the roadway to improve sight distance, and allow for proper road maintenance. All drainage structures, including CMP's, water dips, and ditch relief outlets, shall be inspected and required work performed so that water flow is not impeded. These actions would occur on approximately 35 miles of road.

Road Improvement - The objective of road improvement is to upgrade existing roads to reduce erosion and sediment deposits into streams. These actions would include

improving drainage and/or surfacing on approximately 32.2 miles of road.

Long Term Culvert Upgrade
Proposed activities for this project include the removing and disposal of degraded culverts. The channel would be reconstructed so that the grade where the culvert is being taken out would reflect the natural stream contours. Soil and slope stabilization control structures would be bio-engineered to the greatest extent possible. Excess soil and road material will be disposed of properly (ie. hauled away in dump trucks to designated disposal sites).

The existing culverts range in size from 18" to 78" in diameter and are currently undersized and or/deteriorating. In many cases these culverts have already failed by becoming plugged or water is flowing beneath or around the structure. Other culverts are at a high risk for these problems in the future. These failures pose significant threats to aquatic resources by increasing fine sediment inputs as well as preventing stream substrate, debris, and aquatic organisms from moving freely through the structures.

Road Decommissioning - These actions would be based on resource protection goals identified in watershed analysis and the RMP directives. The road segment would be closed to vehicles on a long-term basis but may be used again in the future. Prior to closure, the road would be prepared to avoid future maintenance needs. The road would be left in an "erosion-resistant" condition by removing cross drain culverts and building waterbars, then removing fills in stream channels and potentially unstable fill areas. Exposed soils would be re-vegetated by seeding with native grasses and/or planting conifers to reduce sedimentation. The road would be closed with a device similar to an earthen barrier or equivalent. These actions would occur on approximately 1.8 miles of road.

Road Full Decommissioning - Roads determined through an interdisciplinary process to have no future need would be subsoiled (or ripped), seeded with native grasses or others as appropriate, mulched, and planted to reestablish vegetation. Cross drains, fills in stream channels, and potentially unstable fill areas would be removed to restore natural hydrologic flow. The road would be closed with a device similar to an earthen barrier or equivalent. The road would not require future maintenance. These actions would occur on approximately 1.3 miles of road.

Helicopter Landings - Thirty helicopter landings have been identified to be used for the proposed harvest activities. These landings have been identified on BLM and private land. A number of these landings are in openings such as existing landings or road junctions and will require minimal construction or additional site disturbance to provide for safe landing activities. The remaining landings which are on BLM land will be constructed but would be decommissioned following completion of logging activities. Decommission would include ripping, seeding with native grasses and mulching. All landings would be less than 1 acre in size.

Pump Chance
The Trail Creek watershed has several small ponds that were built to provide water for fire suppression. Many of these ponds are in need of maintenance or renovation. The work needed includes but is not limited to cleaning, repairing or replacing inflow and outflow devices, removing sediment to restore original water retaining capacity, end hauling excavated material, cutting vegetation around the catchment, repairing any damage to the retaining structure and/or the approach road. Intent of cleaning would be to restore previously built containment pool to hold water for fire suppression, and maintain functioning water flow into and out of the pool.

Location of Pump Chances to be cleaned:

1) T32S R1W Sec. 21 on road 33-1-33.2

2) T32S R1W Sec. 29 on road 32-1-29.3

3) T32S R1W Sec. 33 on road 32-1-33.2

4) T33S R2W Sec. 1 on road 33-2-12

Rock Quarries to be used in timber sale are as follows:

1) Wall creek quarry located in T33S R1W Sec. 5

on road 33-1-5.2

2) Romine creek quarry located in T33S R1W Sec. 23 on road 33-2-23.4

3) Hungry Buck quarry located in T33S R1W Sec.10 on road 33-1-10

Romine and Hungry Buck would not need removal of overburden (soil) for this entry. Wall creek would need a thin layer of overburden removed from the top to bring down a bench. The operation would occur during the dry period of the year. To prevent sediment from entering the stream nearby a silt fence would be constructed along the road edge, with the lower portion of the fence buried into the ground.

Wall creek quarry would be used for a pit run source, rock would be ripped or shot and removed in this form. Romine and Hungry Buck may be a combination of pit run and crushed rock, which would require the use of rock crushing equipment in the quarry.

2c) Water Quality and Fisheries

Culvert Replacement

A culvert located on BLM road # 33-1W-19 is proposed to be replaced for fish passage. The culvert currently has a drop of approximately 3 ft. and is not sized correctly for the streamflow, resulting in a build-up of gravel upstream of the culvert. The stream contains resident cutthroat trout and has also been found to harbor juvenile coho salmon during high winter flows. The proposed project would replace the culvert with a bottomless structure to provide for fish passage, aquatic habitat connectivity, passage of gravels to the West Fork Trail Creek, and restored hydrologic function of the stream.

TRAIL CREEK E.A. PROJECT - ALTERNATIVE 2

T32S

T33S

R2W

R1W

N

6/19/02

1:48,000

1 0.5 0 1 Miles

LEGEND

- HELICOPTER LANDING
- PUMP CHANCE
- QUARRY
- ROADS
- NEW ROAD CONSTR.
- NGFMA_REGEN
- SGFMA_REGEN
- SELECT CUT
- DENSITY MG'T
- RIPARIAN DENSITY M'GT
- NO TREATMENT
- HAND PILE / BURN
- SLASH BUSTER

E. ALTERNATIVE 3

The intent of this alternative is to achieve the goals, objectives, and desired future condition for the timber stands as specified in the Northwest Forest Plan, the Medford District Resource Management Plan and the Trail Creek Watershed Analysis. Emphasis of this alternative is placed on the findings and recommendations of the watershed analysis. Activities are designed to promote species diversity, improve existing stand vigor as well as promote the retention and development of late seral and mature seral stand conditions on the landscape. Treatments on Matrix lands emphasize stocking control to maintain or promote late seral structures in a manner consistent with enhancing productivity for commodity use and reducing existing fire hazard conditions. Regeneration of mature seral stand conditions is avoided. Treatment of the Riparian Reserves are designed to develop late-successional stand characteristics and reduce existing high fuels hazard condition. This alternative is also intended to reduce road related sedimentation by improving existing road conditions and decommissioning of roads no longer needed for access. This alternative includes the projects described below:

3a) Vegetation Management

The overall scope of this action alternative covers approximately 2,758 acres. This action consists of three general treatment methods.

1. Density management / Commercial thinning treatment is proposed on 1,224 acres in this alternative. (Description Same as (2a))

2. Selection harvesting treatment is proposed on 422 acres in this alternative. (Description Same as (2a))

3. Understory reduction treatment is proposed on 1,311 acres in this alternative. (Description Same as (2a)).

Density Management and Fuel Hazard Reduction within Riparian Reserves

Approximately 383 acres of riparian thinning have been identified in this alternative. (Description Same as (2a)).

3b) Roads and Landings

Operator Spur Construction - Ten operator spurs are needed for access, a total of 1.7 miles of length. After harvesting, the spurs would be fully decommissioned.

Road Renovation - These actions would occur on approximately 35 miles of road in this alternative. (Description Same as (2b)).

Road Improvement - These actions would include improving drainage and/or surfacing on approximately 32.2 miles of road in this alternative. (Description Same as (2b)).

Long Term Culvert Upgrade
(Description Same as (2b)).

Road Decommissioning - These actions would occur on approximately 1.8 miles of road in this alternative. (Description Same as (2b)). .

Road Full Decommissioning - These actions would occur on approximately 1.3 miles of road in this alternative. (Description Same as (2b)).

Helicopter Landings - Thirty three helicopter landings have been identified to be used for the proposed harvest activities in this alternative. (Description Same as (2b))

Pump Chance - Same as 2b

3c) Water Quality and Fisheries

Same as Alternative 2.

TRAIL CREEK E.A. PROJECT - ALTERNATIVE 3

T32S

T33S

R2W

R1W

N

1:48,000

1 0.5 0 1 Miles

LEGEND

- HELICOPTER LANDING
- PUMP CHANCE
- QUARRY
- ROADS
- NEW ROAD CONSTR.
- SELECT CUT
- DENSITY MG'T
- RIPARIAN DENSITY M'GT
- NO TREATMENT
- HAND PILE / BURN
- SLASH BUSTER

6/19/02

F. ALTERNATIVE 4

The intent of this alternative is to achieve a combination of the goals, objectives, and desired future condition for the timber stands as specified in the Northwest Forest Plan, the Medford District Resource Management Plan and the Trail Creek Watershed Analysis along with identified issues such as soil productivity and Coho Salmon Critical Habitat. Activities on Matrix lands are designed to maximize commodity production in selected timber stands, promote species diversity, improve existing stand vigor as well as promote the retention and development of late seral and mature seral stand conditions on the landscape and reducing existing fire hazard conditions. Fewer tractor harvest acres are proposed compared to other action alternatives reducing the impacts to sensitive soil areas. Regeneration harvest is avoided in areas tributary to West Fork Trail Creek. Treatment of the Riparian Reserves are designed to develop late-successional stand characteristics. This alternative is also intended to reduce road related sedimentation by improving existing road conditions and decommissioning of roads no longer needed for access. This alternative includes the projects described below:

4a) Vegetation Managment

The overall scope of this action alternative covers approximately 2,634 acres. This action consists of five general treatment methods:

1. Commercial thinning/Density management treatment is proposed on 800 acres in this alternative. (Description Same as (2a)) .

2. Selection harvesting treatment is proposed on 65 acres in this alternative. (Description Same as (2a)).

3. South General Forest Management Area, (SGFMA), treatment is proposed on 244 acres in this alternative. (Description Same as (2a)).

4. North General Forest Management Area, (NGFMA), treatment is proposed on 93 acres in this alternative. (Description Same as (2a)).

5. Understory reduction treatment is proposed on 1,311 acres in this alternative. (Description Same as (2a)).

Density Management within Riparian Reserves

Approximately 12 acres of riparian thinning have been identified in this alternative. (Description Same as (2a)).

4b) Roads

Operator Spur Construction - Nine operator spurs are needed for access, a total of 1.0 miles of length. After harvesting, the spurs would be fully decommissioned.

Road Renovation - These actions would occur on approximately 35 miles of road in this alternative. (Description Same as (2b)).

Road Improvement - The objective of road improvement is to upgrade existing roads to reduce erosion and sediment deposits into streams. These actions would include improving drainage and/or surfacing on approximately 32.2 miles of road in this alternative. (Description Same as (2b)).

Long Term Culvert Upgrade
(Description Same as (2b)).

Road Decommissioning - These actions would occur on approximately 1.8 miles of road in this alternative. (Description Same as (3b)).

Road Full Decommissioning - These actions would occur on approximately 1.3 miles of road in this alternative. (Description Same as (2b)).

Helicopter Landings - Twenty eight helicopter landings have been identified to be used for the proposed harvest activities in this alternative. (Description Same as (2b))

Pump Chance - Same as 2b

4c) Water Quality and Fisheries

Culvert Replacement
Same as Alternative 2

TRAIL CREEK E.A. PROJECT - ALTERNATIVE 4

T32S

T33S

R2W

R1W

N

LEGEND

- HELICOPTER LANDING
- PUMP CHANCE
- QUARRY
- ROADS
- NEW ROAD CONSTR.
- NGFMA_REGEN
- SGFMA_REGEN
- SELECT CUT
- DENSITY MG'T
- RIPARIAN DENSITY MG'T
- NO TREATMENT
- HAND PILE / BURN
- SLASH BUSTER

6/19/02

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

1:48,000

1 0.5 0 1 Miles

TABLE 3 - Description of Alternatives

Action	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Vegetation Management including Fuel Hazard Reduction: 1/				
Estimated Volume	0 MBF	15 MMBF	13 MMBF	12 MMBF
* Acres by treatment type				
* commercial thin/density management	0 acres	986 acres	1224 acres	800 acres
* selective cut	0 acres	16 acres	422 acres	65 acres
* regeneration harvest				
NGFMA Treatment	0 acres	129 acres	0 acres	93 acres
SGFMA Treatment	0 acres	273 acres	0 acres	244 acres
* riparian thin	0 acres	157 acres	181 acres	12 acres
*understory thin/conifer stands				
Manual	0 acres	326 acres	326 acres	326 acres
Mechanical		985 acres	985 acres	985 acres
*Acres by logging or treatment method				
* Tractor	0 acres	573 acres	649 acres	376 acres
*Cable	0 acres	215 acres	256 acres	208 acres
*Helicopter	0 acres	716 acres	865 acres	622 acres
*Lining	0 acres	57 acres	57 acres	8 acres
SEE APPENDIX I - UNIT SUMMARY TABLE				
Roads				
Road Related Projects:				
*Miles of roads improved/renovated	0 miles	32.2 miles	32.2 miles	32.2 miles
*New road construction				
Temporary	0 miles	1.5 miles	1.5 miles	1.2 miles
Permanent	0 miles	0 miles	0 miles	0 miles
*Pump Chance Improved	0	4	4	4
Helicopter Landings	0 landings	30 landings	33 landings	28 landings
Road closure:				
*Seasonal/Temporary	0 miles	16.6 miles	16.6 miles	16.6 miles
*Full Decommission	0 miles	9.4 miles	9.4 miles	9.4 miles
* Partial Decommission	0 mile	5.5 miles	6.0 miles	5.3 miles
Water Quality and Fisheries				
*Mi. of Full Decommission in Rip.	0 miles	3.0 miles	3.0 miles	3.0 miles
*Mi. of Part. Decommission in Rip	0 miles	1.0 miles	1.0 miles	1.0 miles
*Miles of rds improved/renovated in Riparian	0 miles	14.0 miles	14.0 miles	14.0 miles
*Mi. Temp blocks in Riparian Res.	0 miles	4.0 miles	4.0 miles	4.0 miles
*Number of barriers removed	0	1	1	1
Ac. treated within Riparian Reserve	0			
*Riparian Acres thinned	0	157 acres	181 acres	2 acres
*Fuels Treatment Acres within Riparian Reserve	0	328 acres	328 acres	526 acres

D. MANAGEMENT ACTIONS COMMON TO ALL ACTION ALTERNATIVES (Project Design Features--PDF)

1. Minimize the total number of skid roads by designating skid roads with an average of 150' spacing. Avoid creating new skid roads and utilize existing roads where feasible in order to minimize ground disturbance, especially in thinning and selective cut units where no tillage is proposed.

2. All tractor yarding, soil ripping, and excavator piling operations would be restricted from October 15 to May 15 or when soil moisture exceeds 25 percent.

3. Lop and scatter, pile activity slash, or underburn activity slash as necessary to reduce or eliminate additional fuel loading. Burn piled slash during the fall and winter to reduce impacts on air quality. All burning would follow the guidelines of the Oregon Smoke Management Plan.

4. Restrict tractor and/or mechanical operations to slopes generally less than 35 percent. In areas where it is necessary to exceed 35 percent, utilize ridge tops where possible.

5. Waterbar all skid roads and firelines during the same operating season, as constructed.

6. All road renovation, closure, and/or improvement work would be restricted from October 15 to May 15 or when soil moisture exceeds 25 percent.

7. Block or barricade identified roads after use and before beginning of rainy season (generally October 15).

8. Roads within Riparian Reserves identified for decommissioning would be seeded with native seed and mulched in the same operational season they are decommissioned.

9. Roads identified for decommissioning would be seeded in the same operational season.

10. Skid roads would be located to minimize disturbance to coarse woody debris. Where skid roads encounter large, coarse woody debris (CWD) a section of the CWD is to be bucked out for equipment access. The remainder of the CWD is to be left in place and not disturbed.

11. For heavy equipment operations, intermittent and ephemeral stream crossings would be pre-designated by an authorized officer to prevent stream bank degradation. Slash buster operations would be parallel to intermittent and ephemeral draws. All bare soils resulting from equipment crossing these streams would be grass seeded with an appropriate species mixture to reduce erosion.

12. Refueling of equipment would be outside of the Riparian Reserves.

13. A Spill Prevention, Control and Countermeasure Plan (SPCC) would be required prior to operation and would include, but not limited to, hazardous substances to be used in the project area and identification of purchasers representatives responsible for supervising initial containment action for releases and subsequent cleanup.

14. All hazardous materials and petroleum products would be stored outside of the Riparian Reserves, in durable containers and located so that any accidental spill would be contained and not drain into the stream

system.

15. No firelines would be built, or the use of fire retardant chemicals allowed within the Riparian Reserves, under fuels treatment projects, as proposed.

16. No application of dust abatement materials such as lignin, Mag-Chloride, and/or approved petroleum based dust abatement products during or just before wet weather and at stream crossings or other locations that could result in direct delivery to a water body (typically not within 25' of a water body or stream channel.)

17. Seasonal restriction of March 1 to September 30 within ¼ mile of known spotted owl sites (within ½ mile for helicopter operations). May be waived if non-nesting is determined. If any new owls were discovered in harvest units following the sale date, the contract enables a halt to activities until mitigation options can be determined.

18. Meadows and natural openings would be buffered with a 300 foot no commercial harvest buffer (pre-commercial thinning, handpiling and burning would be allowed).

19. Protect known Great Gray Owl nests with 1/4 mile (125 acres) buffer. If any new great gray owl nest were discovered in harvest units following the sale date, the contract enables a halt to activities until mitigation options can be determined.

20. Seasonal restriction and road closure in designated Jackson County Cooperative Travel Management Area (JACTMA) from October 15 to April 30.

21. Protect sharp shinned hawk nest with 10 acre no harvest buffer and seasonal restriction for activities within ¼ mile of nest tree from March 1 to July 15.

22. Seasonal restriction within ¼ mile of Northern goshawk nest from March 1 through August 30. If any new goshawks were discovered in harvest units following the sale date, the contract enables a halt to activities until mitigation options can be determined.

23. Maintain all snags except those which need to be felled for safety reasons. Those snags that must be felled for safety, would be left on site.

24. Seasonal restriction February 1 to July 15 within ½ mile of known peregrine falcon nest sites, within 1 mile from February 1 to August 15 for blasting or helicopter operations.

25. Buffer and apply mitigation measures to areas where there are known archeological sites, as needed to avoid disturbance.

26. Handpiles would be placed outside archeological site protection areas.

27. All Bureau Sensitive vascular plant, lichen, and bryophyte sites and Survey and Manage category A, B, C, D and E vascular plant, lichen, bryophyte and fungi sites would be protected to ensure the long-term existence of the populations. Protection buffer sizes would be determined based on species, proposed treatment and environmental conditions of the site.

28. Ensure that seed, feed grains, forage, straw, and mulch are free of weed reproductive plant parts, as per the North American Weed Free Forage Certification Standards.

29. Ensure that equipment is free of weed reproductive plant parts prior to moving into the management area.

30. Maintain vegetation cover, where operationally feasible, along a 30' strip adjacent to any road or right-of-way to provide shading, reducing the chances of sun-loving weeds from becoming established.

31. All bare soil areas created by burning of slash piles within the riparian reserve would

be grass seeded with an appropriate species mixture to reduce erosion.

32. No treatment within 50' of stream channels.

33. Location of waste stockpile and borrow sites resulting from road construction or reconstruction should be at least one site potential tree length from a stream where sediment-laden runoff can be confined.

34. When removing a culvert, pull back the slopes to the natural slope or at least 1:1 to minimize sloughing, erosion and potential for the stream to undercut streambanks during periods of high streamflows.

35. Areas identified to be ripped (skid roads, landings, decommissioned roads) would be ripped to a depth of 18 inches utilizing a sub-soiler or winged toothed rippers.

36. Ripping of skid trails would occur in all tractor yarded regeneration units and in other tractor harvest treatment units which occur on fragile soils.

37. Seasonally restrict all quarry development, rock crushing and rock hauling operations from Oct. 15 to May 15 or when soil moisture conditions or rainstorms could cause transport of sediments to nearby stream channels.

38. Construct silt fences or other preventative structures (diversion ditches, settling ponds) to prevent the potential for runoff from quarry operations into nearby stream channels.

39. Grass seed and/or plant native vegetation to stabilize all exposed soil areas including overburden from quarry operations.

40. Locate all waste disposal areas away from riparian reserves.

41. If explosives are necessary in the quarry development, then require a detailed blasting plan that addresses minimizing the amount of rock material the may enter any adjacent stream channels.

42. Apply all appropriate measures to ensure that all fluids or hazardous materials from heavy equipment operations do not enter stream channels.

TABLE 4: THE ALTERNATIVES AND THE ISSUES -SUMMARY OF THE CONSEQUENCES

Issue	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4
1) Forest Health - Dense Forest Stands and Declining Stand and Tree Vigor	0	2492	2758	2634
*acres treated	0	402 (10-20%) 16 (35-45%) 1143 (50%+)	0 (10-20%) 422 (35-45%) 1405 (50%+)	337 (10-20%) 65 (35-45%) 812 (50%+)
*change in #/density of trees per acre				
*Change in stand growth	No change	Maximum Stand growth, re-directed to regeneration areas.	Increased Growth	Increased stand growth, re-directed in regeneration areas.
2) Soil Stability & Productivity on Fragile Soils				
*Acres tilled in existing compacted soil areas.	0	394	358	207
*Acres of designated skid trails	0	573	649	76
*Miles of Rds Improved	0	64	64	64
*Acres of Regen on fragile soils.	0	95	0	66
3) Coho Salmon Critical Habitat				
Stream sedimentation	0	32	32	32
*Miles of Rds improved	0	4	4	4
*Miles of existing Rds Dec.	0	9	9	9
*Miles of existing Rds Full Dec.				
Riparian Health	0	157	181	12
*Riparian Ac. Thinned	0	328	328	328
*Riparian Ac. Treated for fuel hazard	0	4	4	4
*Miles of Rds Dec in Riparian Reserves	0	1	1	1
Fish Passage Barriers				
*# of barriers removed				
4) Wildland UrbanInterface				
*Ac treated for hazardous fuels	0	1311	1311	1311
*Existing Fuel Model (See Appendix H)	Fuel Model 6	Fuel Model 6	Fuel Model 6	Fuel Model 6
*Change in fuel model	Fuel Model 6	Fuel Model 8	Fuel Model 8	Fuel Model 8
*Reduction in fire intensities	6 ft. flame length	2' flame length	2' flame length	2' flame length
*Reduction in resistance to wildfires (Rate of spread)	32 chains/hour	2 chains/hour	2 chains/hour	2 chains/hour
5) Water Quality & Quantity Sedimentation from Rds				
*road density	5.5 mi/sq.mi	5.2 mi/sq.mi.	5.2 mi/sq.mi.	5.2 mi/sq.mi.
*stream crossing density	7.7 crossings/sq.mi.	6.6 crossings/sq.mi.	6.6 crossings/sq.mi	6.6 crossings/sq.mi
*miles of rds improved, full or partial dec.	same as Issue 3	same as Issue 3	same as Issue 3	same as issue 3
Maintain Current Water Quantity Conditions				
*anticipated degree of change in low and peak flows	no change	negligible	negligible	negligible

CHAPTER III
AFFECTED ENVIRONMENT

A. Introduction

This chapter describes the present condition of the environment within the proposed Trail Creek project area that would be affected by the alternatives. The information in this chapter would serve as a general baseline for determining the effects of the alternatives. No attempt has been made to describe every detail of every resource within the proposed project area. The information is organized around the major issues identified by the interdisciplinary team. Only enough detail has been given to determine if any of the alternatives would cause significant impacts to the human environment as defined in 40 CFR 1508.27. Surveys have been completed for cultural resources, threatened and endangered plants and animals, and special status plants and all required survey and managed surveys have been completed.

The following critical elements are not known to be present within the proposed project areas, or would not be affected by any of the alternatives, and will not be discussed further: Areas of Critical Environmental Concern (ACEC), Cultural Resources, Prime or Unique Farmlands, Flood plains, Native American Religious Concerns, Water Quality, Wetlands, Wild and Scenic Rivers, and Wilderness.

B. General Description of the Proposed Project Area

A description of the land areas and resources in the Butte Falls Resource Area is presented in Chapter 3 of the Final Medford District Resource Management Plan/Environmental Impact Statement (RMP 1995).

For a detailed description of the watershed refer to the Trail Creek Watershed Analysis, completed June 1999. This document is available at the Butte Falls Resource Area, Medford District BLM Office.

1. Forest Health-Dense Forest Stands and Declining Stand and Tree Vigor

Within the Trail Creek Watershed, a majority of the conifer stands in the watershed are classified as being in the early (0-5"dbh) to mid-seral (6-10"dbh) condition and late seral (11-20"dbh)(WA pgs 3-30). Early seral conditions on BLM lands are represented by plantations from previous harvest activities. The majority of the plantations received vegetative treatments in the form of manual brush cutting. Also, a number of plantations have been pre-commercial thinned or are scheduled to be pre-commercially thinned within the next five years. The brushing and thinning are designed to maintain or increase conifer stand vigor and growth. Stands classified as mid-seral are conifer stands established through wildfires and to a minor extent through harvesting activities. The majority of the mid-seral stands have not been brushed or pre-commercially thinned. The resulting stands are overstocked with more trees than the site can support. Late seral stands consist of dense single storied conditions or an overstory with an overstocked understory. The watershed also contains mature seral stands (21+" dbh). These stands are similar to late seral conditions in that the stands consist of high tree densities or are overstocked due to dense understories. Overall, stand conditions found in the varying seral stages result in increased conifer densities. These stand densities produce increased soil moisture and nutrient demands from the site. Subsequently, moisture and nutrient demands result in increased tree stress and greater potential for insect and disease problems. Higher stand densities result in a decline in mature early seral species such as ponderosa pine, sugar pine, and hardwoods over time. Past harvesting of large diameter overstory trees and the absence of the low thinning effect of fire has produced a shift from early seral species such as pine to mid-late seral species such as Douglas-fir, incense cedar, and white fir (WA pg 4-2 to 4-7). The increased stand densities result in stand structures with fewer mature larger trees (21+"dbh), increased vertical canopy structure, and a shift in species to more shade tolerate species (WA pg 4-2 to 4-7). With the current trend of stands in the Trail Creek watershed, stands will have lower resilience and reduced sustainability. Forest types that are less fire resistant have become more prevalent. An interruption in fire regimes and shift in species composition is resulting in changes to long term soil productivity, stand structure and function, forest health, and biological diversity. Forest health on BLM lands in the watershed is being effected by dense stand conditions, reduced tree vigor and a higher risk of fire disturbance. The stand densities on the majority of the sites within the watershed exceed the carrying capacity of the site resulting in an undesirable site condition.

2. Soil stability and soil productivity in fragile (pyroclastic) soil types

For a detailed description of geologic and soil characteristics see the Trail Creek WA.

Soils within the Trail Creek watershed have formed and are derived predominantly from volcanic rocks of lava flows from the Western Cascade Geologic unit. Although all soils are subject to productivity losses and erosion, soils that are shallow (<20" to bedrock) and stony or have highly weathered clays in the subsoil (30-60%) are at the highest risk for these adverse impacts by management activities.

The most extensive soils within this watershed that have highly weathered clays are the Medco, the McNull, and the Terrabella soil series. (See the Jackson County Soil Survey, National Resource Conservation Service, U. S. Dept. Agriculture for detailed soil descriptions). These soils are most commonly found along gently sloping stream terraces in the West Fork of the Trail Creek drainage. Due to the high amounts of high shrink and swell clays, these soil types are subject to compaction from mechanical (heavy) equipment. Soil compaction can lead to soil productivity losses and increase runoff and increase sediment delivery. Most of these effects are considered to be long term (>10years). Most of the past tractor harvest units in the project area have an existing network of skid roads which exceed the Medford DFO ROD/ RMP (Ppg.4-13 vol. 1) objective to keep soil productivity losses below 5 %.

The stream terraces that have these clay enriched soils are also subject to mass wasting and slumping. These land forms can sometimes supersaturate causing slope instability. These areas can pose a risk to increasing sediment delivery to the stream system. There are several active slides within the West Fork of Trail Creek drainage. These unstable areas have been excluded from timber harvest and mechanical equipment activities, and are proposed for re-stabilization work.

The most extensive soils are shallow and or skeletal (>35% rock fragments in the subsoil), are the Shippa-Straight complex, the Geppert, and McMullin soils. These soils are typically found on steep side slopes (>50%) along ridges in the northern and eastern portions of the watershed. Due to their steep slopes, thin surface organic layer, shallow rooting depth, and low water holding capacity, these soils are subject to surface erosion in bare soil areas created by ground disturbing activities. Surface erosion on these soils can lead to productivity losses and produce sediments that may enter stream channels. Most of these bare soil areas stabilize (revegetate) within 1-3 years and are considered to be short term impacts.

Cumulative Effects-Soils

Temporal and spatial distribution are the keys to determining the cumulative effects of activities on a given landscape. Risk levels of any proposed activity are based on its timing and location when added to past, present, and reasonably foreseeable actions.

With the exception of several road related problems, most areas disturbed by past activities have re-stabilized and are at a low level of risk for surface erosion on BLM lands. However, recent timber harvest activity on private lands (particularly in the West Fork of Trail Creek drainage) have created bare soil areas that are expected to be at risk for surface erosion in the short-term (the next 1-3 years).

3. Coho Salmon Critical Habitat

Fisheries/Aquatic Habitat

A variety of resident and anadromous fish species are present in the Trail Creek watershed. Native fish species that utilize Trail Creek and its tributaries are coho salmon (*Oncorhynchus mykiss*), summer and winter steelhead trout (*O. kistuch*), resident rainbow trout (*O. mykiss*), resident cutthroat trout (*O. clarki*), Pacific lamprey (*Lampetra tridentata*), sculpin (*Cottus sp.*), Klamath small-scale suckers (*Catastomus rimiculus*), redside shiners (*Richardsonius balteatus*), and speckled dace (*Rhinichthys osculus*). Coho salmon are listed as a threatened species under the Endangered Species Act of 1973 as amended (ESA). Pacific lamprey are a State of Oregon designated sensitive species. Overall, there has been a general decline in coho salmon numbers in the Rogue River system since record keeping began (ODFW 1991). There is little known information related to Pacific lamprey populations in the Rogue River.

Introduced fish species found within the Trail Creek watershed include bluegill (*Lepomis* sp.) and bass (*Micropterus* sp.). High summer stream temperatures allow these warm-water species to thrive. Some have even been introduced into constructed pump-chance ponds by local residents for recreational fisheries.

Fish presence/absence surveys have been conducted by the Oregon Department of Fish and Wildlife (ODFW) in Trail Creek to determine the extent of fish use. Fish-bearing streams within the watershed, in addition to the West Fork and the mainstem of Trail Creek, include Canyon, Paradise, Romine, Walpole, Chicago, and Wall Creek. Tributaries that provide spawning habitat for coho salmon include West Fork Trail Creek, Canyon, Chicago, Romine, and Wall Creek.

An intensive aquatic habitat inventory was completed on the West Fork Trail Creek in 1993 by Boise Cascade to assess the current condition of aquatic habitat within the mainstem of West Fork Trail Creek. Stream habitats were inventoried over a length of 7.25 miles of the West Fork Trail Creek. Analysis of the inventory data revealed aquatic habitat in West Fork Trail Creek to be in fair condition based on relevant stream habitat condition indicators. However, the stream is lacking the habitat complexity that is preferred by salmonids (Appendix C). The most notable stream habitat deficiencies are the absence of high quality pools, spawning substrate, and large wood. The absence of these habitat features and the subsequent degraded condition of this stream appears to have persisted for at least the past thirty years (Trail Creek WA). A recent restoration project upstream of this site on lands owned by Boise Cascade placed large wood within the stream channel to provide cover for rearing fish and to collect spawning gravels.

Aquatic habitat inventories have been completed by ODFW on several streams in the Trail Creek watershed. Stream substrate was found to be composed of bedrock, boulders, cobbles, gravels, sand, and silt, with bedrock being the dominant substrate. The stream channel also has consistently high width/depth ratios, very little pool habitat, and high summer temperatures.

Historically, stream habitat conditions were likely dominated by low gradient riffle/pool habitat units with boulder, cobble, and gravel type substrates with large amounts of large woody debris. Removal of this large wood (stream cleaning) and channelization of the streams due to agricultural use, residential use, and roads have combined to create the current degraded streambed condition that is scoured to bedrock. Water withdrawals for domestic use have further impacted the streams and created a situation where aquatic life is non-existent on some reaches at certain times of the year.

Current aquatic habitat conditions are considered to be of low to moderately low quality due to several factors. These include the lack of large wood, absence of large riparian conifers, relatively narrow riparian corridor, high percentage of sand and silt substrate, lack of gravel, low pool frequency and depth, critical low flows and high stream temperatures, and lack of channel sinuosity. However, bank stability has been found to be highly stable on most stream reaches due to the dominance of rock or well vegetated streambanks (Trail Creek WA).

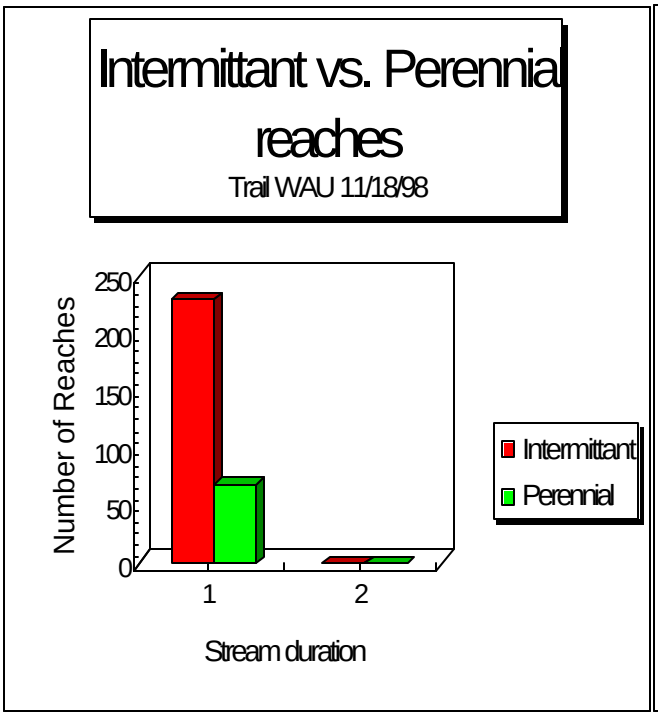
Riparian Ecosystem Current Condition

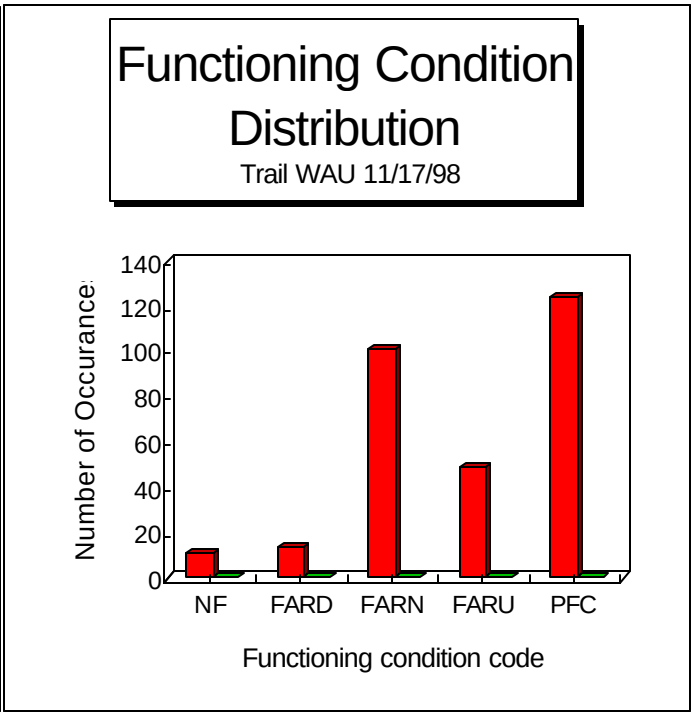
Trail Creek watershed is divided between private and public lands which is an important factor in the continuity of land management practices across ownership. The riparian eco-system, has shifted positively towards functioning at risk-neutral, functioning at risk-upward and properly functioning on BLM lands where land management practices have historically been more strict. More streams are properly functioning on public lands because of the higher amount of late successional and old-growth forest that remain and the long rest periods between harvest entries. However, timber harvesting, existing roads and road construction have contributed greatly to degraded reaches within the riparian ecosystem and continue to be a concern. Riparian surveys were completed on all streams within the watershed and assessments conducted for functioning condition and disturbance causes of the riparian eco-system. Survey results are included in the watershed analysis. The graphs below provide a brief perspective of the types of streams, number of streams and the functioning condition of headwaters streams within the watershed on public lands.

The table below compares some features within the watershed that effect the functioning condition of the riparian eco-system and result in degradation.

Table 2 Limiting Riparian Characteristics by Functioning Condition

	Non Functioning	Functioning at Risk	Properly Functioning
Lack of structure	100%	33%	<1%
Lack of riparian buffer	92%	44%	2%
Upland watershed conditions	100%	65%	0%





NF - Non-functoning, FARD - Functioning at risk downward, FARN - Functioning at risk neutral, FARU - Functioning at risk upward, PFC - Properly Functioning

4. Wildland UrbanInterface
The project area is located in the foothills of the Cascade Mountains in the Trail Creek drainage. Intermittent streams dissect the topography and the summers are long, hot, and droughty. The vegetative community is influenced greatly by these features and shapes a mosaic of vegetative communities from rock outcrops and meadows to buckbrush chaparral and oak/ponderosa, pine/madrone vegetative communities. On shallow soils meadows occur comprised mostly of annual forbs and grasses with vernal seeps in the draws. As soils deepen, the chaparral community develops with buckbrush, deerbrush, and manzanita the dominate plant species. As oaks, ponderosa pine, doug fir, madrone overstory canopy densify, a mixture that includes fewer grasses and more shade tolerant brush, hardwoods, and conifers species occur. Small patches of starthistle exist along roads at the lower elevations.

Lower Elevation Lands
These lands are currently in high to very high fire hazard condition. Portions of these lands are old and dense brush fields. A portion of these lands are in the Wildland urban interface area; this location poses an increased risk of fire ignitions. Large areas are composed of dense semi-stagnant fire generated conifer and mixed hardwood stands. These sites could be expected to burn with 19 ft. flame lengths under typical mid to late fire season conditions. Slope would contribute to fire intensity, the greater the slope the more intense the expected fire behavior. These lands are at the greatest risk for human caused fire, and the stands are at the greatest risk of fires based on vegetation types and seasonal drying trends.

High elevation lands
These lands are currently in a moderate to high fire hazard condition. The moderate to high fire hazard conditions provide for potential crown fires to occur due to stand conditions. These conditions provide for ladder fuels and canopy closure of 70 percent or greater. The mortality in the stand can also contribute to fire spread rates and add to control complexity. Slope would contribute to fire intensity. The open timber stands within the project area would meet criteria fuel model 10. These sites would be expected to burn with a 4-5 ft. flame length under typical mid to late fire season conditions. Closed canopy conifer stands cover the majority of the area with a dense understory and continuous ladder fuels that may burn as either fuel model 6 or 4, or somewhere in between. These sites could be expected to burn with 6-19 ft. flame lengths under typical mid to late fire season conditions.
The importance of these numbers is as follows:

Flame lengths less than 4 ft. Can be attacked by persons using hand tools. Hand line will generally hold the fire.

Flame lengths 4-8 ft Cannot be attacked by hand, hand line generally will not hold. Equipment such as pumpers, dozers, and aircraft can be effective.

Flame lengths 8 -11 ft Fires in this range may present serious control problems such as torching, crowning, and spotting.

Flame length greater than 11 ft. Crowning, spotting, and major runs are probable.

Hazard Reduction Treatments
The proposal is to treat fuels on approximately 1,311acres exclusive of timber sale units. After treatment flame lengths on the majority of the area would be less than 4 feet. The treatment would change the fuel models from a preponderance of fuel model 6, which has a high component of ladder fuels, to a timber model such as fuel model 8, which has minimal ladder fuels present. With the removal of these ladder fuels the ability of a stand to initiate a crown fire would be reduced greatly.

5. Water Quality and Quantity Hydrology
The Trail Creek fifth-field watershed covers approximately 55 square miles within the Upper Rogue sub-basin which covers about 1,618 square miles. Seven sub-watersheds have been delineated within this watershed for analysis purposes.

The hydrology of Trail Creek watershed is typical of the Southern Oregon Cascades. Mean annual precipitation within the Trail Creek watershed averages approximately 40 inches. Annual precipitation is lowest near the Rogue River and the town of Trail, and generally increases to the north with increasing elevation. Typical of the Mediterranean climate of southwestern Oregon, approximately 70 percent of annual precipitation in the watershed falls in the five months of November through March. Streamflow patterns reflect the distribution of precipitation. Streamflows begin to increase from their seasonal summertime lows in the fall, increasing rapidly during late fall and winter storm events.

Peak flows occur during the winter months. Most of the watershed is subject to periodic snowfall and subsequent total to partial snow melt during warm mid-winter rain-on-snow events, which are associated with nearly all major peak flows. Trail Creek is an ungaged watershed. However, representative gaging

stations are located nearby on Elk Creek. The largest peak flow recorded near the mouth of Elk Creek during the period of record, 1947 through 1987, occured in December 1964 at a flow of 19,200 cfs. Low flows occur during the summer and early fall. Minimum flow recorded on the West Fork of Elk Creek reached 0.26 cfs in September 1981. Equivalent maximum and minimum flows at the mouth of Trail Creek are 7,940 and 1.0 cfs respectively (Trail Creek WA. 1-4 - 1-5).

Stream Channels
The Trail Creek watershed has a typical dendritic drainage system with a normal sequence of high gradient tributaries leading to progressively lower gradient and larger channels.

Headwater and tributary streams typically have a steep to moderate gradient and are highly confined within the Trail Creek watershed (Rosgen Aa, A, and B - Source and Transport reaches). The lower reaches of Trail Creek, including the substantial length above the West Fork to Wall Creek and beyond, and the lower reaches of the West Fork below Walpole Creek have gradients below 2 or even 1%, but remain well-confined by bedrock. Defined as response reaches, these areas are expected to be particularly sensitive to wood and sediment input, or lack thereof. Shallow, straight, bedrock channels are the prevalent condition in the main fork of Trail Creek and Wall Creek.

A defining characteristic of the Trail Creek watershed is that response reaches contain very little wood and coarse sediment, critical for formation of quality fisheries rearing and spawning habitat. Water temperatures are known to exceed the Oregon State Water Quality Standards criteria for extended periods during summer months, at least within the lower reaches of the West Fork and Trail Creek (Trail Creek WA 1-5 - 1-6). Substantial removal of forest vegetation has occurred in riparian areas adjacent to most of the major tributaries in the watershed, particularly at lower elevations and along the main stem of Trail Creek and the West Fork. Deforestation of these riparian areas can be expected to have major effects on routing of water, sediment, and wood in these streams (Trail Creek WA 3 -23).

Water Quality
Approximately 190 miles of open roads exist within the Trail Creek watershed. This represents a road density of about 3.5 miles per square mile, more or less evenly distributed throughout each subwatershed. Roads have been identified as the single greatest source of sediment within the Trail Creek watershed. Culvert capacities are on the average size for the 2 year flow and the 100 year flow is 3.5 times the average culvert capacity(Trail Creek WA 3-18).

CHAPTER IV
ENVIRONMENTAL CONSEQUENCES

A. Introduction
This chapter is organized by issue to describe the anticipated environmental impacts of the alternatives on the affected environment. It provides the basis for comparing the alternatives presented in Chapter II. The detail and depth of impact analysis is generally limited to that which is necessary to determine if significant environmental impacts are anticipated.

B. Effects From Implementing Alternative 1 (No Action)

1.1. Forest Health and Declining Vegetation Condition

a)Direct and Indirect Effects
Stand densities would remain near maximum stocking levels resulting in the continued demand and competition for moisture, sunlight, and nutrients. Current tree densities are resulting in increased competition and declining tree growth. The number of trees per acre is above the biologically sustainable level, resulting in greater susceptibility to insects, disease, and severe fire behavior.

In the absence of disturbance events such as fire, density management, or regeneration harvests, the shift in species composition and structure would continue. Scattered large diameter early seral species such as ponderosa pine, sugar pine, and hardwoods will continue to decline with increasing tree competition. Timbered stands would consist of densely stocked slow growing Douglas-fir and incense cedar on drier sites or shift to pure white fir on more moderate sites. Due to the high levels of stocking, establishment of a mixed conifer condition from more light tolerant species would be excluded. With this shift in species and structure, tree species diversity would decline and an important natural defense against insect and disease, prolonged drought, potential climatic change and fire would be lost.

Mature and deteriorating stands would not be entered and would remain at high risk to insect attacks and tree mortality. These stands would continue to shift towards stands dominated by drought and fire intolerant white fir.

b)Short-term Uses vs. Long-term Productivity

In the short-term (5-10 years) the no action alternative would result in the continuation of the existing forest conditions. Eventually, due to dense and deteriorating stand conditions, the probability of insect infestations and disease infections would be greater which would likely result in a decrease in long-term productivity.

Short-term retention of late seral structure and canopy cover is highest with the no action alternative. In the absence of thinning disturbances, overstocked mid-seral stands are expected to display a lower level shift to production of late seral conditions over the long term.

c) Irreversible or Irretrievable Commitments of Resources
None Identified.

d) Cumulative Effects
An increase in insects, diseases, and higher fire risk due to high stand densities would be expected. With high stand densities and high canopy closure, more shade tolerant species would prevail. These species are usually more susceptible to insects and diseases and less able to withstand fire or drought events. In mid seral to late seral stands, a gradual reduction in remnant large diameter conifers and hardwoods would also be expected as age and density dependent mortality result in the loss of individual overstory trees. This in combination with poor growth rates of developing mid seral components may result in a net loss of the larger diameter tree component for these stand types.

1.2. Soil Stability and soil productivity in fragile (pyroclastic) soil types.

a) Direct & Indirect Effects
There would be no direct effect to the soil resource in the project area under this alternative.

Indirectly, the no action alternative would maintain current soil conditions. Roads identified for improvements, closures, or decommissioning would continue to be at risk for erosion and for subsequent sedimentation rate increases. Units with high existing amounts of compaction (>12%) from previous tractor entries would not meet soil productivity objectives without the proposed tillage (ripping) of skid roads. The current high level of risk for wildfire in the project area would continue which increases the potential for soil damage from high intensity wildland fires.

b) Short Term Uses vs long-term Productivity
There would be no change to current trends in long-term soil productivity under this alternative.

c) Irreversible or Irretrievable commitment of resources.
None Anticipated

d) Cumulative Effects
Cumulative effects on the soil resource from this alternative would maintain the same conditions (risk levels) as discussed in the indirect effects. There would be no change to existing cumulative effects from the no action alternative.

1.3. Coho Salmon

a) Direct and Indirect Effects
Under the No Action alternative, no timber harvest, fuels treatments, riparian thinning, road decommissioning, or culvert replacement would take place. Roads which are currently contributing sediment to the stream system would be left in their existing condition. Road densities would remain unacceptably high within the watershed. The Riparian Reserves vegetation would continue to grow at a slow rate due to overstocked, dense stands and would remain at high risk of a catastrophic stand-replacement fire. The culvert identified for replacement would not be replaced and would continue to block fish passage and limit gravel inputs to West Fork Trail Creek.

Indirectly, the vegetation within the Riparian Reserve would continue to develop and provide the long-term necessary elements for healthy aquatic ecosystems. In areas where the Riparian Reserve is currently in an early to mid-successional condition it would be expected that late-successional characteristics would develop at a naturally slow rate.

This alternative would maintain current degraded aquatic habitat conditions and fish passage barriers. Maintaining this current situation would be expected to indirectly result in the continued negative effects of reduced freshwater survival of salmonids and delayed or obstructed fish migration.

Additionally, this alternative could indirectly contribute to stream sedimentation by delaying or foregoing renovation of the road system. This would be expected to have a negative effect on fisheries and aquatic resources through contributing to habitat degradation over the long term.

b) Short-term Uses vs. Long-term Productivity
No measurable change to the current trend in long-term productivity (>10 years) of fisheries and aquatic resources is anticipated by maintaining the current Riparian Reserve vegetation condition in the

proposed project area. This alternative would continue to provide the long-term necessary elements for healthy riparian and aquatic ecosystems and would be anticipated to maintain or increase the current productivity of fisheries and aquatic resources over the long-term.

By delaying or foregoing road decommissioning and road renovation in the short-term , a higher risk of stream sedimentation from roads is likely in the long-term. Current levels of stream sedimentation would be maintained or could increase. This would be expected to negatively affect aquatic habitat and, subsequently, the productivity of fisheries and aquatic resources in the watershed over the long-term.

Foregoing culvert replacement would be expected to maintain negative fish passage and aquatic habitat connectivity conditions, limiting access to additional aquatic habitat in the proposed project area. This would be expected to maintain current depressed levels of fish production over the short-term (<10 years).

Foregoing the fuels reduction actions in the project area will continue to maintain the current fuels densities created by years of fire suppression in this watershed. Current levels of forest nutrient cycling and riparian vegetation condition would be maintained. This would be expected to maintain current levels of fish production over the long-term.

c) Irreversible or Irretrievable Commitments of Resources
None anticipated

d) Cumulative Effects
A positive cumulative effect should result due to increased sizes and amounts of large wood contributed to the aquatic ecosystem as the Riparian Reserve vegetation continues to develop and deliver material to the streams over the long-term.

Due to the lack of road renovation, current levels of stream sedimentation could be increased as the condition of these roads continues to deteriorate. Some roads may stabilize over time as they re-vegetate naturally; however, this may take many decades to achieve. The cumulative effect of roads is also dependent upon private landowners' activities and their use and maintenance of the transportation system in the watershed. The lack of road renovation would be expected to have a negative cumulative effect on fisheries and aquatic resources.

Foregoing the culvert replacement would continue to maintain current aquatic habitat conditions. This would be expected to maintain the current negative cumulative effect of degraded aquatic habitat connectivity and limited access to additional habitat.

Foregoing the fuels treatments would continue to maintain current vegetation conditions, which could lead to an increased risk of a stand replacement fire occurring in the Riparian Reserves. This would be expected to have a negative cumulative effect on the amount of stream shade and large wood available for recruitment to the aquatic system.

e) Determination of Effects on Southern Oregon/Northern California (SONC) Coho Salmon, SONC Critical Habitat, and Essential Fish Habitat from Implementation of Alternative 1:

May Affect, Not Likely to Adversely Affect
The No Action Alternative is not expected to result in more than a negligible chance of "take" of **t**hese species. As a result, the No Action Alternative is considered "not likely to adversely affect" SONC coho salmon (listed "threatened"), SONC Critical Habitat, and Essential Fish Habitat. Informal consultation with the National Marine Fisheries Service (NMFS) was initiated in February 2002 for SONC coho salmon, SONC Critical Habitat, and Essential Fish Habitat.

1.4. Wildland Urban Interface

a) Direct and Indirect Effects
Because stand densities would remain unchanged the trend to highly flammable live fuel types would continue, which would create an increase in ladder fuels. Aerial fuels would also continue to increase until a disturbance, such as fire, enters the stand.

Existing high or very high fuel hazard conditions would continue in the closed canopied conifer stands. The risk of high fire intensities would continue, and wildfire control would be more difficult. Existing hazardous fuels pose an increasing threat to the community of Trail and the associated Wildland Urban Interface residences.

b) Short-term Uses vs. Long-term Productivity
In the short term fuel loads and associated fire hazard increases are expected. As a result, the potential for large destructive fires would increase until some action occurs to change the stand dynamics. When a

stand replacement fire does occur, it would have a high potential for large impacts on long term site productivity.

Encroachment of more shade tolerant brush, hardwood, and conifer species would occur. Potentially there may be a loss of long-term site productivity in the event of a catastrophic fire event.

c) Irreversible or Irretrievable Commitments of Resources
None anticipated

d) Cumulative Effects
Based on cumulative effects to all vegetative communities, the long term prognosis is for an increased potential for large, destructive fires. These fires will have long term effects on communities and both terrestrial and aquatic eco-systems.

1.5. Water Quality and Quantity

a) Direct and Indirect Effects
Under the no action alternative, there would be no silvicultural treatments, road improvements, road decommissioning, road building, or culvert replacements. Under this alternative, there would be no direct effects on the hydrology of this watershed.

The indirect effects in the analysis area under the no action alternative would maintain the current condition of the watershed and cumulative effects of past management practices. Roads would not be improved, renovated, or temporarily blocked. Unimproved roads would continue to erode and transport sediment to streams. Insufficient drainage structures will maintain the current level of sedimentation.

This alternative would not treat those units identified as having a high fire hazard. This maintains the current high risk for having a high intensity wild fire within this project area. A severe wild fire would increase soil erosion and subsequent stream sedimentation, channel downcutting, and increased water temperatures much greater than by treating these units mechanically or with prescribed fire.

b) Short-term Uses vs. Long-term Productivity
Under the no action alternative, there would be no change in long-term productivity for the hydrology of the area.

c) Irreversible/Irretrievable Commitments of Resources
None anticipated

d) Cumulative Effects
Under this alternative, the current conditions of the watershed would be maintained. High road density and unimproved roads would continue to supply sediment to stream channels at the current level and could increase if roads with improper drainage continue to erode. The current fuel loading conditions and high level of risk for a high intensity wildfire would also be maintained. High intensity wildfires can result in erosion and subsequent sedimentation to stream channels especially if there is above average precipitation. The impact of this disturbance generally lasts a short time due to the rapid regrowth of vegetation which soon covers the surface with plant litter thereby reducing the potential for erosion.

C. Effects of Implementing Action Alternative 2

2.1. Forest Health-Dense Forest Stands and Declining Stand and Tree Vigor

a) Direct and Indirect Effects
Conifer dominated stands identified for thinning or selective cutting (approximately 1,002 acres) would harvest smaller and less vigorous trees. Approximately 1,002 acres would have densities reduced to a level where individual tree growth is enhanced (relative densities of 35 % -45%). Removal of smaller less vigorous trees would increase crown base heights, reduce ladder fuels, and crown bulk densities with residual canopy closures ranging from 40% to 60%. The result of these changes is that early seral species would be favored as a stand component and the development of larger diameter and taller trees would be enhanced so that the characteristics of a mature stand are developed faster. Stand vigor and growth would be maximized with density levels at full site occupancy.

Approximately 1,311 acres would be understory thinned, to reduce stand densities. Understory thinning would generally result in the cutting of conifer trees 8" DBH and smaller, though occasionally up to 12" DBH trees would be cut to provide the desired spacing. The resulting densities would provide for improvement in individual tree growth. The thinning, in addition, to providing for increased tree growth, would reduce fuel ladders and subsequent fuel hazards with the implementation of appropriate fuel treatments. Thinning would result in a relative density near 35% and canopy closures of 40% or greater, producing optimum conditions for tree growth and stand vigor. The improved stand vigor and conditions would be maintained for a period of 5-10 years depending upon residual stand conditions after treatment.

In stands identified for regeneration harvest (402 acres), variable levels of vigorous green trees 20 inches d.b.h. and greater would be left (6 to 8 trees per acre left on 129 acres of North General Forest Management Area (NGFMA) and 16 to 25 trees per acre left on 273 acres of South General Forest Management Area (SGFMA). Canopy closure would be reduced to 10 to 40% depending upon the level of green tree retention (NGFMA 10% to 20%) (SGFMA 20% to 40%). Structural diversity would be reduced, canopy layers would be limited to the residual overstory trees, trees less than 8 inches d.b.h. and scattered vigorous trees 8- 20 inches d.b.h. Herbaceous, shrub and tree species composition would be shifted toward shade intolerant species, reversing the current trend towards shade tolerant species.

b) Short-term Uses vs. Long-term Productivity
Commodity production of commercial forest products and improved stand vigor over the short term and long term is the greatest under this alternative. In the short term, the vigor of thinned and selectivity cut stands would be increased. The long-term productivity would be expected to increase due to increased stand vigor and species diversity being maintained or increased. Retention of remnant mature overstory trees would be favored, though surplus and/or dead and dying overstory trees would be removed to redistribute growth to more vigorous dominant and codominant trees.

In regeneration harvests, overstory trees would provide for structual and biological legacies. The species mix and density level of planted trees would trend towards the plant communities and stocking levels that historically would have been present. Late successional characteristics would be expected to redevelop in approximately 80 years.

Understory thinnings would reduce canopy closures for the short term, but would produce improved stand conditions in the long term.

c)Irreversible or Irretrievable Commitments of Resources
None anticipated.

d)Cumulative Effects
Treatment under this alternative would result in stands which are more vigorous, healthy, and resilient to environmental changes. Stand growth and vigor across the analysis area would be maximized to a greater extent than other alternatives being considered. Stand susceptibility to insect attack, disease infection, and fire would also be expected to be reduced across more total acreage than with other alternatives. Species composition would shift towards drought and fire tolerant species. Species diversity would be increased, but structural diversity would be somewhat simplified due to placing growth emphasis on dominant and co-dominant trees in stands to be thinned. An estimated 402 acres would shift from a late or mature seral condition to an early seral condition. Approximately 1,143 acres would be treated to enhance late seral development and 16 acres would have treatments to maintain existing seral conditions in the short term.

2.2. Soil Stability and Soil Productivity in fragile (pyroclastic) soil types

a) Direct & Indirect Effects
Direct effects to the soil resource are expected to come predominantly from ground disturbance created by tractors and heavy equipment particularly on fragile soils (clay enriched pyroclastics). Soil compaction and displacement increases the risk for erosion and productivity losses. Under this alternative approximately 573 acres of tractor yarding are proposed. Of these acres, approximately 394 acres with varying amounts of skid roads are proposed for tillage (ripping) to ameliorate compaction and increase productivity from the existing compacted condition . Most of the proposed tractor units have an extensive network of skid roads and are expected to have a net increase in soil productivity after ripping. All tractor harvest units on fragile soils and all regeneration tractor harvest units will be ripped. The remaining units which do not occur on fragile soils (180 acres of thinning, select cut, and density management)are not proposed for ripping, but would utilize designated skid roads to keep soil compaction and displacement to target levels (<12% of unit area). Some of these units may have existing levels that currently exceed the target level and would not meet this objective until final entry and the expected tillage would be implemented.

Approximately 95 acres of regeneration harvest are proposed in fragile (FP) soil types under this alternative. Due to a greater frequency of slumps and landslides on these soil types, proposed regeneration harvest units will incorporate SGFMA treatment (16-25, 20"+ DBH leave trees per acre) to aid in maintaining slope stability. Other areas with indicators of unstable ground (hummocky ground , pistol butting, jack strawed trees, and tension cracks) have been excluded from harvest consideration. As other unstable areas are encountered, they would be buffered or dropped from ground disturbing activities to maintain slope stability.

With the implementation of the project design

features, direct and indirect effects to the soil resource are expected to be short-term and at a low level of risk. There is no current data to quantify these effects.

b) Short Term Uses vs long-term Productivity
It is expected that long-term soil productivity would increase over the existing condition on tractor units proposed for tillage. On the remaining tractor units, it is expected that the existing level of risk for productivity effects would not have a measurable change with the implementation of the PDF's.

c) Irreversible or Irretrievable commitment of resources.
None Anticipated

d) Cumulative Effects
All proposed timber harvest activities and associated effects (see direct and indirect effects discussion) under this alternative are expected to occur within the next 3-5 years. This is expected to increase the risk for surface erosion and subsequent sedimentation from a low to moderate level in the short-term when considering all activities on all lands within the project area. This is primarily due to the time needed to allow for re-stabilization of areas disturbed by timber harvest, road works, and fuels treatments . Typically, these areas are most prone to erosion in 1-3 years following disturbance. As these areas re-vegetate and the soil stabilizes, the risk of erosion and sedimentation production decreases. There is no current data available to quantify these effects.

Possible Mitigating Measure for Cumulative Effects of Alternative 2
Defer implementing approximately one half of the proposed timber harvest activity (particularly tractor harvesting) for a 5 year period to allow for recovery of disturbed soils before implementing the other one half of the proposed action. This is expected to spread out over time the amount of soil disturbed in any given year and minimize the risk for surface erosion and sedimentation from rainstorms.

2.3. Coho Salmon

a) Direct and Indirect Effects
No direct impacts are expected to occur to fish and aquatic habitat from all proposed timber harvest treatments. The effects of soil compaction caused by tractor logging of 573 acres could indirectly increase the amount of run-off to streams adjacent to the harvest units. Many of these acres were previously compacted during past timber harvest operations. The impacts would be reduced on approximately 400 of these acres which would be ripped after logging occurs, minimizing the soil compaction to negligible levels and reducing previous compaction. Indirectly, fish and aquatic resources could be negatively affected from low level, localized increases to baseline stream turbidity and sediment levels in the short-term (<1 year). However, by restricting harvest to areas outside of Riparian Reserves, keeping tractors on designated skid trails, and ripping of some skid trails, actual compacted acres would be reduced and the effects to fish and aquatic habitat are expected to remain within the range of natural variability.

No direct or indirect impacts are expected to occur to fish and aquatic habitat from stands identified for thinning, density management, select cut, or understory reduction. These treatments would maintain characteristics of a mature stand and would provide sufficient tree canopies to provide the long-term habitat elements necessary for healthy aquatic ecosystems.

This alternative would require the construction of approximately 1.2 miles of temporary road that would be decommissioned following use. This road construction could indirectly alter the hydrologic flow paths by compacting the soil and intercepting and re-directing surface flow. Although the proposed roads would be located on ridges and stable slope areas, the current road densities within this watershed are already considered to be high and the addition of new roads could contribute to further degradation of the watershed. Full decommissioning of 9.4 miles of existing road would mitigate the effects of this new road construction and result in a net decrease in road density within the watershed. Partial decommissioning of approximately 5.5 miles of road and improvement/renovation of approximately 32.2 miles would also result in a decrease in road-related sediment, further reducing the impacts to the aquatic ecosystem.

Replacement and/or removal of culverts could directly impact the aquatic system by disturbing stream banks, vegetation, and substrate. Although these actions could result in short-term increases in turbidity and sedimentation, they would result in a direct beneficial effect on the aquatic system in the long term by restoring hydrologic connectivity and function. Replacement of undersized culverts would also indirectly benefit the aquatic system by reducing the risk of road failure during high flow events.

Thinning for density management would occur on approximately 157 acres, and fuels treatments would occur on approximately 328 acres within Riparian Reserves. This would be expected to indirectly benefit fish and aquatic resources within the

watershed by accelerating development of a late-successional forest, capable of providing adequate shade and large wood to the aquatic ecosystem. No mechanical fuel treatments (i.e. slashbuster) would occur in the Riparian Reserves. Indirectly, fish and aquatic resources could be negatively affected from low level, localized increases to baseline stream turbidity and sediment levels in the short-term (<1 year) resulting from bare soil created by the burning of slash piles. However, by maintaining a 50 foot no-treatment zone and following the appropriate PDFs, these effects would be minimized and are not expected to result in measurable degradation.

b) Short-term Uses vs. Long-term Productivity

This alternative is not expected to impact the current trend in long term productivity (10+ years) of fish and aquatic resources within the project area. Maintaining the current Riparian Reserve design and allowing this vegetation to develop throughout the proposed project area would continue to provide the long-term necessary elements for healthy aquatic ecosystems and would be anticipated to maintain or increase the current productivity of fisheries and aquatic resources over the long-term. Overall, implementation of these proposed actions would be expected to maintain or increase the productivity of fisheries and aquatic resources over the long-term, by accelerating development of a late-successional forest capable of providing shade and large wood to the aquatic ecosystem.

Short-term (<1 year) increases to baseline stream sediment levels are anticipated to occur from road maintenance, renovation, decommissioning, and culvert replacement and/or removal under the proposed timber sale. It is anticipated that an overall reduction in the risk to baseline stream sediment levels would occur due to maintenance, renovation, and decommissioning of the road system. Implementation of the appropriate PDFs is expected to minimize any short-term increases to baseline stream sediment levels to negligible amounts. Subsequently, it is anticipated the current productivity of fisheries and aquatic resources in the watershed would be maintained or increased over the long-term.

The proposed fuels treatments would be expected to restore fuel loads and forest nutrient cycling to more closely resemble historic levels. This would be expected to benefit fish and aquatic resources within the watershed over the long term by accelerating development of a late-successional forest and reducing the risk of a stand-replacement fire. Fish and aquatic resources could be negatively affected from low level, localized increases to baseline stream turbidity and sediment levels in the short-term (<1 year). However, by following the appropriate PDFs these effects would be minimized and are not expected to be outside the range of natural variability.

Overall, implementation of the proposed actions would be expected to maintain or increase the productivity of fisheries and aquatic resources over the long-term by improving aquatic habitat conditions, thereby improving freshwater survival of salmonid species.

c) Irreversible or Irretrievable Commitments of Resources

None anticipated

d) Cumulative Effects

Cumulative effects from the regeneration harvest could occur by increasing the risk of peak flow events within the stream channel due to the reduction of canopy closure below 40%. This may result in a low level, short term increase of sediment delivery to the streams within the proposed units. The cumulative effects of timber harvest on private lands must also be considered along with the actions on public land. The majority of this activity is occurring in West Fork Trail Creek, where there is relatively little public land and a large percentage of private industrial timber lands. Private timber companies are not required to meet the same standards for protection of riparian areas that federal agencies must follow, therefore a greater impact to the aquatic system is occurring in this subwatershed. Restricting the regeneration harvest to Matrix lands outside of Riparian Reserves would minimize the effects to fish and aquatic habitat. No negative cumulative effects to fish and aquatic resources are expected to occur from all other timber harvest prescriptions on Matrix lands within the timber sale.

The proposed road-related projects could have a negative effect on fisheries and aquatic resources in the short-term by adding to current high levels of stream sediment from road maintenance, renovation, decommissioning, and culvert replacement. However, by following the appropriate PDFs these effects would be minimized. A long-term, positive cumulative effect to fish and aquatic resources is anticipated from reducing potential road-generated fine sediment by completing road maintenance, renovation, and decommissioning.

No negative cumulative effects to fish and aquatic resources are expected to occur from the proposed fuels treatments. This alternative would result in the vegetation within the Riparian Reserve developing late-successional characteristics faster than would

occur at a natural rate. This is anticipated to result in a positive cumulative effect to fish and aquatic resources due to increased sizes and amounts of large wood which would be contributed to the aquatic ecosystem.

e) Determination of Effects on Southern Oregon/Northern California (SONC) Coho Salmon, SONC Critical Habitat, and Essential Fish Habitat from Implementation of Alternative 2:

May Affect, Not Likely to Adversely Affect
It would be expected that some effect to aquatic habitat may occur due to potential short-term sediment delivery to streams resulting from the planned timber harvest, fuels treatments, road renovation, road decommissioning, and culvert replacement. However, by following the appropriate PDFs these effects will be minimized and are expected to be minor. Baseline sediment levels would be reduced in the long-term as a result of the road improvements and reduction in road densities. As a result, Alternative 2 is not expected to result in more than a negligible chance of "take" of this species and is considered "not likely to adversely affect" SONC coho salmon, SONC Critical Habitat, or Essential Fish Habitat. Informal consultation with the National Marine Fisheries Service (NMFS) was initiated in February 2002 for SONC coho salmon, SONC Critical Habitat, and Essential Fish Habitat.

2.4. Wildland Urban Interface

a) Direct and Indirect Effects
In stands identified for understory thinning, the primary benefit would occur in the removal of smaller diameter trees (8" dbh and less). Additionally there may be some minor benefits associated with thinning operations that target trees 8 -14" in diameter. These benefits would be in the reduction of ladder fuels and reduced fuel loading. The slash that is created from these operations must be treated in order to realize the maximum benefit in the reduction activities. In selectively cut stands there may be some minor benefit in the reduction of ladder fuels. Reducing canopy cover to less than 60% percent would eliminate the potential for running crown fires.

The risk of high fire intensities would be reduced if a wildfire would occur. Although, wildfire spread rates would remain high, fires would be easier to control.

b) Short-term Uses vs. Long-term Productivity
In the short term fire hazard would be reduced. To maintain this reduction, fuels treatments would need to be maintained. The potential for large scale fires over the project area would be lessened, resulting in both a reduced risk to communities and long term site productivity loss.

c) Irreversible or Irretrievable Commitments of Resources
None anticipated

d) Cumulative Effects
Treatments under this alternative would reduce the fire hazard within the watershed and increase the health and vigor of the vegetative communities. Fires that did occur would have less impact due to lower fuel loadings. No major impacts to air quality are anticipated.

2.5. Water Quality and Quantity

a) Direct and Indirect Effects
Direct effects on the hydrology are not expected as a result of the proposed timber harvest treatments within the project area. Riparian Reserve buffers would minimize sediment from reaching stream channels and maintain current levels of riparian canopy to provide shade for stream channels. Riparian Reserves identified for treatment would include a no-treatment buffer to maintain stream shade, stream channel stability, and to minimize the chance for sediment to reach stream channels.

Indirect effects on the hydrology of the project area is related to roads and road use. An increase in the availability of sediments that can be eroded often comes from the construction and use of roads in forested watersheds. There are two main processes associated with large increases in road related sediment, mass failure and surface erosion. The total road density of the watershed is considered high at 5.5 miles per square mile.

No permanent road is proposed, 6,336 feet (1.2 miles) of temporary road (operator spurs) is proposed to be constructed and then decommissioned after use with this alternative. This may cause some erodable sediment to be transported at first, but road construction would occur away from streams and is not likely to transport sediment to streams. Road improvements and renovations may cause some short term movement of sediment but these treatments are expected to decrease the amount of erodable sediments moving in this project area in the long term.

Summer low flows are not expected to be reduced due to forest harvest activities. The majority of studies of forested watersheds have demonstrated small increases in low flows and water yield due to removal of vegetation (Trail Creek WA, 3-23). Riparian Reserves identified for treatment would include a no-

treatment zone that would maintain the current vegetation conditions near stream channels to prevent rapid regrowth of riparian hardwoods. The proposed treatments for Riparian Reserves are density management and fuels treatments which reduce stand density and are not expected to change the amount of water available for runoff.

b) Short-term Uses vs. Long-term Productivity
Under this alternative, there would be no changes in the long-term productivity on the hydrology of the area.

c) Irreversible/Irretrievable Commitments of Resources
None anticipated

d) Cumulative Effects

Water Quality and Quantity

Drainage Area	Road Density	Proposed Decom. (miles)	Road Density after project
Upper West Fork	4.24	1.81	4.17
Chicago Creek	6.3	0.74	6.06
Lower West Fork	5.7	4.8	5.3
Upper East Fork	6.0	2.88	5.66
Wall Creek	6.3	0.54	6.17
Lower East Fork	4.3	0.45	4.17
Lower Trail Creek	5.3	2.48	5
Trail Creek 5th Field	5.5	13.7	5.2

Cumulative effects from this alternative are expected to be low at the fifth field watershed scale and low to moderate at the sixth field subwatershed level. There would be no net increase of roads in the Trail Creek Watershed. Road density is expected to be reduced by decommissioning 4.28 miles of road and fully decommissioning 9.42 miles of road, with 4.0 miles of those in Riparian Reserves. This amount of road decommissioning would reduce the road density in the Trail Creek Watershed from approximately 5.5 mi/sq mi to 5.2 mi/sq mi. Little to no measurable change in peak flows would be expected from this amount of road density reduction. If this amount of road decommissioning is not implemented, the current watershed road density would not be reduced to this extent. However, the objective of reducing total road length would still be met and the overall trend would be towards reducing road density.

Road decommissioning would also reduce the total number of stream crossings. This action would reduce the amount of fine sediment from surface erosion delivered to stream channels as well as reducing the risk for culverts becoming plugged and washing out road fills.

Improvements and renovations to existing roads are expected to reduce the amount of sediment currently being transported to stream channels. Although these actions would not reduce the road density in the watershed, the amount of sediment produced from traffic is expected to be greatly reduced. Upgrading undersized culverts would considerably reduce the risk of failure during flood events and as a result reduce the chance for sediment delivery to stream channels.

Cumulative effects in the West Fork of Trail Creek have been determined to be moderate to high based on the amount of timber harvest and associated roads from past, current, and future activities in this subwatershed. The amount of early seral vegetation created by this alternative would add to the current condition by approximately 0.7%. Due to the low response in this portion of the watershed, this level of treatment would be at a low risk for increasing peak flows within the Trail Creek Watershed. However, localized effects of compaction may cause slight increases in runoff and erosion which would add to the current conditions within this subwatershed.

There are no new openings proposed in the riparian zone to allow for increased solar radiation on stream channels. Riparian Reserves identified for treatment would include a no-treatment buffer to maintain stream shade, stream channel stability, and to minimize the chance for sediment to reach stream channels.

The majority of the treatments involve the thinning of trees to reduce the fire hazard and competition within stands that are determined to be too dense. These thinning projects generally increase the amount of water available, but the remaining vegetation is expected to utilize this increased availability of water.

The following table shows the percent of harvest acres within each subwatershed by alternative.

Drainage Area	Regen % Alt 2	DM/Thin Select % Alt 2	Regen % Alt 3	DM/Thin Select % Alt 3	Regen % Alt 4	DM/Thin Select % Alt 4
Upper West Fork	0	1.3	0	1.3	0	1.3
Chicago Creek	0	0	0	0	0	0
Lower West Fork	1.1	8.1	0	8.8	0	7.7
Upper East Fork	4.2	4.2	0	9.0	4.2	4.2
Wall Creek	0.7	3.8	0	5.8	0.7	3.8
Lower East Fork	0.3	13.2	0	16.9	0.3	13.5
Lower Trail Creek	2.9	2.5	2.9	2.5	2.9	2.5
Trail Creek 5th Field	1.5	6.1	0	8.5	1.3	4.9

The Trail Creek Watershed was examined for the effects of forest cover removal on rain-on-snow (ROS) peak flows. Wall Creek was found to be the most responsive subwatershed because it has the highest percentage of its area within the higher elevation rain-on-snow precipitation zone. The results indicate that current rain-on-snow flood magnitudes are not substantially different than the reference condition. Current vegetation conditions produce relatively small increases in peak flows. This limited response is explained by the proportionately small area that is in a hydrologically immature condition, and the small area that is in the ROS zone (Trail WA, 4-7).
There would be a slight increase in risk of a higher magnitude flow event occurring as a result of this project.

An area is considered to be at full hydrologic recovery (maturity) at 70% canopy closure. The timber harvest methods that create large openings (ex. Regens, shelterwood) can increase the magnitude of flows when a significant ROS event occurs. The amount of large openings in this project are expected to come from regeneration harvests which will affect 0.1% of the Transient Snow Zone (TSZ). This is considered to be well within acceptable levels due to the rapid regrowth of vegetation, the low probability that a major event will occur within the time expected to regain full hydrologic recovery on those acres, and the stability of streams in this area to withstand high energies. Since the amount of regeneration harvest that is proposed only impacts 1.5% of Trail Creek Watershed it is not possible to separate out these cumulative effects from natural variability.

Hydrologic Recovery	Percent of Area Hydrologically Recovered	
Analysis Area	All Lands	Transient Snow Zone
Trail Creek	78.4*(Ave from 3 WS)	83.5*(Ave from 3 WS)
Trail Creek, Upper	80.1	83.9
Trail Creek, W. Fork	77.9	80.4
Trail Creek, Lower	77.1	86.1

Fuels Treatment Projects - Hydrology Effects

a) Direct and Indirect Effects
The effects of fire on the hydrology and water quality of forested watersheds are varied in time and space (Beschta, 1999). The potential increase of erosion and subsequent sedimentation from prescribed fire increases with fire severity, soil erodibility, steepness

of slope, and intensity or amount of precipitation. The magnitude of erosion and sedimentation from prescribed fire is usually minor because the times and locations that these occur together are rare (McNabb et al, 1999). Forests generally have very low erosion rates unless they are disturbed. Common disturbances include prescribed and wild fire, and harvesting operations. The impact of these operations however, last only for a short time, perhaps one or two years. After that, the rapid regrowth of vegetation soon covers the surface with plant litter, and potential erosion is quickly reduced (Elliot, 2000).

The direct effects on the hydrology and water quality of Trail Creek from the fuel treatment projects are expected to be short term and minimal. The removal of vegetation, intensity of the burn, and exposure of mineral soil for fire lines and through slashbuster use are possible sources of sediment to stream channels. Much of the fuels treatments are designed to be hand treatments which would limit the amount of ground disturbance. The Project Design Features (PDF's) for this project would minimize the potential for sedimentation in the local stream channels. By designing low intensity burns and spacing out the treatments over time, it is expected that sedimentation from erosion would be minimal. The partial removal of vegetation is expected to increase the amount of water availability. However, the remaining vegetation is expected to utilize any additional soil moisture. Therefore the overall timing and amount of water available is not expected to change.

The indirect effects are expected to reduce the potential sedimentation that would occur from a high intensity wildfire.

b) Short-term Uses vs. Long-term Productivity
By implementing the fuels treatment projects, there would be no change in long-term productivity for the hydrology of the area.

c) Irreversible/Irretrievable Commitments of Resources
None anticipated

d) Cumulative Effects
The fuels portion of this project could have the effects listed above at the site scale. Added cumulative effects at the 6th field subwatershed and the 5th field watershed from this project are expected to be low. The fuels treatment projects would not increase the amount of openings in the transient snow zone, there would be no net increase in road density. Additional compaction would be minimized and mitigated by using PDF's and implementing restoration projects.

D. Effects from Implementing Alternative 3

3.1. Forest Health and Declining Vegetation Condition

a) Direct and Indirect Effects
Conifer stands identified for thinning (1,224 acres) and selective cutting (422 acres) would have smaller and less vigorous trees harvested. Approximately 1,405 acres would have densities reduced to a level where individual tree growth is enhanced (relative densities (RD) of 35% to 45% with canopy retention of 40% to 60%). In more heavily thinned stands (RD 35%), maximum stand vigor and growth response of conifers is obtainable. Thinning would improve the vigor and growth of the trees in the residual stand. Retention of remnant mature overstory trees would be emphasized to retain and promote late successional structures. Except, where there are dead or dying conditions, or the number of trees present exceed the resource needs, then some harvest of overstory trees may occur.

Approximately 1,311acres are being understory thinned to reduce stand densities. Understory thinning would generally result in the cutting of conifer trees 8 inches d.b.h. and smaller though occasionally a 12 inch d.b.h. tree would be cut to provide the desired spacing. The resulting densities would provide for improvement in individual tree growth. Thinning, in addition to providing for increased tree growth, would reduce fuel ladders and subsequent fuel hazards with the implementation of appropriate fuel treatments. Thinning would result in a relative density near 35% and canopy closures of 40 + % producing optimum conditions for tree growth and stand vigor. The improved stand vigor and conditions would be maintained for a period of 5-10 years depending upon residual stand conditions after treatment.

b)Short-term Uses vs Long-term Productivity
In the short-term, the vigor of thinned and selectively cut stands would be increased to near maximum levels. The long-term productivity would be expected to increase due to increased stand vigor and species diversity being maintained or increased. Retention of remnant mature overstory trees in mid to late seral stands would be higher than under alternative 2 but initially lower when compared to the no action

alternative. Compared to all alternatives, the presence of larger diameter overstory trees is expected to be higher in the long-term due to reduced competition from mid-story conifers and an increased potential for growth as a result of stocking reductions.

In the short-term, mature stands left untreated would provide for a greater level of late seral stand structure retention across the landscape. The long term effect of this would be similar to the no action alternative. Eventually, due to dense and deteriorating stand conditions, the probability of insect infestations and disease infections would be greater. As a result, these stands would be expected to have a decreased in long term productivity.

c) Irreversible or Irretrievable Commitments of Resources
None are anticipated.

d) Cumulative Effects
Treatment under this alternative would result in stands which are more vigorous, healthy, and resilient to environmental changes than present conditions. Stand susceptibility to insect attack, disease infection, and fire would be expected to be reduced. Retention and development of later seral conditions would be highest under this alternative. Approximately, 1,405 acres treated would enhance stand vigor and promote late seral development and 422 acres would have treatments to maintain existing seral conditions while reducing potential loss from wildfire.

3.2. Soil Stability and Soil Productivity in Fragile (pyroclastic) soil types

a) Direct & Indirect Effects
The direct effects to the soil resource under this alternative are similar to those described in alternative 2. The major difference is in the amount of proposed tractor yarding, 649 acres (573 ac. Alt 2) with 358 acres proposed for tillage (394 ac. Alt 2). This means less ripping would occur and more soil compaction would be left unmitigated. Consequently, soil productivity would not be improved on 291 acres of proposed tractor units with existing skid roads under this alternative. Although there still would be a net increase in productivity from the existing condition and trends toward meeting the target for soil productivity.

There are no proposed regeneration harvests under this alternative. This is expected to minimize the effect of timber harvest on slope stability and landslide potential in the fragile (FP) soil types.
With the implementation of the project design features, direct and indirect effects to the soil resource are expected to be short-term and at a low level of risk. There is no current data to quantify these site specific effects.

b) Short Term Uses vs long-term Productivity
It is expected that long-term soil productivity would increase over the existing condition on tractor units proposed for tillage. On the remaining tractor units, it is expected that the existing level of risk for productivity effects would not have a measurable change with the implementation of the PDFs..

c) Irreversible or Irretrievable commitment of resources.
None Anticipated

d) Cumulative Effects
All proposed timber harvest activities and associated effects (see direct and indirect effects discussion) under this alternative are expected to occur within the next 3-5 years. This is expected to increase the risk for surface erosion and subsequent sedimentation from a low to moderate level in the short-term when considering all activities on all on lands within the project area. This is primarily due to the time needed to allow for re-stabilization of areas disturbed by timber harvest, road works, and fuels treatments . Typically, these areas are most prone to erosion in the 1-3 years following disturbance. As these areas re-vegetate and the soil stabilizes, the risk of erosion and sedimentation production decreases. This alternative has the highest level of risk with regard to surface erosion and sedimentation due to the greater amount of proposed tractor yarding. There is no current data available to quantify these site specific effects.

Possible Mitigating Measure for Cumulative Effects of Alternative 3

Defer implementing approximately one half of the proposed timber harvest activity (particularly tractor harvesting) for a 5 year period to allow for recovery of disturbed soils before implementing the other one half of the proposed action. This is expected to spread out over time the amount of soil disturbed in any given year and minimize the risk for surface erosion and sedimentation from rain storms.

3.3. Coho Salmon

a) Direct and Indirect Effects of Timber Harvest Activities

No direct impacts are expected to occur to fish and aquatic habitat from all proposed timber harvest treatments on Matrix lands. The thinning, density management, select cut, and understory reduction treatments would maintain characteristics of a mature stand, retaining sufficient tree canopies to provide the long-term habitat elements necessary for healthy aquatic ecosystems. The effects of soil compaction caused by tractor logging of 649 acres could indirectly increase the amount of run-off to streams adjacent to the harvest units. Many of these acres were previously compacted during past timber harvest operations. The impacts would be reduced on these acres by ripping the skid trails after logging occurs, minimizing the soil compaction to negligible levels and reducing previous compaction. Indirectly, fish and aquatic resources could be negatively affected from low level, localized increases to baseline stream turbidity and sediment levels in the short-term (<1 year). However, by restricting harvest to areas outside of Riparian Reserves, keeping tractors on designated skid trails, and by ripping skid trails, actual compacted acres would be minimized and the effects to fish and aquatic habitat are expected to be undetectable.

This alternative would require the construction of approximately 1.7 miles of temporary road that would be decommissioned following use. This road construction could indirectly alter the hydrologic flow paths by compacting the soil and intercepting and re-directing surface flow. Although the proposed roads would be located on ridges and stable slope areas, the current road densities within this watershed are already considered to be high and the addition of new roads could contribute to further degradation of the watershed. Full decommissioning of 9.4 miles of existing road would mitigate the effects of this new road construction and result in a net decrease in road density within the watershed. Partial decommissioning of approximately 6 miles of road and improvement/renovation of approximately 32.2 miles would also result in a decrease in road-related sediment, further reducing the impacts to the aquatic ecosystem.

Replacement/removal of culverts could directly impact the aquatic system by disturbing stream banks, vegetation, and substrate. Although, these actions could result in short-term increases in turbidity and sedimentation, they would result in a direct beneficial effect on the aquatic system in the long term by restoring hydrologic connectivity and function. Replacement of undersized culverts would also indirectly benefit the aquatic system by reducing the risk of road failure during high flow events.

Thinning for density management would occur on approximately 383 acres, and the proposed fuels treatments would occur on approximately 328 acres within Riparian Reserves. This would be expected to indirectly benefit fish and aquatic resources within the watershed by accelerating development of a late-successional forest capable of providing adequate shade and large wood to the aquatic ecosystem. No mechanical fuel treatments (i.e. slashbuster) would occur in the Riparian Reserves. Indirectly, fish and aquatic resources could be negatively affected from low level, localized increases to baseline stream turbidity and sediment levels in the short-term (<1 year). However, by following the appropriate PDFs these effects would be minimized and are not expected to result in measurable degradation.

b) Short term Uses vs. Long term Productivity

This alternative is not expected to impact the current trend in long term productivity (10+ years) of fish and aquatic resources within the project area. Maintaining the current Riparian Reserve design and allowing this vegetation to develop throughout the proposed project area would continue to provide the long-term necessary elements for healthy aquatic ecosystems and would be anticipated to maintain or increase the current productivity of fisheries and aquatic resources over the long-term. Overall, implementation of these proposed actions would be expected to maintain or increase the productivity of fisheries and aquatic resources over the long-term, by accelerating development of a late-successional forest capable of delivering large wood to the aquatic ecosystem.

Short-term (<1 year) increases to baseline stream sediment levels are anticipated to occur from road maintenance, renovation, decommissioning, and culvert replacement/removal. It is anticipated that an overall reduction in the risk to baseline stream sediment levels would occur due to maintenance, renovation, and decommissioning of the road system. Implementation of the appropriate PDFs is expected to minimize short-term increases to baseline stream sediment levels to negligible amounts. Subsequently, it is anticipated that the current productivity of

fisheries and aquatic resources in the watershed would be maintained or increased over the long-term.

The proposed fuels treatments would be expected to restore fuel loads and forest nutrient cycling to more closely resemble historical levels. This would be expected to benefit fish and aquatic resources within the watershed over the long term by accelerating development of a late-successional forest capable of delivering large wood to the aquatic ecosystem. Fish and aquatic resources could be negatively affected from low level, localized increases to baseline stream turbidity and sediment levels in the short-term (<1 year). However, by following the appropriate PDFs these effects would be minimized.

Overall, implementation of the proposed actions would be expected to maintain or increase the productivity of fisheries and aquatic resources over the long-term by improving aquatic habitat conditions, thereby improving freshwater survival of salmonid species.

c) Irretrievable or Irreversible Commitment of Resources
None anticipated

d) Cumulative Effects
No negative cumulative effects to fish and aquatic resources are expected to occur from all timber harvest prescriptions within the timber sale.

The proposed road-related projects could have a negative effect on fisheries and aquatic resources in the short-term by adding to current high levels of stream sediment from road maintenance, renovation, decommissioning, and culvert replacement/removal. However, by following the appropriate PDF's these effects will be minimized. A long-term, positive, cumulative effect to fish and aquatic resources is anticipated from reducing potential road-generated fine sediment by completing road maintenance, renovation, and decommissioning.

No negative cumulative effects to fish and aquatic resources are expected to occur from the proposed fuels treatments. This alternative would result in the vegetation within the Riparian Reserve developing late-successional characteristics faster than would occur at a natural rate. This is anticipated to result in a positive cumulative effect to fish and aquatic resources due to increased sizes and amounts of large wood which would be contributed to the aquatic ecosystem.

e) Determination of Effects on Southern Oregon/Northern California (SONC) Coho Salmon, SONC Critical Habitat, and Essential Fish Habitat from Implementation of Alternative 3

May Affect, Not Likely to Adversely Affect
It would be expected that some effect to aquatic habitat may occur due to potential short-term sediment delivery to streams resulting from the planned timber harvest, fuels treatments, road renovation, decommissioning, and culvert replacement. However, by following the appropriate PDFs these effects will be minimized. Baseline sediment levels should be reduced in the long-term as a result of these actions. As a result, Alternative 3 is not expected to result in more than a negligible chance of "take" of **t**hese species and is considered "not likely to adversely affect" SONC coho salmon (listed "threatened"), SONC Critical Habitat, or Essential Fish Habitat. Informal consultation with the NMFS was initiated in February 2002 for SONC coho salmon, SONC Critical Habitat, and Essential Fish Habitat.

3.4. Wildland Urban Interface

a) Direct and Indirect Effects
In stands identified for understory thinning, the primary benefit will occur in the removal of smaller diameter trees (8" dbh and less). Additionally there may be some minor benefits associated with thinning operations that target trees 8 - 14" in diameter. These benefits will be in the reduction of ladder fuels. The slash that is created from these operations must be treated in order to realize the maximum benefit in the reduction activities. In selectively cut stands there may be some minor benefit in the reduction of ladder fuels. Reducing canopy cover to less than 60% percent will eliminate the potential for running crown fires. No major impacts to air quality are anticipated.

The risk of high fire intensities would be reduced if a wildfire would occur. Although, wildfire spread rates would remain high, fires would be easier to control.

b) Short-term Uses vs. Long-term Productivity
In the short term fire hazard would be reduced. To maintain this reduction, fuels treatments would need to be maintained. The potential for large scale fires over the project area would be lessened, resulting in a

reduced risk to communities or of long term site productivity loss.

c) Irreversible or Irretrievable Commitments of Resources
None anticipated

d) Cumulative Effects
Treatments under this alternative would reduce the fire hazard within the watershed and increase the health and vigor of the vegetative communities. Fires that did occur would have less impact due to lower fuel loadings.

3.5. Water Quality and Quantity

a) Direct and Indirect Effects
Direct effects on the hydrology are not expected as a result of the proposed timber harvest treatments within the project area. Riparian Reserve buffers would minimize sediment from reaching stream channels and maintain current levels of riparian canopy to provide shade for stream channels. Riparian Reserves identified for treatment would include a no-treatment buffer to maintain stream shade, stream channel stability, and to minimize the chance for sediment to reach stream channels.

Indirect effects on the hydrology of the project area is related to roads and road use. An increase in the availability of sediments that can be eroded often comes from the construction and use of roads in forested watersheds. There are two main processes associated with large increases in road related sediment; mass failure and surface erosion. The total road density of the watershed is considered high, 5.5 miles per square mile.

No permanent road is proposed, 8,976 feet (1.7 miles) of temporary road (operator spurs) is proposed to be constructed and then decommissioned after use, with this alternative. This may cause some erodable sediment to be transported at first, but road construction would occur away from streams and is not likely to transport sediment to streams. Road improvements and renovations may cause some short term movement of sediment but these treatments are expected to decrease the amount of erodable sediments moving in this project area in the long term.

The amount of temporary road proposed in this alternative is slightly more (0.5 miles) than in Alternative 2, but would be decommissioned after use and would not increase road densities. The level of road decommissioning would be the same as proposed in Alternative 2 and would result in the same level of road density reduction. This action would be expected to reduce long term fine sediment delivery from surface erosion as well as road related mass failures within this watershed.

b) Short-term Uses vs. Long-term Productivity
Under alternative 3, there would be no changes in the long-term productivity on the hydrology of the area.

c) Irreversible/Irretrievable Commitments of Resources
None anticipated

d) Cumulative Effects
The cumulative effects from this alternative are expected to be similar as those described in Alternative 2. However, all the units identified for regeneration harvests in alternative 2 would be changed to select cuts. By changing the units to select cuts, the remaining canopy that would be left would be at 40% or greater. This level of crown closure would be considered to be at a hydrologically intermediate condition and would be considered hydrologically mature when vegetation grows back and the canopy returns to its current crown closure.

This alternative would have low to moderate added cumulative effects at the 6th field subwatershed and low added cumulative effects at the 5th field watershed scale. There is no net increase in roads, very low amounts of openings within the TSZ, and no additional exposure to stream surfaces.

Fuels Treatment Projects - Hydrology Effects

a) Direct and Indirect Effects
Same as Alternative 2

b) Short-term Uses vs. Long-term Productivity
Same as Alternative 2

c) Irreversible/Irretrievable Commitments of Resources
Same as Alternative 2

d) Cumulative Effects
Same as Alternative 2

E. Effects of Implementing Action Alternative 4

4.1. Forest Health-Dense Forest Stands and Declining Stand and Tree Vigor

a) Direct and Indirect Effects
Conifer dominated stands identified for thinning(approximately 800 acres) or selective cutting (approximately 65 acres) would have smaller and less vigorous trees harvested. Approximately 865 acres would have densities reduced to a level where individual tree growth is enhanced (relative densities of 35-45%). Removal of smaller less vigorous trees would increase crown base heights, reduce ladder fuels, and crown bulk densities with residual canopy closures ranging from 40 to 60%. The result of these changes is that early seral species would be favored as a stand component and the development of larger diameter and taller trees would be enhanced so that the characteristics of a mature stand are developed faster. Stand vigor and growth would be maximized with density levels at full site occupancy.

Approximately 1,311 acres are being understory thinned to reduce stand densities. Understory thinning would generally result in the cutting of conifer trees 8" DBH and smaller though occasionally a 12" DBH tree would be cut to provide the desired spacing. The resulting densities would provide for improvement in individual tree growth. In addition , thinning, would provide for increased tree growth and would reduce fuel ladders and subsequent fuel hazards with the implementation of appropriate fuel treatments. Thinning would result in a relative density near 35% and canopy closures of 40% or greater, producing optimum conditions for tree growth and stand vigor. The improved stand vigor and conditions would be maintained for a period of 5-10 years depending upon residual stand conditions after treatment.

In stands identified for regeneration harvest (337 acres), variable levels of vigorous green trees 20" DBH and greater would be left (6 to 8 trees per acre left on 93 acres NGFMA, and 16 to 25 trees per acre left on 244 acres of SGFMA). Canopy closure would be reduced to 10 to 40% depending upon the level of green tree retention (NGFMA 10% to 20%) (SGFMA 20% to 40%). Structural diversity would be reduced, canopy layers would be limited to the residual overstory trees, trees less than 8" DBH and scattered vigorous trees 8- 20" DBH. Herbaceous, shrub and tree species composition would be shifted toward shade intolerant species, revising the current trend towards shade tolerant species.

b) Short-term Uses vs. Long-term Productivity
Commodity production of commercial forest products and improved stand vigor over the short term and long term is the greatest under this alternative. In the short term, the vigor of thinned and selectivity cut stands would be increased. The long-term productivity would be expected to increase due to increased stand vigor and species diversity being maintained or increased. Retention of remnant mature overstory trees would be favored, though surplus and/or dead and dying overstory trees would be removed to redistribute growth to more vigorous dominant and codominant trees.

In regeneration harvests, overstory trees would provide for structural and biological legacies. The species mix and density level of planted trees would trend towards the plant communities and stocking levels that historically would have been present. Late successional characteristics would be expected to redevelop in approximately 80 years.

Understory thinnings would reduce canopy closures for the short term but would produce improved stand conditions in the long term.

c) Irreversible or Irretrievable Commitments of Resources
None anticipated.

d) Cumulative Effects
Treatment under this alternative would result in stands which are more vigorous, healthy, and resilient to environmental changes. Stand growth and vigor across the analysis area would be similar to Alternative 2 on the units treated. Units not treated would develop, or continue developing characteristics and conditions similar to Alternative 1, the No Action Alternative. Stand susceptibility to insect attack, disease infection, and fire would also be expected to be reduced in the treated units. Species composition would shift towards drought and fire tolerant species. Species diversity would be increased, but structural diversity would be somewhat simplified due to placing growth emphasis on dominant and co-dominant trees in stands to be thinned. An estimated 337 acres would shift from a late or mature seral condition to an early seral condition. Approximately 812 acres would be treated

to enhance late seral development and 65 acres would have treatments to maintain existing seral conditions in the short term.

4.2. Soil Stability and Soil Productivity in Fragile (pyroclastic) soil types

a) Direct & Indirect Effects
This alternative is expected to have similar direct effects as described in Alternative 2. There are less overall acres proposed for tractor yarding 376 acres, with 207 acres proposed for tillage under this alternative**.** Soil productivity would be improved on 207 acres , with 169 acres maintaining existing levels. It is expected there would be a net gain in soil productivity, which would trend towards meeting soil productivity objectives.

There would be a considerably less tractor yarding (105 acres) on fragile (FP) soil types which would reduce the potential for erosion and sedimentation when compared with Alternative 2 and 3. With the implementation of the project design features, direct and indirect effects to the soil resource are expected to be at a low level of risk in the short-term. There is no current data to quantify these site specific effects.

b) Short Term Uses vs long-term Productivity
It is expected that long-term soil productivity would increase over the existing condition on tractor units proposed for tillage. On the remaining tractor units, it is expected that the existing level of risk for productivity effects would not have a measurable change with the implementation of the PDFs..

c) Irreversible or Irretrievable commitment of resources.
None Anticipated

d) Cumulative Effects
Under this alternative is anticipated that there would be much less soil disturbance from tractor yarding when compared with Alternatives 2 and 3. Approximately 376 acres are proposed for tractor logging. All of these acres are located outside of the West Fork of Trail Creek sub watershed, where most of the privately owned timberlands have recently been logged**.** This is expected to address the spatial and temporal cumulative concerns of erosion and sedimentation from soil disturbance and aid in the re-stabilization of the soils. This alternative is expected to maintain a low level of risk for erosion and sedimentation within the project area. There is no current data available to quantify these site specific effects.

4.3. Coho Salmon

a) Direct and Indirect Effects of Timber Harvest Activities
No direct impacts are expected to occur to fish and aquatic habitat from all proposed timber harvest treatments. This alternative proposes 337 acres of regeneration harvest, which could indirectly alter the natural hydrologic regime by reducing canopy cover below 40% and possibly increase the risk of erosion and subsequent stream sedimentation. The additional effects of soil compaction caused by tractor logging of 376 acres could increase the amount of run-off to streams adjacent to the harvest units. Many of these acres were previously compacted during past timber harvest operations. The impacts would be reduced on these acres by ripping the skid trails after logging occurs, minimizing the soil compaction to negligible levels and reducing previous compaction. **By restricting harvest to areas outside of Riparian Reserves, keeping tractors on designated skid trails, and by ripping of skid trails, actual compacted acres would be minimized**.

Indirectly, fish and aquatic resources could be negatively affected from low level, localized increases to baseline stream turbidity and sediment levels in the short-term (<1 year). **However, due to the distance of the timber harvest units from designated Critical Habitat of listed fish species, the effects to fish and aquatic habitat are expected to be negligible. The thinning, density management, select cut, and understory reduction treatments** would maintain characteristics of a mature stand and would provide sufficient tree canopies to provide the long-term habitat elements necessary for healthy aquatic ecosystems.

This alternative would require the construction of approximately 1 mile of temporary road that would be decommissioned following use. This road construction could indirectly alter the hydrologic flow paths by compacting the soil and intercepting and redirecting surface flow. Although, the proposed

roads would be located on ridges and stable slope areas, the current road densities within this watershed are already considered to be high. The addition of new roads could contribute to further degradation of the watershed. Full decommissioning of 9.4 miles of existing road would mitigate the effects of this new road construction and result in a net decrease in road density within the watershed. Partial decommissioning of approximately 5.3 miles of road and improvement/renovation of approximately 32.2 miles would also result in a decrease in road-related sediment, further reducing the impacts to the aquatic ecosystem.

Replacement and/or removal of culverts could directly impact the aquatic system by disturbing stream banks, vegetation, and substrate. Although these actions could result in short-term increases in turbidity and sedimentation, they would result in a direct beneficial effect on the aquatic system in the long term by restoring hydrologic connectivity and function. Replacement of undersized culverts would also indirectly benefit the aquatic system by reducing the risk of road failure during high flow events.

The proposed fuels treatments would be expected to restore fuel loads and forest nutrient cycling to more closely resemble historical levels. This would be expected to indirectly benefit fish and aquatic resources within the watershed by accelerating development of a late-successional forest capable of delivering large wood to the aquatic ecosystem. No mechanical fuel treatments would occur in the Riparian Reserves. Indirectly, fish and aquatic resources could be negatively affected from low level, localized increases to baseline stream turbidity and sediment levels in the short-term (<1 year). However, by following the appropriate PDFs these effects would be minimized.

b) Short term Uses vs. Long term Productivity

This alternative is not expected to impact the current trend in long term productivity (10+ years) of fish and aquatic resources within the harvest treatment. Maintaining the current Riparian Reserve design and allowing this vegetation to develop throughout the proposed project area would continue to provide the long-term necessary elements for healthy aquatic ecosystems. It would be anticipated to maintain or increase the current productivity of fisheries and aquatic resources over the long-term. Overall, implementation of these proposed actions would be expected to maintain or increase the productivity of fisheries and aquatic resources over the long-term, by accelerating development of a late-successional forest capable of delivering large wood to the aquatic ecosystem.

Short-term (<1 year) increases to baseline stream sediment levels are anticipated to occur from road maintenance, renovation, decommissioning, and culvert replacement and/or removal under the proposed timber sale. It is anticipated that an overall reduction in the risk to baseline stream sediment level increases would occur due to maintenance, renovation, and decommissioning of the road system. Implementation of the appropriate PDF's is expected to minimize short-term increases to baseline stream sediment levels to negligible amounts. Subsequently, it is anticipated the current productivity of fisheries and aquatic resources in the watershed would be maintained or increased over the long-term.

The proposed fuels treatments would be expected to restore fuel loads and forest nutrient cycling to more closely resemble historical levels. This would be expected to benefit fish and aquatic resources within the watershed over the long term by accelerating development of a late-successional forest capable of delivering large wood to the aquatic ecosystem. Fish and aquatic resources could be negatively affected from low level, localized increases to baseline stream turbidity and sediment levels in the short-term (<1 year). However, by following the appropriate PDF's these effects would be minimized.

Overall, implementation of the proposed actions would be expected to maintain or increase the productivity of fisheries and aquatic resources over the long-term by improving aquatic habitat conditions, thereby, improving freshwater survival of salmonid species.

c) Irretrievable or Irreversible Commitment of Resources

None anticipated

d) Cumulative Effects

Cumulative effects from the regeneration harvest could occur by increasing the risk of peak flow events within the stream channel. This may result in a low level, short term increase of sediment delivery to the streams within the proposed units. However, due to the distance of the timber harvest units from

designated Critical Habitat of listed fish species and by restricting harvest to areas outside of Riparian Reserves, the effects to fish and aquatic habitat are expected to be negligible. The cumulative effects of timber harvest on private lands must also be considered along with the actions on public land. The majority of this activity is occurring in West Fork Trail Creek, where there is relatively little public land and a large percentage of private industrial timber lands. Private timber companies are not required to meet the same standards for protection of riparian areas that federal agencies must follow, therefore, a greater impact to the aquatic system is occurring in this subwatershed. This alternative has eliminated all regeneration harvest units within West Fork Trail Creek as a means of addressing this issue. Restricting the regeneration harvest to Matrix lands outside of Riparian Reserves in the remainder of the watershed would minimize the effects to fish and aquatic habitat.

No negative cumulative effects to fish and aquatic resources are expected to occur from all other timber harvest prescriptions within the timber sale.

The proposed road-related projects could have a negative effect on fisheries and aquatic resources in the short-term by adding to current high levels of stream sediment from road maintenance, renovation, decommissioning, and culvert replacement and/or removal. However, by following the appropriate PDF's these effects would be minimized. A long-term, positive cumulative effect to fish and aquatic resources is anticipated from reducing potential road generated fine sediment by completing road maintenance, renovation, and decommissioning.

No negative cumulative effects to fish and aquatic resources are expected to occur from the proposed fuels treatments. This alternative would result in the vegetation within the Riparian Reserve developing late-successional characteristics faster than would occur at a natural rate. This is anticipated to result in a positive cumulative effect to fish and aquatic resources due to increased sizes and amounts of large wood which would be contributed to the aquatic ecosystem.

e) Determination of Effects on Southern Oregon/Northern California (SONC) Coho Salmon, SONC Critical Habitat, and Essential Fish Habitat from Implementation of Alternative 4

May Affect, Not Likely to Adversely Affect

It would be expected that some effect to aquatic habitat may occur due to potential short-term sediment delivery to streams resulting from the planned timber harvest, fuels treatments, road renovation, decommissioning, and culvert replacement. However, by following the appropriate PDFs these effects would be minimized. Baseline sediment levels should be reduced in the long-term as a result of these actions. As a result, Alternative 4 is not expected to result in more than a negligible chance of "take" of these species and is considered "not likely to adversely affect" SONC coho salmon (listed "threatened"), SONC Critical Habitat, or Essential Fish Habitat. Informal consultation with the National Marine Fisheries Service (NMFS) was initiated in February 2002 for SONC coho salmon, SONC Critical Habitat, and Essential Fish Habitat.

4.4. Wildland Urban Interface

a) Direct and Indirect Effects

In stands identified for understory thinning, the primary benefit would occur in the removal of smaller diameter trees (8" DBH and less). Additionally, there may be some minor benefits associated with thinning operations that target trees 8 to 14" DBH in diameter. These benefits would be in the reduction of ladder fuels. The slash that is created from these operations must be treated in order to realize the maximum benefit in the reduction activities. In selectively cut stands there may be some minor benefit in the reduction of ladder fuels. Reducing canopy cover to less than 60% would eliminate the potential for running crown fires. No major impacts to air quality are anticipated.

The risk of high fire intensities would be reduced if a wildfire would occur. Although, wildfire spread rates would remain high, fires would be easier to control.

b) Short-term Uses vs. Long-term Productivity

In the short term fire hazard would be reduced. To maintain this reduction, fuels treatments would need to be maintained. The potential for large scale fires over the project area would be lessened, resulting in a reduced risk to communities or of long term site productivity loss.

c) Irreversible or Irretrievable Commitments of Resources

None anticipated

d) Cumulative Effects
Treatments under this alternative would reduce the fire hazard within the watershed and increase the health and vigor of the vegetative communities. Fires that did occur would have less impact due to lower fuel loadings.

4.5 Water Quality and Quantity

a) Direct and Indirect Effects
Direct effects on the hydrology are not expected as a result of the proposed timber harvest treatments within the project area. Riparian Reserve buffers would minimize sediment from reaching stream channels and maintain current levels of riparian canopy to provide shade for stream channels. Riparian Reserves identified for treatment would include a no-treatment buffer to maintain stream shade, stream channel stability, and to minimize the chance for sediment to reach stream channels.

Indirect effects on the hydrology of the project area is related to roads and road use. An increase in the availability of sediments that can be eroded often comes from the construction and use of roads in forested watersheds. There are two main processes associated with large increases in road related sediment, mass failure and surface erosion. The total road density of the watershed is considered high, 5.5 miles per square mile.

No permanent road is proposed, 5,280 feet (1.0 miles) of temporary road (operator spurs) is proposed to be constructed and then decommissioned after use with this alternative. This may cause some erodable sediment to be transported at first, but road construction would occur away from streams and is not likely to transport sediment to streams. Road improvements and renovations may cause some short term movement of sediment, but these treatments are expected to decrease the amount of erodable sediments moving in this project area in the long term.

The amount of temporary road proposed in this alternative is less than in Alternative 2 and 3, and would be decommissioned after use and would not increase road densities. The level of road decommissioning would be the same as proposed in Alternative 2 and would result in the same level of road density reduction. This action would be expected to reduce long term fine sediment delivery from surface erosion as well as road related mass failures within this watershed.

b) Short-term Uses vs. Long-term Productivity
There would be no changes in the long-term productivity on the hydrology of the area.

c) Irreversible/Irretrievable Commitments of Resources
None anticipated

d) Cumulative Effects
This alternative would have low added cumulative effects at both the 6th field subwatershed and 5th field watershed scale. There is no net increase in roads, low increases of early seral stage vegetation in West Fork of Trail Creek, very low amounts of openings within the TSZ, and no additional exposure to stream surfaces.

This alternative would eliminate regeneration harvest in the West Fork Trail 6th field subwatershed to address current concerns of watershed cumulative effects. Alternative 4 also changes some timber harvest units into fuels treatment units and the effects for these ground disturbing activities are expected to be less. This reduction of effects comes from changing tractor harvest units to slashbuster units. Slashbuster treatment uses low pressure equipment and walks on existing slash to limit the amount of soil displacement and risk for erosion.

Fuels Treatment Projects - Hydrology Effects

a) Direct and Indirect Effects
Same as Alternative 2

b) Short-term Uses vs. Long-term Productivity
Same as Alternative 2

c) Irreversible/Irretrievable Commitments of Resources
Same as Alternative 2

d) Cumulative Effects
Same as Alternative 2

V. List of Preparers

NAME	RESPONSIBILITIES
Jim Welden, Forester	Silvicultural Prescription Writer
Jim Harper, Wildlife Biologist	T&E Animals
Jayne LeFors, Fisheries Biologist	Fisheries/ Aquatic Ecosystems
John Dinwiddie, Fuels Specialist	Fuels/Air Quality
Marcia Wineteer, Botanist	Plants
Ken Van Etten, Soil Scientist	Soils
Doug Kendig, Riparian Reserve Coordinator	Riparian/Special Status and Survey & Manage Plants
Shawn Simpson, Hydrologist	Water, Wetlands, & Foodplains
Amy Sobiech, Forestry Technician	Cultural Resources
John McNeel, Engineer	Engineering
Craig Brown, Forester	Layout
John Bergin, Ecosystem Planner	Planning
Jean Williams, Environmental Coordinator	Environmental Assessment

APPENDICES

Appendix

A. Cultural Resources

B. Botany Report - Plants (Sensitive, Survey & Manage, and Threatened & Endangered)

C. Wildlife Report (Sensitive, Survey & Manage, and Threatened & Endangered)

D. Road Recommendations

E. Silvicultural Prescription
- Marking Guidelines
- Stand Inventory Summary

F. Biological Assessment on Listed Fish Species and Designated Critical Habitat
- BA for Fuels Treatments
- BA for Timber Sale and other projects
- ACS Consistency

G. Hydrology

H. Fuel Models
- FM 4
- FM 5
- FM 6
- FM 8
- FM 10

I. Unit Summary Table - By Soil Type

J. Pre-project Surveys

GLOSSARY

National Environmental Policy Act (NEPA) - An act passed in 1969 to declare a National policy that encourages productive and enjoyable harmony between humankind and the environment, promotes efforts that prevent or eliminate damage to the environment and biosphere, stimulates the health and welfare of humanity, enriches the understanding of the ecological systems and natural resources important to the nation, and established a Council of Environmental Quality (USDA, USDI 1994a).

Environmental Assessment (EA) - A systematic analysis of site-specific activities used to determine whether such activities would have significant effect on the quality of the human environment, whether a formal environmental impact statement is required, and also to aid agency compliance with the National Environmental Policy Act when no environmental impact statement is necessary (USDA, USDI 1994a).

Environmental Impact Statement (EIS)- A statement of the environmental effects of a proposed action and alternatives to it.

Northwest Forest Plan 1994 (NFP) - Coordinated ecosytem management direction incorporated into land management plans for lands administered by the Bureau of Land Management and the Forest Service within the range of the northern spotted owl.

Resource Management Plan 1994 (RMP) - A land use plan prepared by the BLM under current regulations in accordance with the Federal Land Policy and Management Act (FLPMA)

Interdisciplinary team (ID team) - A group of individuals with varying areas of speciality assembled to solve a problem or perform a task.

Late Successional Reserves (LSR's) - A forest in its mature and/or old-growth age classes. (identified in the NFP)

Riparian Reserves - Areas along live and intermittent streams, wetlands, ponds, lakes, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. Riparian Reserves are important to the terrestrial ecosystem as well, serving, for example, as dispersal habitat for certain terrestrial species (USDA, USDI 1994a).

Matrix - Federal land outside of reserves, withdrawn areas, Managed Late-Successional Areas and Adaptive Management Areas that will be available for timber harvest at varying levels.

Connectivity - A measure of the extent to which conditions between late-successional/old growth forest areas provide habitat for breeding, feeding, dispersal, and movement of late-successional/old growth associated wildlife and fish species.

Endangered Species Act - A law passed in 1973 to conserve species of wildlife and plants determined by the Director of the U.S. Fish and Wildlife Service (USFWS)or the National Marine Fisheries Service (NMFS) to be endangered or threatened with extinction in all or a significant portion of its range.

Consultation - process where Federal agencies confer with USFWS or (NMFS) to determine if proposed actions are in compliance with the Endangered Species Act.

Survey & Manage Species - Species that are closely associated with late-successional or old-growth forests whose long-term persistence is a concern. Various levels of surveys are completed and management actions taken to maintain the habitat elements needed to provide for persistence of the species at known sites. (list of species identified in Survey & Manage Supplemental EIS)

Survey Protocols - These are interagency documents describing the survey techniques needed to have a reasonable chance of locating the species when it is present on the site, or needed to make an "equivalent-effort" of locating the species when it is present on the site.
Canopy - The more or less continuous cover of branches and foliage formed collectively by adjacent trees and other woody species in a forest stand.

Overstory - That portion of trees which form the uppermost layer in a forest stand which consists of more than one distinct layer (canopy)

Understory - The trees and other woody species growing under the canopies of larger adjacent trees and other woody growth (USDA, USDI 1994a).

Regeneration Harvest - Timber harvest conducted with the partial objective of opening a forest stand to the point where favored tree species will be reestablished.

General Forest Management Area (GFMA)- Forest land managed on a specified regeneration harvest cycle. Biological legacies of green trees are retained to assure forest health. The Medford District's RMP identifies 2 GFMA's .

Northern General Forest Management Area (NGFMA) - Retain 6-8 trees per acre, 20" or greater in diameter. Canopy closure would be approximately 10-15% following treatment.

Southern General Forest Management Area (SGFMA) - Retain 16-25 trees per acre, 20" or greater in diameter. Canopy closure would be approximately 40% following treatment.

Green Tree Retention - A stand management practice in which live trees as well as snags and large down wood, are left as biological legacies within harvest units to provide habitat components over the next management cycle.

Biological Legacies - Large trees, down logs, snags and other components of the forest stand left after harvesting for the purpose of maintaining site productivity and providing structures and ecological functions in subsequent stands.

Commercial Thinning - The removal of merchantable trees from an even-aged stand to encourage growth of the remaining trees.

Density Management - Cutting of trees for the primary purpose of widening their spacing so that growth of remaining trees can be accelerated. It can also be used to improve forest health, to open the forest canopy, or to accelerate the attainment of old growth characteristics if maintenance or restoration of biological diversityis the objective.

Selection Cutting - A method of uneven-aged management involving the harvesting of single trees from stands or in groups without harvesting the entire stand at any one time.

Prescribed Fire - A fire burning under specified conditions that will accomplish certain planned objectives.

Wildland urbanInterface Area - Areas where BLM-administered lands are adjacent to or intermingled with privately owned lands zoned for 1 or 20-acre lots or that already have residential development.

Boulder Weir - A row of large boulders that are tightly interlocked together that span a channel with the objective of creating pool habitat and trapping substrate to form gravel beds.

Fire Intensity - Expression commonly used to describe the power of wildland fires.

Flame Lengths - Average length of the flame from a projection point.

Fuel Loading - Fuel property for predicting whether a fire will ignite, its rate of spread and the intensity at which it will burn.

Fuel Models - Collection of various components of vegetation, live and dead, which are used to estimate fire behavior potential. Each fuel model is described by the fuel load, the depth of the fuel bed involved in the fire front and fuel moisture, including that at which fire will not spread.

Hand piling and burning - Hand piling and burning of hand piles reduces the hazardous slash buildup which is created by the various described treatments and when understory burning (UB) is not possible. Sticks between 1 and 6" in diameter and greater than two feet in length would be stacked in piles by hand crews. Piles would then be covered with black plastic to create a dry ignition point and would be burned in the winter season after enough precipitation has occurred. Piles are burned during this season to reduce the potential for fire to spread outside each pile, and to reduce the potential for scorch and mortality to the residual trees and shrubs.

Hazardous Fuels - Excessive live or dead wildland fuel accumulations that increase the potential for uncharacteristically intense wildland fire and decrease the capability to protect life, property, and natural resources.

Ladder Fuels - Vertical continuity of fuels which influence flame length, and the ability of a fire to torch or potentially develop into a crown fire.

Prescribed Fire - Any fire ignited by management actions to meet specific objectives. All prescribed fires are conducted in accordance with prescribed fire plans.

Rate of Spread - The rate of advance of the "head" of the fire or the forward spread rate.

Risk - The probability that potential harm or undesirable consequences will be realized.

Slash - Concentrations of downed fuel (forest and other vegetation) resulting from natural events such as wind, fire, or human activities such as logging and road construction.

Understory Thinning - Mainly used as an initial entree treatment to thin dense understory vegetation reducing fuels which contribute to high intensity wildland fires. Reducing the understory will decrease the existing fire and fuel hazards and allow for the reintroduction of fire through controlled underburning and/or broadcast burns. Where it is operationally impractical because of significant risks to ecological processes or to rural communities understory thinning maybe utilized to maintain the low fuel hazard created with the initial treatment. The density of the understory vegetation would be reduced the by cutting and spacing of vegetation that is less than 7" DBH. Species diversity would be maintained by selectively slashing hardwoods, conifers and shrubs, reserving specified species. Spacing of vegetation is based on the overstory present in each area.

Understory Burning or Underburn - The application of prescribed fire will be to reduce the fuel hazard for both dead and down woody material and to reduce the amount of ladder fuels present, maintain the low fuel hazard created with initial fuels treatments, restore wildlife habitats, meadows and oak woodlands and reduce the fuel hazard created during harvest operations. Prescribe fire will mainly be used as a periodic follow up or maintenance treatment but where operationally feasible and where no significant risks to ecological processes or to rural communities exist prescribe fire maybe also be used initially to reach the desired fuels conditions.

Unwanted Wildland Fire - Fire that burns more intensely than the natural or historical range of variability, thereby fundamentally degrading the ecosystem or destroying communities or rare or threatened species/habitat. Also, known as catastrophic, severe, or damaging.

Wildland-Urban Interface (WUI) - The line, area, or zone, where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Spring Burn - A burning operation conducted in the "spring season" (based on time of year)

Spring Like burn - A burn conducted when fuel moisture conditions will give the results of a spring burn regardless of time of year. (based on results)

Fall Burn - A burn conducted in the "fall season" (based on time of year)

Fall Like Burn - A burn conducted when fuel moisture conditions will give the results of a fall burn regardless of time of year. (based on results)

REFERENCES

ROD for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl. April 1994.

Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl. April 1994. Standards and Guidelines for Survey and Manage Species: C-4 to C-6. Aquatic Conservation Strategy Objectives: B-11 to B-17. Standards and Guidelines: C-30 to C-38.

BLM Riparian-Wetland Initiative for the 1990's. September 1991. USDI.

Forest Ecosystem Management: an Ecological, Economic, Social Assessment. 1993, Chapter V, Aquatic Ecosystem Assessment.

Medford District ROD and Resource Management Plan. June 1995. Appendix C. Special Status Species, Species to be Protected Through Survey and Manage Guidelines and Protection Buffer Species: 135-147. Riparian Reserves: 26 to 32.

Species Information Addendum to Appendix B, Riparian Reserve Evaluation Techniques and Synthesis, Version 2.2

Trail Creek Watershed Analysis, Western Watershed Analysts, June, 1999.

Restoring Fire-Adapted Ecosystems on Federal Lands, May 2002

TRAIL CREEK E.A. PROJECT - ROAD OBJECTIVES

T32S

T33S

R2W

R1W

N

LEGEND

- PUMP CHANCE
- QUARRY
- NEW ROAD CONSTR.
- EXISTING ROADS

LAND ADMINISTRATION

- BLM
- FOREST SERVICE

RECOMMENDATION

- Full Decommission
- Partial Decommission
- Improvement
- Temporary Block

6/19/02

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

1:48,000

1 0.5 0 1 Miles

To: Trail Creek Timber Sale E. A.

From: Amy Sobiech Cultural Resources Specialist Butte Falls Resource Area

Date: October 10, 2001

Subject: Archaeological Resources

Purpose of the Work
The Butte Falls Resource Area is planning a timber sale in the Trail Creek watershed. Preliminary to the timber sale project, the Resource Area must complete its obligations to protect archaeological resources, as stipulated in Section 106 of the National Preservation Act.

The project area totals 17,050 acres, located in Townships 32, 33 and 34 South and Ranges 1 and 2 West. SHPO standards stipulate that 100% of the high probability lands, 20% of medium probability, and 5% of low probability lands must be surveyed. Also, a minimum of 20% of the total project area was required to be surveyed. Thus, approximately 3,410 acres of this watershed were surveyed. The surveys for this project were completed in fall 1999. The cultural resource project number is filed at the Medford District office of the BLM under AH99-41 or under BF 99-41.

Current Conditions
In accordance with the National Historic Preservation Act of 1966 Section 106 an archaeological reconnaissance was conducted for the Trail Creek project area. A total of 18 archaeological sites exist within the larger Trail Creek watershed area. Ten sites exist on BLM administered lands. Nine newly recorded sites and one previously recorded site are present. In addition, seven sites exist on private land. One previously recorded site exists on both BLM and private land. Due to possible discrepancies in actual site location, three previously recorded sites were revisited to determine their true locations in relation to property boundaries.

The archaeological sites mentioned in the above paragraph are all located outside of current timber sale operational unit boundaries and consequently require no mitigation to ensure their preservation and protection. However, if unit boundaries are changed, helicopter landing areas are added or road construction is undertaken near archaeological site areas mitigative techniques will need to be applied. These techniques can include site avoidance, directional tree falling, application of buffer areas and data recovery. If data recovery becomes necessary then the affected sites will need to be formally evaluated and impacts to them may need to be mitigated through further study or other actions.

APPENDIX B

TO: Trail Creek E.A. File

FROM: Marcia Wineteer, Botanist

SUBJECT: Botany Report

DATE: January 15, 2002

DESCRIPTION OF THE EXISTING ENVIRONMENT

The proposed project area is within the Trail Creek watershed, located on the western slopes of the Cascade Range. Vegetation communities are influenced by elevation, slope, aspect and soil type. Higher elevation and north-facing slopes generally contain moist white fir and Douglas fir forests while south-facing and lower elevation slopes are dominated by dry Douglas fir-white fir and Douglas fir-ponderosa pine/poison oak forests. These mixed conifer and conifer-hardwood stands may be interspersed with western hemlock, ponderosa pine, sugar pine or incense cedar in the overstory and madrone, black oak, golden chinkapin or canyon live oak in the mid-story canopy. Dominant shrubs include poison oak, California hazel, creambrush oceanspray, creeping snowberry, and dwarf Oregon grape. Special habitats include rock outcrops and cliffs, riparian corridors and small patches of oak woodlands or grasslands scattered throughout the project area.

VASCULAR PLANT SPECIES

Vascular plant surveys were conducted on approximately 5192 acres in the Trail Creek project area in 1998, 2000 and 2001. Approximately 252 acres were surveyed in 1998 by an agency botanist; 1444 acres in 2000 and 3496 acres in 2001 were surveyed under contract. All surveys were conducted by professional botanists using intuitively controlled transect methodology with an emphasis on special habitats such as riparian areas, meadows, rock outcrops, as well as mature forest habitat. Contractors were provided with the 2000 and 2001 Medford District Special Status Plant Lists which include Threatened and Endangered, Bureau Sensitive, Bureau Assessment and Survey and Manage category A and C vascular plant species likely to occur on the district. Comprehensive species lists were compiled for all units by section. Surveys have been completed for all but 5 units which are scheduled for survey in spring 2002:

T32S-R1W-S33	units #33-11, 33-12, 33-13, 33-14	71 acres
T33S-R1W-S30	unit 30-1	16 acres
	Total	87 acres

Threatened and Endangered (T&E) Plants

Three Federally listed T&E or Proposed T&E plant species occur in the Butte Falls Resource Area - *Limnanthes floccosa* ssp. *grandiflora*, *Lomatium cookii* and *Fritillaria gentneri,*. The known ranges of all three species are outside the Trail Creek project area.

Limnanthes floccosa ssp. *grandiflora* "big-flowered wooly meadow-foam" - Federally Proposed annual that grows in and around the edges of vernal pools. It has only been found on private land in Jackson County. Blooms in April and May. (Eastman 1990)

CHECK INFO and status

Lomatium cookii "Cook's desert parsley" - Federally Proposed species that inhabits seasonally wet meadows and vernal pool edges. Known sites are on private land in the Agate Desert in Jackson County and on BLM, state and private land in Josephine County. Blooms in March and April. (Eastman 1990, Knight and Seevers 1992)

CHECK INFO

Fritillaria gentneri "Gentner's fritillary" - Federally Endangered plant that is endemic to southwestern Oregon. It grows in dry, open oak or Douglas-fir or oak woodlands or in openings or brushfields at the margins of woodlands. The majority of sites are clustered around Jacksonville, but other sites have been discovered scattered in the Rogue and Illinois River drainages in Josephine and Jackson Counties. Most sites are below 3000 feet elevation in the Klamath Mountain foothills, although one disjunct population in the Cascade-Siskiyou National Monument is at 4,450 feet elevation. Blooms in April and May. (Brock and Callagan 2001)

Effects determination

Vascular plant surveys conducted in 1998, 2000 and 2001 during the appropriate survey season in all proposed units discovered no T&E or Proposed T&E plant species. Because the project area is outside the known range of all three Federally listed plant species and surveys discovered no populations, the planned timber harvest, fuels reduction and riparian thinning activities will have **No Effect** on *Limnanthes floccosa* ssp. *grandiflora, Lomatium cookii* or *Fritillaria gentneri*.

Special Status and Survey and Manage Vascular Plants

Surveys for Special Status and Survey and Manage vascular plants were conducted on approximately 5192 acres within the project area in 1998, 2000 and 2001. Approximately 252 acres were surveyed in 1998 by an agency botanist; 1444 acres in 2000 and 3496 acres in 2001 were surveyed under contract. All surveys were conducted by professional botanists using intuitively controlled transect methodology with emphasis on special habitats such as riparian areas, meadows, rock outcrops, as well as in mature forest habitat. Contractors were provided with the 2000 and 2001 Medford District Special Status Plant Lists which contain Bureau Sensitive, Bureau Assessment and Survey and Manage category A and C vascular plant species likely to occur on the district, as well as Bureau Tracking and

Medford Watch species. Comprehensive species lists were compiled for all units by section.

Table 1. Results of Vascular Plant Surveys in Trail Creek Project Area

Species Name	Status	# of Sites
Cypripedium montanum	Bureau Tracking, S&M C	10
Cypripedium fasciculatum	Bureau Sensitive, S&M C	1
Iliamna latibracteata	Bureau Assessment	4
Perideridia howellii	Bureau Tracking	10
Allium bolanderi var. mirabile	Bureau Tracking	3
TOTALS	5	27

Cypripedium montanum "mountain lady slipper" - On both Bureau Tracking and Survey and Manage category C lists. An autotrophic orchid that occurs in a broad range of habitats and soil substrates (including ultramafic) between 1500 and 6500 feet elevation, but usually from 2500-4000. Habitats include mostly northerly aspects of mixed conifer or mixed evergreen/oak woodlands, often with 60-80% canopy closure. (USDA/USDOI 1998)

Cypripedium fasciculatum "clustered lady's-slipper" - On both Bureau Sensitive and Survey and Manage category C lists. A long-lived perennial orchid that occurs in a variety of habitats throughout the Klamath Mountains. Sites vary from dry to damp and rocky to loamy in mixed conifer, Douglas-fir, pine and black oak forests. Aspects are mostly northerly, elevation ranges from 1000-5300 feet and canopy cover from 60-100%. (USDA/USDOI 1998)

Iliamna latibracteata "globe mallow" - Bureau Assessment species. Habitat is in moist, often shaded places and along creek banks. In Butte Falls has been found in disturbed areas, along old skid roads and cut banks. (Knight and Seevers 1992)

Perideridia howelllii "Howell's false-caraway" - Bureau Tracking species. Habitat is along streambanks and in wet meadows. (Knight and Seevers 1992)

Alium bolanderi var. *mirabile* "Bolander's lily" - Bureau Tracking species. Found on heavy, clay soil in openings among brushy woods below 3000 feet. (Knight and Seevers 1992)

(Special Status Plants of the Medford District, A Guide to Rare Plants of the Siskiyou National Forest)

Protection Measures

Perideridia howelllii and *Allium bolanderi* var. *mirabile* are both Bureau Tracking species and as such require no specific protection. However, *Perideridia howelllii* grows along streams and will be protected within riparian buffers.

Each vascular plant species and site will be evaluated to determine the appropriate level of protection to ensure viability of the species, the population and habitat. Some species and sites may not be effected by, or may even benefit in the long-term from pro-active management activities during periods of dormancy or senescence, such as fall burning that enhances habitat or reduces competition. Other situations may require protection buffers around the population. The exact size of the buffers will be determined by considering a number of ecological factors, including aspect, slope, canopy closure, herbaceous ground cover, fuel loading, aut-ecology, and local population abundance, distribution and density where appropriate. Protection measures may vary from site to site. Risks assessments will be made on a site by site basis based on the prescribed activity and site conditions to determine the potential risks and impacts to the population, any potential micro-site habitat changes and any inter-related host-dependant effects.

Protection measures will be implemented with the intention of managing known sites to conserve the species and populations and to ensure that actions authorized, funded or carried out do not contribute to the need to list any of these species as Threatened or Endangered in accordance with the Management Recommendations for Vascular Plants, Dec. 1998 and BLM Manual, 6840 Special Status Species Management, Sept. 1988.

Each *Cypripedium montanum, C. fasciculatum* and *Iliamna latibracteata* sites will be protected with 100 foot buffers in density management, selective cut and thinning treatment units, 150 foot buffers in Southern GFMA regen units and 200 foot buffers in Northern GFMA regen treatment units.

SPECIAL STATUS and SURVEY & MANAGE NON-VASCULAR PLANT SPECIES

Pre-disturbance surveys for fungi were not conducted or required in the Trail Creek Timber Sale and Fuels Reduction project area under the Record of Decision for Amendment to the Survey & Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines (2001).

CHECK REFERENCE

Strategic surveys that were conducted for targeted Survey and Manage fungi species in fall 2001 in the Butte Falls Resource Area were not in the Trail Creek project area. Several fungi are included on the Medford District Special Status 2001 list as Bureau Tracking species, however pre-disturbance surveys for Bureau Tracking species are encouraged but discretionary (BLM Manual 6840). No surveys were conducted specifically for fungi in the project area. Several S&M species were discovered during surveys and site visits and they will be protected with buffers appropriate to the site.

Surveys for lichens and bryophytes were conducted in 2001 and 2002. Approximately 376 acres were surveyed by an agency botanist and 4110 acres were surveyed under contract. All surveys were

conducted by professional botanists using intuitively controlled transect methodology with an emphasis on special habitats such as riparian areas, meadows, rock outcrops, as well as mature forest habitat. Surveyors were provided with the Medford District 2001 Special Status Plant Species and Survey and Manage Species lists. Surveys targeted all Bureau Sensitive, Bureau Assessment and Survey and Manage categories A and C species, but incidental sightings of Bureau Tracking, Medford Watch and Survey and Manage categories B, D, E and F species were also documented.

Survey Results

Table 2. Results of Non-vascular Plant Species in the Trail Creek Project Area

Species name	Type	Status	# of Sites
Bryoria tortuosa	lichen	S&M D	2
Buxbaumia viridis	moss	S&M D	37
Collema nigrescens	lichen	S&M F	many in each section
Dendriscocaulon intriculatum	lichen	S&M B	38
Hedwigia stellata	moss	Bureau Tracking	1
Lecanora pringlei	lichen	Bureau Tracking	1
Leptogium cyanescens	lichen	S&M A	6
Leptogium rivale	lichen	S&M B	2
Leptogium teretiusculum	lichen	S&M E	1
Sulcaria badia	lichen	Bureau Sensitive	1
Tortula subulata	moss	Bureau Tracking	3
Tremiscus helvelloides (=Phlogiotis h.)	fungi	S&M B	1
TOTALS		12	93

Protection Measures

PROJECT DESIGN FEATURES

Sources:

Brock, Richard and Richard Callagan. 2001. Siskiyou BioSurvey LLC. Fritillary Survey and Habitat Analysis - General Summary. Internal Report. Medford District, Bureau of Land Management. 9 pp.

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Mullens, Linda. April 2000. A Guide to Rare Plants of the Siskiyou National Forest. USDA - Forest Service, Siskiyou National Forest, P.O. Box 440, 200 N.E. Greenfield Road, Grants Pass Oregon 97528. 163 pp.

USDA Forest Service R-5/6, USDOI Bureau of Land Management OR/WA/CA. December 1998. Management Recommendations for Vascular Plants. BLM 1630/1736-PFP (BLM-OR931)P.

Appendix C. Terrestrial Wildlife Report - Trail Creek 17 June 2002

Jim Harper, Wildlife Biologist [timbsale/TrailCk/WLRept]

The entire Trail Creek watershed was considered for potential timber sale activities and other projects. At the time of this report, the sale area is to be broken into a Trail North and a Trail South project areas, with three proposed action alternatives.

Description of the Existing Environment

The Watershed Analysis for Trail Creek (completed June 1999) encompasses 1,618 acres (approximately 55 square miles), of which about 41% (14,640 acres) are managed by BLM. The east half is within the Western Cascade Physiographic Province, and the west half is within the Klamath Mountains Province, although there is no distinct type break between the two provinces within the watershed. Elevations range from 1,436 to 4,698 feet.

Wildlife Appendix table 1 lists the Special Status wildlife species that may occur within the Butte Falls Resource Area, including Federally listed, State listed, Bureau Sensitive species, and Survey & Manage species.

FEDERALLY LISTED

Bald Eagle - Federal Threatened, State Threatened.

There are no known bald eagle nests (active or historic) within the watershed. The nearest known nest is along the Rogue River 4 miles from the nearest project area. An occasional wintering eagle could be expected to wander over sale units, as could a migrant. Wintering eagles eat more carrion and waterfowl than nesting season eagles that eat mostly fish. Since the lower main stem of Trail Creek goes almost dry in summer months (limiting the fish prey base), there is a low probability that bald eagles would begin nesting in the sale area in the next decade. Any new nests along the Rogue River would still be two miles from the nearest project unit.

Northern Spotted Owl - Federal Threatened, State Threatened

The entire watershed is within a spotted owl density study area that was intensively surveyed annually by the Cooperative Wildlife Research Unit of Oregon State University from 1990 through 1996. Occupancy, productivity, and other demographic data was collected on 14 active and historic sites. Monitoring of the known sites has continued through 2001 by BLM and Boise Corp. personnel. Of the 11 sites within the watershed with a center-of-activity on BLM, 4 are believed to be still active through the 2001 nesting season. Of 3 historic sites on non federal lands, none are still active. Most adult owls in and surrounding the watershed are color marked (plastic leg band) to enable long-term monitoring of site fidelity and productivity. Most juveniles are color banded to monitor dispersal and

longevity.

Monitoring continues in the 2002 season on the known sites. Several areas of vacant good habitat are checked each year to detect potential new sites.

Three sites on US Forest Service at the northwest end of the watershed (outside the sale area) have not been surveyed since 1996. There are an additional 3 sites to the east of the sale that are within the provincial radius (1.2 miles for Cascade, 1.3 miles for Klamath) of a proposed sale unit, and 2 of those sites are active. The peak number of owls detected in the sale area was 5 pairs and 6 singles in 1993. In 2001, there were 4 pairs and one single detected. There is a high probability of one or two additional single "floater" owls that move around between the established territories. The probability of an undetected resident nesting pair is low.

Under the Northwest Forest Plan (NWFP), all sites on BLM that were known as of January 1994 have been given a 100 acre core, which is to be managed as a late successional reserve (LSR). There are no BLM owl sites within 3 miles that have been discovered since the 1994 cutoff that do not have a designated 100 acre core.. Active sites on non-federal lands get a 70 acre core under the state Forest Practices Act. Sites on non-federal that are vacant for three years do not get a core, which is the case for the Romine, Wally Rollo, East Chicago sites.

Spotted Owl Critical Habitat

Most of the north half of the watershed is within designated Critical Habitat (Federal Register, 50 CFR Part 17, Vol 57 No 10, Wed Jan 15 1992, pages 1796-1838. The wildlife appendix in the Trail Creek Watershed Analysis lists the pertinent citations. In effect, the Northwest Forest Plan incorporates the intent of the critical habitat designation by maintaining the large LSRs, plus the 100 acre cores (unmapped LSR stepping stones), plus connectivity blocks, plus wide riparian management zones, plus dispersal habitat across the landscape. The NWFP was implemented in 1994 (two years after critical habitat was designated) and did not incorporate specific protections for critical habitat.

The US Fish & Wildlife Service (FWS) reaffirmed the adequacy of NWFP to meet the intent of critical habitat in the Final Report "A rangewide baseline summary and evaluation of data collected through section 7 consultation for the northern spotted owl and its critical habitat 1994-2001", issued June 26, 2001. The NWFP meets the "primary constituent elements" by providing suitable habitat to support population clusters (the LSRs) and support for dispersal.

Vernal Pool Fairy Shrimp - Federal Threatened (not state listed)

Fairy shrimp have been identified in vernal pool habitat near the Table Rocks. The nearest vernal pool habitat is over 8 miles from any Trail Creek project unit.

Marbled Murrelet - Federal Threatened, State Threatened

The sale area is over 75 miles inland from the ocean, well outside the documented range of the species.

BUREAU SENSITIVE

Peregrine Falcon - State Endangered, Bureau Sensitive

There is one known nesting pair of peregrines within the project vicinity. It is on non-federal land, and originally proposed sale units within one half mile were dropped. Young were produced in 1999, 2000, 2001, and 2002. Fledging at this site occurs by 20 June. Two additional nesting territories are outside the sale area, and each is at least 1½ miles from the nearest unit.

There are additional suitable cliffs for nesting within the sale area. The three known sites are approximately six miles apart, and the probability of a new pair colonizing an additional rock so close to an existing site is low. The known sites will be monitored annually through the implementation of the Trail Creek sales. Peregrines can range 10 miles from the nest cliff while foraging for a wide array of avian prey. Regardless of the vegetative cover type, there are a variety of bird species occurring that the falcon is capable of capturing, if the prey is above the canopy layer (of trees or brush).

The peregrine used to be a federally threatened species, but it was delisted in August 1999. At that time, BLM added the species to its Bureau Sensitive list, which affords similar mitigation as for federal listing. Some states are moving to delist peregrines, but such action in Oregon is at least a year away (Charles Bruce, ODFW, pers.com.).

Northern Goshawk

In 1999, 2000, and 2001, 4,500 acres of first year goshawk surveys were completed in suitable goshawk habitat (older seral). Of that area, 2,200 acres were surveyed a second year. Another 900 acres will be surveyed for the second year in June/July 2002. Surveys for goshawks are not mandatory. One nest was located in 2001 (Eldermill site). There is a high potential of an additional undiscovered site within the sale vicinity, but core areas are usually several miles apart, are difficult to detect, and goshawks can shift their nest location up to a half mile from year-to-year. The known pair will be monitored annually.

The goshawk in the western US has been proposed for federal listing three times, and US Fish & Wildlife Service denied the listing each time (most recently Federal Register 29 June 1998, Vol 63, number 124, pgs 35183-84.)

Western Pond Turtle

Turtles have been seen in main streams and pump chances and ponds within the watershed. The species was proposed for federal listing several years ago, but the petition was denied.

Fisher

A radiotelemetry study on fisher in the Prospect area had animals found near just east of Trail Creek, so they would be expected to occur in the watershed. Females have an annual home range of about 10 square miles. Males range over 50 square miles (Aubrey & Raley, 2002). The fisher has been petitioned for federal T&E listing twice in the last 10 years, with a 3rd petition in Nov 2000.

Townsends Big-eared Bat

There have been no detections in the sale area. Maternity colonies are found in caves and mines, but there are no such structures in the watershed. Townsend's big-eared bats could roost in crevices in rock outcrops, loose bark on snags, in old abandoned buildings, or under bridges.

SURVEY & MANAGE (S&M)

Great Gray Owl

Survey routes were run to interagency protocol standards in likely habitat in 1998, 1999, 2000, and 2001. Surveys are repeated six times from mid March through late June, and focus on timbered stands within 1000 ft of meadow habitat. There were several detections in the watershed (Longbranch, Romine, 3 East, Off the Wall), but no nests were located. The known detection areas will continue to be monitored annually. There have been no detections thus far in 2002. There is a high potential for additional great grays in the watershed.

Red Tree Vole

Surveys were done to interagency protocol standards on 6,500 acres in the watershed from 1997 through spring 2002 on all proposed sale units. Nests were frequently found in the north half of the watershed (higher elevation, moister, fog belt). Units with nests discovered in 1997 were all dropped from the sale plan. The southern third of the watershed (lower elevation, drier) has very few nests. Probable vole nests were categorized as active, inactive, or unknown. In 2001 and 2002, over 700 trees were climbed to clarify the status of unknown nests.

Mollusks

A total of 5,174 acres were surveyed to interagency protocol standards in Trail Creek, including all proposed sale units, quarry sites, tailhold tree areas, and helipads. Most were done in 2000 and 2001, with the last completed in March 2002. S&M snail species that could possibly occur include Oregon Shoulderband (*Helminthoglypta hertleini*), Oregon Megomphix (*Megomphyx hemphilli*), Crater Lake Tightcoil (*Pristiloma arcticum*). Two species of slugs, the Blue-gray

Taildropper (*Prophysaon coeruleum*) and the Papillose Taildropper (*Prophysaon dubium*), were deleted from the S&M list by the Supplemental EIS on Survey & Manage (November 2000) "For Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines". Over 6,000 additional acres have been surveyed within the Butte Falls Resource Area, with the only detections of S&M mollusks being the delisted slug species.

Thus far, there have been no confirmed detections of the S&M mollusks in the watershed. Surveys sample the sale units, and do not cover every acre. There have been no detections of the three species in surveys in other parts of the resource area. The taildropper slugs do occur in the sale area, but were dropped from special protection because they are fairly common in SW Oregon.

Salamanders

The only S&M salamander species to occur in SW Oregon is the Siskiyou Mountains Salamander, which has only been detected west of I-5 and south of Medford. The proposed sale area is more than 25 miles from the nearest known detection, therefore surveys are not mandated. The 2000 SEIS deleted the Del Norte Salamander from the S&M list. It too has not been detected east of I-5, and is more than 25 miles from the sale area.

OTHER SPECIES OF INTEREST

Oregon Dept of Fish & Wildlife (ODFW) sources consulted include DeWayne Jackson, Merv Wolfer, Simon Wray (March 2002).

Roosevelt Elk

The Tiller-Trail Highway 227 is the division between ODFWs Evans Unit (to the west) and the Dixon Unit (to the east). Elk are currently at 60% of the benchmark target of 900 animals. The three year average ratio through spring 2002 in the Evans Unit is 24 bulls per 100 cows, which is high, due to poor access for hunters in the western part of the Evans Unit. In the Dixon unit, the current three year average is 22 bulls per 100 cows. The elk population trend is in a decline, and ODFW has reduced the number of cow tags. Poaching pressure is believed to be high, in part due to the easy access afforded by the density of open roads.

Black Tailed Deer

Deer are widespread in the watershed. No target population levels have been set for the Dixon Unit, but in the Evans Unit, the current population is estimated to be 12% above a benchmark goal of 9,600 animals. Through the fall 2001 post-hunting period, the three year average is 21 bucks per 100 does (with a goal of minimum of 20). The number of doe hunting tags is currently 35 (vs 900 in 1998) due to concerns for a declining trend. Telemetry has shown that in winter months, deer from higher elevations near Prospect migrate into the sale area. There is also a resident population that doesn't migrate, based on a dozen radio collared deer from 1995 through 1997. In the South Cascades Black Tailed Deer Study, there was 80% survival of adults. The average age of bucks was 3 years, and 4 years for does. ODFW is concerned about mortality from an outbreak of adenovirus, but through

2001 the sick deer were limited to lower elevations (below 1500 ft). A "hair loss syndrome" in the past two years has been afflicting deer in Josephine County and in the Applegate, but has not yet spread to Trail Creek.

JACTMA

The Jackson Access Cooperative Travel Management Area (JACTMA) was implemented in 1996. The plan provides winter road closures via a "green dot" system on 87 square miles of federal and non-federal lands in three areas in the Butte Falls Resource Area. Objectives include reduced disturbance on big-game winter range, reduced road maintenance needs on unsurfaced roads, reduced poaching opportunities, reduced trash dumping, etc. The southern portion of the proposed sale area (Canyon Creek, Longbranch) is within the road use restriction area..

Turkey

Wild turkeys (Rio Grande variety) were introduced in SW Oregon in 1975. They are found throughout the watershed, with an increasing trend, to the extent that ODFW now receives damage complaints due to turkeys in people's gardens, on porches, roosting on vehicles, etc.

Black Bear

ODFW estimates a density of roughly one adult bear for every 16 square miles, based on a telemetry and mark/recapture study north of the Trail Creek Watershed. Trend is believed to be increasing, partially due to restrictions on use of hounds in hunting.

Cougar

ODFW estimates a population of one adult cougar per approximately 20 square miles, based on a telemetry study near Tiller at Jackson Creek, north of Trail Creek. Populations have been increasing due to the ban on hunting with dogs, but many male cougar are killed by other male cougars (territorial interactions), and parasites claim some.

Bats

An array of bat species are expected to be found across the watershed. One pump chance near Romine Creek was mist netted in 1995. Species captured included the long-legged myotis, silver-haired bat, and the big brown bat.

SPECIAL HABITATS

Cliffs

There is a high density of cliff habitat in the watershed, relative to the rest of the Butte Falls Resource Area. Structures range from lone pinnacles to large mounds to quarter mile long faces of rimrock 40 to 150 ft high. Such cliffs provide crevice habitat for roosting bat species and nesting raptors

Caves

No caves or mine adits have been identified within the watershed.

Meadows

There are several relatively flat wet meadows. There are many steep rocky open areas with encroaching wedgeleaf, oak, conifers.

Oak Woodland

There are a few patches of oak woodlands scattered about. A 20 acre thinning and underburn of a woodland to benefit big-game winter range was conducted at Cold Springs in 2000. ODFW has done some oak thinnings on private lands.

Marsh/Swamp/Pump Chance

There are two large manmade pump chances and five small pump chances within the sale vicinity. There are many slumpy swampy patches. These locations provide amphibian habitat.

Low Elevation Older Seral Habitat

During public scoping meetings for the Trail project, a concern was raised for protecting low elevation old growth, for example section 17 (Twp 33S, Rg 1W), which ranges from 2000 to 2300 ft. Concern for this habitat has not been raised previously. The usual emphasis is to maintain lower elevation thermal cover for big-game winter range. Lower elevation older seral habitat, without human intervention, would have underburned more frequently, resulting in a more open understory. The uniqueness of the low elevation older seral type has not been addressed for special management in the Northwest Forest Plan or the Medford Resource Management Plan (RMP).

Environmental Consequences

As of this date, there are 4 alternatives to the Trail Creek project (from EA table 3):

Alternative 1 - No Action (no harvest).

Alternative 2 - has more regeneration harvest, less selective cut, and a comparable amount (to Alts 3 & 4) of commercial thin/density management, understory thin, and riparian thin, produces 15 MMBF.

Alternative 3 - has no regen harvest, more selective cut, produces 13 MMBF.

Alternative 4 - has a medium level of regen harvest, less riparian thin, more understory reduction, produces 12 MMBF.

There could be changes in harvest units subsequent to this writing, but changes would be less impacting, resulting from deleting harvest units or doing a lighter touch entry.

Impacts to terrestrial species from these alternatives are similar, with differences in degree due to changes in acreage of different harvest types.

T&E Species

Consultation

Medford BLM, along with the Rogue River and Siskiyou National Forests, completed a Biological Assessment on 18 July 2001 to analyze FY 01/02/03 projects. The US Fish & Wildlife Service (FWS) issued Biological Opinion #1-7-01-F-032 on 12 October 2001. That document completes the consultation process required under Section 7 of the Endangered Species Act, which establishes Terms and Conditions, Project Design Criteria for "incidental take" of federally listed species for three years of projects on BLM and the two national forests, which includes the Trail Creek project, regardless of which alternative is selected. BLM will provide an annual report to FWS for tracking of alteration of suitable owl habitat.

Bald Eagles

All four of the alternatives would be a No Affect for bald eagles, since there is no nesting nearby, no identified winter roosts, and the only eagle use is expected to be by occasional transitory foraging birds. Proposed sale activities will not alter eagle foraging quality (fish habitat), and there will be no project disturbance near a nest. Foraging opportunities on carrion, rabbits, waterfowl would be unchanged. There is negligible impact to bald eagles or their habitat regardless of which timber sale alternative is selected.

Northern Spotted Owl

Consultation: The three action alternatives would be a May Affect, Likely to Adversely Affect (MA,LAA), since suitable owl habitat would be removed near known owl sites. These impacts are within the scope of the incidental take permit of the Biological Opinion from FWS. No habitat would be removed within the adjacent (to the east) Elk Creek late successional reserve (LSR), and no habitat within designated 100 acre cores would be altered.

Project Design Features: There would be a seasonal restriction from March 1 until September 30 on any activities within 1/4 mile of an owl core area. This restriction would be waived once owls were determined to be not nesting. If any new owls were discovered following the sale date, the contract stipulation E-4 enables a halt to activities until mitigation options can be explored.

Habitat Quality Rating: Spotted owl " habitat 1" (McKelvey 1) is defined as suitable for nesting. "Habitat 2" (McKelvey 2) is defined as suitable for roosting & foraging. Habitat 1 and 2 together are termed "suitable habitat". "Dispersal habitat" is too open or small or uniform to serve as nesting/roosting/foraging, but does provide a stepping stone network of cover for juvenile owls to disperse across the landscape in their first fall and winter.

A comparison by alternative of owl suitable habitat acreage to be treated is displayed in the next table. "Acres by proposed treatment" refers only to units of currently suitable owl habitat. Some units are in previously thinned stands that are not considered to be currently suitable. That total is depicted in the third column from the right.

Caveat: An assumption in the table is that any select cut, density management, or thinning entry in suitable habitat will remove that acreage as suitable. Habitat for prey such as woodrat and flying squirrel would be disrupted by opening the canopy and by human disturbance. However, much of this "light touch" harvest entry would be expected to ameliorate within 5 or 10 years, and the stand would return to suitable "roosting/foraging" status. The table is intended to display the heaviest impact to owls. By the time the timber sale is ready for auction, some units will have been dropped due to newly discovered conflicts such as additional sensitive plant buffers.

As suitable habitat is removed, the probability of continued successful owl nesting will be gradually reduced. This probability is not quantifiable, as there are other factors that influence productivity or survival, such as random disturbance events, harvest on adjacent non-federal lands, presence of goshawk predators, competition from encroaching barred owls, or senescence of the resident spotted owls (growing too old to successfully raise young). Due to the history of various intensities of partial cutting, and various degrees of proposed entry in this sale (density management vs thin vs understory reduction vs select cut), any assessment of acres of suitable habitat has a strong element of subjectivity.

Comparison between alternatives: Alternative 2 is the heaviest impact to spotted owls, due to the larger amount of regeneration harvest. But the plan is within the guidelines for the NWFP, and within the incidental take provided in the Biological Assessment from FWS. Due to the quantity of acreage being deferred for red tree vole buffers, the impact of this sale to owls will be considerably less than originally projected under the Northwest Forest Plan, which permitted more regeneration harvest.

Alternative 1 (no action) will be the least impact to owls and their habitat. All of the three action alternatives will employ quarter mile radius nesting season restrictions, and none of the 100 acre cores will be entered. The contract E-4 stip can be used to halt harvesting if a new owl site is discovered.

Critical Habitat

Comparison by alternative of owl acreage to be altered within designated spotted owl Critical Habitat is displayed in the second half of the table. Again, this reduction in amount or quality of suitable owl habitat in designated Critical Habitat is within the parameters allowed by the Northwest Forest Plan ROD, the FWS Biological Opinion, and the FWS Final Rule of 26 June 2001. Critical Habitat acres to be entered are considered to as NWFP Matrix land. The "primary constituent elements" will remain. "Effects to connectivity are generally offset because of other contributions to supporting dispersal that exist within the Forest Plan matrix .... As such, the relatively low impact of activities consulted on in these areas will not inhibit connectivity among the reserved habitat intended to provide population support (in LSRs and the LSR portion of critical habitat)". (from the Final Rule, just prior to table 4-6).

Caveat on acreage comparisons: Acreage impacts within the provincial radius for individual owl sites are shown in the second table. The number of suitable acres remaining within a provincial radius has not been an accurate predictor of site viability or productivity on Medford District BLM. Some sites with over a thousand acres of suitable habitat have not produced young in years, and other sites with less than 600 acres have produced young every other year. Use of threshold acreage levels implies a misleading level of reliability.

In the no-action alternative, there would be no fuels treatments, so fuels would continue to build, with a slow increase in the risk of a stand-replacement fire, which would reduce suitable owl habitat. But with no harvest, more of the suitable habitat would remain, and previously partial cut areas would continue to grow up to return to nesting/roosting/foraging (NRF) habitat.

In the three action alternatives, fuels would be treated, reducing fuel loading and increasing the probability of being able to control a fire with fewer acres of stand replacement. But more existing NRF habitat would be harvested, and stands that would become NRF in the next 5-20 years would remain unsuitable. Refer to the table for specific acreage comparisons between alternatives and stand treatments.

Acres of proposed treatment in suitable spotted owl habitat - for all sale units - as of 3/28/02 draft								Summary effect on suitable owl habitat			
Alternative	SGFMA (leave 16-25 tpa, regen)	NGFMA (leave 6-8 tpa, regen)	Density Mgmt/Thin	Riparian Density Mgmt	Select Cut	Understory Thin	Understory reduction	Total suitable to enter	Total unsuitable to enter	Total regen (suitable to unsuitable)	Total thin (suitable to dispersal)
Alt 2	324	128	882	185	16	595	0	2,086	473	452	1,634
Alt 3	0	20	1,096	209	443	595	0	2,363	507	20	2,343
Alt 4	275	74	713	66	83	619	401	2,231	205	617	1,882
Only units in designated Spotted Owl Critical Habitat (CHU O-17)											
Alt 2	113	79	238	33	0	18	0	437	23	192	245
Alt 3	0	0	263	33	207	18	0	521	57	0	521
Alt 4	113	54	240	33	25	18	0	483	23	167	316

Acres to be entered within provincial radius of known spotted owl sites				
ID # & Site Name	Active vs Historic (last year active)	Acres suitable (nesting/roost/ foraging)	Acres in Alt 2 sale units	Acres suitable remaining post-sale
Klamath Province sites - units within 1.3 mile radius of owl center				
1822A Romine	Historic (1993)	506	64	442
0926 Walpole	Historic (1994)	578	0	578
2629 Upper Canyon Ck	Historic (1997)	825	445	377
4381 Canyon Ck (single)	Historic (1995)	444	237	207
1949 Millcat Trail	Historic (1996)	592	82	510
3395 Wally Rollo (single)	Historic (1993)	315	0	315
3396 East Chicago (single)	Historic (1994)	228	51	177
3394 Off The Wall	Active (2001)	1,098	202	896
Cascades Province sites - units within 1.2 mile radius of owl center				
2219 Clear Creek	Active (2001)	1,246	145	1,101
2625 Toothacher Ck	Active (2001)	955	101	854
1832 Trail Ck	Historic (1988)	1,522	89	1,433
1823 Trailhead (single)	Historic (1991)	1,642	103	1,539
1824 Morine	Active (2001)	1,492	116	1,376
2006A South Boundary	Historic (1995)	1,523	110	1,413
1304 Oliver Springs	Active (2001)	1,210	21	1,189
4027A Paradise Ck	Active (2001)	778	371	407
2630 Paradise East	Historic (1999)	713	487	226

In the NWFP and the Spotted Owl Effectiveness Monitoring Plan, it is presumed that the 100 acre owl cores will function primarily as connectivity stepping stones for genetic interchange. If surrounded by regeneration units, a core will no longer support productive nesting. Four spotted owl sites in the watershed are currently productive (Clear Creek, Toothacher Creek, Off The Wall, Paradise Creek). The probability of continued reproductive success of these sites will be reduced by harvest of suitable habitat within the provincial radius. But most of the proposed adjacent units are lighter touch thinning or select cut, rather than regen, which will lessen the impact that is permitted in matrix lands.

CONNECTIVITY

Late successional and older growth habitat (LSOG) occurs scattered across the landscape. A goal of the NWFP is to provide connectivity for genetic interchange through each watershed. A requirement is to maintain a minimum of 15% of each watershed in late successional forest, which the BLM State Office has defined as stands of over 80 years age. Some feel that late successional forest should not be counted unless it is over 120 years age. Large LSRs are spaced approximately 12 - 15 miles apart throughout western Oregon.

A stepping stone network of older seral habitat is provided by maintaining 100 acre spotted owl cores, and riparian management zones, and connectivity blocks (of longer age rotation). There are 10 owl core reserves, and two connectivity blocks within the watershed. Riparian management areas are 170 or 340 feet each side of creeks. Thus, pathways for salamanders, big game, plants, and owls are provided for dispersal, and as refugia to enable recolonization of harvest areas over time.

The three action alternatives will remove or thin some LSOG habitat, but the 15% requirement will still be maintained in the form of owl cores, riparian areas, and connectivity blocks. The northern third of the watershed is important for east-west connectivity along the Rogue-Umpqua Divide between the Cascades and Klamath Provinces. Due to red tree vole presence, over 900 acres of originally proposed units have been dropped from the sale plan. The differences to connectivity between the three action alternatives are minimal when viewed at a watershed scale. Spotted owl dispersal habitat will remain plentiful following the sale, both on federal and on non-federal lands.

BUREAU SENSITIVE

Peregrine Falcon

All units within ½ mile of the known site were dropped. There will be a seasonal restriction on disturbance activities for a one mile radius from February 1 through July 15 if the pair is nesting. There is low probability of an additional undiscovered pair, due to the proximity of suitable cliffs to the existing pair. There is a high probability of continued successful nesting following the sale. The main threat to the site is recreational rock climbing, which could increase regardless of the sale plan. The nest cliffs are on non-federal land.

Northern Goshawk

Current BLM Oregon State Office direction is to maintain a 30 acre core for each goshawk pair. For the known Eldermill site that nested in 2001, a 30 acre no-cut unit will remain. The nearest unit boundary is 550 ft away. There is additional adjacent LSOG habitat that will not be treated in this project.

Goshawks can shift their nest up to a half mile from year-to-year, or they may reuse an old nest. They will nest in areas that have had the canopy thinned or have been clearcut nearby. There have been two sites in the Butte Falls Resource Area (Fredenburg South, Lodgepole) in the past three years where birds continued to nest following harvest operations within 200 feet, and seasonal restrictions were imposed.

The known site will continue to be monitored annually through the life of the sale. Contract stip E-4 permits a halt to harvest activities in case the birds move closer to a unit. A seasonal restriction from March 1 through July 30 would be imposed on all units within ½ mile of the 2001 nest, or within 1/4 mile of a new nest. Goshawks have a high probability of continued nesting in the sale area. They have a large home range, so there are likely to be only two or three pairs in the watershed. They are difficult to monitor because they can be secretive and can shift the center of activity annually.

Western Pond Turtle

The main forks of Trail Creek where turtles occur will have no units within 340 ft of each side. Turtles may be temporarily disturbed if pump chances are dug out, but these are man-made habitats. Cleaning a pond with a backhoe would occur during the summer, and would deepen the water storage. Current turtle populations would not be impacted by the sale. The main threat is predation on baby turtles by bullfrogs.

Fisher

They are mobile, and use older habitat with dense canopy, brushpiles, cavities in trees. Diverse habitat opportunities will remain regardless of which sale alternative is selected. Minimum numbers of snags and downed woody material will be left in harvest units. Sufficient acreage will remain unentered to provide for fisher.

Townsends Big-eared Bat

Since no cave or mine adit habitat has been located in the watershed, sale impacts will be negligible. The NWFP mandates leaving snag habitat in harvest units, and there are many remaining unentered riparian corridors with ample snags for various species of roosting bats.

SURVEY AND MANAGE

Great Gray Owl

The NWFP requires a 300 ft buffer around meadow habitat to provide for nesting great grays. There are no known nests near project units. If a nest is located in 2002, it will receive a 1/4 mile (125 acre) protection zone. Newly discovered great grays are also covered by the E-4 contract stip that can halt activity while mitigation is pursued.

Mitigation would be the same regardless of the selected alternative. There would be a seasonal restriction within 1/4 mile from March 1 through July 1. Great grays are dependant on open meadow habitat for their small mammal prey. Young clearcuts mimic the structure of meadows. Alternative three would have the least regeneration harvest (20 acres) that would create open habitat. Alternative 2 would create the most (over 450 acres). Great grays in SW Oregon nest in a variety of stand densities. The main impact of a timber sale is the risk of noise disturbance or inadvertant cutting of an undiscovered nest tree.

Sites where owls were previously heard will be monitored each year until the sale has been terminated. The NFWP does not currently mandate a buffer in areas of owl detections unless a nest tree has been found. Ongoing harvest on nonfederal lands continues to supply early seral habitat suitable for great gray foraging. Regardless of which sale alternative is implemented, the potential for successful nesting will remain similar to current levels. Great grays are difficult to pin down while at the nest, but there are probably several nest sites within the watershed.

Red Tree Vole

Habitat areas for vole sites are being maintained in accordance with the interagency Management Recommendations for the Oregon Red Tree Vole, version 2.0. Each individual red tree vole nest has received a 10 acre no-cut buffer. Each clump of active nests has received a buffer that extends at least 170 feet from each nest tree (2.1 acres). A vole home range only extends up to 150-200 ft from the nest. Over 900 acres of harvest has been dropped from the sale plan due to red tree vole presence. Underburning would still occur in red tree vole areas to reduce fuel loading. Voles live in the canopy, and it is believed that alteration of the ground layer understory has minimal effect on vole viability. Hand piles would be piled away from the base of vole trees to minimize heat and smoke disturbance.

Mollusks

No survey & manage mollusk species were detected in the watershed. Many units dropped from original sale consideration will provide habitat for an array of mollusk species. The many riparian management areas will provide refugia to enable recolonization of disturbed areas.

Salamanders

No survey & manage salamanders have been detected in the watershed. Talus habitat will be maintained, as well as an extensive riparian corridor system. The bulk of the sale units will be thinning,

density management, or select cut that will continue to support other salamander species. The NWFP requirement to maintain 120 lineal feet of downed logs will be met in regeneration harvest units.

OTHER SPECIES OF INTEREST

ODFW is becoming concerned about a reduction in quality forage for deer and elk due to curtailment of clearcutting on federal forests. Units scheduled for SGFMA and NGFMA regeneration harvest will result in more forage. Alternative 2 has 450 acres of regen harvest, vs alternative 4 has 350, or 20 acres for alternative 3. Alternative 4 has 400 acres of understory reduction. Clearcutting has continued on non-federal lands, so sufficient quality and quantity of forage will remain on a watershed scale following the timber sale, regardless of which alternative is selected.

Current population levels of cougar, bear, turkey will continue to increase regardless of which alternative is selected.

SPECIAL HABITATS

Cliffs

No units are proposed immediately adjacent to cliff habitat (within 100 ft). Current screening cover, microhabitat, and perch trees would remain.

Meadows

As per ROD guidance, meadows will receive a 300 ft buffer. Where the meadow is currently bounded by dense thickets, there may be precommercial thinning or understory thinning after the first 100 ft of buffer, which will enable the remaining trees to continue growing faster. Some of the "meadows" in the watershed are steep rocky openings of dogtail, medusahead, with some wedgeleaf, as opposed to a pasturelike meadow that would be more beneficial to great gray owls or big-game.

Low Elevation Older Seral Habitat

Current management direction is to maintain 15% of each watershed in older seral stage (over 80 year age). Within the watershed, there is no guidance to distinguish between elevational zones. In the case of section 17, the proposal is for precommercial thinning, understory reduction by hand, with no removal of canopy trees. The older character of the stand will be maintained.

SHORT TERM USES VS LONG TERM PRODUCTIVITY

In each alternative, open foraging areas (brushfields) would be rejuvenated. Earlier successional stages of brush would be created by understory reduction. Density management, select cut, and thinning units would continue to grow larger trees and reduce ground fuel loads. Regeneration units would eliminate older seral habitat for 60-80 years. Differences in acreages of various treatments are shown in the owl

habitat table.

IRREVERSIBLE/IRRETRIEVABLE COMMITMENT OF RESOURCES

None identified. It is presumed that harvested LSOG older habitat is capable of growing back in 80 years, and that road spurs can be obliterated at a future date. There is negligible difference between the proposed alternatives in terms of irreversible/irretrievable commitment.

CUMULATIVE EFFECTS

The Bureau has no control over what harvest or development will occur on non-federal lands in the watershed. It is expected that most non-federal land will continue to be harvested when timber stands reach an age of 60 to 100 years. Development of parcels into homesites will increase human use. These cumulative effects will be the same regardless of which sale alternative is selected.

The amount of suitable spotted owl habitat has been reduced to the west of Trail by recent BLM sales at Cleveland Railroad and the Musty Donut sale (currently on hold).

BUTTE FALLS RESOURCE AREA

2002 SPECIAL STATUS SPECIES REVIEW

PROJECT NAME Trail Creek North & South

U.S.F.W./OREGON T&E SPECIES						
SPECIES	STATUS	RANGE (Y/N)	P/A	HAB. QUAL.	SURVEY LEVEL	COMMENT
Bald eagle	FT, ST	Y	T	medium	low	will protect if found
Northern spotted owl	FT, ST	Y	P	mixed	thorough	no-cut cores, season. restrictions
Peregrine falcon	SE, BS	Y	P	high	medium	protect known site
Vernal pool fairy shrimp	FT	N	A	N/A	none	no habitat, out of range

STATE CRITICAL AND BUREAU SENSITIVE SPECIES						
SPECIES	STATUS	RANGE (Y/N)	P/A	HAB. QUAL	SURVEY LEVEL	COMMENT
Western pond turtle	SC, BS	Y	P	Low	limited	Present in pump chances and main creeks
Black-backed woodpecker	SC	U	U	Low	None	None documented
Northern goshawk	SC, BS	Y	Y	Medium	Thorough	Surveyed; Known nest protected
Flammulated owl	SC	Y	S	Medium	Limited	No detections
Great gray owl	SM	Y	P	High	Thorough	Surveyed; No known nests
Lewis's woodpecker	SC	Y	S	mixed	None	None documented
Three-toed woodpecker	SC	U	U	Low	None	None documented
White-headed woodpecker	SC, BS	U	T	Low	None	None documented
Fisher	SC, BS	Y	U	Medium	None	Probably present

SPECIES	STATUS	RANGE (Y/N)	P/A	HAB. QUAL	SURVEY LEVEL	COMMENT
Red tree vole	SM	N	P	High	Thorough	Known sites protected
Townsend's big-eared bat	SC, BS	Y	S	Low	Limited	No cave/mine habitat
Franklin's bumblebee	BS	U	U	Medium	None	None documented in area
Oregon Shoulderband	BS, SM	Y	A	Low	Thorough	None detected
Oregon Megomphix	BS, SM	Y	P	Medium	Thorough	None detected
Crater Lake tightcoil	BS, SM	Y	U	Low	Thorough	None detected

Status:
FE - USFW Endangered - in danger of extinction throughout a significant portion of its range
FT - USFW Threatened - likely to become endangered species within the foreseeable future
FC - USFW Candidate - proposed and being reviewed for listing as threatened or endangered
SE - State Endangered - in danger of extinction in the state of Oregon
ST - State Threatened - listed as likely to become endangered by the state of Oregon
SC - State Critical - listing is pending, or appropriate, if immediate conservation action not taken
SM - Survey & Manage - Forest plan ROD directs protection of known sites and/or survey for new sites
BS - Bureau Sensitive (BLM) - eligible for addition to Federal Notice of Review, and known in advance of official publication. Generally these species are restricted in range and have natural or human caused threats to their survival.

P/A Presence:
P - Present
S - Suspected
U - Uncertain
A - Absent
T - Possibly transitory

Habitat quality:
H - High
M - Medium
L - Low
A - Absent

SPECIAL STATUS WILDLIFE SPECIES–2002
HABITAT AND OCCURRENCE IN THE BUTTE FALLS RESOURCE AREA

Bald eagle (*Haliaeetus leucocephalus*)

Six nest sites are currently known within the boundaries of the Butte Falls Resource Area. Two are on private land, one on Corps of Engineers land, and three are on BLM lands. In Oregon, the majority of nests (84%) are located within one mile of lakes, reservoirs, large rivers, and coast estuaries. Nest trees are larger, dominant or co-dominant trees in the stand and are usually components of old growth or older second growth forests. Prey is fish, waterfowl, small mammals

(rabbits, etc.), and carrion.

Black-backed woodpecker (*Picoides arcticus*)

Presence is undetermined in the Medford BLM district. Has been documented in Cascade Mountains in Jackson County and in the Siskiyou Mountains in Josephine County. In Oregon, the black-backed woodpecker tends to occur in lower elevation forests of lodgepole pine, ponderosa pine, or mixed pine/conifer forests. Dead trees used for foraging have generally been dead three years or less.

Crater Lake tightcoil (*Pristiloma arcticum crateris*)

Species is known from south of Crater Lake, Klamath County and an occurrence in Jefferson County. Species may be found in moist conifer forests and among mosses and other vegetation near wet lands, springs, seeps and riparian areas above 2000 ft. elevation.

Fisher (*Martes pennanti pacifica*)

Habitat is mature and old growth forests. They appear to be closely associated with riparian areas in these forests. In a study done in Trinity County, California, a preference was shown for conifer forests with some hardwoods present. They seem to prefer 40-70% canopy cover. They mainly use large living trees, snags and fallen logs for denning. Have been documented in the eastern part of the Butte Falls Resource near the USFS boundary.

Flammulated owl (*Otus flammeolus*)

Habitat is a mosaic of open forests containing mature or old-growth ponderosa pine mixed with other tree species. In California, habitat included conifer and black oak. Nests mainly have been located in abandoned Northern flicker or pileated woodpecker cavities. The presence of dense conifers for roosting may be a necessary habitat components. Feeds mostly on insects. May also eat other arthropods and small vertebrates.

Franklin's bumblebee (*Bombus franklini*)

Franklin's bumblebee has been found in herbaceous grasslands between 1400-4000 ft. elevation. Activity spans the entire blooming season, so they do not appear restricted to a particular host or flower. Adults probably present and in active flight from May (on warm sunny days) through early September. Range restricted to southwestern Jackson County, Oregon, perhaps southeastern corner of Josephine Co., perhaps part of northern California.

Great gray owl (*Strix nebulosa*)

Habitat preference is open forest or forest with adjoining deep-soil meadows. Nest in broken top trees, abandoned raptor nests, mistletoe clumps, and other platforms created by whorls of branches. Majority of nests in one study were in over-mature or remnant stands of Douglas fir and grand fir forest types on north facing slopes. Probably found in low densities across the district.

Lewis's woodpecker (*Melanerpes lewis*)

These woodpeckers breed sparingly in the foothill areas of the Rogue and Umpqua river valleys in Douglas, Jackson, and Josephine counties. Habitat preference is hardwood oak stands with scattered pine near grassland shrub communities. Breeding areas in the Rogue valley are uncertain. In some locales, the woodpeckers breed in riparian areas having large cottonwoods and in oak conifer woodlands. They usually do not excavate nest cavities, but most often use cavities excavated by other woodpecker species. They winter in low elevation oak woodlands.

Northern goshawk (*Accipiter gentilis*)

Goshawks use small patches of mature habitat to meet their nesting requirements within a mosaic of habitats of different age classes, including both deciduous and conifer types. While it typically does use mature forest or larger trees with high canopy for nesting habitat, it appears to be a forest

habitat generalist as to the types and ages of forests used to meet life history requirements. Perches where they pluck their prey, known as plucking posts, are provided by stumps, rocks, or large horizontal limbs below the canopy.

Northern spotted owl (*Strix occidentalis caurina*)

Old growth coniferous forest is preferred nesting, roosting and foraging habitat, or areas with some old growth characteristics with multi-layered, closed canopies with large diameter trees with an abundance of dead and down woody material. Northern spotted owls commonly nest in cavities 50 or more feet above the ground in large decadent old growth trees. Other nest sites include large mistletoe clumps, abandoned raptor nests, and platforms formed by whorls of large branches. NSO "core areas", 100 acres of the best habitat around activity centers for known sites (as of 1/1/94) have been designated and mapped as late successional reserves. Prey is primarily small arboreal mammals, such as flying squirrels, woodrats, voles, etc. and occasionally small birds.

Oregon megomphix (*Megomphix hemphilli*)

Expected to occur in moist conifer/hardwood forests up to 3000 ft. Found in hardwood leaf litter and decaying nonconiferous plant matter under bigleaf maple trees, especially if there are any rotten logs or stumps nearby. A bigleaf maple component in the tree canopy and an abundance of sword fern on forested slopes and terraces seems characteristic of the sites.

Oregon shoulderband (*Helminthoglypta hertleini*)

This species is known from rocky areas including talus deposits, but not necessarily restricted to these areas. Suspected to be found within its range wherever permanent ground cover and/or moisture is available. This may include rock fissures or large woody debris sites. Somewhat adapted to somewhat xeric conditions during a part of the year.

Peregrine falcon (*Falco peregrinus*)

Primary habitat is tall cliffs. Three confirmed active sites occur in the BFRA. Local breeding pairs are thought to remain through the winter. Other occasional sightings are made during the winter months, but these are thought to be migrating individuals. Forest lands provide habitat for prey species for peregrine falcons. Prey is mostly birds, especially doves and pigeons. Peregrines also prey on shorebirds, waterfowl, and passerine birds.

Red tree vole (*Arborimus longicadus*)

An arboreal vole which lives in Douglas fir, spruce, and hemlock forests. Food consists entirely of needles of the tree in which they are living. They build a bulky nest, up to the size of a half bushel measure in the branches, usually near the trunk, 15-100 feet above the ground. The nest becomes larger with age, and may be occupied by many generations.

Three-toed woodpecker (*Picoides tridactylus*)

Presence is undetermined in the Medford BLM district. Range is along the crest of the Cascade Range and eastward. Generally found in higher elevation forests, above 4000 feet. In eastern Oregon, three-toed woodpeckers nest and forage in lodgepole pine forests. They are occasionally found roosting in hemlock and Engelmann spruce trees in mature and over mature mixed conifer forests. Bark beetle larvae are primary food source.

Townsend's big-eared bat (*CorynorhinusPlecotus townsendii*)

Roost in mines, caves, cavities in trees, and attics of buildings. They have low tolerance to changes in temperature and humidity and removal of trees around these sites may change airflow patterns to make the area less desirable as a hibernaculum, maternity, or roosting site. Food consists primarily of moths, and other arthropods.

Vernal pool fairy shrimp (*Branchinecta lynchi)*

Habitat is vernal pools. They have only been found in Agate Desert and Table Rock areas.

Western pond turtle (*Clemmys marmorata marmorata*)

Live in most types of freshwater environments with abundant aquatic vegetation, basking spots, and terrestrial surroundings for nesting and over-wintering. Some northwestern pond turtles leave water in late October to mid-November to overwinter on land. They may travel up to 1/4 mile from water, bury themselves in duff and remain dormant throughout winter. Turtles have been found to generally stay in one place in areas with heavy snowpack, but may move up to 5-6 times in a winter in areas with little or no snow. General habitat characteristics of overwintering areas appear to be broad. There may be specific microhabitat requirements, which are poorly understood at this time.

In many areas, predation on the hatchlings and competition from bullfrogs, bass, and other exotic species is limiting population levels. Adult turtles are relatively long lived, but as the adults age, recruitment is not occurring at levels which can maintain future healthy populations.

White-headed woodpecker (*Picoides albolarvatus*)

Presence in the BFRA is undetermined. May migrate through the area. White headed woodpeckers occur in ponderosa pine and mixed ponderosa forests. They forage mainly on trunks of living conifers for insects. Nest cavities are within 15 feet of ground in dead trees which have heart rot. Standing and leaning snags and stumps are used. Area is in periphery of known range.

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	ROAD	NUMBER	SEGMENT	MILES	SURFACE TYPE	CONTROL	RECOMMENDATIONS
32 S	01 W	16.00		0.62	ASC	BLM	Improvement
32 S	01 W	19.00	A	0.04	NAT	PVT	Renovate
32 S	01 W	19.00	B	0.52	NAT	OTA	Renovate
32 S	01 W	19.00	C	0.59	NAT	PVT	Renovate
32 S	01 W	19.00	D	1.15	ASC	OTA	Renovate
32 S	01 W	19.00	H	0.30	ASC	BLM	Renovate
32 S	01 W	19.00	SPUR A	0.10	NKN	NKN	Renovate
32 S	01 W	19.00	SPUR B	0.11	NKN	NKN	Renovate
32 S	01 W	19.00	SPUR C	0.44	ASC	OTA	Renovate
32 S	01 W	19.00	SPUR D	0.54	ASC	OTA	Renovate/Temp Block
32 S	01 W	20.00	__	0.80	PRR	BLM	Temporary Block
32 S	01 W	21.00	__	0.59	ASC	BLM	Full Decommission
32 S	01 W	21.01	__	0.42	ASC	BLM	Full Decommission
32 S	01 W	21.02	__	0.24	ASC	BLM	Full Decommission
32 S	01 W	21.05	__	1.17	NAT	BLM	Improvement
32 S	01 W	27.02	__	0.13	ABC	BLM	Temporary Block
32 S	01 W	29.00	__	0.28	PRR	BLM	Partial Decommission
32 S	01 W	29.02	__	1.18	ASC	BLM	Renovate
32 S	01 W	29.03	__	0.76	ABC	BLM	Renovate
32 S	01 W	29.04	__	0.26	PRR	BLM	Renovate
32 S	01 W	30.01	__	0.30	NAT	BLM	Full Decommission
32 S	01 W	30.02	__	0.48	NAT	BLM	Full Decommission
32 S	01 W	30.03	__	0.05	NAT	BLM	Full Decommission
32 S	01 W	31.00	__	0.71	PRR	BLM	Improvement
32 S	01 W	31.01	__	0.17	PRR	BLM	Improvement
32 S	01 W	31.02	__	0.24	NAT	BLM	Full Decommissionn
32 S	01 W	31.02	__	0.16	NAT	BLM	Improvement

ROAD	NUMBER	SEGMENT	MILES	SURFACE TYPE	CONTROL	RECOMMENDATIONS
32 S	01 W	16.00	0.62	ASC	BLM	Improvement
32 S	01 W	31.03	A	0.28	PRR	BLM	Improvement
32 S	01 W	31.03	B	0.04	PRR	BLM	Improvement
32 S	01 W	31.03	B	0.28	PRR	BLM	Full Decommission
32 S	01 W	31.04	__	0.42	PRR	BLM	Improvement
32 S	01 W	33.00	A	0.79	NAT	BLM	Renovate
32 S	01 W	33.00	B	0.28	NAT	BLM	Renovate
32 S	01 W	33.01	__	0.30	ABC	BLM	Partial Decommission
32 S	01 W	33.01	A	0.41	ABC	BLM	Improvement
32 S	01 W	33.01	B	1.27	ABC	BLM	Improvement
32 S	01 W	33.01	C	2.16	ABC	BLM	Improvement
32 S	01 W	33.02	A	2.18	ASC	BLM	Renovate
32 S	01 W	33.02	B	2.30	ASC	BLM	Renovate
32 S	01 W	33.02	C	0.39	ASC	BLM	Renovate
32 S	01 W	33.03	__	0.97	ABC	BLM	Improvement
32 S	01 W	33.00	__	0.97	ASC	BLM	Improvement
32 S	01 W	33.03	A	0.97	PRR	BLM	Improvement
32 S	01 W	33.03	SPUR	0.05	ABC	BLM	Full Decommission
32 S	01 W	33.04	A	0.28	NAT	BLM	Improvement
32 S	01 W	33.00	SPUR A	0.05	NAT	BLM	Full Decommission
32 S	01 W	33.00	SPUR B	0.19	NAT	BLM	Full Decommission
32 S	01 W	33.00	SPUR C	0.23	NAT	BLM	Full Decommission
33 S	01 W	5.00	A	0.10	ABC	BLM	Temporary Block
33 S	01 W	5.00	B	0.83	ABC	BLM	Temporary Block
33 S	01 W	5.00	C	1.44	ABC	BLM	Temporary Block
33 S	01 W	5.00	D	0.50	ABC	BLM	Temporary Block
33 S	01 W	5.00	E	0.29	ABC	BLM	Temporary Block

	ROAD	NUMBER	SEGMENT	MILES	SURFACE TYPE	CONTROL	RECOMMENDATIONS
32 S	01 W	16.00		0.62	ASC	BLM	Improvement
33 S	01 W	5.02	__	0.45	ABC	BLM	Improvement
33 S	01 W	5.04	A	2.00	NAT	BLM	Improvement
33 S	01 W	5.04	B	0.15	NAT	BLM	Improvement
33 S	01 W	7.00	__	0.64	ABC	BLM	Temporary Block
33 S	01 W	7.00	SPUR	0.10	NAT	BLM	Full Decommission
33 S	01 W	7.01	__	0.25	NAT	BLM	Full Decommission
33 S	01 W	7.02	__	0.21	ABC	BLM	Temporary Block
33 S	01 W	8.00	A	2.60	ASC	BLM	Renovate
33 S	01 W	8.00	B	0.30	ABC	BLM	Renovate
33 S	01 W	8.01	__	1.09	ABC	BLM	Temporary Block
33 S	01 W	9.00	__	1.12	ASC	BLM	Improvement
33 S	01 W	10.00	A	0.35	ASC	BLM	Improvement
33 S	01 W	10.01	__	0.04	NAT	BLM	Renovate
33 S	01 W	10.01	__	0.11	NAT	BLM	Full Decommission
33 S	01 W	10.01	__	0.25	NAT	BLM	Partial Decommission
33 S	01 W	10.02	__	0.62	NAT	BLM	Temporary Block
33 S	01 W	10.03	__	0.27	NAT	BLM	Partial Decommission
33 S	01 W	10.04	__	0.34	NAT	BLM	Full Decommission
33 S	01 W	15.01	__	0.20	NAT	BLM	Partial Decommission
33 S	01 W	18.00	__	0.64	NAT	BLM	Temporary Block
33 S	01 W	18.01	__	0.12	NAT	BLM	Temporary Block
33 S	01 W	19.01	B	1.53	ASC	BLM	Renovate
33 S	01 W	19.01	C	0.39	ASC	BLM	Temporary Block
33 S	01 W	19.02	__	1.46	NAT	BLM	Temporary Block
33 S	01 W	28.00	D	0.33	NAT	BLM	Partial Decommission
33 S	01 W	28.00	F	0.16	NAT	BLM	Renovate

	ROAD	NUMBER	SEGMENT	MILES	SURFACE TYPE	CONTROL	RECOMMENDATIONS
32 S	01 W	16.00		0.62	ASC	BLM	Improvement
33 S	01 W	28.00	H	0.51	NAT	BLM	Temporary Block
33 S	01 W	29.00	A	1.30	ABC	BLM	Renovate
33 S	01 W	29.00	B	0.62	ABC	BLM	Renovate
33 S	01 W	29.01	A1	0.34	ASC	BLM	Improvement
33 S	01 W	29.01	A2	1.38	ASC	BLM	Improvement
33 S	01 W	29.01	A3	0.54	ASC	BLM	Improvement
33 S	01 W	29.01	A4	1.28	ASC	BLM	Improvement
33 S	01 W	29.01	B	2.10	ABC	BLM	Improvement
33 S	01 W	29.02	A	1.01	ABC	BLM	Improvement
33 S	01 W	29.02	C	0.49	ABC	PVT	Improvement
33 S	01 W	29.02	D	0.48	NAT	BLM	Improvement
33 S	01 W	29.04	__	0.39	NAT	BLM	Full Decommission
33 S	01 W	31.00	A	0.74	ASC	BLM	Improvement
33 S	01 W	31.00	B	1.46	ASC	BLM	Improvement
33 S	01 W	31.01	__	0.51	ABC	BLM	Full Decommission
33 S	01 W	31.02	__	0.18	ABC	BLM	Full Decommission
33 S	01 W	31.02	__	0.17	ABC	BLM	Improvement
33 S	01 W	31.03	__	0.31	ABC	BLM	Improvement
33 S	01 W	31.04	A	0.44	PRR	BLM	Temporary Block
33 S	01 W	31.04	B	0.29	PRR	BLM	Temporary Block
33 S	01 W	31.04	C	0.62	NAT	BLM	Temporary Block
33 S	01 W	32.00	A	1.54	ABC	BLM	Improvement
33 S	01 W	32.00	B	0.15	ABC	PVT	Improvement
33 S	01 W	32.00	C	0.56	NAT	BLM	Improvement
33 S	02 W	1.00	__	0.19	NAT	BLM	Full Decommission
33 S	02 W	3.00	__	0.75	PRR	BLM	Full Decomm last 0.25 mile

	ROAD	NUMBER	SEGMENT	MILES	SURFACE TYPE	CONTROL	RECOMMENDATIONS
32 S	01 W	16.00		0.62	ASC	BLM	Improvement
33 S	02 W	3.01	A	1.30	PRR	BLM	Improvement
33 S	02 W	3.01	B	0.23	PRR	BLM	Improvement
33 S	02 W	3.02	__	0.56	ABC	BLM	Temporary Block
33 S	02 W	3.03	__	0.33	ABC	BLM	Partial Decommission
33 S	02 W	3.04	__	0.33	ABC	BLM	Temporary Block
33 S	02 W	3.05	__	0.27	ABC	BLM	Temporary Block
33 S	02 W	3.06	__	0.43	GRR	BLM	Full Decommission
33 S	02 W	12.00	A1	0.82	PRR	BLM	Improvement
33 S	02 W	12.00	A2	0.23	PRR	BLM	Improvement
33 S	02 W	12.00	B1	0.77	PRR	BLM	Improvement
33 S	02 W	12.00	B2	0.49	PRR	BLM	Full Decommission
33 S	02 W	12.00	B2	0.62	PRR	BLM	Improvement
33 S	02 W	12.01	A	0.12	PRR	BLM	Temporary Block
33 S	02 W	12.01	B	0.97	PRR	BLM	Temporary Block
33 S	02 W	13.00	A	0.87	ABC	BLM	Improvement
33 S	02 W	13.00	B	1.41	ASC	BLM	Improvement
33 S	02 W	13.00	C	0.72	ABC	BLM	Partial Decommission
33 S	02 W	13.00	C	0.40	ASC	BLM	Improvement
33 S	02 W	13.01	A1	1.08	ABC	BLM	Improvement
33 S	02 W	13.01	A2	1.57	ABC	BLM	Improvement
33 S	02 W	13.01	B	0.09	NAT	BLM	Improvement
33 S	02 W	13.01	C	0.07	NAT	BLM	Partial Decommission
33 S	02 W	13.01	SPUR A	0.10	NKN	NKN	Full Decommission
33 S	02 W	13.01	SPUR B	0.10	NKN	NKN	Full Decommission
33 S	02 W	15.00	__	1.27	ABC	BLM	Improvement
33 S	02 W	15.01	A	0.69	ABC	BLM	Partial Decommission

	ROAD	NUMBER	SEGMENT	MILES	SURFACE TYPE	CONTROL	RECOMMENDATIONS
32 S	01 W	16.00		0.62	ASC	BLM	Improvement
33 S	02 W	15.01	B	0.04	ASC	BLM	Partial Decommission
33 S	02 W	23.00	SPUR	0.18	NAT	BLM	Full Decommission
33 S	02 W	23.00	__	0.48	PRR	BLM	Renovate
33 S	02 W	23.01	__	0.04	PRR	BLM	Full Decommission
33 S	02 W	23.02	A	0.20	PRR	BLM	Full Decommission
33 S	02 W	23.02	B	0.12	NAT	BLM	Full Decommission
33 S	02 W	23.03	__	0.19	PRR	BLM	Full Decommission
33 S	02 W	23.04	A	0.52	ABC	BLM	Renovate
33 S	02 W	23.04	A	0.26	ABC	BLM	Partial Decommission
33 S	02 W	23.04	B	0.07	NAT	BLM	Partial Decommission
33 S	02 W	23.05	B	0.26	NAT	BLM	Full Decommission
33 S	02 W	23.05	SPUR		NAT	BLM	Full Decommission
33 S	02 W	23.05	SPUR		NAT	BLM	Full Decommission
33 S	02 W	23.06	__	0.28	NAT	BLM	Full Decommission
33 S	02 W	23.07	__	0.18	NAT	BLM	Improvement/Full Decomm
33 S	02 W	23.08	__	0.03	NAT	BLM	Full Decommission
33 S	02 W	23.09	A	0.07	NAT	PVT	Improvement
33 S	02 W	23.09	B	0.11	NAT	PVT	Renovate
33 S	02 W	24.02	A	0.09	NAT	PVT	Full Decommission
33 S	02 W	24.02	B	0.21	NAT	BLM	Full Decommission
33 S	02 W	25.00	A	0.33	NAT	BLM	Full Decommission
33 S	02 W	25.00	B	0.48	NAT	BLM	Full Decommission
33 S	02 W	25.00	SPUR	0.10	NAT	BLM	Full Decommission
33 S	02 W	25.01	A	0.17	GRR	BLM	Partial Decommission
33 S	02 W	25.01	B	0.06	NAT	BLM	Full Decommission
33 S	02 W	25.02	__	1.05	PRR	BLM	Improvement

	ROAD	NUMBER	SEGMENT	MILES	SURFACE TYPE	CONTROL	RECOMMENDATIONS
32 S	01 W	16.00		0.62	ASC	BLM	Improvement
33 S	02 W	25.03	__	0.75	PRR	BLM	Temporary Block
33 S	02 W	25.03	__	0.04	PRR	BLM	Temporary Block
33 S	02 W	25.04	__	0.30	PRR	BLM	Temporary Block
33 S	02 W	25.05	__	0.44	PRR	BLM	Temporary Block
33 S	02 W	25.06	__	0.34	PRR	BLM	Temporary Block
33 S	02 W	25.07	__	0.42	GRR	BLM	Temporary Block
33 S	02 W	25.08	__	0.13	GRR	BLM	Partial Decommission
34 S	01 W	6.00	A	0.04	NAT	PVT	Renovate
34 S	01 W	6.00	B	0.13	NAT	BLM	Temporary Block
34 S	01 W	6.01	__	0.45	NAT	PVT	Renovate
34 S	02 W	1.00	B1	0.02	PRR	PVT	Renovate
34 S	02 W	1.00	B2	0.77	PRR	BLM	Renovate
34 S	02 W	1.01	__	0.20	NAT	BLM	Full Decommission
34 S	02 W	1.02	__	0.13	PRR	BLM	Full Decommission
34 S	02 W	1.04	__	0.55	PRR	BLM	Full Decommission
34 S	02 W	1.05	A	0.42	PRR	BLM	Full Decommission
34 S	02 W	1.06	__	0.52	PRR	BLM	Renovate
		FS_3206		0.58	NAT	BLM	Full Decommission
		FS_3206		0.16	NAT	PVT	Full Decommission
		FS_3206		0.54	NAT	OTA	Full Decommission

APPENDIX E - SILVICULTURAL PRESCRIPTION

SILVICULTURAL PRESCRIPTION - TRAIL CREEK TIMBER SALES
MANAGEMENT DIRECTION AND OBJECTIVES

Management Direction
To manage timber resources on matrix lands as provided for under the Medford District Resource Management Plan and the Record of Decision for the Northwest Forest Plan.

General Objectives
1. Manage forests of the Matrix land use allocation so that over time landscapes would trend toward a forest composed of stands containing a variety of structures, stands containing trees of varying age and size, and stands with an assortment of canopy configurations.

2. Manage forests to assure a moderately high to high level of sustained timber productivity for the future.

Treatment Objectives Specific to the Trail Creek Watershed
The objectives of a harvest entry in the Trail Creek watershed area at this time are:

1. To favor a return to the seral phase of the white fir and Douglas-fir series as a long term silvicultural approach to provide for sustainable forest conditions. Potential climatic change may alter conditions on these sites such that the future sustainable vegetation may be the more drought tolerant seral phases of the white fir and Douglas-fir series. Favored species should be the shade intolerant and intermediates, ponderosa pine, sugar pine, incense cedar, Douglas-fir and hardwood species. Of particular concern is maintaining pine species on sites within the moderate to dry end of the Douglas-fir plant association series.

2. To reduce wildfire risks for conifer stands within the rural interface by reducing ladder fuels and crown bulk densities. Desired canopy closures are between 40% to 60%.

3. To thin from below in merchantable second growth stands, to redistribute growth to vigorous dominant and co-dominant trees.

4. To reduce density levels towards the carrying capacity of the site. In selectively cut stands, remove individual trees across all diameter classes to reduce inter-tree competition while maintaining or promoting the development of multiple canopy layers.

5. To regenerate deteriorating stands; and to prepare units for seedling establishment and growth by providing suitable site conditions for planting.

6. To maintain coarse woody debris, snags and large green conifers for long term site productivity and biological legacies.

7. To return areas of diminished conifer productivity to their full, long term capability.

SITE/STAND DESCRIPTION

1. General Description of the Site

The proposed sale area is located in portions of Sections 19,21,27,28,29,30,31,32,33, and 34 in Township 32S, Range 1W and Sections 3,5,7,9,10,15,17,18,19,21,29,30, and 31 in Township 33S, Range 1W, and Section 5 in Township 34S, Range 1W and Sections 1,9,23,25, and 35 in Township 33S, Range 2W and Sections 1,3, and 4 Township 34S, Range 2W.

2. Abiotic Conditions

a. Soil types - Soils within the watershed were formed and derived predominately from volcanic rocks of lava flows from the Western Cascade Geologic Unit. The main trail creek portion of the watershed is dominated by soils of the Shippa-straight complex, Geppert and McMullin Series The Geppert, Shippa-straight complex and McMullin series are moderately deep (20 to 40 inches) and skeletal (> 35% rock fragments in the subsoil). The soils in the west fork trail creek portion of the watershed contain highly weathered clays. The dominant soil series present are Medco and McNull. These soils are shallow to moderately deep and have a high amount of shrink-swell clays (> 30%). The high amount of clay in these soils greatly influences the vegetation communities that are supported.

b. Climate/Topography - The landform within this area is highly variable and ranges from very steep to gentle slopes. The watershed is characterized by rugged topography with irregular ridges and deep narrow canyons. Ridge formations are primarily aligned southeast to northwest. The watershed's elevational range is approximately 1436-4700 feet above sea level. Annual precipitation averages approximately 40". Most of the precipitation occurs in the late fall, winter and early spring as rainfall with the exception of the higher elevations where snow accumulates.

c. Potential site problems - Drought is the primary abiotic conditions of concern within the analysis area. High growing season temperatures and high evaporative demands are typical in the analysis area. These conditions result in a decrease in moisture availability which may result in an increased susceptibility of trees to insects, disease and competition related mortality.

d. Site Index - The average site index on matrix lands considered for treatment is 78 for Douglas-fir. The site index range is as low as 61, on the dry lower elevation clay dominated soils, to as high as 103 where the soils are a deeper loam with higher amounts of precipitation. Site index is based upon Hann-Scrivani site index equations with a base age of 50 years. Site index is the average height of dominant trees at age 50. Height growth of dominant trees is relatively independent of stand density and therefore can be used as a measure of site productivity.

3. Biotic Conditions

a. Plant associations - Within the proposed Trail Creek watershed, Douglas-fir is the dominate plant series. The white fir series is restricted to the upper elevational reaches of the analysis area. Ponderosa pine, sugar pine, incense cedar, Pacific madrone and Douglas-fir represent the early seral component of these series. Douglas-fir generally dominates the overstory of most stands with sugar pine and ponderosa pine and incense cedar occurring on a scattered basis. Ponderosa pine and white oak plant

series are common on lower elevation and shallow soil sites. Oaks and/or pine generally dominate the overstory with varying levels of Douglas-fir on more moist pine sites. White oak, ponderosa pine are early seral tree species. Increasing levels of Douglas-fir and ponderosa pine develop in the understory in more developed stands.
The majority of the plant communities within the northeast portion of the analysis area and/or above 3000 feet elevation are at the moderate to moist end of the environmental gradient for the Douglas-fir series with some sites grading into the white fir series. Within the southwestern portion of the analysis area and at elevations below 2500 feet, plant communities tend toward the moderate to dry end of the Douglas-fir series. Much drier Ponderosa pine and white oak communities are common as well. These plant communities are found on drier aspects and where soil depth is reduced. The highly intermixed nature of the drier plant communities serves to fragment the vegetation types across the landscape. Dry site indicators such as white oak and poison oak are common understory species. Pacific madrone is common throughout the analysis area and often competes with developing conifers where openings have been created. Douglas-fir and incense cedar are the primary conifer species regenerating within un-managed conifer stands.

b. Stand history - Historically, fire was the primary large scale natural disturbance event. Within the analysis area, the majority of timber stands commonly experience high temperatures, moderate precipitation and low fuel moisture in the summer. Historically, this provided conditions conducive to frequent fire occurrence with variable levels of severity. Frequent fire often provided for a low thinning effect and retention of seral fire resistant species such as ponderosa pine, sugar pine and incense cedar. Intense stand replacement fires have occurred occasionally in lower elevations and are evidenced by the development of stands dominated by madrone or evenaged Douglas-fir with little to no variation in structure. Moderate to high severity fires were more infrequent in occurrence and would typically occur on northern aspects and higher elevations (above 3500 feet) where higher productivity levels, relatively cooler summertime temperatures and higher levels of moisture would work in combination to provide for a longer fire return interval.

During the past century, logging has replaced fire as the primary event that has shaped stand condition and structure.

c. Structure Description - The structural characteristics of the stands within the proposed treatment areas vary from single canopy even-aged stands to multi-canopy stands. Multi canopy stand conditions are the norm where stands are mature (150 years or greater). In general, two storied and multi-storied stands have understories which are suppressed and usually dominated by Douglas-fir or incense cedar. In most stands widely scattered 30"-40"+ Douglas-fir, sugar pine, ponderosa pine, and incense cedar trees are also present as fire remnants of previous stands.

d. Insect, Disease, Pocket Gophers and High Stand Densities
Root pathogens are not a widespread problem but do occur in the area. Infection centers of root pathogens such as *Phellinus weirri*, *Phomes Annosus,* and *Armillaria spp*. are present. Small pockets of white fir and Douglas-fir are affected.

Douglas-fir mistletoe and white fir mistletoe is present and affecting tree vigor in some of the stands. Throughout the majority of the analysis area however it occurs at low levels and is primarily a concern with respect to future stand development considerations. Lightly infected mature stands with an

understory of host species have the greatest potential for severe mistletoe infection and spread. Mistletoe is host specific and may cause: tree mortality, growth loss, alteration of crown and canopy structure, increased fire hazard and increased susceptibility to bark beetles, root rots and drought. Removal of infected trees, thinning to favor non-host species and/or regeneration of non-host species will minimize the potential for increased levels of mistletoe infection.

Pocket gopher populations are generally low within the proposed analysis area and are dependant upon the availability of herbaceous food sources. The greatest potential for high pocket gopher populations is where the greatest amount of herbaceous food source is available. Regeneration harvest of upper elevation stands on the moist end of the Douglas-fir series are the most likely to provide suitable food sources following disturbance. Creation of favorable gopher habitat in these sites will be discouraged by maintaining some canopy cover and limiting soil disturbance. Site preparation will be a combination of lopping and scattering, slashing and hand piling, excavator piling, and burning of piles. These methods will minimize the re-initiation of early seral herbaceous vegetation.

Stand densities are currently very high, >60%RD. High densities is the most critical factor currently affecting stand vigor and development within the analysis area. Inter-tree competition for limited site resources has resulted in declining tree vigor and growth, tree mortality and an increased susceptibility of trees to insect attack, disease infection, and fire intensity. Low elevation drier sites, which historically were thinned by fire, are in the most critical condition with respect to stand densities and/or forest health. The result is stagnated stands in which Douglas-fir or suppressed incense cedar is becoming the dominant species. The structure of the vegetation is also such that low thinning effect wildfire regimes are shifting to where stand replacement fires will become the norm. These dry sites can be difficult to reforest yet serve as important forested cover to more open adjacent oak woodlands and non forested lands. Maintenance of species diversity is important on these sites to ensure resilience and stability to drought, fire or insect and disease infestation.

e. Coarse woody debris (CWD) - Transects were completed within the treatment areas considered for regeneration harvest. The amount and decay classes of woody debris reflects the stage of stand development. In a natural cycle, two stages of stand development typically have the greatest amounts of CWD. Those stages are, stand initiation following a stand replacement event and as the old growth phase.

The objectives within the treatment area are: 1). In the younger stands maintain existing levels as they currently are. 2). In stands proposed for regeneration harvest to create or maintain 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long, decay class 1&2.

f. Snags - The kind and amount of snags varies depending on the stage of stand development. Under natural processes, early and old growth stands typically have the greatest amounts of stage 1&2 snags. In late seral stands, the snag component is usually variable with the majority in stages 3, 4 & 5. The objective of this prescription is to retain all stage 1&2 snags for wildlife and future coarse woody debris. The only instances where stage 1 snags may be removed in areas are when they are a safety hazard. In regeneration harvest stands, the target level of snags is 1.8 snags per acre.

ANALYSIS IN SUPPORT OF THE PRESCRIPTION

The target stand reflects not only what is planned for the future but also what is expected immediately after treatment. The target stand represents optimum conditions to strive for through management.

1). Target Stand - Selective Cut (SC)

Stands: T33S 1W, 35-2

Immediately following the harvest entry, these stands are composed of the most vigorous trees of all species and diameter classes. Large healthy ponderosa pine and sugar pine have been released to insure their continued presence in the stand. Species composition is dominated by Douglas- fir, followed by smaller amounts of ponderosa pine, sugar pine and incense cedar. All hardwoods greater than 14 inches in diameter have been left. Vertical and biological diversity is present through the retention of healthy trees of all age and size classes. Basal area has been regulated to reduce density levels towards the carrying capacity of the site. Growth rates and individual tree vigor has been increased due to the greater availability of moisture and nutrients for the residual trees. Planting of Douglas-fir has occurred in openings created from removal of low vigor trees or where the brush component has been excavator piled. Basal area is approximately 100-140 sq. ft. with average canopy closure approximately 35% or greater. Coarse woody debris (CWD) is present and provides conditions favorable for nutrient recycling, soil mychorrizae, and the development of nitrogen fixing bacteria. Cull trees have been left to insure that a near-term "pulse" of CWD and snags will be available.

YEAR	SELECTIVE CUT TREATMENT
0	* Initial harvest - reduce stand densities by marking trees across all diameter classes up to, but not including, 40" d.b.h. . Tree vigor is the primary factor in determining the trees to remove. Trees in excess of 40" d.b.h. may **only** be removed if they are heavily infected with mistletoe (mistletoe rating >4) **and** threaten the health of the surrounding stand. Trees in excess of 40" d.b.h. may also be removed within specific units (referenced within the marking guides) if those trees exhibit deteriorating crown and tree conditions and their removal provides for attaining overall stand objectives such as release of existing pine species. * Use widely spaced designated skidtrails or corridors, directional falling and log length skidding to reduce site impacts. * Treat logging slash and where necessary existing brush and hardwoods. Methods may include: slashing brush and hardwoods and hand piling and burning or lopping and scattering heavy slash concentrations, refer to the attached stand treatment recommendations.
0-1	* Slash all hardwoods regardless of condition and all sprung or severely damaged conifers between 1&7". Provide for thinning of remaining conifers between 1 and 7 inches D.B.H. as follows: conifers retained should have a 30% live crown ratio or greater. Leave trees should be the larger and more vigorous individuals with the following order of species preference (sugar pine, ponderosa pine, Douglas-fir, incense cedar, true fir). Space trees 14 to 16 feet apart on average allowing for up to 30% variation in spacing between individual trees to provide for selection of more desirable trees. Where residual damage is high and/or trees do not meet vigor requirements slashing of all except vigorous individuals will occur. Spacing requirements only apply to areas where an adequate number of "acceptable" trees exist. * Plant Douglas-fir and ponderosa pine and sugar pine in created openings.
10-20	* Where necessary, seedlings and saplings in the understory have been thinned and released from brush competition. * Conduct stand exam to assess stand conditions and to determine if any additional management treatments are needed.

Selective Cut (SC) - Silvicultural Options Considered:
The silvicultural prescription process considered other harvest methods as well as no action.

Existing stand condition: In the stands recommended for selective cut, an adequate mix of species are present to promote long-term resistance to damaging agents, (insect & disease associated with any one specific species). In addition, an adequate number of overstory and understory trees have good crown ratios and vigor to provide for site occupancy following a harvest treatment; These stands are typically

overstocked however and many trees are showing symptoms of decline (poor crown ratios, chlorotic thinning foliage and in cases the presence of mistletoe, stem decay etc;). As stands age, moisture stress problems and consequent mortality increase for the following reasons: 1). Decreased water conductance and other physiological problems increase with tree size and age making older trees more susceptible to drought and other stress factors (insects and disease). 2). The amount of photosynthate required to meet the respiratory requirements of a tree increases with tree size, making less of the energy available for growth or to withstand stress. The energy required to maintain the life of trees or of stands increases rapidly with air temperature and with tree size. 3). As shade tolerant tree species invade the understories of stands, competition for site resources (moisture and nutrients) increases, leading to the mortality of overstory trees because their respiratory requirements can not be met.

Based upon the existing stand conditions a regeneration harvest is not recommended for these stands. With healthy overstory trees, a mixed species condition and variable amounts of understory trees a healthy stand can remain following entry. Stand densities will also be reduced, freeing up site resources (water & nutrients) for the remaining trees. The post harvest stand would be more vigorous and resilient to environmental stresses (drought, insects, disease, climate change).

No action is not recommended based on current stand densities, the potential for tree species simplification and a likely increase in insect, disease and wildfire risk. With treatment deferral stand densities will remain high. Mortality of overstory trees and competition will promote development of an understory dominated by low vigor Douglas-fir, white fir (on moist sites) and incense cedar. Ponderosa pine, sugar pine and larger hardwoods will decline as a stand component due to overstory shading and inter-tree competition. The overall result is species simplification as the mixed conifer overstory fades out and understory competition favors shade tolerant species. The resulting stand will be prone to high levels of mortality from insect, disease and competition due to poor vigor & species simplification. With poor individual tree growth, increased mortality and dense stocking, these stands will become more susceptible to loss from wildfire. Treatment however will provide a stand condition which maintains species diversity, enhanced diameter growth of understory components and reduced available fuel loadings (lower mortality rates and reduced vertical and horizontal continuity of crowns).

2). Target Stand - Regeneration Harvest (RH)

Two different regeneration silvicultural methods will be implemented, Shelterwood Retention and Modified Even-aged The target stand conditions for each of these methods are the same, except for the number of trees greater than 20 inches in diameter at breast height (dbh) that are left. Listed below are the number of trees > 20" dbh that are to be left.

Shelterwood Retention - 16-25 trees/acre > 20" dbh.
Stands:

T32S - R1W - Section 29	29-3,29-4,29-9,29-13,29-14,
T32S - R1W - Section 31	31-10
T33S - R1W - Section 10	10-1,10-2,10-3,10-5,10-6,10-9,10-10
T33S - R1W - Section 15	15-2

T33S - R1W - Section 18	18-1,18-2,18-3,18-4,
T33S - R1W - Section 31	S31-1, S31-2, S31-3, S31-4, S31-5, S31-6, S31-8, S31-9, S31-10, S31-11
T34S - R1W - Section 5	S5-1, S5-2
T34S - R2W - Section 1	S1-2

Instead of a Structural Retention, a Shelterwood Retention will be implemented on the above stands. The 16-25 trees per acre of the structural retention will be used but the stand condition nor structure of the units necessitate the utilization of a structural retention. Shelterwood Retention will be used on units with pyroclastic soils. The 16-25 trees per acre of the South General Forest Management Area will be implemented to provide increased soil protection on the units. Following the establishment of a second growth stand (15-20 years), a modified even-aged harvest would be implemented reducing the number of trees per acre to 6-8 >20" dbh if appropriate for the stand conditions existing at the time.

Modified Even-aged - 6-8 trees/acres
Stands:

T32S - R1W - Section 32	32-1, 32-6, 32-8
T32S - R1W - Section 33	33-6, 33-8, 33-16, 32-1, 33-15, 33-7, 33-5
T33S - R1W - Section 03	3-4
T33S - R1W - Section 19	S19-1, S19-2,
T33S - R1W - Section 29	S29-1, S29-4, S29-5, S29-9

(Target number from above) green conifers/acre, greater than 20" dbh remain following entry. Healthy Douglas-fir, ponderosa pine, sugar pine, incense cedar, and white fir will be will be favored to leave as the overstory trees equal to or greater than 20" dbh. Additionally, all vigorous ponderosa pine, Douglas-fir, incense cedar, and sugar pine regardless of size would be left unless thinning of pockets is appropriate. At least three hardwoods per acre greater than 10" dbh will be retained when possible. All of the smaller diameter white fir 8-20" would removed unless needed to meet the target canopy closure. Basal area immediately following entry would be approximately 20-80 square feet, with an estimated canopy closure of 10% to 40%. In addition to stage 3,4 & 5 snags a minimum of 1.8/acre stage 1&2 snags are present. All decay classes of coarse woody debris are present (either standing or down) with a minimum of 120 linear feet of decay class 1&2. Site preparation would include shrub control and slash treatment by excavator piling from designated skidtrails or slashing of brush and hardwoods and handpiling and burning. Skidtrails would be ripped. These units will be planted with a mix of conifer species. Species diversity is present with Douglas-fir, ponderosa pine, sugar pine, and incense cedar. Stand density would be periodically regulated by precommercial thinning and commercial thinning entries. Approaching age 100, these stands would become a fully stocked stand of healthy, vigorous dominant and co-dominant second growth trees with scattered large remnants. Stocking would be approximately 35% relative density (185 SDI).

REGENERATION HARVEST	
YEAR	TREATMENT
0	* Harvest - Leave target number of green conifer trees/acre, >20"dbh and all vigorous ponderosa pine, Douglas-fir, incense cedar, sugar pine 8-20" dbh. Leave 3 hardwoods 10" dbh and > where possible * A minimum of 1.8 snags/acre (stage 1&2) and 120 linear feet coarse woody debris (decay class 1&2, 16" X 16') would be left. * Use widely spaced designated skidtrails, directional falling and log length skidding to reduce site impacts. * Site preparation: Slash trees damaged from logging activities, 1-6". Leave all other healthy unmerchantable trees. Brush and hardwoods are to be treated either by excavator removal or slashing. Excavator or handpile brush and slash and burn. Limit piling of logging slash to pieces < 16" diameter. * Rip skidtrails
0-1	* Plant with a mix of ponderosa pine, Douglas-fir, sugar pine and incense cedar. Apply appropriate maintenance (vexar tubing, mulching, shading, scalping, baiting) treatments to insure planting success.
1	* Conduct 1st year survival survey, assess need for supplemental planting or additional maintenance treatment.
3	* Conduct 3rd year survey, assess need for replanting and/or additional maintenance needs.
5	* Conduct 5th year stocking survey. Target stand will have a minimum a 229 well spaced trees per acre. Competing vegetation will have been controlled, with trees growing rapidly.
10	* Precommercial thin the understory if more than 300 trees per acre are present.
35	* Average diameter at breast height is 10", commercial thin if stand density is appropriate, otherwise delay until crown closure and competition reduces growth rates.
45-80	* Commercial thin if appropriate, consider underburning to provide nutrient "pulse" and for regulating understory seedling and sapling component.
100+	* Assess stand and watershed conditions for possible regeneration harvest.

Regeneration Harvest (Structural Retention, Modified Even-aged, and Shelterwood Retention) - Silvicultural Options Considered:

Existing Conditions: The overstory in these stand exhibits declining characteristics, such as, poor crown conditions, low crown ratios, poor growth rates, mistletoe infestation and moderate to high levels of stem decay. The understory is predominantly scattered or clumped small white fir Douglas-fir and incense cedar at 1-6" in diameter. Understory trees less than 4 inches d.b.h. are overtopped by brush and typically have less than 30% live crown and exhibit an average annual height growth of less than 6 inches. Mid-story trees are generally vigorous but represent less than 10% of the total stocking.

Uneven-aged Regeneration Options:
Neither individual tree selection nor group selection are desirable due to the structure, vigor and species composition of the existing stands. These types of methods would further encourage the establishment and growth of undesirable white fir and an increase in mistletoe infection.

Intermediate Treatment Options:
Commercial thinning is not appropriate due to the advanced age, structure, poor vigor and current stand density within the units.

No Action
No action will result in continued loss of the existing overstory with little change to the existing understory which is dominated by brush species. Overstory mortality will continue and through time conifer regeneration will slowly occupy the site (20 to 40 years). With this, understory trees will be highly susceptible to stem decays, mistletoe, and stress related mortality due to existing suppression from the brush component and inoculation of mistletoe from the existing overstory. Allowed to continue into the long term (50 years+) snag levels, down wood and structural complexity will increase. Compared to a managed stand where brush is cleared and conifers are planted, re-establishment of a mature conifer stand will be delayed to 100-120 years versus 80 years with management.

4). Target Stand - Density Management (DM)

T32S - 1W - Section 19	19-1*,19-5, 19-8, 19-7* 19-4, 19-3, 19-2*, 19-6
T32S - 1W - Section 21	21-2, 21-3, 21-5, 21-6
T32S - 1W - Section 28	28-2
T32S - 1W - Section 29	29-1, 29-6*
T32S - 1W - Section 31	31-4, 31-5
T32S - 1W - Section 32	32-3, 32-5, 32-7

T32S - 1W - Section 33	33-5, 33-11, 33-12, 33-17, 34-3, 33-1, 33-2*
T32S - 1W - Section 34	34-3
T33S - 1W - Section 03	3-3
T33S - 1W - Section 05	5-1, 5-3
T33S - 1W - Section 10	10-4*, 10-7, 10-8, 10-11*
T33S - 1W - Section 15	15-1*, 15-3
T33S - 1W - Section S21	S21-1, S21-2
T33S - 1W - Section S29	S29-2, S29-3, S29-6, S29-7, S29-8
T33S - 1W - Section 30	30-1
T33S - 2W - Section 01	1-1, 1-3*, 1-5, 1-6, 1-7, 1-8
T33S - 2W - Section 23	23-1, 23-2*, 23-5
T33S - 2W - Section 35	35-1*, 35-3, 35-4*, 35-5*, 35-6, 35-8*, 35-9*, 35-10, 35-11*, 35-12*
T34S - 2W - Section 01	S1-1*, S1-3*, S1-4, S1-6, S1-7*, S1-8,S1-9* S1-10,
T34S - 2W - Section 03	S3-1*, S3-2*
T34S - 2W - Section 04	S4-1*

* Indicates Density Management within Riparian Areas

Immediately following the harvest, these stands will have density levels that are near the carrying capacity of the site. Species composition is well represented with Douglas-fir, ponderosa pine, sugar pine, incense cedar and white fir. Hardwood species occur as an occasional stand component either singly (California black oak) or in clumps (madrone). Trees sizes may include vigorous seedlings, saplings, small conifers and , where available, healthy large conifer trees. Overall stocking however will trend towards the dominant overstory size class for a given stand. The residual merchantable trees (>8" d.b.h.) are characterized by co-dominant or dominant attributes, such as, crown ratios greater than 35%, good growth rates and larger diameters. The mosaic of size classes provides the structural diversity. Late seral stands (11"-21" d.b.h.) will possess late successional characteristics with growth accelerated. Crown closure will be approximately 40% or greater, with basal area ranging from 90-160 sq.ft. Density management conditions in Riparian Areas will be similar to the above described density management treatment except for the following: 1) Thinning will not occur within 50 feet on either side of drainages. 2) The intensity of thinning will be less so that a canopy closure of 60% is maintained. 3) Basal area for the thinned areas will range between 120 - 160 sq. ft.

The amount of coarse woody debris (CWD) for all stands will be dependant upon the current levels, availability of overstory snags, and residual green trees. Stage 1 and 2 snags will remain for wildlife. Large fire remnant trees generally >200 years and >30-40" d.b.h. will be retained as a scattered stand

component.

YEAR	TREATMENT
0	* Initial harvest - thin from below, favor seral species, utilize relative density of 35%, 40% or 45%. Utilize a canopy closure of 60% for riparian areas. Regular density management units maintain a canopy closure of 40% >. * Use widely spaced designated skidtrails, directional falling and log length skidding to reduce site impacts. * Slash all excess, sprung or severely damaged conifers and hardwoods between 1&6" * Pile and burn or lop and scatter heavy slash concentrations.
10-20	* Conduct stand exam to assess stand conditions and to determine if any additional management treatments are needed.

5). Target Stand - Understory Reduction (mechanical and hand thinning)

T33S - R1W - Section 33	33-14, 33-13
T33S - R1W - Section 05	5-1*, 5-4*, 5-2*,
T33S - R1W - Section 07	7-1*, 7-2*, 7-3*, 7-4, 7-5, 7-6, 7-7*
T33S - R1W - Section 17	17-1, 17-2, 17-4, 17-7
T33S - R1W - Section 31	S31-7
T33S - R2W - Section 23	23-5*, 23-2*, 23-7*
T33S - R2W - Section 25	25-1, 25-2*, 25-3*, 25-4* 25-5*, 25-6, 25-7*, 25-8, 25-9

* Indicates mechanical thinning

Immediately following the treatment, thinned early and mid seral stands (0-11 inches d.b.h.) will have density levels that are near the carrying capacity of the site. Residual trees will be pruned to 8 feet in order to increase crown base heights. Species composition is well represented with Douglas-fir, ponderosa pine, sugar pine, incense cedar. Hardwood species occur as an occasional stand component either singly (California black oak) or in clumps (madrone). Trees sizes may include vigorous seedlings, saplings, small conifers and , where available, large conifer trees. Overall stocking, however, will trend towards the dominant overstory size class for a given stand. Merchantable trees (>8" d.b.h.) will have been retained except in site specific circumstances where removal will have released larger vigorous pines or provided spacing for conifer growth. Residual trees (<8" d.b.h.) Will trend towards co-dominant or dominant attributes, such as, crown ratios greater than 35%, good

growth rates and larger diameters. Residual basal areas will be dependant upon existing size classes but vary from 40-120 sq. ft.. Canopy closures will vary from 40-60%.

Understory reduction (thinning) in more developed stands (>11' d.b.h.) will have trees 8 inches and less in diameter removed to increase crown base height and reduce crown bulk densities. Stocking of overstory trees (>8" d.b.h.) will be relatively unchanged with only individual trees or isolated pockets removed to release larger vigorous pine or hardwood species. Crown closure will be approximately 60% or greater. Residual basal areas will be dependant upon existing size classes but vary from 120-250 sq. ft..

The amount of coarse woody debris (CWD) for all stands will be dependant upon the current levels, availability of overstory snags, and residual green trees. Stage 1 and 2 snags will remain for wildlife. Large fire remnant trees generally >200 years and >30-40" d.b.h. will be retained as a scattered stand component.

YEAR	TREATMENT
0	* Initial harvest - thin from below removing 8" d.b.h. or smaller trees. Favor seral species, utilize a canopy closure of 60% where possible in late seral stands. Utilize a relative density of 35%, 40% or 45% in early to mid seral stands.
0-1	* Pile and burn or lop and scatter heavy slash concentrations.
10-20	* Conduct stand exam to assess stand conditions and to determine if any additional management treatments are needed.

POTENTIAL FOR "AVOIDANCE" VEGETATION MANAGEMENT STRATEGIES:

The objectives of vegetative management are:
- to improve early soil moisture conditions by eliminating or reducing the transpirational demands of competing brush and herbaceous vegetation.
- to improve survival by manipulating the distribution, density and composition of competing vegetation.
- to create access for tree planting and subsequent silvicultural treatments.
- to increase site productivity and tree growth leading to a reduction in rotation length.
- to reduce the risk of wildfire by reducing crown bulk density, surface fuels and increasing crown base heights.

With these objectives in mind, possible avoidance or prevention strategies are formulated. Under these strategies, control of vegetation relies in total or in part on habitat modifications or the complementing of natural ecosystems and processes. Method considered fall under three categories:
1. Manipulation of cutting methods -- partial cutting methods which retain sufficient canopy to reduce/prevent understory shrub growth yet still provide conditions suitable for tree growth or regeneration (natural or artificial).

2. Intensive methods -- fire, mechanical (cat piling/excavator piling/scarification/ripping), handtools (brushing).
3. Combinations of 1 & 2.

For the Trail Creek watershed timber sale, vegetation control is tied to the cutting method and the retention of sufficient canopy to preclude the establishment if excessive amounts of competing shrubs. Within the regeneration harvests excavator and hand piling of brush greater than 1 inch in diameter would occur.

MONITORING

Implementation of the standard and guidelines in the Record of Decision (ROD) and management direction contained within the Medford District Resource Management Plan and Final Environmental Impact Statement (RMP/FEIS) require a monitoring system to insure effective on-the-ground results. The ROD states the following: "Monitoring is an essential component of natural resource management because it provides information on the relative success of management strategies. The implementation of these standards and guidelines will be monitored to ensure that management actions are meeting the objectives of the prescribed standards and guidelines, and that they will comply with laws and management policy. Monitoring will provide information to determine if the standards and guidelines are being followed (implementation monitoring), verify if they are achieving the desired results (effectiveness monitoring), and determine if underlying assumptions are sound (validation monitoring). Some effectiveness and most validation monitoring will be accomplished by formal research.".

Monitoring of the proposed actions will follow the outline in the Medford District RMP/EIS, Volume II, Appendices 147-163. Monitoring will be specific to the land allocations and resources affected in the Trail Creek Watershed treatment areas.

Monitoring should:
* Detect changes in ecological systems from both individual and cumulative management actions and natural events
* Provide a basis for natural resources policy decisions
* Provide standardized data
* Compile information systematically
* Link overall information management strategies for consistent implementation
* Ensure prompt analysis and application of data in the adaptive management process
* Distribute results in a timely manner

Monitoring begins with resource assessment and data collection which describes the existing conditions prior to management actions. Data collection is in the form of sampling which provides a representative description of the proposed treatment area. Stand exams were completed in the proposed commercial harvest areas. Stand information was collected, using a comprehensive stand exam process. Within stands, a systematic sampling grid was used to establish plot centers. From the plot centers a variable plot and two nested fixed plots were used to record tree data. Information collected included:
- tree growth
- presence of insects or disease
- stand structure (tree height, diameter, crown ratio)

- species composition for all vegetation (trees, shrubs, herbaceous vegetation).
- coarse woody debris (diameters, length, decay class)
- canopy closure
- aspect, percent slope and topographic position
- snags (diameter, height and decay class)
- shrub and herbaceous vegetation (species, percent cover, location by slope and aspect)
- site index tree to determine site class/potential.

This information is then used in a BLM stand exam program that provides a variety of analysis reports. These reports provide a description of stand characteristics and a detailed assessment of stand conditions and health.

Post harvest monitoring can then be implemented, using the pre-harvest stand information to determine if the objectives have been met.

MARKING GUIDELINE TRAIL CREEK

Summary of treatment objectives

1. To favor a return to the seral phase of the white fir and Douglas-fir plant series as a long term silvicultural approach to provide for sustainable forest conditions.
2. To reduce wildfire risks for conifer stands within the rural interface by reducing ladder fuels, surface fuels and crown bulk densities. Desired canopy closures are between 40% to 60%.
3. In merchantable second growth stands, to thin from below to redistribute growth to vigorous dominant and co-dominant trees.
4. To reduce density levels towards the carrying capacity of the site. In selectively cut stands, remove individual trees across all diameter classes to reduce inter-tree competition while maintaining or promoting the development of multiple canopy layers.
5. To regenerate deteriorating stands and stands with Douglas-fir infected with dwarf mistletoe; and to prepare units for seedling establishment and growth by providing suitable site conditions for planting.
6. To maintain coarse woody debris, snags and large green conifers for long term site productivity and biological legacies.
7. To return areas of diminished conifer productivity to their full, long term capability.
8. To reduce stocking levels as well as conifer and brush encroachment in oak/pine woodlands to provide for increased mast production, forage palatability and reduced fire severity.

DENSITY MANAGEMENT / THINNING

1. Density reduction and the retention of at least 35% to 60% canopy closure are the primary objectives for these stands. Thin from below in second growth stands/clumps.
    * Stocking will be reduced to Relative Densities of 35-45%, see table for target levels.
    * Leave trees need to be dominant and codominant with the best crown ratios.
    * Favor healthy ponderosa pine, sugar pine, Douglas-fir, incense cedar over western hemlock and white fir.
    * Trees to be removed are in excess of wildlife, CWD and biological diversity needs.
2. Leave all large fire remnant trees >40" dbh, regardless of condition. Emphasis should be placed on retaining higher vigor remnant overstory trees > 30" dbh. Large diameter trees may be thinned to release adjacent large diameter trees or are lower vigor trees which may qualify as salvage or which pose an insect or disease risk to the residual stand.

When available release around vigorous dominant or co-dominant ponderosa ping and sugar pine. All trees, regardless of size class or vigor, underneath the dripline of released pines should be removed. Additionally, all trees up to 20" dbh within 15 feet of the dripline should be removed. Pine species selected for release should have full crowns with dark green foliage and minimal weak spots.

3. Leave all hardwoods greater than 14" dbh or provide for 3 hardwoods/acre greater than 10" where hardwoods are lacking.
4. Trees harvested should be in excess of wildlife, CWD and biological diversity need.
5. Leave all snags (stages 1-5)
6. Within areas designate for riparian thinning, leave a 50 foot each side of channel no cut buffer. Leave the largest /vigorous conifers for leave trees within the riparian area. Leave a canopy closure of 60% or greater and a relative density of 40-45%. Leave all trees greater than 20" dbh.

SHELTERWOOD RETENTION - REGENERATION HARVEST (RH)

See table for units.

The minimum requirements are:

1. 1.8 wildlife trees/acre, >20" dbh.
2. 120 linear feet of ROD CWD.
3. 16-25 green conifers/acre, >20" dbh. Leave trees should have the following attributes: a). windfirm (dominant/co-dominant) b). disease free, specifically, mistletoe free Douglas-fir. c). Crown ratio >30%, with a healthy crown, dark foliage, dense needles. d). Favor healthy seral species, ponderosa pine, sugar pine, incense cedar, where possible. Tree diameter should not be the deciding factor for removing a tree, crown vigor should.
4. The target canopy closure should be 30% or greater. Depending on stand conditions some areas may have greater canopy closure and others less.

Reference: 12 TPA >20" dbh = approximately 20% canopy closure.
18 TPA >20" dbh = approximately 30% canopy closure.
25 TPA >20" dbh = approximately 38% canopy closure.
Trees less than 20" dbh will also provide some of the target canopy closure.

5. Target residual basal area approximately 60-120 square feet(see table for unit BA). Stand conditions will result in variable levels of basal area across the stand.
6. All healthy ponderosa pine, Douglas-fir, incense cedar, sugar pine should be left . These trees should have the following attributes: a). crown ratios 30% b). healthy foliage c). disease and insect free. Small diameter white fir 8-20" should be left if needed to meet canopy closure targets.
7. Leave all hardwoods greater than 14" dbh or provide for 3 hardwoods/acre greater than 10" where hardwoods are lacking

MODIFIED EVEN-AGED - REGENERATION HARVEST (RH)

See table for units.

The **minimum** requirements are:

1. 1.8 wildlife trees/acre.
2. 120 linear feet of CWD.
3. 6-8 green conifers/acre, >20" dbh (proportionally representing the total range of tree sizes >20"). These are minimum levels, where additional healthy green trees are available they should be left. Determination of leave and take trees should be based upon tree/crown vigor as opposed to the strict implementation of the 6-8 leave tree guideline. Let tree condition dictate where and how many trees are left. Leave trees should have the following attributes: a). Windfirm b). Crown ratio >35% with a healthy crown, dark foliage, dense needles c). Disease free (specifically mistletoe free Douglas-fir) d). Favor healthy seral species, ponderosa pine, sugar pine, incense cedar, where possible.
4. All healthy ponderosa pine, Douglas-fir, incense cedar, sugar pine should be left .These trees should have the following attributes: a). crown ratios 30% b). healthy foliage c). disease and insect free.
5. Leave all hardwoods greater than 14" dbh or provide for 3 hardwoods/acre greater than 10" where hardwoods are lacking
6. Units do not have to be uniform in appearance; diversity, patchiness is desirable.

SELECTIVE CUT (SC)

1. 60% canopy closure, the removal of poor vigor trees and density reduction is the primary objectives for this stand.

* Dependant upon the spatial arrangement of poor vigor trees, some areas may have canopy closure greater than 60%, and in other areas less than 60%. Variability is okay, the objective is a stand average of 60% (refer to the attached canopy closure guide).

* Tree selection criteria should be based upon the retention of the desired basal area with tree vigor (risk factors) used as the primary aid in determining individual trees to mark. Refer to the attached poor vigor and high risk of mortality guidelines. Ideally, trees selected for removal should be proportional to their presence within the stand, although this will not always be possible. For example, if the size class distribution within a stand is, 70% of the trees are 8- 20" dbh, 20% of the trees are 20-32" dbh and 10% of the trees are 32"dbh or greater, then the majority of the trees selected would be in the 8-20" size class with lesser amounts marked in the 20-32" size class and even fewer marked that are greater than 32" dbh.

* The average residual basal area of treated stands will range between 140 to 220 square feet per acre. See below for the approximate residual basal area for each stand.

* Clumpiness of residual trees is okay, meeting the target basal area is more important than meeting a spacing requirement. Spatial and structural variability is a desired stand condition.

* Trees will be marked across all diameter classes up to but not including 40" dbh. Trees in excess of 40" dbh may **only** be removed if they are heavily infected with mistletoe (mistletoe rating >4) **and** threaten the health of the surrounding stand. Leave mistletoe infected trees > 40" dbh that are located in topographic positions that are not conducive to the spread of the disease. Such as, draws, lower slopes of units and in areas that all adjacent trees are non-host species. These trees will provide for habitat diversity.

2. Favor drought and fire tolerant tree species, such as ponderosa pine. sugar pine, incense cedar, Douglas-fir and hardwood species. In general, white fir should be discriminated against because of it's low tolerance of fire, drought, and root diseases. This does not mean all white fir are to be removed. White fir should be left where necessary to meet density levels and when it is a more vigorous tree than adjacent preferred species..

3. When available release around vigorous dominant or co-dominant ponderosa pine and sugar pine. All trees, regardless of size class or vigor, underneath the dripline of released pines should be removed. Additionally, all trees up to 20" dbh within 15' of the dripline should be removed. Pine species selected for release should have full crowns with dark green foliage and minimal weak spots. Pine species with poor crowns characterized by a ragged appearance as well as foliage which is bunchy and of poor color should be removed, do not release around.

4. Leave all hardwoods greater than 14" dbh or provide for 3 hardwoods/acre greater than 10" where hardwoods are lacking .

5. Leave all snags, stages 1-5, except those that are a safety hazard.

6. Leave all coarse woody debris, decay classes 1-5.

7. Minimize the marking of large, >20" dbh, broken, fork top and deformed trees. Retain for plant and animal habitat, as well as future sources of coarse woody debris and snags.

HARVEST MARKING GUIDELINE TABLE

Location	Unit	Acre	Prescription	BA Harv. Sq.Ft.	TPA Harv	BA Lv. SqFt	TPA Lv	Crown Clos. % Approx	Harv. Syst.	Site Prep	Remarks
32-1W-19	19-1, 19-5, 19-8	136 8	DM/Thin Prop.	130	103, 8-26", 2@26"	95	240	42	H	N	
	19-1	15	Riparian DM	100	80, 8-18",	125	260	60	H	N	
	19-1, 19-4	2 2	DM/Thin Prop	130	103,8-26", 2@26"	95	240	42	C	N	
	19-3	5	DM/Thin Prop	90	105,8-28",	90	106	45	C	N	
	19-2 19-6	6 7	DM/Thin Prop	90	105,8-28",	90	106	45	C	N	
	19-2	4	Riparian DM	70	75, 8-18",	110	136	60	H	N	
	19-7	12	DM/Thin Prop	90	105,8-28",	90	106	45	T	N	
	19-7	4	Riparian DM	70	75, 8-18",	110	136	60	H	N	.
32-1W-21	21-2	11	DM/Thin Prop	115	62,8-28",	127	68	45	C	N	
	21-3	6	DM/Thin Prop	115	62,8-28",	127	68	45	T	N	
	21-6	7	DM/Thin Below	60	112,8-16",	133	60	54	T	N	
	21-6 21-5	7 3	DM/Thin Below	150	297,8-30",	50	130	43	T C	N	
32-1W-28	28-2	11	DM/Thin Prop	85	366,8-22",	85	364	45	H	N	
32-1W-29	29-3 29-13	4 10	16-25 Regen	153	157	10	16>20"	5	C C	HP HP	
	29-9	5	16-25 Regen	140	157	20	18>20"	10	C	HP	

	29-1	8	DM/Thin Prop	45	43,all dia.	104	164	48	C	N	
	29-6	8	DM/Thin Below	94	122,8-18",	131	63	44	T	N	
	29-6	3	Riparian DM	48	117,8-12",	190	118	60	T	N	BL
	29-4	17	16-25 Regen	96	109,8-20"	100	24>20"	15	C	HP	
	29-14	4	16-25 Regen	96	109,8-20"	100	24>20"	15	T	EXP	
32-1W-31	31-4	12	DM/Thin Prop	66	50,all dia.	109	134	42	T	N	
	31-5	6	DM/Thin Prop	66	50,all dia.	109	134	42	T	N	
	31-10	3	16-25 Regen	75	90 , 8-20"	60	24>20"	22	T	EXP	
32-1W-32	32-1	15	6-8 Regen	141	132	40	6> 20"	12	T	EXP	
	32-2	21	DM/Thin Below	103	158,8-16 13@16"	100	40	32	H	N	
	32-3	25	DM/Thin Prop	80	62 all dia.	100	249	48	H	N	17ac. 33-1w-5
	32-5	6	DM/Thin Below	80	130,8-18	100	250	48	H	N	
	32-6	10	6-8 Regen	141	132	40	6> 20"	12	H	HP	
	32-7	7	DM/Thin Below	80	130,8-18	100	250	48	H	N	
	32-8	25	6-8 Regen	180	209	40	7> 20"	10	H	HP	
32-1W-33	32-1	10	6-8 Regen	141	132	40	6> 20"	12	T	EXP	
	33-1	6	DM/Thin Below	85	134,8-14 39@14"	100	40	32	T	N	
	33-2	18	Riparian DM/Thin Below	185	47,8-12 6@12"	185	115	61	C	N	
	34-3	32	DM/Thin Prop	39	20, all dia	87	340 mos t<8"	49	H	N	
	33-5	6	DM/Thin Below	113	201,8-18 7@18"	100	21	21	H	N	

32-1W-33	33-6	3									dlv
	33-7	1	DM/Thin Below	93	144,	128	71	41	H	N	
	33-8	3									dlv
	33-11	3	DM/Thin Below	103	158,8-16 13@16"	100	40	32	C	N	
	33-12	5	DM/Thin Below	103	158,8-16 13@16"	100	40	32	C	N	
	33-13	3	Understory Reduction						Hand		
	33-14	6	Understory Reduction						Hand		
	33-15	2	6-8 Regen	193	210	40	6> 20"	12	H	HP	
	33-16	6	6-8 Regen	214	186	30	6> 20"	12	T	EXP	
	33-17	2	DM/Thin Below	103	158,8-16 13@16"	100	40	32	C	N	
	33-18	2	DM/Thin Below	103	158,8-16 13@16"	100	40	32	C	N	
	33-19	4	DM/Thin Below	103	158,8-16 13@16"	100	40	32	C	N	
32-1W-34	34-3	32	DM/Thin Below	74	82,8-14 19@14"	90	342 most t<6"	49	H	N	
33-1W-03	3-3	25	DM/Thin Prop	107	122,8-24" 2@24"	159	29	38	H	N	
	3-4	20	6-8 Regen	252	225	60	6> 20"	12	H	HP	
33-1W-05	5-1	38	DM/Thin Prop	112	106, all dia	75	622 most t<8"	40	T	N	
	32-3	17	DM/Thin Prop	80	62 all dia.	100	249	48	H	N	8ac 32-1w-32
33-1W-10	10-1	8	16-25 Regen	120	64,8-26"	120	19>20"	55	C	HP	
	10-2	12	16-25 Regen	120	64,8-26"	120	19>20"	55	C	HP	
	10-3	8	16-25 Regen	120	64,8-26"	120	19>20"	55	C	HP	

	10-4	18	DM/Thin Prop	79	32 all dia.	100	334	45	T 4ac BL	N	4ac riparian
	10-5	6	16-25 Regen	120	64,8-26"	120	19>20"	55	H	N	
33-1W-10	10-6	4	16-25 Regen	120	64,8-26"	120	19>20"	55	C	HP	
	10-7	6	DM/Thin Prop	97	74 all dia.	93	258	45	H	N	
	10-8	3	DM/Thin Prop	79	32 all dia.	100	334	45	T	N	
	10-9	19	16-25 Regen	120	64,8-26"	120	19>20"	55	H	N	
	10-10	2	16-25 Regen	120	64,8-26"	120	19>20"	55	H	N	
	10-11	6	DM/Thin Prop	83	53,8-24 2@24.	158	30	45	H	N	
33-1W-15	15-1	32	DM/Thin Below	89	128,8-24	143	45	45	H	N	
	15-1	6	Riparian DM/Thin Below	83	46,8-18	158	30	74	H	N	
	15-2	11	16-25 Regen	132	151,8-22"	100	21>20"	28	H	N	
	15-3	9	DM/Thin Below	89	128,8-24	143	45	45	H	N	
33-1W-18	18-1	19	16-25 Regen	108	71,8-22" 4@22"	80	18>20"	28	H	HP	dlv
	18-2	25	16-25 Regen	108	71,8-22" 4@22"	80	18>20"	28	H	HP	
	18-3	5	16-25 Regen	108	71,8-22" 4@22"	80	18>20"	28	T	EXP	
	18-4	5	16-25 Regen	108	71,8-22" 4@22"	80	18>20"	28	H	HP	
33-1W-19	S19-1	9	6-8 Regen	130	54	40	6> 20"	8	H	HP	
	S19-2	9	6-8 Regen	130	54	40	6> 20"	8	T	EXP	
33-1W-21	S21-1	10	DM/Thin Below	89	128,8-24	143	45	45	H	N	
	S21-2	13	DM/Thin Below	89	128,8-24	143	45	45	H	N	

33-1W-29	S29-1	2	6-8 Regen	70	28	40	6> 20"	8	C	HP	10 ac drop soils& water
	S29-2	67	DM/Thin Below	67	103,8-18 11@18	140	68	51	H	N	
33-1W-29	S29-3	14	DM/Thin Below	54	94,8-16 4@16	120	60	47	C		
	S29-4	1	6-8 Regen	70	70	40	6> 20"	8	C	HP	
	S29-5	10	6-8 Regen	70	28,8-28	40	6> 20"	8	T	EXP	
	S29-6	8	DM/Thin Below	121	185,8-14 20@14	123	87	47	T		
	S29-7	4	DM/Thin Below	54	94,8-16 4@16	120	60	50	H		
	S29-8	4	DM/Thin Below	54	94,8-16 4@16	120	60	50	T		
	S29-9	5	6-8 Regen	70	28,8-28	40	6> 20"	8	H		
33-1W-30	30-1	11	DM/Thin Below	70	36,8-22 3@22	100	26	28	T		
33-1W-31	S31-1	48	16-25 Regen	134	126,8-22" 2@22"	80	22>20"	26	C	HP	
	S31-2	7	16-25 Regen	94	89,8-24" 2@24"	80	17>20"	23	C	HP	
	S31-3	5	16-25 Regen	94	89,8-24" 2@24"	80	17>20"	23	T	EXP	
	S31-4	1	16-25 Regen	94	89,8-24" 2@24"	80	17>20"	23	T	EXP	
	S31-5	9	16-25 Regen	94	89,8-24" 2@24"	80	17>20"	23	C	HP	
	S31-6	7	16-25 Regen	94	89,8-24" 2@24"	80	17>20"	23	C	HP	
	S31-8	32	16-25 Regen	95	102,8-24" 2@24"	60	19>20"	23	T	EXP	
	S31-9	11	16-25 Regen	94	89,8-24" 2@24"	80	17>20"	23	T	EXP	
	S31-10	3	16-25 Regen	134	126,8-22" 2@22"	80	22>20"	26	H	HP	
	S31-11	12	16-25 Regen	94	89,8-24" 2@24"	80	17>20"	23	T	EXP	

34-1W-05	S5-1	15	16-25 Regen	105	103,8-24" 6@24"	120	21>20"	35	H	HP	
	S5-2	8	16-25 Regen	105	103,8-24" 6@24"	120	21>20"	35	T	EXP	
33-2W-01	1-1	17	DM/Thin Below	113	120,8-14 25@14	126	75	39	H	N	
33-2W-01	1-3	31	DM/Thin Below	113	120,8-14 25@14	126	75	39	T,2ac Bl,riparian thin	N	2ac riparian
	1-5	4	DM/Thin Below	113	120,8-14 25@14	126	75	39	H	N	
	1-6	8	DM/Thin Below	113	120,8-14 25@14	126	75	39	H	N	
	1-7	32	DM/Thin Below	113	120,8-14 25@14	126	75	39	T	N	usrm
	1-8	2	DM/Thin Below	113	120,8-14 25@14	126	75	39	T	N	
33-2W-23	23-1	42	DM/Thin Below	141	123,8-22 4@22	100	106	35	T	N	usrm
	23-2	73	DM/Thin Prop.	98	68,8-28 3@28	50	65	41	T	N	usrm
	23-2	14	DM/Thin Prop.Riparian	20	37,8-18 2@18	110	115	65	T	N	usrm
	23-5	14	DM/Thin Below	105	89,8-16 8@16	53	137	53	T	N	usrm
33-2W-35	35-1	39	DM/Thin Below	132	237,8-14 25@14	128	69	35	T	N	
	35-1	9	DM/Thin Below riparian	116	73,8-12 25@14	220	209	60	T-BL	N	
	35-3	7	DM/Thin Below riparian	116	73,8-12 25@14	220	209	60	H	N	
	35-4	10	DM/Thin Below	132	237,8-14 25@14	128	69	35	H	N	
	35-4	4	DM/Thin Below riparian	116	73,8-12 25@14	220	209	60	H	N	
	35-6	7	DM/Thin Below	132	237,8-14 25@14	128	69	35	H	N	

	35-8	11	DM/Thin Below	132	237,8-14 25@14	128	69	35	H	N	
	35-8	12	DM/Thin Below riparian	116	73,8-12 25@14	220	209	60	H	N	
	35-9	7	DM/Thin Below	132	237,8-14 25@14	128	69	35	H	N	
	35-9	2	DM/Thin Below riparian	116	73,8-12 25@14	220	209	60	H	N	
	35-10	1	DM/Thin Below	132	237,8-14 25@14	128	69	35	H	N	
	35-11	9	DM/Thin Below	132	237,8-14 25@14	128	69	35	H	N	
	35-11	20	DM/Thin Below riparian	116	73,8-12 25@14	220	209	60	H	N	
	35-12	31	DM/Thin Below	132	237,8-14 25@14	128	69	35	H	N	
	35-12	53	DM/Thin Below riparian	116	73,8-12 25@14	220	209	60	H	N	
	35-2	16	Select Harvest	97	134 all dia	90	305	62	H	N	
	35-5	5	DM/Thin Below	132	237,8-14 25@14	128	69	35	C	N	
	35-5	5	DM/Thin Below riparian	116	73,8-12 25@14	220	209	60	C	N	
34-2W-1	S1-1	9	DM/Thin Below	74	120,8-12 47@12	124	81	61	T	N	
	S1-1	3	DM/Thin Below riparian	45	87,8-18	140	110	64	T-BL	N	
	S1-2	12	16-25 Regen	106	65,8-18" 8@18"	60	19>20"	21	T	EXP	
	S1-3	15	DM/Thin Below	74	120,8-12 47@12	124	81	61	T	N	usrm
	S1-3	1	DM/Thin Below riparian	74	120,8-12 47@12	124	81	61	T-BL	N	
	S1-4	12	DM/Thin Below	90	141,8-14 30@14	100	40	46	T	N	usrm

	S1-6	4	DM/Thin Below	90	130,8-16 9@16	100	38	38	T	N	
	S1-7	15	DM/Thin Below	90	130,8-16 9@16	100	38	38	T	N	usrm
	S1-8	11	DM/Thin Below	90	130,8-16 9@16	100	38	38	C	N	
	S1-9	9	DM/Thin Below	79	138,8-12 209@12	125	788	45	T	N	usrm
34-2W-1	S1-9	3	DM/Thin Below riparian	45	87, 8-18"	140	110	64	T-BL	N	
	S1-10	13	DM/Thin Below	90	130,8-16 9@16	100	38	38	T	N	
34-2W-3	S3-1	6	DM/Thin Below	79	138,8-12 209@12	125	788	45	T	N	
	S3-1	2	DM/Thin Below riparian	45	87, 8-18"	140	110	64	T-BL	N	
	S3-2	8	DM/Thin Below	79	138,8-12 209@12	125	788	45	T		
	S3-2	22	DM/Thin Below riparian	45	87, 8-18"	140	110	64	T-BL	N	
34-2W-4	S4-1	5	DM/Thin Below	79	138,8-12 209@12	125	788	45	T		
	S4-1	2	DM/Thin Below riparian	45	87, 8-18"	140	110	64	T-BL	N	

N = None, T = Tractor, T-BL = Tractor Bull Line, C = Cable, H = Helicopter, usrm =Understory Reduction Machine, EXP = Excavator Pile, HP = Hand Pine, dlv = Drop Low Volume

.

RELATIVE DENSITY GUIDELINES
Use RD 35-45 when thinning in stands dominated by Douglas-fir.

Estimate the average diameter of potential leave trees and determine the desired spacing in feet by referring to the table below. Follow the basal area and spacing table as closely as possible. Once the area has been marked verify the leave basal area using a relaskop or prism, adjust basal area as necessary. As the average diameter changes spacing will also change holding stand density constant.

RELATIVE DENSITY - 35%		
AVERAGE LEAVE TREE DBH	*LEAVE TREE BASAL AREA*	*AVERAGE LEAVE TREE SPACING*
8″	*92*	*13′ X 13′*
10″	*101*	*15′ X 15′*
12″	*108*	*18′ X 18′*
14″	*115*	*20′ X 20′*
16″	*121*	*22′ X 22′*
18″	*127*	*25′ X 25′*
20″	*133*	*27′ X 27′*
22″	*138*	*29′ X 29′*
24″	*143*	*31′ X 31′*
26″	*147*	*33′ X 33′*
28″	*152*	*35′ X 35′*
30″	*156*	*37′ X 37′*
RELATIVE DENSITY - 40%		
AVERAGE LEAVE TREE DBH	*LEAVE TREE BASAL AREA*	*AVERAGE LEAVE TREE SPACING*
8″	*106*	*12′ X 12′*
10″	*116*	*14′ X 14′*
12″	*124*	*17′ X 17′*
14″	*132*	*19′ X 19′*
16″	*139*	*21′ X 21′*
18″	*146*	*23′ X 23′*
20″	*152*	*25′ X 25′*
22″	*158*	*27′ X 27′*
24″	*163*	*29′ X 29′*
26″	*169*	*31′ X 31′*
28″	*174*	*33′ X 33′*
30″	*178*	*35′ X 35′*
. ***RELATIVE DENSITY - 45%***		
AVERAGE LEAVE TREE DBH	***LEAVE TREE BASAL AREA***	***AVERAGE LEAVE TREE SPACING***
8″	***119***	***11′ X 11′***
10″	***130***	***14′ X 14′***
12″	***139***	***16′ X 16′***
14″	***148***	***18′ X 18′***
16″	***156***	***20′ X 20′***

18"	*164*	*22' X 22'*
20"	*171*	*24' X 24'*
22"	*177*	*25' X 25'*
24"	*183*	*27' X 27'*
26"	*189*	*29' X 29'*
28"	*195*	*31' X 31'*
30"	*200*	*33' X 33'*

Definition: Poor Vigor - High Risk of Mortality

Trees available for removal as poor vigor - high risk include:

1. Poor vigor trees

a. Poor vigor, high risk ponderosa pine trees are defined as those trees meeting the criteria for risk for classes 3 and classes 4

Class #3

* crowns of fair to poor health, somewhat ragged or thin in parts of crown
* Foliage in parts of crown thin, bunchy, or unhealthy, needles average to shorter than average in length.
* Needle color poor to fair.
* Some to many twigh or branches lacking foliage, few to many twigs or branches fading or dead.
* Small localized weaken parts of crowns usually present.
* Crown width is narrow or flat on one or more sides.

Class #4

* Crowns in poor condition, ragged or thin
* Foliage thin or bunchy, needles short or sparse, poor color.
* Twigs and branches dead or dying, parts of crown definitely weakened.
* Crown width is very narrow and sparse or limbs all on one side.

b. High risk Douglas-fir and white fir trees are defined as:

* Crown has thin appearance when viewed against the sky.
* Short needle length
* Needle color very poor, yellowish.
* Dead or dying twigs or branches in the crown forming holes, sparse and ragged crown appearance.
* Poor crown ratio.
* Mistletoe infected.

c. Trees affected by root rot, visual characterisitcs are:

* groups of trees affected, with trees showing variable levels of decline.
* trees have reduced height growth, look at top of trees for reduced increment growth.
* yellow foliage, decline of the crown is from the top to the bottom.
* distress cone crop.
* bark beetles sometimes present because of the stressed trees.

2. Insect infested trees

Douglas-fir and white fir trees undergoing attack from Douglas-fir bark beetle, as identified by red boring dust present in bark crevices or on the ground near the base of the tree. Foliage is thinning and yellowish in appearance. Borers typically begin their attack in the top of the tree, then may spread to the lower bole. Pitch streamers may also be present on the mid to upper bole.

Ponderosa pine trees undergoing current attack from western pine beetle or red turpentine beetle. Pitch tubes should contain reddish/brown granular frass. Pitch tubes clear in color indicate the tree has been successful in expelling the beetle, these trees should not be marked if otherwise healthy.

All snags and coarse woody debris will be maintained as they presently occur; snags that are a

safety hazard may be felled but will be left on site.

UNDER STORY REDUCTION (HAND & MECHANICALTHINNING) CONIFER STANDS (US)

Early and mid- seral stand structures (0-11 inches d.b.h.)

1. Density reduction and the retention of at least 40% - 60% canopy closure are the primary objectives for these stands.

2. Thin smaller and less vigorous trees between 1 and 8 inches d.b.h.. Conifers between 1and 8 inches d.b.h. will be hand thinned to a 14 ft. by 14 ft. spacing, while mechanical thinning will be completed on a 16 ft. by 16 ft. spacing. Dominant trees will be used to determine spacing intervals. Trees from 5-8 inches d.b.h. which are not going to be removed from the site will be girdled rather than felled. On all pine trees greater than 12" d.b.h., all trees between 1" and 8" shall be removed 10 feet out from the dripline of the crown. Slash all brush and hardwoods (less than 12" d.b.h.). Additionally conifers over 1 foot tall and in excess to spacing needs should be slashed. Species preference in selecting leave trees is as follows: Sugar pine, ponderosa pine, Douglas-fir, incense cedar, true fir.

3. Prune all conifers which are taller than 16 feet to a height of 8 feet from ground level. Cut limbs and tops free of slashed tree boles and pile and burn as needed for hazard reduction.

4. Inclusions with more developed stand conditions should be treated as described for late and mature seral stands.

Late and mature seral stand structures (11 inches d.b.h. and larger)

1. Increasing crown base height through the reduction of ladder fuels is the primary objective with these stands. A 40% residual canopy closure is desired where current stocking and tree size classes allow for this level of reduction.

2. Thin from below removing smaller and less vigorous trees which are 8"d.b.h. or less. Whenever possible, smaller trees should be removed to attain a 40% canopy closure. Where practical, removal of 8" and smaller trees should work towards providing species selection criteria as described for early to mid seral stand conditions. Regardless of condition, trees greater than 8"d.b.h. should be left at the current stocking and canopy closure levels. Exceptions to this are in specific treatment areas where release of seral species is desired (refer to exceptions list below).

3. Within 300 feet of natural openings(meadows), leave cut material on site. Additionally provide for retention of scattered pockets of undisturbed under story (throughout treatment areas) to provide structural diversity and cover for wildlife. Provide for an approximate equivalent of 1/4 acre for every 5 acres treated as undisturbed within a given section. Locate undisturbed patches along riparian inclusions, adjacent untreated stands, survey and manage buffers, along game trails and where relatively healthier groups of under story are present. To ensure fuel management objectives are provided for, reserve patches should be in a scattered pattern and towards the interior of the treatment area.

4. Prune all conifers which are taller than 16 feet to a height of 9 feet from ground level. Cut limbs and tops free of slashed tree boles and pile and burn as needed for hazard reduction.

5. Inclusions with smaller early seral stand conditions should be treated as described for early and mid seral structures.

Exceptions: Removal of trees greater than 8" d.b.h. may occur within treatment areas where activity is 300 feet away from natural openings. For these areas, removal of trees up to 12" may occur **only** where there is an opportunity to release around vigorous dominant or co-dominant Douglas-fir, ponderosa pine, sugar pine, incense cedar, or large remnant hardwoods greater than 14" dbh.. All trees, less than 12" d.b.h. and underneath the dripline of released pines & hardwoods, should be removed regardless of vigor. Additionally, all trees up to 12" dbh within 15' of the dripline should be removed. Pine species selected for release should have full crowns with dark green foliage and minimal weak spots. Hardwoods should be at least 14" or greater in diameter and have at least 30% live crown. To avoid Douglas-fir bark beetle buildups, in areas where removal of felled material is not possible, no more than 3 Douglas-fir trees/acre greater than 12" d.b.h. should be cut

STAND INVENTORY SUMMARY

Location	OI Unit	EA Unit	OI Acres	EA Acres	Prescription	Harvest System	Site Prep.	Remarks
32-1W-19	001	19-1	94	15	Riparian DM	H	N	
	001 / 002	19-1	94 / 44	13	DM	H	N	
	001	19-1	94	2	DM	C	N	
	001	19-5	94	6	DM	H	N	
	001	19-8	94	8	DM	H	N	
	003	19-7	74	12	DM	T	N	
	003	19-7	74	4	Riparian DM	TBL	N	
	001	19-4	94	2	DM	C	N	
	003	19-3	74	5	DM	C	N	
	003	19-2	74	4	Riparian DM	C	N	
	003	19-2	74	6	DM	C	N	
	003	19-6	74	7	DM	C	N	
32-1w-21	002	21-2	20	11	DM	C	N	
		21-3		6	DM	T	N	
	003		59					Drop RTV
	009		151					Drop RTV
	012		8					Drop RTV
	014		4					Drop RTV
	018	21-6	15	7	DM	T	N	
	019	21-6	14	7	DM	T	N	
		21-5		3	DM	C	N	
	020		30					Drop RTV
	022		22					Drop RTV
	023		3					Drop RTV
	024		11					Drop RTV

32-1W-27	006		95					Drop RTV
	007		29					Drop RTV
	013		12					Drop RTV
	016		6					Drop RTV
	019		5					Drop RTV
32-1W-28	003	28-2	30	5	DM	H	N	
Location	OI Unit	EA Unit	OI Acres	EA Acres	Prescription	Harvest System	Site Prep.	Remarks
32-1W-28	005		19					Drop RTV
	011		65					Drop RTV
	013	28-2	12	6	DM	H	N	
32-1W-29	001	29-3	30	4	16-25 Regen.	C	HP	
		29-13		10	16-25 Regen.	C	HP	
	004		19					Drop RTV
	006	29-8	11					Drop US
		29-9		5	16-25 Regen.	C	HP	
	008	29-1	42	8	DM	T	N	
		29-6		3	DM	T	N	
		29-6		5	Riparian DM	TBL	N	
	010		128					Drop RTV
	014	29-4	43	17	16-25 Regen.	C	HP	
		29-14		4	16-25 Regen	T	EXP	
	701		7					Drop SB
32-1W-30	002		26					Drop RTV
	003		37					Drop RTV
32-1W-31	002		139					Drop SB
	003	31-5	24	6	DM	T	N	

	006	31-10	16	3	16-25 Regen	T	EXP	
	007	31-4	39	12	DM	T	N	
	009		44					Drop RTV &B
	010		161					Drop RTV &B
	011		47					Drop RTV &B
32-1W-32	001	32-1	60	15	6-8 Regen	T	EXP	
		32-7		7	DM	T	N	
		32-5		6	DM	H	N	
		32-3		25	DM	H	N	Includes 17ac 33-1W-5
	002	32-8	39	25	6-8 Regen	H	HP	
	004		98					Drop Soils
32-1W-32	007	32-2	36	21	DM	H	N	
	008	32-6	75	10	6-8 Regen	H	HP	
32-1W-33	002	32-1	99	10	6-8 Regen	T	EXP	
		33-15		2	6-8 Regen	H	HP	
		33-6		3	6-8 Regen	T	EXP	
		33-8		3	6-8 Regen	T	EXP	
	003		31					Drop SB
	007	33-12	71	5	DM	C	N	
		33-14		15	Understory Reduction		Hand Thin	
		33-17		2	DM	C	N	
		33-18		2	DM	C	N	
		33-19		4	DM	C	N	
		33-11		3	DM	C	N	
	015	33-11	39	5	DM	C	N	
		33-13		3	Understory Reduction		Hand Thin	
		33-5		6	DM	H	N	
	008	34-3	20	32	DM	H	N	Includes ac from 32-1W-34-009

		33-7		1	6-8 Regen	H	HP	
	011	33-1	51	6	DM	T	N	
		33-2		18	Riparian DM	C	N	
	014	33-16	59	6	6-8 Regen	T	EXP	
32-1W-34	008		20					Drop RTV
	009	34-3	71	32	DM	H	N	Includes ac from 32-1W-33,008
	014	11						Drop RTV &B
33-1W-03	005	3-3	105	25	DM	H	N	
		3-4		20	6-8 Regen	H	HP	
33-1W-05	005	5-1	120	38	DM	T	N	usrm 38ac
		5-4		42	Understory Reduction		thin mech.	
	003	5-2	28	14	Understory Reduction		thin mech.	
	001	32-3	17	25	DM	H	N	Included with 32-3
33-1W-07	001	7-3	73	70	Understory Reduction		thin mech..	MT=62ac HT=8ac
	002	7-4	212	129	Understory Reduction		Hand Thin	
		7-7		80	Understory Reduction		thin mech.	
	003	7-1	72	53	Understory Reduction		thin mech..	MT=45ac HT=8ac
	011	7-2	111	82	Understory Reduction		thin mech.	
		7-5		8	Understory Reduction		Hand Thin	
		7-6		9	Understory Reduction		Hand Thin	
33-1W-09	006		41					Drop low volume
	008		12					Drop RTV
33-1W-10	002	10-3	60	8	16-25 Regen.	C	HP	
		10-9		19	16-25 Regen.	H	HP	

	005	10-1	30	8	16-25 Regen.	C	HP	
		10-10		2	16-25 Regen.	H	HP	
		10-11		6	DM	H	N	
	006	10-2	64	12	16-25 Regen.	C	HP	
		10-5		6	16-25 Regen.	H	HP	
		10-6		4	16-25 Regen.	C	HP	
	008	10-4	19	9	DM	T	N	4ac riparian TBL
	506	10-8	7	3	DM	T	N	
	012	10-7	7	6	DM	H	N	
33-1W-15	007	15-1	59	32	DM	H	N	6ac riparian thin
	009	15-3	12	9	DM	H	N	
	013	15-2	25	11	16-25 Regen.	H	HP	
33-1W-17	001	17-2	42	43	Understory Reduction		Hand Thin	1ac from OI 002
	002	17-4	46	6	Understory Reduction		Hand Thin	
	006	17-7	30	30	Understory Reduction		Hand Thin	
33-1W-17	009	17-1	28	24	Understory Reduction		Hand Thin	
33-1W-18	002	18-1	84	19	16-25 Regen.	H	HP	Drop low Volume
		18-2		25	16-25 Regen.	H	HP	
		18-3		5	16-25 Regen	T	EXP	
		18-4		5	16-25 Regen.	H	HP	
33-1W-19	004	S19-1	24	9	6-8 Regen	H	HP	
		S19-2		9	6-8 Regen	T	EXP	
	009		36					Drop low volume
33-1W-21	017	S21-1	10	10	DM	H	N	
	018	S21-2	13	13	DM	H	N	
	019		88					Drop low priority
	011		11					Drop low volume

	013		11					Drop low volume
	014		12					Drop low volume
33-1W-22	008		11					Drop low volume
33-1W-29	001	S29-1	45	2	6-8 Regen	C	HP	approx 10 ac drop due to soil & springs
		S29-5		10	6-8 Regen	T	EXP	
		S29-9		5	6-8 Regen	H	HP	
	006	S29-2	34	34	DM	H	N	
	008	S29-2	39	33	DM	H	N	
		S29-6		8	DM	T	N	
	003	S29-4	22	1	6-8 Regen	C	HP	
	009	S29-3	23	14	DM	C	N	
		S29-7		4	DM	H	N	
		S29-8		4	DM	T	N	
33-1W-30	004	30-1	16	11	DM	T	N	
	005		12					Drop low volume
33-1W-31	001	S31-8	33	32	16-25 Regen	T	EXP	
33-1W-31	009	S31-1	52	48	16-25 Regen	C	HP	
		S31-10		3	16-25 Regen	H	HP	
	003	S31-7	43	11	Understory Reduction		Hand Thin	
				20	Understory Reduction		thin mech.	
	006	S31-4	134	1	16-25 Regen	T	EXP	
		S31-3		5	16-25 Regen	T	EXP	
		S31-2		7	16-25 Regen	C	HP	
		S31-5		9	16-25 Regen	C	HP	
		S31-6		7	16-25 Regen	C	HP	
		S31-9		11	16-25 Regen	T	EXP	
		S31-11		12	16-25 Regen	T	EXP	

34-1W-05	001	S5-1	32	15	16-25 Regen	H	HP	
		S5-2		8	16-25 Regen	T	EXP	
33-2W-01	001	1-5	93	4	DM	H	N	
	004	1-6	55	8	DM	H	N	
		1-8		2	DM	T	N	
	006	1-7	38	32	DM	T	N	usrm 32ac
	011	1-1	45	17	DM	H	N	
		1-3		31	DM	T	N	2ac riparian thin BL, usrm 29ac
	014		8					Drop Soils
33-2W-09	014		8					Drop adjacent stand harvested within 5 years.
	019		14					Drop adjacent stand harvested within 5 years
33-2W-23	003	23-5	31	14	DM	T	N	usrm 14 ac
	006	23-2	23	73	DM	T	N	
	009	23-2	67	14	Riparian DM	TBL	N	
33-2W-23	011	23-2	26	28	Understory Reduction		thin mech.	
	007	23-1	42	36	DM	T	N	
		23-1 & 23-7		36	Understory Reduction		thin mech.	
	004	23-4	6	6	Understory Reduction		thin mech.	
	001		90					Drop treatment not needed at this time

	010		22					Drop treatment not needed at this time
	016		22					Drop treatment not needed at this time
33-2W-25	002	25-1	94	65	Understory Reduction		Hand Thin	
		25-6		2	Understory Reduction		Hand Thin	
		25-7		11	Understory Reduction		thin mech.	
	004	25-2	206	85	Understory Reduction		thin mech.	
		25-5		28	Understory Reduction		thin mech.	
		25-8		50	Understory Reduction		Hand Thin	
		25-9		10	Understory Reduction		Hand Thin	
	003	25-4	37	25	Understory Reduction		thin mech.	
	103	25-3	24	17	Understory Reduction		thin mech.	
33-2W-35	002	35-1	216	39	DM	T	N	
				9	Riparian DM	TBL	N	
		35-3		7	DM	H	N	
	010	35-4	14	10	DM	H	N	
				4	Riparian DM	H	N	
33-2w-35	002	35-5	216	5	DM	C	N	
				5	Riparian DM	C	N	
		35-6		7	DM	H	N	
		35-8		11	DM	H	N	
				12	Riparian DM	H	N	
		35-9		7	DM	H	N	
				2	Riparian DM	H	N	
		35-10		1	DM	H	N	

		35-11		20	Riparian DM	H	N	
				9	DM	H	N	
		35-12		31	DM	H	N	
				53	Riparian DM	H	N	
	005	35-2	16	16	Select Harvest	H	N	
34-2W-01	007	S1-1	13	9	DM	T	N	
		S1-1		3	Riparian DM	TBL	N	
	005	S1-3	17	15	DM	T	N	usrm 15ac
				1	Riparian DM	TBL	N	
	001	S1-8	93	11	DM	C	N	
		S1-6		4	DM	T	N	
		S1-7		14	DM	T	N	usrm 14ac
		S1-7		1	Riparian DM	TBL	N	
		S1-10		13	DM	T	N	
	003	S1-2	4	4	16-25 Regen	T	EXP	
	002	S1-4	12	12	DM	T	N	usrm 12ac
	013	S1-9	36	9	DM	T	N	usrm 9ac
		S1-9		3	Riparian DM	TBL	N	
34-2W-03	001	S3-2	30	8	DM	T	N	
		S3-2		22	Riparian DM	TBL	N	
	002	S3-1	8	6	DM	T	N	
		S3-1		2	Riparian DM	TBL	N	
34-2W-04	001	S4-1	7	5	DM	T	N	
		S4-1		2	Riparian DM	TBL	N	

H= Helicopter Harvest, C= Cable Harvest, T= Tractor Harvest, TBL= Tractor using a Bull Line, DM= Density Management,
US= Unstable Soils, SB= Soils & Stream Buffers, B= Stream Buffers, RTV= Red Tree Voles, N= None, HP= Hand Pile,
EXP= Excavator Pine(Mechanical), MT= Mechanical Thin, HT=Hand Thin, usrm= understory reduction mechanical

ESTIMATED TREATMENT ACRES:

TOTAL OI UNIT ACRES PROPOSED 6700
TOTAL EA UNIT ACRES PROPOSED 2710
EA UNIT ACRES DROPPED 1649

PRESCRIBED TREATMENT

SELECTIVE CUT: 16 ACRES
6-8 REGENERATION HARVEST: 131 ACRES
16-25 REGENERATION HARVEST: 326 ACRES
DENSITY MANAGEMENT: 946 ACRES
DENSITY MANAGEMENT RIPARIAN: 199 ACRES
UNDERSTORY REDUCTION HAND: 436 ACRES
UNDERSTORY REDUCTION MECH: 656 ACRES (SLASHBUSTER)

TRACTOR: 676 ACRES
CABLE: 249 ACRES
HELICOPTER: 788 ACRES

APPENDIX F

Consultation Report for Effects Determinations on Listed Fish Species and Designated Critical Habitat

I. Project Information — March 15, 2002

A. General

Project Name:	Trail Creek Fuels Treatments
BLM District and Resource Area:	Medford District, Butte Falls R.A.
Project Location (6th Field HUC sub-watersheds):	Lower Trail Creek, West Fork Trail Creek, Upper Trail Creek
Project Location (5th Field HUC watersheds):	Trail Creek
Watershed Analyses Names and Dates Completed:	Trail Creek WA, June 1999
NEPA Document ID Number:	OR-110-02-05
Fish Species Considered:	Southern Oregon/Northern California Coho Salmon, SONC Critical Habitat, Essential Fish Habitat
Effects Determination:	May Affect, Not Likely to Adversely Affect (NLAA)

B. Background

The following information for the Trail Creek fuels treatments serves to clearly document the logic tracking and links of the project with Watershed Analysis (WA), the Aquatic Conservation Strategy (ACS), and National Marine Fisheries Service's (NMFS) March 18, 1997 plan-level Biological Opinion (BO). The Trail Creek fuels treatments are covered under a landscape type Environmental Assessment (EA).

The proposed Trail Creek fuels treatments are included within the landscape EA. Fuels treatments occur within one fifth field watershed: Trail Creek; and three sixth field watersheds: Lower Trail Creek, West Fork Trail Creek, and Upper Trail Creek.

For the purposes of this consultation, Essential Fish Habitat is identical to coho Critical Habitat and includes all streams in this project area which are currently or historically accessible to anadromous fish.

This includes most of West Fork Trail Creek to approximately .6 mile above the Forest Service property boundary where a 7 ft. falls prevents anadromous fish passage; Walpole Creek to river mile 1 where a 16 ft. falls blocks passage; Romine Creek to river mile 1 where a house-sized boulder blocks anadromous fish; Canyon Creek to approximately 1 mile upstream below a 16 ft. falls; Walls Creek has 1.5 miles of habitat below a 13 ft. falls; and Trail Creek mainstem to an 8 ft. falls located just above the confluence of Walls Creek. Chicago Creek has a 5 ft. falls just above the mouth at .16 miles so it does not provide Critical Habitat for coho salmon. Paradise Creek is known to be a fish-bearing stream but there is currently no information on the type or quality of habitat it provides. Other tributary streams to Trail Creek are intermittent in duration of flow and do not provide spawning or rearing habitat for salmon.

The Preferred Alternative chosen for this consultation is Alternative 2 in the Trail Creek EA.

C. Summary of the Proposed Action for Trail Creek Watershed

Trail Creek Fuels Treatments
HUC 5: Trail Creek

Fuels Treatments: Lower Trail Creek HUC 6	***Understory Reduction*** 3 acres Slash Buster	No treatment in Riparian Reserves
West Fork Trail Creek HUC 6	***Understory Reduction*** 205 acres Slash Buster	***Understory Thin*** 7 acres Hand Treatment
Upper Trail Creek HUC 6	***Understory Reduction*** 319 acres Slash Buster	***Understory Thin*** 132 acres Hand Treatment

II. Consistency Evaluation

A. Evaluation of Consistency with the Northwest Forest Plan Standards and Guidelines

These projects are located in the Matrix, Administratively Withdrawn, and Riparian Reserve Land Use Allocations (LUA); therefore the S&G's for these LUA's would apply. The following S&G's are required by the NFP:

1). Watershed analysis (WA) must be completed before initiating actions within the Riparian Reserves (B-20). The Trail Creek WA has been completed.

2). Riparian Reserves are specified for five categories of streams or water bodies (C-30). The Riparian Reserve widths are established as 170 feet on each side (340' total) for non-fish bearing streams, and 340 feet on each side (680' total) for fish bearing streams in the project area.

3). S&G RF-2a (C-32) states that ACS objectives are to be met by "minimizing road and

landing locations in Riparian Reserves." No roads or landings would be constructed in the Riparian Reserves (EA pg. 23, D-13.)

B. Evaluation of Consistency with Aquatic Conservation Strategy Objective Components

Four components of the ACS are integral in both the Northwest Forest Plan (NFP, February 1994) and Resource Management Plan (RMP, June 1995) to assist the BLM in developing and implementing projects that are consistent with ACS objectives. These four components are: 1. **Riparian Reserves**; 2. **Key Watersheds**; 3. **Watershed Analysis**; and 4. **Watershed Restoration**. The following narrative addresses how each of these components relates to both the proposed action and the fifth field watershed.

1. RIPARIAN RESERVES

The Trail Creek WA determined the site-potential tree height to be at 170 ft. Although site-potential tree height within the project area has been measured at 155 ft., the Reserve widths have been set according to the WA recommendations. At the project level all Riparian Reserve widths are established as 170 ft. on each side (340 ft. total) for non-fish bearing streams, and 340 ft. on each side (680 ft. total) for fish-bearing streams.

Planned activities in Trail Creek Watershed Riparian Reserves

No new roads or skid road building will occur within the Riparian Reserves for the Trail Creek projects. No treatment will occur within Riparian Reserves on fish-bearing streams. A 50 foot no-treatment buffer will be maintained along all streams. This buffer was determined after visiting the sites to be adequate for protection of bank stability, retention of stream shade, and future recruitment of large wood.

Approximately 139 acres of understory thinning using hand-held equipment for fire hazard reduction will be done within the Riparian Reserves. Fuels treatments (underburning) will not be implemented in Riparian Reserves; however, slash piles created by the proposed thinning in Riparian Reserves will be burned. No mechanical fuel treatments (e.g. slash buster) will occur, and no fire lines will be built or fire retardant chemicals used in the Riparian Reserves. Fuels treatments are expected to occur over a two to four year time period during the fall and spring.

2. KEY WATERSHEDS

Trail Creek is not designated as a Key Watershed.

3. WATERSHED ANALYSIS

The proposed landscape projects occur within the Lower Trail Creek, West Fork Trail Creek, and Upper Trail Creek sub-watersheds. These sub-watersheds are analyzed as a part of the Trail Creek Watershed Analysis. The findings indicate that the project area has an extreme fire hazard rating as a result of fire suppression which has led to a buildup of fuels.

Recommendations support the reduction of stand densities and ladder fuels to reduce the risk of a high-intensity stand replacement fire. The WA findings and recommendations also support encouraging the development of late-seral characteristics in Riparian Reserves to provide increased stream shading, bank stabilization, and future recruitment of large woody debris through silvicultural and fuels treatment practices (Trail Creek WA, pp. 4-17, 4-23).

4. WATERSHED RESTORATION

Restoration recommendations are identified in the Trail Creek WA (pp. 4-15 to 4-25).

Short Term Active Restoration (to be completed within the next 5 years)

The following restoration projects are proposed to be completed within the next 5 years and are consistent with recommendations made within the Trail Creek Watershed Analysis. Analysis of the effects of these projects is included in the Trail Creek EA, except for the boulder weir placement which was analyzed in the West Fork Trail Creek Aquatic Habitat Restoration Project EA, dated April 11, 2001. The projects are planned to be funded through the proposed timber sales or through the Jobs-In-The-Woods program.

Road Decommissioning	13.7 miles
Road Improvement	37.26 miles
Culvert Replacement	16 culverts
Fish Passage Barrier Removal	1 site
Boulder Weir Placement	½ mile of stream
Vegetation restoration projects/fuels treatments (1003 acres total)	429 acres understory thin hand treatments 513 acres understory thin slash buster 61 acres riparian density management

C. Evaluation of Consistency with NEPA Documentation

The Environmental Analysis was completed consistent with NEPA documentation regulations. Within the EA a "no action" alternative, and three "action" alternatives were analyzed through the interdisciplinary team process to determine the effects of each action on the riparian and aquatic ecosystems. Key issues included were analyzed and listed within the EA. Biological and physical elements were analyzed to determine the short and long term effects to the aquatic ecosystem and ensure consistency with ACS objectives. ACS consistency and matrix checklists were completed with input from the interdisciplinary team.

D. Evaluation of Consistency with NMFS' March 18, 1997 Plan-level BO

Conservation Recommendations

The WA completed for the Trail Creek watershed included assessments of the aquatic ecosystem which address salmonid conservation as a main issue. This is consistent with the RMP BO Conservation Recommendation 3, page 47. The completed WA also included recommendations for restoration projects, including projects that promote long-term recovery such as road decommissioning. This is consistent with the RMP BO Conservation Recommendations 5 and 6. The Transportation Management Objectives were completed for the sale area which prioritized roads that were identified for restoration opportunities. Based on the analysis of consistency with ACS Objective 5 contained in this document, Conservation Recommendation 13 is also met. No other Conservation Recommendations specifically apply to this proposed action.

Reasonable and Prudent Measures

During WA and the project design processes the interdisciplinary team used criteria in the NFP Record Of Decision (ROD) to ensure the proposed actions are fully consistent with applicable standards and guidelines and ACS objectives. This is consistent with Reasonable and Prudent Measure 1. The proposed project has been reviewed by the Level 1 Team. This is consistent with Reasonable and Prudent Measure 2. Based on the Aquatic Conservation Strategy evaluation contained in this document, the proposed actions associated with the fuels treatments are not anticipated to cause any adverse effects, with the project ultimately providing some measure of long-term ecosystem recovery. This is consistent with Reasonable and Prudent Measure 4. No other Conservation Recommendations specifically apply to this proposed action.

Terms and Conditions

No Terms and Conditions specifically apply to this proposed action.

Project Design Features

The following Project Design Features (PDFs) have been included in the EA as mitigating measures which will reduce anticipated impacts of the project (EA, pp. 15-16).

1. Lop and scatter, pile activity slash, or underburn activity slash as necessary to reduce or eliminate additional fuel loading. Burn piled slash during the fall and winter to reduce impacts on air quality. All burning would follow the guidelines of the Oregon Smoke Management Plan.

2. Restrict tractor and/or mechanical operations to slopes generally less than 35 percent. In areas where it is necessary to exceed 35 percent, utilize ridge tops where possible.

3. Waterbar all skid roads and firelines during the same operating season, as constructed.

4. Refueling of equipment would be outside of the Riparian Reserves.

5. A Spill Prevention, Control and Countermeasure Plan (SPCC) would be required prior to operation and would include, but not limited to, hazardous substances to be used in the project area and identification of purchasers representatives responsible for supervising initial containment action for releases and subsequent cleanup.

6. All hazardous materials and petroleum products would be stored outside of the Riparian Reserves, in durable containers and located so that any accidental spill would be contained and not drain into the stream system.

7. No firelines would be built, or the use of fire retardant chemicals allowed within the Riparian Reserves, under fuels treatment projects, as proposed.

8. Maintain all snags except those which need to be felled for safety reasons. Those snags that must be felled for safety, would be left on site.

9. No new permanent roads would be constructed within Riparian Reserve lands.

10. All bare soil areas created by burning of slash piles within the riparian reserve would be grass seeded with an appropriate species mixture to reduce erosion.

11. No treatment within 50' of stream channels.

The following is an analysis of ACS indicators which may be affected by this project. All other indicators not specifically mentioned here are not affected by the project.

Riparian Reserves

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. Riparian Reserves within these watersheds have been impacted by agricultural use on private lands which has removed streamside vegetation, and by fire suppression, road building, and past timber harvest practices on public lands.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. It is expected that there may be short term, localized impacts to Riparian Reserve vegetation as a result of the proposed fuels treatments. The thinning treatments will decrease overstocked stand densities and reduce the potential for catastrophic fire to enter the Riparian Reserves. The effects of the proposed actions are expected to result in long term benefits by restoring the historical fire regime within Riparian Reserves where the vegetation consists of suppressed, overstocked stands. By implementing a 50 foot no treatment buffer, bank stability, large wood supply, and stream shade will not be affected. Although the actions will move the indicator in a positive direction, they are not expected to measurably change the indicator, therefore the current condition will be maintained.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. The proposed actions would not be expected to impact the Riparian Reserves at the fifth field scale.

Disturbance History

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. The major disturbances that have occurred within the project area are absence of wildfire, timber harvest, road construction, surface water diversions, and the conversion of lands to agricultural use.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. Approximately 527 acres of mechanical fuels treatments are proposed. Although these actions could result in low level, short term increases in local disturbance levels, in the long term the proposed fuels treatments will begin to restore previous disturbance impacts.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. Through natural recovery of managed forest stands and fuel treatments it is expected that the proposed actions would not contribute to disturbance levels at the fifth field scale.

Substrate

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. Average percentages of sand/silt/organics on the streams surveyed by ODFW exceeded 20%. Gravel percentages within these watersheds were found to be generally low, and areas of bedrock substrate were high on several stream reaches.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. It is expected that small amounts of sediment may be generated from fuels treatments. This could cause localized, short term increases to baseline fine sediment levels in streams adjacent to or downstream from (within approximately 200 feet) the activity. Implementation of Best Management Practices and Project Design Features will minimize these impacts. The anticipated increases would not be of a magnitude that would be expected to affect any downstream beneficial uses or negatively impact listed fish species.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. It is anticipated that small amounts of site-level sediment inputs could occur. However, this is expected to be undetectable at the watershed scale.

Large Woody Debris (LWD)

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. ODFW aquatic inventories within these watersheds found less than the acceptable level of 25 key pieces of large wood per mile.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. Fuels treatments/thinning would be expected to accelerate the development of a late-successional forest capable of delivering large wood to the aquatic ecosystem, and would not reduce the current amount of wood available for recruitment into the stream.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. Fuels treatments would be expected to accelerate the development of a late-successional forest capable of delivering large wood to the aquatic ecosystem. Although these actions would move the indicator in a positive direction, the benefits would occur only at the site

specific level and would not change the indicator from one category to another.

Sediment/Turbidity

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. ODFW surveys have documented high percentages of sand/silt/organics in stream substrates. BLM stream surveys also found high amounts of substrate embeddedness.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. It is expected that small amounts of sediment could be generated from fuels treatments. This could cause short term, localized increases to turbidity levels in streams adjacent to or downstream from (within approximately 200') the activity. Implementation of Best Management Practices and Project Design Features will minimize these impacts. The anticipated increases would not be expected to affect any downstream beneficial uses or negatively impact listed fish species.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. No long term effects are expected to occur that would measurably change the current condition at the fifth field scale.

Change in Peak/Base Flows

Environmental Baseline:

(Upper Trail Creek): AT RISK. Human activities that have altered the peak and base flows include the removal of vegetation by timber harvest and wildfire, road building, and soil compaction. There are no documented water diversions in this subwatershed.

(All Remaining Sixth Fields): NOT PROPERLY FUNCTIONING. In addition to the above-mentioned activities, diversions of water for irrigation purposes have regularly depleted streams within these subwatersheds during the summer months, resulting in many reaches completely drying up in drought years.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. Changes in infiltration, antecedent moisture conditions, interception, and evapotranspiration losses due to fuels treatments are not expected to substantially alter the flow regime. Analysis has shown that over 78% of the area of these watersheds is in a hydrologically recovered condition, and that the proposed fuels treatments would not bring this below acceptable levels.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. No long term effects are expected to occur that would measurably change the current flow regime at the fifth field scale.

I. Dichotomous Key for Making ESA Determination of Effects

Project Name: Trail Creek Timber Sales
Resource Area: Butte Falls Resource Area
Project Status: Future

1. Are there any proposed/listed anadromous salmonids and/or proposed/designated critical habitat in the watershed or downstream from the watershed?

NO.....No effect
YES.....May Affect, **Go to 2**

2. Will the proposed action have any effect whatsoever[1] on the species and/or critical habitat?

NO.....No effect
YES.....**Go to 3**

3. Does the proposed action(s) have the potential to hinder attainment of relevant properly functioning indicators (from section G)?[2]

NO.....**Go to 4**
YES.....Likely to adversely affect

4. Does the proposed action(s) have the potential to result in "take"[3] of proposed/listed anadromous salmonids or destruction/adverse modification of proposed/designated critical habitat?

A. **There is a negligible (extremely low) probability of take of proposed/listed anadromous salmonids or destruction/adverse modification of critical habitat. .....Not likely to adversely affect.**

B. There is more than a negligible probability of take of proposed/listed anadromous salmonids or destruction/adverse modification of critical habitat
.....Likely to adversely affect[4]

[1] "Any effect whatsoever" includes small effects, effects that are unlikely to occur, and beneficial effects. I.e., a "no effect" Determination is only appropriate if the proposed action will literally have no effect whatsoever on the species and/or critical habitat, not a small effect, an effect that is unlikely to occur, or a beneficial effect.

[2] We acknowledge there may be site level degrades associated with the project, but there is a negligible potential that the project will hinder attainment of relevant properly functioning indicators.

[3] "Take" - The ESA (Section 3) defines take as "to harass, harm, pursue, hunt, shoot, wound, trap, capture, collect or attempt to engage in any such conduct". The USFWS further defines "harm" as "significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering", and "harass" as "actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering".

[4] Document of expected adverse effect follows this key.

Biologist: Jayne LeFors **Date:** 4/15/02

Conclusion

Based on the above review, I find the proposed project is consistent with Watershed Analysis recommendations and findings, applicable Northwest Forest Plan Standards and Guidelines, NEPA Documentation, and applicable aspects of NMFS' March 18, 1997 Biological Opinion. In addition, I find the proposed project does not hinder or prevent attainment of Aquatic Conservation Strategy objectives at the 5th field watershed scale over the long-term.

Lance Nimmo _____
Area Manager, Butte Falls Resource Area

APPENDIX F

Consultation Report for Effects Determinations on Listed Fish Species and Designated Critical Habitat

I. Project Information — March 15, 2002

A. General

Project Name:	Trail Creek Timber Sales
BLM District and Resource Area:	Medford District, Butte Falls R.A.
Project Location (6th Field HUC sub-watersheds):	Lower Trail Creek, West Fork Trail Creek, Upper Trail Creek, Upper Evans Creek, Upper Elk Creek (S. Umpqua)
Project Location (5th Field HUC watersheds):	Trail Creek, Evans Creek, Elk Creek (S. Umpqua)
Watershed Analyses Names and Dates Completed:	Trail Creek WA, June 1999; East Evans Creek WA, March 1996; Elk Creek WA, October 1996
NEPA Document ID Number:	OR-110-02-05
Fish Species Considered:	Southern Oregon/Northern California Coho Salmon, SONC Critical Habitat, Essential Fish Habitat
Effects Determination:	May Affect, Not Likely to Adversely Affect (NLAA)

B. Background

The following information for the Trail Creek timber sales serves to clearly document the logic tracking and links of the project with Watershed Analysis (WA), the Aquatic Conservation Strategy (ACS), and National Marine Fisheries Service's (NMFS) March 18, 1997 plan-level Biological Opinion (BO). The Trail Creek timber sales are covered under a landscape type Environmental Assessment (EA).

The proposed Trail Creek timber sales are included within the landscape EA. Timber harvest occurs within three fifth field watersheds: Trail Creek, Evans Creek, and Elk Creek (S. Umpqua); and five sixth field watersheds: Lower Trail Creek, West Fork Trail Creek, Upper Trail Creek, Upper Evans Creek, and Upper Elk Creek.

Also included in the EA are road decommissioning, road renovation, temporary road closure (gating), and culvert replacement. Road work that will be done under the timber sale contracts is included in this BA.

For the purposes of this consultation, Essential Fish Habitat is identical to coho Critical Habitat and includes all streams in this project area which are currently or historically accessible to anadromous fish. This includes most of West Fork Trail Creek to approximately .6 mile above the Forest Service property boundary where a 7 ft. falls prevents anadromous fish passage; Walpole Creek to river mile 1 where a 16 ft. falls blocks passage; Romine Creek to river mile 1 where a house-sized boulder blocks anadromous fish; Canyon Creek to approximately 1 mile upstream below a 16 ft. falls; Walls Creek has 1.5 miles of habitat below a 13 ft. falls; and Trail Creek mainstem to an 8 ft. falls located just above the confluence of Walls Creek. Chicago Creek has a 5 ft. falls just above the mouth at .16 miles so it does not provide Critical Habitat for coho salmon. Paradise Creek is known to be a fish-bearing stream but there is currently no information on the type or quality of habitat it provides. Other tributary streams to Trail Creek are intermittent in duration of flow and do not provide spawning or rearing habitat for salmon.

The harvest units proposed within the Evans Creek watershed are located approximately 1 mile upstream of known fish use on Chapman Creek. Unidentified trout species were found to occupy the creek up to approximately river mile 1.2. The average stream gradient at this point is 7.7 % according to ODFW aquatic habitat inventories, which would effectively act as a barrier to coho salmon use. The harvest units proposed within the Elk Creek watershed are located approximately 2.5 miles upstream of known fish use. The average stream gradient at this point is 10 % according to USGS quad maps. This gradient would be considered a barrier to coho salmon use.

The Preferred Alternative chosen for this consultation is Alternative 2 in the Trail Creek EA.

C. Summary of the Proposed Action for Trail Creek Watershed

Trail Creek Timber Sale
HUC 5: Trail Creek

HUC 6	Planned Activities Outside Riparian Reserves (Acres or Miles)	Planned Activities Within Riparian Reserves (Acres or Miles)

Harvest Information: Lower Trail Creek HUC 6	***Density Management/Thin*** 105 acres Total: 80 acres Tractor 25 acres Cable ***SGFMA Regeneration Harvest*** 161 acres Total: 72 acres Tractor 71 acres Cable 18 acres Helicopter	***Density Management/Thin*** 8 acres Bull-line
West Fork Trail Creek HUC 6	***Density Management/Thin*** 305 acres Total: 205 acres Tractor 100 acres Helicopter ***Select Cut*** 16 acres Helicopter ***SGFMA Regeneration Harvest*** 49 acres Helicopter ***NGFMA Regeneration Harvest*** 36 acres Total: 19 acres Tractor 3 acres Cable 14 acres Helicopter	***Density Management/Thin*** 16 acres Bull-line
HUC 6	**Planned Activities Outside Riparian Reserves (Acres or Miles)**	**Planned Activities Within Riparian Reserves (Acres or Miles)**

Upper Trail Creek HUC 6	***Density Management/Thin*** 365 acres Total: 102 acres Tractor 40 acres Cable 223 acres Helicopter ***SGFMA Regeneration Harvest*** 116 acres Total: 7 acres Tractor 68 acres Cable 41 acres Helicopter ***NGFMA Regeneration Harvest*** 99 acres Total: 37 acres Tractor 62 acres Helicopter	***Density Management/Thin*** 38 acres Total: 13 acres Bull-line 22 acres Cable 6 acres Helicopter

HUC 6	Planned Activities Outside Riparian Reserves (Acres or Miles)	Planned Activities Within Riparian Reserves (Acres or Miles)
Road Information: Lower Trail Creek HUC 6	***Improvement/Renovation*** 7.36 miles of road ***Temporary Closure*** 2 miles of road ***Partial Decommission*** .33 miles of road ***Full Decommission*** 1.63 miles of road ***Temporary Road Construction*** .21 miles of road	***Improvement/Renovation*** 2.21 miles of road ***Gating*** .42 miles of road ***Partial Decommission*** .18 miles of road ***Full Decommission*** .92 miles of road
West Fork Trail Creek HUC 6	***Improvement/Renovation*** 9.92 miles of road ***Temporary Closure*** 2.64 miles of road ***Partial Decommission*** .4 miles of road ***Full Decommission*** 2.11 miles of road ***Temporary Road Construction*** .14 miles of road	***Improvement/Renovation*** 3.63 miles of road ***Gating*** 1.09 miles of road ***Partial Decommission*** .11 miles of road ***Full Decommission*** .78 miles of road
Upper Trail Creek HUC 6	***Improvement/Renovation*** 9.75 miles of road ***Temporary Closure*** .74 miles of road ***Partial Decommission*** .7 miles of road ***Full Decommission*** 1.2 miles of road ***Temporary Road Construction*** .6 miles of road	***Improvement/Renovation*** 4.31 miles of road ***Gating*** .08 miles of road ***Partial Decommission*** .23 miles of road ***Full Decommission*** .19 miles of road

HUC 5: Evans Creek

HUC 6	Planned Activities Outside Riparian Reserves (Acres or Miles)	Planned Activities Within Riparian Reserves (Acres or Miles)
Harvest Information: **Upper Evans Creek HUC 6**	***Density Management/Thin*** **146 acres Total:** **58 acres** **5 acres Cable** **83 acres Helicopter**	***Density Management/Thin*** 131 acres Total: 35 acres Bull-line 5 acres Cable 91 acres Helicopter
Road Information: **Upper Evans Creek HUC 6**	***Improvement/Renovation* 1.25 miles of road**	

HUC 5: Elk Creek (S. Umpqua)

HUC 6	Planned Activities Outside Riparian Reserves (Acres or Miles)	Planned Activities Within Riparian Reserves (Acres or Miles)
Harvest Information: **Upper Elk Creek HUC 6**	***Density Management/Thin*** **34 acres Total:** **2 acres Tractor** **11 acres Cable** **21 acres Helicopter**	***Density Management/Thin*** 15 acres Helicopter
Road Information: **Upper Elk Creek HUC 6**	***Improvement/Renovation* 1.06 miles of road**	***Improvement/Renovation*** .09 miles of road

II. Consistency Evaluation

A. Evaluation of Consistency with the Northwest Forest Plan Standards and Guidelines

These projects are located in the Matrix, Administratively Withdrawn, and Riparian Reserve Land Use Allocations (LUA); therefore the S&G's for these LUA's would apply. The following S&G's are required by the NFP:

1). Watershed analysis (WA) must be completed before initiating actions within the Riparian Reserves (B-20). The Trail Creek, East Evans Creek, and Elk Creek WAs have been completed.

2). Riparian Reserves are specified for five categories of streams or water bodies (C-30). The Riparian Reserve widths are established as 170 feet on each side (340' total) for non-fish bearing streams, and 340 feet on each side (680' total) for fish bearing streams in the project area.

3). S&G RF-2a (C-32) states that ACS objectives are to be met by "minimizing road and landing locations in Riparian Reserves." No roads or landings would be constructed in the Riparian Reserves (EA pg. 23, D-13.)

B. Evaluation of Consistency with Aquatic Conservation Strategy Objective Components

Four components of the ACS are integral in both the Northwest Forest Plan (NFP, February 1994) and Resource Management Plan (RMP, June 1995) to assist the BLM in developing and implementing projects that are consistent with ACS objectives. These four components are: 1. **Riparian Reserves**; 2. **Key Watersheds**; 3. **Watershed Analysis**; and 4. **Watershed Restoration**. The following narrative addresses how each of these components relates to both the proposed action and the fifth field watershed.

1. RIPARIAN RESERVES

The East Evans Creek Watershed Analysis used the interim Riparian Reserve widths of 150 ft. for non-fish and 300 ft. for fish-bearing streams established in the Northwest Forest Plan. The Trail Creek and Elk Creek WAs determined the site-potential tree height to be at 170 ft. Although site-potential tree height within the project area has been measured at 155 ft., the Reserve widths have been set according to the WA recommendations. At the project level all Riparian Reserve widths in all watersheds are established as 170 ft. on each side (340 ft. total) for non-fish bearing streams, and 340 ft. on each side (680 ft. total) for fish-bearing streams.

Planned activities in Trail Creek Watershed Riparian Reserves

No new roads or skid road building will occur within the Riparian Reserves for the Trail Creek projects. No harvest will occur within Riparian Reserves on fish-bearing streams. A 50 foot no-treatment buffer will be maintained along all streams. This buffer was determined after visiting the sites to be adequate for protection of bank stability, retention of stream shade, and future recruitment of large wood.

Density management/understory thinning is proposed on approximately 62 acres within the Riparian Reserves. This would occur in densely stocked, even-aged stands where the treatment would benefit growth rates and accelerate the development of late-successional stand characteristics. A 50 foot no-treatment buffer will be maintained along all streams. Harvest would be accomplished using either helicopter, cable, or bull-line from equipment located outside the Riparian Reserve boundaries. No trees >20" dbh will be harvested. Canopy closure will be retained at a minimum of 60% after harvest. Within the 120 ft. riparian treatment areas, the number of trees left per acre ranges from to 52 to 86. A total of 29 acres per mile of stream would be treated within the 120 ft. treatment areas, or 14.5 acres on either side of the stream. This would equate to a range of from 1,508 to 2,494 trees per mile of stream retained in these units, which would provide more than an adequate supply for future large wood recruitment. This is in addition to the trees left within the 50 ft. no treatment buffer.

Road improvement and decommissioning are also planned as part of this project. Road decommissioning would provide and restore long term benefits to the stream corridor which would promote an increase in canopy closure and riparian vegetation, decrease in sediment delivery, and improve the functioning condition of the Riparian Reserve. A total of 1.89 miles of road within Riparian Reserves are planned for full decommissioning, .52 miles will be partially decommissioned, 1.59 miles will be temporarily blocked by gating, and 10.15 miles will be improved or renovated for this project. Project Design Features are listed on pages 11-13 of this BA which will be implemented to reduce the risk of sediment reaching streams. All work will be done during the dry season when many streams in this watershed, including portions of the mainstem and West Fork of Trail Creek, are no longer flowing. Roads scheduled for full or partial decommissioning would be unlikely to transmit sediment to Critical Habitat, which is located at least ½ mile away from these activities.

Pump chance improvement will occur at 4 sites in this watershed. This activity would include dredging of sediment from the pool area and disposal of waste outside of the Riparian Reserves. None of the pump chances proposed for improvement are located on fish-bearing streams, and all are located at least ½ mile from coho Critical Habitat. Two of the pump chances are located approximately 4 miles from Critical Habitat, one is located on an intermittent stream, and one is fed by ditchline runoff located off-channel. Timing of the improvements would happen during the dry season when stream flows are lowest and the risk for sediment delivery would be minimal.

Replacement of culverts to accommodate 100-year flood events is planned on 6 culverts that are within ½ mile of Critical Habitat. Two of these six are located on fish-bearing streams but are not within Critical Habitat; the remaining four are on intermittent, non-fish streams. Project Design Features developed for culvert replacement/removal are listed on pp. 12-14 of this BA and will be implemented to reduce any impacts to negligible levels.

An existing rock quarry will be further developed within the Riparian Reserve on a fish-bearing

tributary to Walls Creek located in 33S-1W-5. The quarry is approximately 50 ft. from the stream at its closest point, and a road is located between the quarry and the stream. Mitigating measures are listed as specific rock quarry development Project Design Features on p. 14 of this BA.

Planned activities in Evans Creek Watershed Riparian Reserves

Density management/understory thinning is proposed on approximately 131 acres within the Riparian Reserves. This would occur in densely stocked, even-aged stands where the treatment would benefit growth rates and accelerate the development of late-successional stand characteristics. Harvest would be accomplished using either helicopter, cable, or bull-line from equipment located outside the Riparian Reserve boundaries. Fuels treatments (underburning) will not be implemented in Riparian Reserves; however, slash piles created by the proposed thinning in Riparian Reserves will be burned. A 50 foot no-treatment buffer will be maintained along all streams. There are no fish-bearing streams within the project area. No trees >20" dbh will be harvested. Canopy closure will be retained at a minimum of 60% after harvest. Within the 120 ft. riparian treatment areas, the number of trees left per acre ranges from to 118 to 1,050. A total of 29 acres per mile of stream would be treated within the 120 ft. treatment areas, or 14.5 acres on either side of the stream. This would equate to a range of from 3,422 to 30,450 trees per mile of stream retained in these units, which would provide more than an adequate supply for future large wood recruitment. This is in addition to the trees left within the 50 ft. no treatment buffer.

Planned activities in Elk Creek Watershed Riparian Reserves

Density management/understory thinning is proposed on approximately 15 acres within the Riparian Reserves. This would occur in densely stocked, even-aged stands where the treatment would benefit growth rates and accelerate the development of late-successional stand characteristics. Harvest would be accomplished by using a helicopter. Fuels treatments (underburning) will not be implemented in Riparian Reserves; however, slash piles created by the proposed thinning in Riparian Reserves will be burned. A 50 foot no-treatment buffer will be maintained along all streams. There are no fish-bearing streams within the project area. No trees >20" dbh will be harvested. Canopy closure will be retained at a minimum of 60% after harvest. Within the 120 ft. riparian treatment areas, the number of trees left per acre ranges from to 136 to 260. A total of 29 acres per mile of stream would be treated within the 120 ft. treatment areas, or 14.5 acres on either side of the stream. This would equate to a range of from 3,994 to 7,540 trees per mile of stream retained in these units, which would provide more than an adequate supply for future large wood recruitment. This is in addition to the trees left within the 50 ft. no treatment buffer.

2. KEY WATERSHEDS

The project area in the Elk Creek drainage is located within a Key Watershed. The silvicultural prescription for the Elk Creek harvest is consistent with the WA recommendations (Elk Creek

WA, pp.169-170). Neither Trail Creek nor Evans Creek are designated as Key Watersheds.

3. WATERSHED ANALYSIS

The proposed landscape projects occur within the Lower Trail Creek, West Fork Trail Creek, Upper Trail Creek, Upper Evans Creek, and Upper Elk Creek sub-watersheds. These sub-watersheds are analyzed as a part of the Trail Creek, East Evans Creek, and Elk Creek Watershed Analyses. The findings indicate that the project area has an extreme fire hazard rating as a result of fire suppression which has led to a buildup of fuels. Recommendations support the reduction of stand densities and ladder fuels to reduce the risk of a high-intensity stand replacement fire. The WA findings and recommendations also support encouraging the development of late-seral characteristics in Riparian Reserves to provide increased stream shading, bank stabilization, and future recruitment of large woody debris through silvicultural and fuels treatment practices (Trail Creek WA, pp. 4-17, 4-23).

4. WATERSHED RESTORATION

Restoration recommendations are identified in the Trail Creek WA (pp. 4-15 to 4-25).

Short Term Active Restoration (to be completed within the next 5 years)

The following restoration projects are proposed to be completed within the next 5 years and are consistent with recommendations made within the Trail Creek Watershed Analysis. Analysis of the effects of these projects is included in the Trail Creek EA, except for the boulder weir placement which was analyzed in the West Fork Trail Creek Aquatic Habitat Restoration Project EA, dated April 11, 2001. The projects are planned to be funded through the proposed timber sales or through the Jobs-In-The-Woods program.

Road Decommissioning	13.7 miles
Road Improvement	37.26 miles
Culvert Replacement	16 culverts
Fish Passage Barrier Removal	1 site
Boulder Weir Placement	½ mile of stream
Vegetation restoration projects/fuels treatments (1003 acres total)	429 acres understory thin hand treatments 513 acres understory thin slash buster 61 acres riparian density management

C. Evaluation of Consistency with NEPA Documentation

The Environmental Analysis was completed consistent with NEPA documentation regulations. Within the EA a "no action" alternative, and three "action" alternatives were analyzed through the interdisciplinary team process to determine the effects of each action on the riparian and

aquatic ecosystems. Key issues included were analyzed and listed within the EA. Biological and physical elements were analyzed to determine the short and long term effects to the aquatic ecosystem and ensure consistency with ACS objectives. ACS consistency and matrix checklists were completed with input from the interdisciplinary team.

D. Evaluation of Consistency with NMFS' March 18, 1997 Plan-level BO

Conservation Recommendations

The WAs completed for the Trail Creek, East Evans Creek, and Elk Creek watersheds included assessments of the aquatic ecosystem which address salmonid conservation as a main issue. This is consistent with the RMP BO Conservation Recommendation 3, page 47. The completed WAs also included recommendations for restoration projects, including projects that promote long-term recovery such as road decommissioning. This is consistent with the RMP BO Conservation Recommendations 5 and 6. The Transportation Management Objectives were completed for the sale area which prioritized roads that were identified for restoration opportunities. Based on the analysis of consistency with ACS Objective 5 contained in this document, Conservation Recommendation 13 is also met. No other Conservation Recommendations specifically apply to this proposed action.

Reasonable and Prudent Measures

During WA and the project design processes the interdisciplinary team used criteria in the NFP Record Of Decision (ROD) to ensure the proposed actions are fully consistent with applicable standards and guidelines and ACS objectives. This is consistent with Reasonable and Prudent Measure 1. The proposed project has been reviewed by the Level 1 Team. This is consistent with Reasonable and Prudent Measure 2. Based on the Aquatic Conservation Strategy evaluation contained in this document, the proposed actions associated with the landscape projects may result in short term, localized adverse affects, with the project ultimately providing some measure of long-term ecosystem recovery. This is consistent with Reasonable and Prudent Measure 4. All road related work would be completed during the dry season and utilize applicable Best Management Practices. This is consistent with Reasonable and Prudent Measures 5 and 6. Any temporary roads constructed for project transportation would be decommissioned following the project. This is consistent with Reasonable and Prudent Measure 8. No other Conservation Recommendations specifically apply to this proposed action.

Terms and Conditions

All temporary road construction under the proposed action is limited to stable areas or ridgetops, and would be decommissioned following the completion of the project. This is consistent with the Term and Condition 8.b. All road renovation and decommissioning activities that are identified as mitigation are included under the same timber sale contract. This

is consistent with Term and Condition 8.e.ii. No other Terms and Conditions specifically apply to this proposed action.

Project Design Features

The following Project Design Features (PDFs) have been included in the EA as mitigating measures which will reduce anticipated impacts of the project (EA, pp. 15-16).

1. Minimize the total number of skid roads by designating skid roads with an average of 150' spacing. Avoid creating new skid roads and utilize existing roads where feasible in order to minimize ground disturbance, especially in thinning and selective cut units where no tillage is proposed. Rip skid roads as identified.

2. All tractor yarding, soil ripping, and excavator piling operations would be restricted from October 15 to May 15 or when soil moisture exceeds 25 percent. Rip identified access spur roads to a depth of 18" utilizing a subsoiler or winged-toothed ripper.

3. Lop and scatter, pile activity slash, or underburn activity slash as necessary to reduce or eliminate additional fuel loading. Burn piled slash during the fall and winter to reduce impacts on air quality. All burning would follow the guidelines of the Oregon Smoke Management Plan.

4. Restrict tractor and/or mechanical operations to slopes generally less than 35 percent. In areas where it is necessary to exceed 35 percent, utilize ridge tops where possible.

5. Waterbar all skid roads and firelines during the same operating season, as constructed.

6. All road renovation, closure, and/or improvement work would be restricted from October 15 to May 15 or when soil moisture exceeds 25 percent.

7. Block or barricade identified roads after use and before beginning of rainy season (generally October 15).

8. Road within Riparian Reserves identified for decommissioning would be seeded with native seed, if available, and mulched in the same operational season they are decommissioned.

9. Roads identified for decommissioning would be seeded in the same operational season.

10. Skid roads would be located to minimize disturbance to coarse woody debris. Where skid roads encounter large, coarse woody debris (CWD) a section of the CWD is to be bucked out for equipment access. The remainder of the CWD is to be left in place and not disturbed.

11. Refueling of equipment would be outside of the Riparian Reserves.

12. A Spill Prevention, Control and Countermeasure Plan (SPCC) would be required prior to operation and would include, but not limited to, hazardous substances to be used in the project area and identification of purchasers representatives responsible for supervising initial containment action for releases and subsequent cleanup.

13. All hazardous materials and petroleum products would be stored outside of the Riparian Reserves, in durable containers and located so that any accidental spill would be contained and not drain into the stream system.

14. No application of dust abatement materials such as lignin, Mag-Chloride, and/or approved petroleum based dust abatement products during or just before wet weather and at stream crossings or other locations that could result in direct delivery to a water body (typically not within 25' of a water body or stream channel.)

15. Seasonal restriction and road closure in designated Jackson County Cooperative Travel Management Area (JACTMA) from October 15 to April 30.

16. Maintain all snags except those which need to be felled for safety reasons. Those snags that must be felled for safety, would be left on site.

17. No new permanent roads would be constructed within Riparian Reserve lands.

18. All bare soil areas created by burning of slash piles within the riparian reserve would be grass seeded with an appropriate species mixture to reduce erosion.

19. No treatment within 50' of stream channels.

20. Location of waste stockpile and borrow sites resulting from road construction or reconstruction should be at least one site potential tree length from a stream where sediment-laden runoff can be confined.

21. When removing a culvert, pull back the slopes to the natural slope or at least 1:1 to minimize sloughing, erosion and potential for the stream to undercut streambanks during periods of high streamflows.

In addition to these PDFs, the following PDFs were developed by Medford District fisheries and engineering specialists to reduce impacts of the culvert removal/replacement work and have been incorporated into the EA.

- At all stream crossings the approach should be as near a right angle to the stream as possible to minimize disturbance to streambanks and riparian habitat.

- Road crossings on all fish-bearing streams should be designed to **maintain natural streambed substrate and site gradient** where feasible, while minimizing long term maintenance needs; the specific design should also be based on expected longevity and economics.

- **Width of a crossing structure** should be at least as wide as the mean bankfull width at the crossing site; to be measured by a qualified professional.

- **Divert the stream around the work area** in a manner (e.g. a pipe or lined ditch) that will minimize stream sedimentation. Require the contractor to submit an approved plan for water diversion before instream work begins. The diverted stream should not be returned to the channel through the project area until all instream work has been completed. The resource area fish biologist should be consulted before deviating from this practice. If it is impractical to dewater a stream channel due to factors such as deep channel incision or high gradient, strongly consider scheduling the work toward the end of the instream work period, rather than at the beginning.

- **Reduce movement of sediment downstream** from the project site with the use of straw bales, geotextile fabric or coconut fiber logs/bales immediately downstream of the work area

- **Wet or green (wet: fresh enough to flow; green: hardened but less than 21 days old) cement,** new or old asphalt has acute and chronic adverse effects on aquatic life and should not be allowed to enter a stream. This includes water used to clean tools and wash out cement trucks after delivering material. Again, if the stream is dewatered before construction begins, aquatic species should be unaffected.

- To **restore streambed habitat complexity inside new crossing structures**, consider lining the bottom of the crossing structure with 1-3 foot diameter boulders. (The streambed is usually uniform following preparation of a new site or when replacing an existing pipe. Boulders that are placed in replacement pipes must be large (high) enough so that they are not buried by streambed substrate that may have been deposited immediately upstream of the inlet of the original pipe.) Use a prediction model to determine the size of boulder needed to ensure stability at the estimated 100 year peak flow.

- **Fill material over a stream crossing structure should be stabilized** as soon as possible after construction has been completed, normally before October 15. Work should be temporarily suspended if rain saturates soils to the extent that there is potential for environmental damage, including movement of sediment from the road to the stream.

- **Bare soil areas** should be mulched with hydro-seeding, weed-free straw, bark chips, etc and native seed or other approved seed mix prior to fall rain or when moisture conditions are appropriate to discourage invasion of noxious plant species and to reduce soil erosion.

- **Location of waste stockpile and borrow sites** should be at least one site potential tree length from a stream where sediment-laden runoff can be confined unless there is no way for sediment to move off-site.

- The contractor should be notified that he is responsible for meeting all **state and federal requirements for maintaining water quality.** Standard contract stips should include the following:

  - Heavy equipment should be inspected and cleaned if necessary before moving onto the project site in order to remove oil and grease, noxious weeds and excessive soil.

  - Hydraulic fluid and fuel lines on heavy mechanized equipment must be in proper working condition in order to minimize leakage into streams.

  - Waste diesel, oil, hydraulic fluid and other hazardous materials and contaminated soil near the stream should be removed from the site and disposed of in accordance with DEQ regulations. Areas that have been saturated with toxic materials should be excavated to a depth of 12 inches beyond the contaminated material or as required by DEQ.

  - Equipment refueling would be conducted within a confined area outside the stream channel such that there is minimal chance that toxic materials could enter a stream.

  - Use spill containment booms or other equipment as required by DEQ.

  - Equipment containing toxic fluids should not be stored in a stream channel at any time.

- Consider constructing a **control weir** or **rock apron** at a culvert outlet as insurance that water velocity through a new culvert will not cause "perching": (a) a **"control weir**" (log or boulders) (Porior 00) is installed about 3 channel widths downstream of the culvert to back water into the pipe outlet (b) an **rock apron** consists of burying 1-3 foot diameter rock at the culvert outlet across the stream channel and downstream for a distance equal to 2-3 culvert diameters such that tops of boulders are the same elevation as the bottom of the culvert.

- When designing a **temporary stream crossing,** consider using the following materials: (a) 1 to 3 inch diameter washed, uncrushed river rock as fill over the culvert (the gravel size will provide good spawning substrate for steelhead and salmon after the pipe is removed). One inch minus aggregate and soil are unacceptable fill material around a temporary culvert (b) geotextile fabric over the river rock , and (c) surface aggregate when needed. Surface aggregate should be removed from the channel before pulling the culvert and disposed of properly so that fines will not enter the stream.

- After a temporary culvert crossing is removed, leave river rock in the streambed and breach the fill

rock to allow free movement of water. Failure to breach the gravel may cause the stream to jump the channel onto the road surface during peak flows.

- **When removing a culvert and not replacing it,** pull back the slopes to the natural slope or at least 1:1 to minimize sloughing, erosion and potential for the stream to undercut streambanks during periods of high streamflow. Make sure that the entire bankfull width stream channel (as measured by a qualified professional) is opened to peak flows, not just the area previously occupied by the culvert, which may have been undersized. When culvert fill depth exceeds capability of equipment to remove all of it, consider placing a rock blanket in the bottom of the draw to slow the erosion rate.

The following PDFs were added specifically for the rock quarry development:

- Seasonally restrict all quarry development, rock crushing and rock hauling operations from Oct. 15 to May 15 or when soil moisture conditions or rainstorms could cause transport of sediments to nearby stream channels.

-Construct silt fences or other preventative structures (diversion ditches, settling ponds) to prevent the potential for runoff from quarry operations into nearby stream channels.

-Grass seed and/or plant native vegetation to stabilize all exposed soil areas including overburden from quarry operations.

-Locate all waste disposal areas away from riparian reserves..

- If explosives are necessary in the quarry development, then require a detailed blasting plan that addresses minimizing the amount of rock material the may enter any adjacent stream channels.

-Apply all appropriate measures to ensure that all fluids or hazardous materials from heavy equipment operations do not enter stream channels.

No timber harvest activities which are planned outside of Riparian Reserves will have any direct effect upon coho salmon or Critical Habitat. All indirect effects will be minimized by implementing the appropriate PDFs and BMPs. No adverse effects are expected from any of the proposed harvest activities.

The following is an analysis of ACS indicators which may be affected by this project. All other indicators not mentioned specifically here are not affected by the project.

Riparian Reserves

Environmental Baseline:

(All Trail Creek and Elk Creek Sixth Fields): NOT PROPERLY FUNCTIONING. Riparian

Reserves within these watersheds have been impacted by agricultural use on private lands which has removed streamside vegetation, and by fire suppression, road building, and past timber harvest practices on public lands.
(Upper Evans Sixth Field): FUNCTIONING AT RISK. BLM stream surveys have found that the majority of Riparian Reserves are in a Functioning At Risk condition.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. It is expected that there may be short term, localized impacts to Riparian Reserve vegetation as a result of the proposed density management/thinning. The thinning treatments will decrease overstocked stand densities and reduce the potential for catastrophic fire to enter the Riparian Reserves. The effects of the proposed actions are expected to result in long term benefits by restoring the historical fire regime within Riparian Reserves where the vegetation consists of suppressed, overstocked stands. By implementing a 50 foot no treatment buffer, bank stability, large wood supply, and stream shade will not be affected. Although the actions will move the indicator in a positive direction, they are not expected to measurably change the indicator, therefore the current condition will be maintained.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. The proposed actions would not be expected to impact the Riparian Reserves at the fifth field scale.

Disturbance History

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. The major disturbances that have occurred within the project area are absence of wildfire, timber harvest, road construction, surface water diversions, and the conversion of lands to agricultural use.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. Disturbance resulting from the harvest of timber could be expected on approximately 56 acres which are proposed for NGFMA regeneration harvest by tractor yarding. This includes 37 acres that would occur in the Upper Trail 6th field and 19 acres in the West Fork Trail 6th field. However, analysis has shown that hydrologic recovery would not be measureably affected and would remain within acceptable ranges. Approximately 4.94 miles of roads would be fully decommissioned, reducing high road densities within the project area. Although these actions could result in low level, short term increases in local disturbance levels, in the long term the reduction of roads from the proposed road decommissioning and the proposed silvicultural treatments will begin to restore previous disturbance impacts.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. Through natural recovery of managed forest stands and road decommissioning and improvement, it is expected that the proposed actions would not contribute to disturbance levels at the fifth field scale.

Road Density and Location

Environmental Baseline:
(All Sixth Fields): NOT PROPERLY FUNCTIONING. Road densities are high in these sub-watersheds, averaging 5.5 miles/square mile.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. Temporary operator spurs totaling 1.2 miles of new road construction would be built to access some harvest units, but would be fully decommissioned after use. Approximately 4.94 miles of roads will be fully decommissioned as part of the proposed projects, including 1.89 miles in Riparian Reserves. Reducing the road densities by an average of .2 miles/square mile within these watersheds would move the indicator in a positive direction, but would not be significant enough to move it from "not properly functioning" to "at risk".
Fifth Field Effect:
(All Fifth Fields): MAINTAIN. Although reducing the road density within these watersheds would move the indicator in a positive direction, it is not expected to be enough to change from "not properly functioning" to "at risk".

Increase in Drainage Network
Environmental Baseline:
(All Sixth Fields): NOT PROPERLY FUNCTIONING. Water diversions, roads, soil compaction, and inadequate or misplaced culverts have led to an alteration of the drainage network within the watershed. This alteration in the drainage network has contributed to a general increase in road-related sediment reaching the streams, which can result in a loss of spawning habitat.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. Approximately 1.2 miles of new temporary spur roads would be constructed under the proposed projects, but would be fully decommissioned following use. Decommissioning 4.94 miles of existing permanent roads will result in a localized decrease in road related impacts and restore flows to the natural stream channels. Although these actions would not be considered of a magnitude that would measurably change baseline conditions at the sixth field scale, they are beneficial and would thus move the indicator in a positive direction.
Fifth Field Effect:
(All Fifth Fields): MAINTAIN. Decommissioning existing permanent roads in the watershed will result in a localized decrease in road related impacts and restore flows to the natural stream channels. Although these actions would not be considered of a magnitude that would measurably change baseline conditions at the fifth field, they are beneficial and would thus move the indicator in a positive direction.

Substrate
Environmental Baseline:
(All Sixth Fields): NOT PROPERLY FUNCTIONING. Average percentages of sand/silt/organics on the streams surveyed by ODFW exceeded 20%. Gravel percentages within these watersheds were found to be generally low, and areas of bedrock substrate were high on several stream reaches.

Sixth Field Effect:
(All Sixth Fields): MAINTAIN. It is expected that small amounts of sediment may be generated from road related activities and harvest related activities (hauling/increased truck traffic). This could cause localized, short term increases to baseline fine sediment levels in streams adjacent to or downstream from (within approximately 200 feet) the activity. Implementation of Best Management Practices and Project Design Features will minimize these impacts. The anticipated increases would not be of a magnitude that would be expected to affect any downstream beneficial uses or negatively impact listed fish species. Although road decommissioning activities may create short term, localized increases in sediment levels within the project area, the long term benefits of reducing the road density and thus sediment levels provide long term decreases in road-related sediment runoff. It is expected that decreases in this type of sediment source would improve substrate conditions within these areas, but would not be enough to move the indicator.
Fifth Field Effect:
(All Fifth Fields): MAINTAIN. It is anticipated that small amounts of site-level sediment inputs could occur. However, this is expected to be undetectable at the watershed scale. Additionally, road improvements and decommissioning are designed to reduce the risk of sediment inputs in the future. However, this is not expected to be of a level that would measurably improve the current conditions at the watershed scale.

Large Woody Debris (LWD)
Environmental Baseline:
(All Sixth Fields): NOT PROPERLY FUNCTIONING. ODFW aquatic inventories within these watersheds found less than the acceptable level of 25 key pieces of large wood per mile.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. Density management/thinning would be expected to accelerate the development of a late-successional forest capable of delivering large wood to the aquatic ecosystem, and would not reduce the current amount of wood available for recruitment into the stream.
Fifth Field Effect:
(All Fifth Fields): MAINTAIN. Density management/thinning would be expected to accelerate the development of a late-successional forest capable of delivering large wood to the aquatic ecosystem. Although these actions would move the indicator in a positive direction, the benefits would occur only at the site specific level and would not change the indicator from one category to another.

Streambank Condition
Environmental Baseline:
(All Trail Creek Sixth Fields): PROPERLY FUNCTIONING. ODFW aquatic habitat inventory data indicates that in general streambanks are stabilized by vegetation and show little evidence of active bank erosion.
(Upper Evans Creek): AT RISK. ODFW aquatic habitat inventory data indicates that in general streambanks have less than adequate cover and some show evidence of erosion.
(Upper Elk Creek Sixth Field): NOT PROPERLY FUNCTIONING. Professional judgement has

determined that streambanks are not stabilized in this subwatershed.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. Streambank condition can be altered by direct disturbance of the streambank, removal of vegetation, an increase in peak flow, or an increase in debris torrent frequency. Although some bank disturbance is expected to occur during removal/replacement of culverts, the actions will prevent additional erosion from occurring due to inadequate culvert size or misplacement. Streambank condition will be restored where culverts are removed in road decommissioning. None of the other proposed actions would be expected to affect streambank condition.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. No long term effects are expected to occur that would measurably change the current streambank condition at the fifth field scale.

Sediment/Turbidity

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. ODFW surveys have documented high percentages of sand/silt/organics in stream substrates. BLM stream surveys also found high amounts of substrate embeddedness.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. It is expected that small amounts of sediment could be generated from road related activities and harvest related activities (hauling/increased truck traffic). This could cause short term, localized increases to turbidity levels in streams adjacent to or downstream from (within approximately 200') the activity. Implementation of Best Management Practices and Project Design Features will minimize these impacts. The anticipated increases would not be expected to affect any downstream beneficial uses or negatively impact listed fish species. Road decommissioning projects should result in a long-term reduction in the risk of road generated sediment reaching stream channels. However, this is not expected to be of a magnitude that would substantially change current conditions at the sixth field. No long-term effects are expected to occur from other proposed projects that would measurably change the current sediment regime or turbidity levels in the long term.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. No long term effects are expected to occur that would measurably change the current condition at the fifth field scale.

Change in Peak/Base Flows

Environmental Baseline:

(Upper Trail Creek): AT RISK. Human activities that have altered the peak and base flows include the removal of vegetation by timber harvest and wildfire, road building, and soil compaction. There are no documented water diversions in this subwatershed.

(All Remaining Sixth Fields): NOT PROPERLY FUNCTIONING. In addition to the above-mentioned activities, diversions of water for irrigation purposes have regularly depleted streams within these subwatersheds during the summer months, resulting in many reaches completely drying up in drought years.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. Changes in infiltration, antecedent moisture conditions, interception, and evapotranspiration losses due to timber harvesting are not expected to substantially alter the flow regime. Analysis has shown that over 78% of the area of these watersheds is in a hydrologically recovered condition, and that the proposed harvest treatments would not bring this below acceptable levels. The proposed action also includes road decommissioning, which would be expected to reduce the risk of road-related flow increases.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. No long term effects are expected to occur that would measurably change the current flow regime at the fifth field scale. Additionally, road decommissioning should result in a long-term reduction in the risk of roads influencing the flow regime.

I. Dichotomous Key for Making ESA Determination of Effects

Project Name: Trail Creek Timber Sales
Resource Area: Butte Falls Resource Area
Project Status: Future

1. Are there any proposed/listed anadromous salmonids and/or proposed/designated critical habitat in the watershed or downstream from the watershed?

NO.....No effect
YES.....May Affect, **Go to 2**

2. Will the proposed action have any effect whatsoever[1] on the species and/or critical habitat?

NO.....No effect
YES.....**Go to 3**

3. Does the proposed action(s) have the potential to hinder attainment of relevant properly functioning indicators (from section G)?[2]

NO.....**Go to 4**
YES.....Likely to adversely affect

4. Does the proposed action(s) have the potential to result in "take"[3] of proposed/listed anadromous salmonids or destruction/adverse modification of proposed/designated critical habitat?

A. There is a negligible (extremely low) probability of take of proposed/listed anadromous salmonids or destruction/adverse modification of critical habitat.
.....Not likely to adversely affect.

B. There is more than a negligible probability of take of proposed/listed anadromous salmonids or destruction/adverse modification of critical habitat
.....Likely to adversely affect[4]

[1] "Any effect whatsoever" includes small effects, effects that are unlikely to occur, and beneficial effects. I.e., a "no effect" Determination is only appropriate if the proposed action will literally have no effect whatsoever on the species and/or critical habitat, not a small effect, an effect that is unlikely to occur, or a beneficial effect.

[2] We acknowledge there may be site level degrades associated with the project, but there is a negligible potential that the project will hinder attainment of relevant properly functioning indicators.

[3] "Take" - The ESA (Section 3) defines take as "to harass, harm, pursue, hunt, shoot, wound, trap, capture, collect or attempt to engage in any such conduct". The USFWS further defines "harm" as "significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering", and "harass" as "actions that create the likelihood

of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering".

[4] Document of expected adverse effect follows this key.

Biologist: Jayne LeFors **Date:** 4/15/02

Conclusion

Based on the above review, I find the proposed project is consistent with Watershed Analysis recommendations and findings, applicable Northwest Forest Plan Standards and Guidelines, NEPA Documentation, and applicable aspects of NMFS' March 18, 1997 Biological Opinion. In addition, I find the proposed project does not hinder or prevent attainment of Aquatic Conservation Strategy objectives at the 5th field watershed scale over the long-term.

Lance Nimmo _____
Area Manager, Butte Falls Resource Area

APPENDIX F

Evaluation of Consistency with Aquatic Conservation Strategy Objectives

In the following ACS consistency evaluation discussion, a list of factors and indicators from the NMFS checklist (i.e. NMFS Matrix of Pathways and Indicators) has been provided under each ACS objective. There are different factors and indicators that relate to each of the nine ACS objectives and many of these relate to and address more than one ACS objective. By including the factors and indicators in the ACS objective consistency discussion, a common link and logic track is developed between ACS consistency and the effects determination of the project on federally listed or proposed fish species.

When discussing effects in the individual analysis of ACS objectives, "long term" is used in the context of ACS, meaning a period of time defined as "decades, possibly more than a century" (NFP ROD, p. B-9), unless otherwise described.

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.*

Summary

Based on design features, this project should either maintain or begin to restore the elements outlined in ACS Objective 1. Density management/thinning within Riparian Reserves is designed to restore the health of riparian vegetation by reducing densities that have resulted in suppressed growth and high risk of catastrophic fire. Road mileage within the project area will be reduced overall by approximately 5 miles. No indicator is expected to be degraded at either the site level or the fifth field watershed over the long term. Therefore, it is concluded this project is consistent with ACS Objective 1.

Relevant Indicators from NMFS Matrix Used to Assist in the Consistency Determination

Off-channel Habitat	*Disturbance history*
Refugia	*Road density and location*
Riparian Reserves	*Floodplain connectivity*

Discussion of Indicators

<u>Off-channel Habitat</u>

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. ODFW Aquatic Habitat Inventories have found very little of the off-channel habitat that would be expected to occur in low gradient, wide valley bottom streams such as Trail Creek and Evans Creek.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. If any off-channel areas do exist they would be protected as part of

the Riparian Reserve. Based on the Project Design Features included in the EA, it is expected that any off-channel habitat that does exist will be maintained.

Fifth Field Effects:

(All Fifth Fields): MAINTAIN. Based on anticipated site-specific levels of effects analyzed above, it is expected that any off-channel habitat would be maintained at the fifth field scale.

Refugia

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. Although the West Fork Trail Creek 6th field has been designated by ODFW as a Core Habitat Area for salmonids, most of this habitat is located on private lands which are currently being harvested according to OFPA standards, which provide limited protection for stream channels. There is currently little information regarding refugia (stream reaches which provide exceptional spawning or rearing habitat) in the Trail Creek, Evans Creek, and Elk Creek watersheds. If refugia do exist, they could be located on private lands, as well as federal lands. If located on private lands, refugia may not receive the same level of protection as on federal lands. Therefore, it is concluded that if refugia exists within the sub-watersheds it could be at risk of degradation.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. Any refugia within the watershed that do exist on federal lands would be protected within the Riparian Reserves. Based on the Project Design Features (PDFs) from the EA, it is expected that any refugia will be maintained.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. Based on anticipated site specific levels of effects analyzed above, it is expected that refugia would be maintained at the fifth-field scale.

Riparian Reserves

Environmental Baseline:

(All Trail Creek and Elk Creek Sixth Fields): NOT PROPERLY FUNCTIONING. Riparian Reserves within these watersheds have been impacted by agricultural use on private lands which has removed streamside vegetation, and by fire suppression, road building, and past timber harvest practices on public lands.

(Upper Evans Sixth Field): FUNCTIONING AT RISK. BLM stream surveys have found that the majority of Riparian Reserves are in a Functioning At Risk condition.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. It is expected that there may be short term, localized impacts to Riparian Reserve vegetation as a result of the proposed density management/thinning. The thinning treatments will decrease overstocked stand densities and reduce the potential for catastrophic fire to enter the Riparian Reserves. The effects of the proposed actions are expected to result in long term benefits by restoring the historical fire regime within Riparian Reserves where the vegetation consists of suppressed, overstocked stands. By implementing a 50 foot no treatment buffer, bank stability, large wood supply, and stream shade will not be affected. Although the actions will move the indicator in a positive direction, they are not expected to measurably change the indicator, therefore the current condition will be maintained.

Fifth Field Effect:
(All Fifth Fields): MAINTAIN. The proposed actions would not be expected to impact the Riparian Reserves at the fifth field scale.

Disturbance History
Environmental Baseline:
(All Sixth Fields): NOT PROPERLY FUNCTIONING. The major disturbances that have occurred within the project area are absence of wildfire, timber harvest, road construction, surface water diversions, and the conversion of lands to agricultural use.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. Disturbance resulting from the harvest of timber could be expected on approximately 56 acres which are proposed for NGFMA regeneration harvest by tractor yarding. This includes 37 acres that would occur in the Upper Trail 6th field and 19 acres in the West Fork Trail 6th field. However, analysis has shown that hydrologic recovery would not be measureably affected and would remain within acceptable ranges. Approximately 4.94 miles of roads would be fully decommissioned, reducing high road densities within the project area. Approximately 527 acres of mechanical fuels treatments are also proposed. Although these actions could result in low level, short term increases in local disturbance levels, in the long term the reduction of roads from the proposed road decommissioning and the proposed fuels treatments will begin to restore previous disturbance impacts.
Fifth Field Effect:
(All Fifth Fields): MAINTAIN. Through natural recovery of managed forest stands, fuel treatments, and road decommissioning and improvement, it is expected that the proposed actions would not contribute to disturbance levels at the fifth field scale.

Road Density and Location
Environmental Baseline:
(All Sixth Fields): NOT PROPERLY FUNCTIONING. Road densities are high in these sub-watersheds, averaging 5.5 miles/square mile.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. Temporary operator spurs totaling 1.2 miles of new road construction would be built to access some harvest units, but would be fully decommissioned after use. Approximately 4.94 miles of roads will be fully decommissioned as part of the proposed projects, including 1.89 miles in Riparian Reserves. Reducing the road densities by an average of .2 miles/square mile within these watersheds would move the indicator in a positive direction, but would not be significant enough to move it from "not properly functioning" to "at risk".
Fifth Field Effect:
(All Fifth Fields): MAINTAIN. Although reducing the road density within these watersheds would move the indicator in a positive direction, it is not expected to be enough to change from "not properly functioning" to "at risk".

Floodplain Connectivity
Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. Road building, agricultural practices, and residential development has led to stream confinement that has disconnected streams from the floodplains, reduced or eliminated side channels, and reduced flood refugia.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. No proposed action is expected to impact the floodplain connectivity. The current condition is expected to be maintained at the local level.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. No long-term effects are expected to occur that would measurably change current conditions at the fifth field.

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.*

Summary

The project would maintain the current Riparian Reserve network. By establishing this Riparian Reserve network, floodplains that are currently inundated at regular intervals are expected to remain laterally connected through regular inundation. Areas that are not currently laterally connected and not within the project area will likely remain laterally disconnected in the short-term and possibly in the long-term. However, this is dependent upon private actions within the watersheds.

Density management/thinning treatments proposed within Riparian Reserves are designed to improve riparian health by accelerating the development of late-seral stand characteristics and reducing the risk of loss to wildfire. A 50 foot no-treatment buffer will be left on all streams proposed for treatment. The buffer will provide protection to streambanks and maintain adequate stream shade and large wood recruitment in those units.

Culvert removal associated with the road decommissioning would begin to restore the drainage network connectivity by removing physical obstructions to movement of aquatic species.

No actions are proposed that would physically or chemically obstruct routes to areas within or outside the watershed that are critical for fulfilling life history requirements of aquatic and riparian-dependent species. No indicator is expected to be degraded in the fifth field watershed over the long term. No short or long-term effects are expected to occur that would measurably change current conditions at either the fifth field or project level. Therefore, it is concluded this project is consistent with ACS Objective 2.

Relevant Indicators from NMFS Matrix Used to Assist in the Consistency Determination

Off-channel Habitat	*Temperature*
Refugia	*Physical barriers*

Increase in drainage network *Riparian Reserves*
Floodplain connectivity

Discussion of Indicators

Off-channel Habitat See ACS Objective 1.

Refugia See ACS Objective 1.

Increase in Drainage Network
Environmental Baseline:
(All Sixth Fields): NOT PROPERLY FUNCTIONING. Water diversions, roads, soil compaction, and inadequate or misplaced culverts have led to an alteration of the drainage network within the watershed. This alteration in the drainage network has contributed to a general increase in road-related sediment reaching the streams, which can result in a loss of spawning habitat.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. Approximately 1.2 miles of new temporary spur roads would be constructed under the proposed projects, but would be fully decommissioned following use. Decommissioning 4.94 miles of existing permanent roads will result in a localized decrease in road related impacts and restore flows to the natural stream channels. Although these actions would not be considered of a magnitude that would measurably change baseline conditions at the sixth field scale, they are beneficial and would thus move the indicator in a positive direction.
Fifth Field Effect:
(All Fifth Fields): MAINTAIN. Decommissioning existing permanent roads in the watershed will result in a localized decrease in road related impacts and restore flows to the natural stream channels. Although these actions would not be considered of a magnitude that would measurably change baseline conditions at the fifth field, they are beneficial and would thus move the indicator in a positive direction.

Floodplain connectivity See ACS Objective 1.

Temperature
Environmental Baseline:
(All Sixth Fields): NOT PROPERLY FUNCTIONING. The Upper Evans Creek sub-watershed and the Elk Creek watershed are currently listed by DEQ under 303(d) of the Clean Water Act as water quality limited for exceeding summer water temperature standards. Monitoring of streams within the Trail Creek watershed by BLM personnel has consistently shown high summer stream temperatures.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. The proposed action would not alter any streamside vegetation that would be expected to influence stream temperature. Riparian thinning treatments would not remove any large trees that provide stream shade. Thinning would help the remaining stands reach a late-seral

condition in a shorter time period by reducing competition for light, nutrients, and moisture.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. The current thermal regime in the watershed is not expected to be measurably influenced by the project. Over the long term, as more early to mid-successional streamside vegetation from the Riparian Reserves develops late-successional characteristics, the current thermal regime may improve to a more historic, cooler regime.

Physical Barriers

Environmental Baseline:

(Upper Trail Creek, Lower Trail Creek): PROPERLY FUNCTIONING. Few human-made barriers have been documented in these subwatersheds.

(Upper Evans Creek, West Fork Trail Creek): NOT PROPERLY FUNCTIONING. Numerous instream water diversion structures and impassable culverts exist throughout these watersheds.

(Upper Elk Creek): FUNCTIONING AT RISK. Current information suggests that this subwatershed may have several human-made barriers to fish passage.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. No new permanent roads would be built that would cross streams. No dams or water impoundments would be constructed. A culvert that currently blocks fish passage in West Fork Trail Creek is proposed to be replaced with a bottomless arch or bridge structure. Although this action would remove barriers to passage at the site, it would not be significant enough to change the indicator from one category to another.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. No dams, water impoundments, or other barriers to fish passage would be constructed.

Riparian Reserves: See ACS Objective 1.

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

Summary

The physical integrity of the aquatic system would be maintained by establishing a 170' (nonfish-bearing streams) to 340' wide (fish-bearing streams) Riparian Reserve boundary. In Riparian Reserves which are proposed for density management/thinning, a 50 foot no treatment buffer will provide adequate protection for stream banks. Burning of slash piles within Riparian Reserves could create small areas of bare soil; however, typical piles do not burn completely and are not larger than 6 foot diameter. These piles would be located outside the 50 foot no treatment buffer and would have no effect on the physical integrity of the aquatic system. It is expected that small amounts of sediment could be generated from road, fuels treatment, and harvest related activities, and in particular from the culvert replacement/removals. This could cause localized, short-term increases to turbidity and fine sediment levels in streams adjacent to or downstream from the ground disturbing activity (within approximately 200'). Implementation of Best Management Practices (Medford ROD and RMP, pp. 162-170) and Project Design Features will minimize these increases. The anticipated increases would not be expected

to affect any downstream beneficial uses or designated Critical Habitat of listed fish species. The road decommissioning is located at least ½ mile from Critical Habitat and any sediment generated by this activity would not be expected to travel that distance. Additionally, road improvement, maintenance, and decommissioning should result in a long-term reduction in the risk of road-generated sediment reaching local stream channels. Based on design features, the project should maintain elements outlined in ACS Objective 3. No NMFS indicator is degraded in the fifth field watershed in the long term. Therefore, this project is consistent with ACS Objective 3.

Relevant Indicators from NMFS Matrix Used to Assist in the Consistency Determination

Off-channel Habitat	*Width-Depth Ratio*
Substrate	*Streambank condition*
Large woody debris	*Floodplain connectivity*
Pool frequency	*Sediment/turbidity*
Pool quality	*Refugia*

Discussion of Indicators

Off-channel Habitat See ACS Objective 1

Substrate

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. Average percentages of sand/silt/organics on the streams surveyed by ODFW exceeded 20%. Gravel percentages within these watersheds were found to be generally low, and areas of bedrock substrate were high on several stream reaches.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. It is expected that small amounts of sediment may be generated from road related activities, fuels treatments, and harvest related activities (hauling/increased truck traffic). This could cause localized, short term increases to baseline fine sediment levels in streams adjacent to or downstream from (within approximately 200 feet) the activity. Implementation of Best Management Practices and Project Design Features will minimize these impacts. The anticipated increases would not be of a magnitude that would be expected to affect any downstream beneficial uses or negatively impact listed fish species. Although road decommissioning activities may create short term, localized increases in sediment levels within the project area, the long term benefits of reducing the road density and thus sediment levels provide long term decreases in road-related sediment runoff. It is expected that decreases in this type of sediment source would improve substrate conditions within these areas, but would not be enough to move the indicator.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. It is anticipated that small amounts of site-level sediment inputs could occur. However, this is expected to be undetectable at the watershed scale. Additionally, road improvements and decommissioning are designed to reduce the risk of sediment inputs in the future. However, this is not expected to be of a level that would measurably improve the current conditions at the watershed scale.

Large Woody Debris (LWD)

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. ODFW aquatic inventories within these watersheds found less than the minimum acceptable level of 25 key pieces of large wood per mile.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. Fuels treatments/thinning would be expected to accelerate the development of a late-successional forest capable of delivering larg would not reduce the current amount of wood available for recruit

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. Fuels treatments would be expected to accelerate the development of a late-successional forest capable of delivering large wood to the aq actions would move the indicator in a positive direction, the benefits would occur only at the site specific level and would not change the indicator from one category to another.

Pool Frequency

Environmental Baseline:

(All Sixth Fields): NOT PROPERLY FUNCTIONING. NMFS Matrix criteria establishes desirable pool frequency to be >30% of the stream channel area. No streams surveyed within these sub-watersheds reach the desired pool frequency levels.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. The proposed projects are not expected to affect pool forming processes within the watershed.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. The proposed actions would not affect pool frequency at the fifth field scale.

Pool Quality

Environmental Baseline:

(All Trail Creek and Elk Creek Sixth Fields): NOT PROPERLY FUNCTIONING. ODFW Aquatic Habitat Inventory data indicates pools quality is impaired by shallow depths, lack of wood, and high percentages of fines.

(Upper Evans Creek): AT RISK. Streams that have been surveyed by ODFW have indicated acceptable pool depths but a lack of wood within pool habitat.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. The proposed projects are not expected to change the current pool quality within the watershed.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. No short or long term effects are expected to occur that would change the current pool quality at the fifth field scale.

Width/Depth Ratio

Environmental Baseline:
(Upper Elk Creek Sixth Field): NOT PROPERLY FUNCTIONING. Based upon professional judgement, this subwatershed does not have proper width/depth ratios.
(All Other Sixth Fields): PROPERLY FUNCTIONING. ODFW Aquatic Habitat Inventory data indicates that the average width/depth ratio on streams surveyed within these watersheds is within the normal range for these stream types.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. No proposed actions are expected to occur that would measurably change the width/depth ratio of streams within the watershed.
Fifth Field Effect:
(All Fifth Fields): MAINTAIN. No short or long term effects are expected to occur that would change the current width/depth ratio of streams at the fifth field scale.

Streambank Condition
Environmental Baseline:
(All Trail Creek Sixth Fields): PROPERLY FUNCTIONING. ODFW aquatic habitat inventory data indicates that in general streambanks are stabilized by vegetation and show little evidence of active bank erosion.
(Upper Evans Creek): AT RISK. ODFW aquatic habitat inventory data indicates that in general streambanks have less than adequate cover and some show evidence of erosion.
(Upper Elk Creek Sixth Field): NOT PROPERLY FUNCTIONING. Professional judgement has determined that streambanks are not stabilized in this subwatershed.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. Streambank condition can be altered by direct disturbance of the streambank, removal of vegetation, an increase in peak flow, or an increase in debris torrent frequency. Although some bank disturbance is expected to occur during removal/replacement of culverts, the actions will prevent additional erosion from occurring due to inadequate culvert size or misplacement. Streambank condition will be restored where culverts are removed in road decommissioning. None of the other proposed actions would be expected to affect streambank condition.
Fifth Field Effect:
(All Fifth Fields): MAINTAIN. No long term effects are expected to occur that would measurably change the current streambank condition at the fifth field scale.

Floodplain Connectivity See ACS Objective 1.

Sediment/Turbidity
Environmental Baseline:
(All Sixth Fields): NOT PROPERLY FUNCTIONING. ODFW surveys have documented high percentages of sand/silt/organics in stream substrates. BLM stream surveys also found high amounts of substrate embeddedness.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. It is expected that small amounts of sediment could be generated from road related activities, fuels treatments, and harvest related activities (hauling/increased truck traffic).

This could cause short term, localized increases to turbidity levels in streams adjacent to or downstream from (within approximately 200') the activity. Implementation of Best Management Practices and Project Design Features will minimize these impacts. The anticipated increases would not be expected to affect any downstream beneficial uses or negatively impact listed fish species. Road decommissioning projects should result in a long-term reduction in the risk of road generated sediment reaching stream channels. However, this is not expected to be of a magnitude that would substantially change current conditions at the sixth field. No long-term effects are expected to occur from other proposed projects that would measurably change the current sediment regime or turbidity levels in the long term.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. No long term effects are expected to occur that would measurably change the current condition at the fifth field scale.

Refugia See ACS Objective 1.

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.*

Summary

It is expected that small amounts of sediment may be generated from road, fuels treatment, and harvest related activities. This could cause localized, short-term increases to turbidity and fine sediment levels in streams adjacent to or downstream from the activity (within approximately 200'), however this would not be expected to reach Critical Habitat. Implementation of Best Management Practices and Project Design Features are expected to minimize these increases to the point of being immeasurable against normal background levels. The anticipated increases would not be expected to affect any downstream beneficial uses or to negatively impact listed fish species. Road improvement, maintenance, and decommissioning should result in a long-term reduction in the risk of road-generated sediment reaching stream channels. Additionally, the proposed fuels treatments should serve to restore the cycling of forest nutrients to more closely resemble historical levels that occurred before fire suppression. The proposed actions would be expected to improve water quality conditions over the long term.

Any activity involving gas or diesel powered machinery within the Riparian Reserves has a potential to result in a hazardous materials spill. The greatest risk of chemical contamination that would result from the proposed action would be some type of fuel spill related to logging operations and refueling of equipment. The project design features stipulate that "all hazardous materials and petroleum products would be stored outside of the Riparian Reserves, in durable containers and located so that any accidental spill would be contained and not drain into the stream system" (EA, page 24, par. D-19.). The contractor would be required to have a Spill Prevention, Control and Countermeasure Plan (SPCC) to contain and clean-up the spill. If a hazardous materials spill did occur, this Plan would assure that the mechanisms are in place to respond quickly to the incident and minimize the likelihood of

contamination of a waterway. It is expected that contamination of a stream system with hazardous materials is highly unlikely to occur and should not affect any waters within the project area.

Based on design features, the project should maintain elements outlined in ACS Objective 4. No NMFS indicator is degraded in the fifth field watershed in the long term. Therefore, this project is consistent with this ACS objective 4.

Relevant Indicators from NMFS Matrix Used to Assist in the Consistency Determination

Temperature *Chemical Contaminants/Nutrients*
Sediment/Turbidity

Discussion of Indicators

Temperature See ACS Objective 2.

Sediment/Turbidity See ACS Objective 3.

Chemical Contaminants/Nutrients
Environmental Baseline:
(All Trail Creek and Elk Creek Sixth Fields): AT RISK. No stream within the watershed has been identified as being water quality limited for chemicals and/or bacteria. Little information is available for these sub-watersheds. However, because of the influence of private agricultural practices which allow runoff from fields to enter the streams, it can be concluded that these watersheds are at risk.
(Upper Evans Creek): NOT PROPERLY FUNCTIONING. Although there are no studies which show the levels of chemicals/nutrients being used in this watershed, professional judgment would argue that, due to the high percentage of private lands adjacent to streams which are in agricultural or private industrial use, it would be expected that this watershed is not properly functioning.
Sixth Field Effect:
(All Sixth Fields): MAINTAIN. The greatest risk of chemical contamination that would result from the proposed action would be a fuel spill related to equipment operations and refueling. The project design features stipulate that all hazardous materials (particularly petroleum products) would be stored in durable containers and located so that any accidental spill would be contained and not drain into any riparian areas. The contractor would be required to have a hazardous materials action plan to contain and clean up any spill. It is expected that contamination of a stream channel with hazardous materials is highly unlikely to occur and should not affect any waters within the project area. In addition, the proposed fuels treatments would serve to restore the cycling of forest nutrients to more closely resemble historical levels that occurred before fire suppression.
Fifth Field Effect:
(All Fifth Fields): MAINTAIN. No long term effects are expected to occur that would measurably change the current condition at the fifth field scale.

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.*

Summary

It is expected that small amounts of sediment may be generated from road, fuels treatment, and harvest related activities. This could cause localized, short-term increases to turbidity and fine sediment levels in streams adjacent to or downstream from the activity (within approximately 200'). Implementation of Best Management Practices and Project Design Features will minimize these expected increases to undetectable levels. The anticipated low-level sediment increases would not be expected to affect any downstream beneficial uses or to negatively impact listed fish species or their Critical Habitat.

Based on design features, the project should maintain elements outlined in ACS Objective 5. No NMFS indicator would be degraded in the fifth field watershed in the long term. Therefore, this project is consistent with ACS Objective 5.

Relevant Indicators from NMFS Matrix Used to Assist in the Consistency Determination

Sediment/turbidity	*Road density & location*
Substrate	*Increase in drainage network*
Change in peak/base flow	

Discussion of Indicators

Sediment/turbidity See ACS Objective 3.

Substrate See ACS Objective 3.

Change in Peak/Base Flows

Environmental Baseline:

(Upper Trail Creek): AT RISK. Human activities that have altered the peak and base flows include the removal of vegetation by timber harvest and wildfire, road building, and soil compaction. There are no documented water diversions in this subwatershed.

(All Remaining Sixth Fields): NOT PROPERLY FUNCTIONING. In addition to the above-mentioned activities, diversions of water for irrigation purposes have regularly depleted streams within these subwatersheds during the summer months, resulting in many reaches completely drying up in drought years.

Sixth Field Effect:

(All Sixth Fields): MAINTAIN. Changes in infiltration, antecedent moisture conditions, interception, and evapotranspiration losses due to timber harvesting and fuels treatments are not expected to substantially alter the flow regime. Analysis has shown that over 78% of the area of these watersheds is in a hydrologically recovered condition, and that the proposed harvest treatments would not bring this

below acceptable levels. The proposed action also includes road decommissioning, which would be expected to reduce the risk of road-related flow increases.

Fifth Field Effect:

(All Fifth Fields): MAINTAIN. No long term effects are expected to occur that would measurably change the current flow regime at the fifth field scale. Additionally, road decommissioning should result in a long-term reduction in the risk of roads influencing the flow regime.

Road density & location See ACS Objective 1.

Increase in drainage network See ACS Objective 2.

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.*

Peak, summer, and annual flows are influenced primarily by precipitation intensity, catchment size, soil characteristics, vegetative cover, road densities, and topographic features. Human related activities that have altered the peak and base flows within the watershed include the removal of vegetation by timber harvest and wildfire, road building, water diversions, and soil compaction. Changes in infiltration, antecedent moisture conditions, interception, and evapotranspiration losses due to the proposed timber harvesting and fuels treatments are not expected to substantially alter the flow regime.

Based on design features, the project should maintain elements outlined in ACS Objective 6. In addition, the proposed fuels treatments should serve to restore the cycling of forest nutrients and wood routing to more closely resemble historical levels that occurred before fire suppression. No NMFS indicator is degraded in the fifth field watershed in the long term. Therefore, this project is consistent with ACS Objective 6.

Relevant Indicators from NMFS Matrix Used to Assist in the Consistency Determination

Change in peak/base flow *Increase in drainage network*

Discussion of Indicators

Change in peak/base flow See ACS Objective 5.

Increase in drainage network See ACS Objective 2.

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

Summary

The proposed action would maintain the current Riparian Reserve network on federally administered

lands over an indefinite time period. By establishing this Riparian Reserve network, the timing, magnitude, variability, and duration of floodplain inundation is expected to be maintained in the short-term and restored through recovery over the long-term. Areas that are not currently connected with the floodplain would likely remain disconnected in the short-term and possibly in the long-term. However, this is highly dependent upon private actions within the watershed. No change in the current flow regime is anticipated.

Based on design features, the proposed project should maintain and begin to restore the elements outlined in ACS Objective 7. Therefore it is concluded the proposed project is consistent with ACS Objective 7.

Relevant Indicators from NMFS Matrix Used to Assist in the Consistency Determination

Increase in drainage network *Floodplain connectivity*
Change in peak/base flow

Discussion of Indicators

Increase in drainage network See ACS Objective 2.

Change in peak/base flow See ACS Objective 5.

Floodplain connectivity See ACS Objective 1.

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.*

Summary
The proposed action would maintain the current Riparian Reserve network on federally administered lands over an indefinite time period. The proposed action would not alter any streamside vegetation that would be expected to influence stream temperature. The proposed density management/thinning treatments within Riparian Reserves are not expected to change the current thermal regime at the site or in the watershed over the short-term, and should accelerate the development of mature stand characteristics. Over the long-term, as more early to mid-successional stands develop into a late-successional condition, the current thermal regime may begin to approximate a historic, cooler thermal regime. However, this is also dependent upon private activities within the watershed. By establishing the Riparian Reserve network, adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, channel migration, and coarse woody debris recruitment is expected to be maintained on federal lands in the short-term and restored through

recovery over the long-term.

Based on design features, the proposed project should maintain and begin to restore the elements outlined in ACS Objective 7. Therefore it is concluded the proposed project is consistent with ACS Objective 7.

Relevant Indicators from NMFS Matrix Used to Assist in the Consistency Determination

Large woody debris	*Riparian Reserves*
Road density & location	*Disturbance history*

Discussion of Indicators

Large Woody Debris See ACS Objective 3.

Road Density and Location See ACS Objective 1.

Riparian Reserves See ACS Objective 1.

Disturbance History See ACS Objective 1.

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

Summary

The proposed action would maintain the current Riparian Reserve network over an indefinite time period. By establishing this Riparian Reserve network, habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species is expected to be maintained in the short-term and restored over the long-term. The riparian thinning treatments will reduce the risks of a stand-replacing fire from occurring, and will also allow the vegetation to reach a late-seral condition in a shorter time period by reducing competition for light, nutrients, and moisture. No long-term negative impacts are expected to occur as a result of the proposed projects. Therefore, it is concluded the proposed projects should maintain and begin to restore habitat elements of ACS Objective 9.

Relevant Indicators from NMFS Matrix Used to Assist in the Consistency Determination

Off-channel Habitat	*Physical barriers*
Substrate	*Refugia*
Large woody debris	*Floodplain connectivity*
Riparian Reserves	*Pool quality*
Sediment/turbidity	*Width/depth ratio*
Temperature	*Chemical concentration/nutrients*

Please refer to discussions in appropriate ACS Objectives 1-8.

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

Project Name: Trail Creek
Physiographic Province: Cascades West; Klamath Mountains
4th Field HUC: Upper Rogue
5th Field HUC: Trail Creek
6th Field HUC: Lower Trail Creek
Project Scale
Date: 1/31/02
Preparers: Jayne LeFors, Shawn Simpson
Resource Area, Medford BLM: Butte Falls

PATHWAY INDICATORS		ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)[2]			
		Properly Functioning[1]	At Risk[1]	*Not* Properly Functioning[1]	Restore[2]	Maintain[2]	Degrade[2]	Consistent with ACS?
Water Quality	Temperature			BLM		X		Y
	Sediment			ODFW		X		Y
	Chem. Contam./ Nutrient Load		PJ			X		Y
	Physical Barriers	ODFW				X		Y
Habitat Elements	Substrate			ODFW		X		Y
	Large Woody Debris			ODFW		X		Y
	Pool Frequency			ODFW		X		Y
	Pool Quality			ODFW		X		Y
	Off-Channel Habitat			ODFW		X		Y
	Refugia			PJ		X		Y
Chan. Cond. & Dyna.	Width/Depth Ratio	ODFW				X		Y
	Streambank Condition	ODFW				X		Y
	Floodplain Connectivity			PJ		X		Y
Flow/Hydro	Peak/Base Flows			PJ		X		Y
	Drainage Network Increase			WA		X		Y
Wshed Condition	Road Density and Location			WA		X		Y
	Disturbance History			WA		X		Y
	Riparian Reserve			BLM		X		Y

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

Project Name: Trail Creek
Physiographic Province: Klamath Mountains
4th Field HUC: Upper Rogue
5th Field HUC: Trail Creek
6th Field HUC: West Fork Trail Creek
Project Scale
Date: 1/31/02
Preparer: Jayne LeFors, Shawn Simpson
Resource Area, Medford BLM: Butte Falls

PATHWAY INDICATORS		ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)[2]			
		Properly Functioning[1]	At Risk[1]	*Not* Properly Functioning[1]	Restore[2]	Maintain[2]	Degrade[2]	Consistent with ACS?
Water Quality	Temperature			BLM		X		Y
	Sediment			ODFW		X		Y
	Chem./ Nutrient		PJ			X		Y
	Physical Barriers			ODFW		X		Y
Habitat Elements	Substrate			ODFW		X		Y
	Large Woody Debris			ODFW		X		Y
	Pool Frequency			ODFW		X		Y
	Pool Quality			ODFW		X		Y
	Off-Channel Habitat			ODFW		X		Y
	Refugia			PJ		X		Y
Chan. Cond. & Dyna.	Width/Depth Ratio	ODFW				X		Y
	Streambank Condition	ODFW				X		Y
	Floodplain Connectivity			PJ		X		Y
Flow/Hydro	Peak/Base Flows			PJ		X		Y
	Drainage Network Increase			WA		X		Y
Wshed Condition	Road Density and Location			WA		X		Y
	Disturbance History			WA		X		Y
	Riparian Reserve			BLM		X		Y

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

Project Name: Trail Creek
Physiographic Province: Cascades West; Klamath Mountains
4th Field HUC: Upper Rogue
5th Field HUC: Trail Creek
6th Field HUC: Upper Trail Creek
Project Scale
Date: 1/31/02
Preparer: Jayne LeFors, Shawn Simpson
Resource Area, Medford BLM: Butte Falls

PATHWAY INDICATORS		ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)[2]			
		Properly Functioning[1]	At Risk[1]	*Not* Properly Functioning[1]	Restore[2]	Maintain[2]	Degrade[2]	Consistent with ACS?
Water Quality	Temperature			BLM		X		Y
	Sediment			ODFW		X		Y
	Chem. Contam./ Nutrient Load		PJ			X		Y
	Physical Barriers	ODFW				X		Y
Habitat Elements	Substrate			ODFW		X		Y
	Large Woody Debris			ODFW		X		Y
	Pool Frequency			ODFW		X		Y
	Pool Quality			ODFW		X		Y
	Off-Channel Habitat			ODFW		X		Y
	Refugia			PJ		X		Y
Chan Cond/Dyna	Width/Depth Ratio	ODFW				X		Y
	Streambank Condition	ODFW				X		Y
	Floodplain Connectivity			PJ		X		Y
Flow/Hydro	Peak/Base Flows		PJ			X		Y
	Drainage Network Increase			WA		X		Y
Wshed Condition	Road Density and Location			WA		X		Y
	Disturbance History			WA		X		Y
	Riparian Reserve			BLM		X		Y

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

Project Name: Trail Creek
Physiographic Province: Klamath Mountains
4th Field HUC: Middle Rogue
5th Field HUC: Evans Creek
6th Field HUC: Upper Evans Creek
Project Scale
Date: 1/31/02
Preparer: Jayne LeFors, Shawn Simpson
Resource Area, Medford BLM: Butte Falls

PATHWAY INDICATORS		ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)[2]			
		Properly Functioning[1]	At Risk[1]	*Not* Properly Functioning[1]	Restore[2]	Maintain[2]	Degrade[2]	Consistent with ACS?
Water Quality	Temperature			DEQ		X		Y
	Sediment			ODFW		X		Y
	Chem. Contam./ Nutrient Load			PJ		X		Y
	Physical Barriers			ODFW		X		Y
Habitat Elements	Substrate			ODFW		X		Y
	Large Woody Debris			ODFW		X		Y
	Pool Frequency			ODFW		X		Y
	Pool Quality		ODFW			X		Y
	Off-Channel Habitat			ODFW		X		Y
	Refugia			PJ		X		Y
Chan. Cond. & Dyna.	Width/Depth Ratio	ODFW				X		Y
	Streambank Condition		ODFW			X		Y
	Floodplain Connectivity			PJ		X		Y
Flow/Hydro	Peak/Base Flows			PJ		X		Y
	Drainage Network Increase			WA		X		Y
Wshed Condition	Road Density and Location			WA		X		Y
	Disturbance History			PJ		X		Y
	Riparian Reserve		BLM			X		Y

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

Project Name: Trail Creek
Physiographic Province: Klamath Mountains
4th Field HUC: South Umpqua
5th Field HUC: Elk Creek
6th Field HUC: Upper Elk Creek
Project Scale
Date: 1/31/02
Preparer: Jayne LeFors, Shawn Simpson
Resource Area, Medford BLM: Butte Falls

PATHWAY INDICATORS		ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)[2]			
		Properly Functioning[1]	At Risk[1]	*Not* Properly Functioning[1]	Restore[2]	Maintain[2]	Degrade[2]	Consistent with ACS?
Water Quality	Temperature			DEQ		X		Y
	Sediment			WA		X		Y
	Chem. Contam./ Nutrient Load		PJ			X		Y
	Physical Barriers		PJ			X		Y
Habitat Elements	Substrate			WA		X		Y
	Large Woody Debris			WA		X		Y
	Pool Frequency			WA		X		Y
	Pool Quality			WA		X		Y
	Off-Channel Habitat			WA		X		Y
	Refugia			PJ		X		Y
Chan. Cond. & Dyna.	Width/Depth Ratio			PJ		X		Y
	Streambank Condition			PJ		X		Y
	Floodplain Connectivity			PJ		X		Y
Flow/Hydro	Peak/Base Flows			PJ		X		Y
	Drainage Network Increase			WA		X		Y
Wshed Condition	Road Density and Location			WA		X		Y
	Disturbance History			WA		X		Y
	Riparian Reserve			WA		X		Y

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

Project Name: Trail Creek
Physiographic Province: Cascades West; Klamath Mountains
4th Field HUC: Upper Rogue

5th Field HUC: Trail Creek

5th Field Scale

Date: 1/31/02
Preparers: Jayne LeFors, Shawn Simpson
Resource Area, Medford BLM: Butte Falls

PATHWAY INDICATORS		ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)[2]			
		Properly Functioning[1]	At Risk[1]	*Not* Properly Functioning[1]	Restore[2]	Maintain[2]	Degrade[2]	Consistent with ACS?
Water Quality	Temperature			BLM		X		Y
	Sediment			ODFW		X		Y
	Chem. Contam./ Nutrient Load		PJ			X		Y
	Physical Barriers		ODFW			X		Y
Habitat Elements	Substrate			ODFW		X		Y
	Large Woody Debris			ODFW		X		Y
	Pool Frequency			ODFW		X		Y
	Pool Quality			ODFW		X		Y
	Off-Channel Habitat			ODFW		X		Y
	Refugia			PJ		X		Y
Chan. Cond. & Dyna.	Width/Depth Ratio	ODFW				X		Y
	Streambank Condition	ODFW				X		Y
	Floodplain Connectivity			PJ		X		Y
Flow/Hydro	Peak/Base Flows			PJ		X		Y
	Drainage Network Increase			WA		X		Y
Wshed Condition	Road Density and Location			WA		X		Y
	Disturbance History			WA		X		Y
	Riparian Reserve			BLM		X		Y

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

Project Name: Trail Creek
Physiographic Province: Klamath Mountains
4th Field HUC: Middle Rogue
5th Field HUC: Evans Creek
5th Field Scale
Date: 1/31/02
Preparers: Jayne LeFors, Shawn Simpson
Resource Area, Medford BLM: Butte Falls

PATHWAY INDICATORS		ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)[2]			
		Properly Functioning[1]	At Risk[1]	*Not* Properly Functioning[1]	Restore[2]	Maintain[2]	Degrade[2]	Consistent with ACS?
Water Quality	Temperature			DEQ		X		Y
	Sediment			ODFW		X		Y
	Chem. Contam./ Nutrient Load		PJ			X		Y
	Physical Barriers			ODFW		X		Y
Habitat Elements	Substrate			ODFW		X		Y
	Large Woody Debris			ODFW		X		Y
	Pool Frequency			ODFW		X		Y
	Pool Quality			ODFW		X		Y
	Off-Channel Habitat			ODFW		X		Y
	Refugia			PJ		X		Y
Chan. Cond. & Dyna.	Width/Depth Ratio		ODFW			X		Y
	Streambank Condition		ODFW			X		Y
	Floodplain Connectivity			PJ		X		Y
Flow/Hydro	Peak/Base Flows			PJ		X		Y
	Drainage Network Increase			WA		X		Y
Wshed Condition	Road Density and Location			WA		X		Y
	Disturbance History			WA		X		Y
	Riparian Reserve			BLM		X		Y

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

Project Name: Trail Creek
Physiographic Province: Klamath Mountains
4th Field HUC: South Umpqua

5th Field HUC: Elk Creek

5th Field Scale

Date: 1/31/02
Preparers: Jayne LeFors, Shawn Simpson
Resource Area, Medford BLM: Butte Falls

PATHWAY INDICATORS		ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)[2]			
		Properly Functioning[1]	At Risk[1]	*Not* Properly Functioning[1]	Restore[2]	Maintain[2]	Degrade[2]	Consistent with ACS?
Water Quality	Temperature			DEQ		X		Y
	Sediment			WA		X		Y
	Chem. Contam./ Nutrient Load		PJ			X		Y
	Physical Barriers		PJ			X		Y
Habitat Elements	Substrate			WA		X		Y
	Large Woody Debris			WA		X		Y
	Pool Frequency			WA		X		Y
	Pool Quality			WA		X		Y
	Off-Channel Habitat			WA		X		Y
	Refugia			PJ		X		Y
Chan. Cond. & Dyna.	Width/Depth Ratio			PJ		X		Y
	Streambank Condition			PJ		X		Y
	Floodplain Connectivity			PJ		X		Y
Flow/Hydro	Peak/Base Flows			PJ		X		Y
	Drainage Network Increase			WA		X		Y
	Road Density and Location			WA		X		Y
Wshed Condition	Disturbance History			WA		X		Y
	Riparian Reserve			WA		X		Y

APPENDIX G

Date: March 5, 2002

To: Files - Trail Timber Sale

From: Shawn Simpson, Butte Falls Resource Area Hydrologist

Subject: Trail Hydrology Appendix

Hydrologic Recovery

The removal of vegetation reduces interception which allows more precipitation to reach the soil surface and infiltrate or become runoff. The increased runoff and available soil moisture can increase peak flows. Large openings due to vegetation removal within the transient snow zone (TSZ) can produce an increase in snowpack accumulation. This additional snowpack can quickly melt during a rain on snow (ROS) event and may result in extremely high streamflows. Once vegetation is removed, it is considered to be hydrologically immature until new vegetation obtains the same crown closure as the previous stand. Douglas-fir and white fir stands are generally considered to be 100 percent hydrologically recovered at 70 percent crown closure and Pine stands are fully recovered at about 40 percent. These canopy closure percentages reflect reference conditions when natural disturbances were more frequent. The range of natural variability includes canopy closure that would be greater and less that full hydrologic recovery.

The hydrologic recovery data was calculated by applying recovery factors to the vegetation information derived from the Western Oregon Digital Image Processing (WODIP) satellite imagery data. The satellite imagery data is only available in 10 percent increments, starting at 5 percent, so full recovery was taken at 75% rather than 70%. The satellite data does not have the capability of distinguishing between tree series so pine stands had to be treated the same as Douglas-fir. Therefore, the percent hydrologic recovery calculated is a conservative estimate. Areas classified as water, rock, and grassland/shrubland are considered fully recovered for this analysis. Uban/agricultural areas are 0 percent recovered. (See Table Below)

Hydrologic Recovery	Percent of Area Hydrologically Recovered			
	No Action	ALT 2	ALT 3	ALT 4
Analysis Area	Pre-project	Post-project	Post-project	Post-project
Trail Creek	78.4	76.5	77.5	76.7
Trail Creek - TSZ	83.5	83	83.2	83
Trail Creek, Upper	80.1	78.2	79.1	78.2
Trail Creek, Upper - TSZ	83.9	82.5	83.1	82.5
Trail Creek, W. Fork	77.9	77.2	77.7	77.8
Trail Creek, W. Fork - TSZ	80.4	80.4	80.4	80.4
Trail Creek, Lower	77.1	74.1	75.7	74.1
Trail Creek, Lower - TSZ	86.1	86.1	86.1	86.1

For a complete discussion on Hydrologic Change in the Trail Creek Watershed, refer to the Trail Creek Watershed Analysis (pp 3 - 19 to 3 - 24 and 4 - 7 to 4 - 8) and Appendix C on Hydrology. A portion of this discussion and selected tables from Appendix C are also included on the following pages.

3.3 Hydrologic Change
Reference Conditions

The reference condition for this watershed is fully forested, interrupted by widespread severe wildfire at intervals of several decades to centuries. Wildfires may have caused partial water repellency of soils in severely burned areas for one to five years following fire. Overland flow in some areas of the watershed may have then occurred, causing elevated peak flows. Wildfire influenced rain-on-snow flood effects were minimal due to the low elevation of the watershed (see Current Conditions fully-clearcut results). In this analysis, snowmelt-associated floods are simulated based on the current condition of the watershed's vegetation in comparison to a hypothetical fully-forested reference condition.[8]

Current Conditions

This report presents the findings of a Hydrologic Conditions Assessment for the Trail Creek watershed conducted according to the Washington Forest Practices Board Standard Methodology for Conducting Watershed Analysis, Version 3.0 (WFPB, 1995). The purpose of the Hydrologic Conditions Assessment is to evaluate the effects of forest cover removal on peak flows in the watershed.

This analysis includes discussion of the following topics: summary of current watershed conditions, review of large peak flows and low flows, modeling of peak flow increases caused by mid-winter rain-on- snow (ROS) events, hazard calls, conclusions, and confidence in work products.

Overview

The fundamental underlying assumption of the Washington hydrologic analysis procedure (WFPB, 1995) is that the greatest likelihood of cumulative changes in forest hydrologic processes is due to increases in peak flows attributable to the influence of timber harvest on snow accumulation and melt rates during rain-on-snow (ROS) events. The WFPB methodology predicts changes in peak flow magnitude. Changes in peak flow frequency and duration are not explicitly addressed. However, it is inferred that where substantial increases in peak flow magnitude occur, corresponding increases in peak flow frequency and duration are also likely to occur.

The WAR analysis provides a means of estimating the magnitude of changes in water available for runoff (WAR) that are likely to be produced by rain-on- snow conditions for various levels of hydrologic maturity and for various flood recurrence intervals. For this analysis, we applied the basic Manual procedure using local climatic data to estimate values for the processes which generate WAR, including storm rainfall, snow accumulation, and snow melt. WAR estimates were then used to estimate peak flows.

We modeled a range of conditions under which ROS-generated WAR might occur. Each scenario represents a particular combination of three conditions: precipitation amount, storm type, and the hydrologic maturity of vegetation in the drainage. Precipitation amounts used in this assessment are the 24-hour totals for the 2, 5, 10, and 100-year return intervals. Two storm intensities were considered: an "average" storm, representing a typical ROS event; and an "unusual" storm, representing a less frequent, more intense event. Three vegetation cover conditions were considered: "fully-forested," representing the reference conditions; the "current" condition, representing the present day distribution and composition of land use and cover types; and "clearcut," representing removal of all forest canopy cover.

[8] Non-forest areas (rock, meadows, etc.) and areas permanently converted to non-forest use, such as agricultural lands, were held constant within this analysis for

both the reference and current conditions: only private lands adjacent to Trail Creek, the East Fork and West Fork of Trail Creek may have been converted. Moreover, irrespective of conversion, these low elevation lands occur solely within the "lowland" hydrologic response zone, and there is no modeled peak flow response due to forest removal within this zone.

Estimation of the WAR requires addition of the estimated 24-hour snowmelt to the 24-hour precipitation amount for a given return interval. The snowmelt was determined by simulating a 24-hour storm event occurring over a modeled snowpack, taking into consideration the effects of forest cover on snow accumulation and wind speed. Snow accumulates to greater depth in open forests than it does under dense canopy cover, and snow melts faster in open forests during ROS conditions due to greater wind speeds over the snowpack.

Flood frequency analysis is a method of estimating flood magnitudes at selected recurrence intervals. Regional flood frequency relationships have been developed by the USGS for western Oregon, which relate streamflow for various recurrence intervals to drainage basin characteristics. These flood discharge estimates are baseline flood magnitudes, to which we must add the additional flood volume predicted to occur as a result of the melted snow component of WAR during ROS conditions. To do this, we followed standard Manual procedures to develop regression equations which correlate peak flows, as predicted by the USGS regional equations, to 24-hour storm precipitation. Finally, peak flows for each forest cover and meteorologic scenario were estimated by substituting the 24-hour WAR values (in place of precipitation) into these regression equations.

Current Watershed Conditions

The Trail Creek watershed was divided into 7 sub-watersheds [9] (Figure 1-5) for the purposes of this hydrologic assessment. These sub-watersheds allow examination of the potential effects of vegetative manipulation in different areas of the watershed which vary in precipitation and temperature characteristics, and also allow examination of effects as they accumulate in a downstream direction. Current vegetation conditions in the watershed are shown in Figure 1-6. Descriptions of each map unit can be found in Section 1.4. Table C-1 (Appendix C) summarizes vegetation condition by rain-on-snow potential zone by sub-watershed, and a summary of this information for the entire watershed is presented in Figure C-1 (Appendix C).

Streamflow and Climatic Records

Streamflow data is not reported for any locations within the Trail Creek watershed, however, a stream gauge is located near the mouth of Elk Creek, the drainage immediately to the east of Trail Creek.[10]
The highest flow of record at the Elk Creek gauge occurred in December, 1964; other large peak flows at this station occurred in December, 1945; January, 1953; December, 1955; January, 1974; and January, 1997. Mean daily discharge tends to be highest in the months of January and February. The lowest flow recorded for the Elk Creek stream gauge occurred in the month of September. Mean daily discharge tends to be lowest in the months of August and September (Moffatt et al., 1990). Mean annual flow, peak flows, and low flows in Trail Creek are likely to be proportionately similar to those reported for Elk Creek. Trail Creek below the West Fork has been reported to go completely dry in some areas, at least in part due to water withdrawals for rural residential domestic and minor agricultural uses, which increases water temperatures and limits fish production. (Evenson, 1998; Menteer, 1998).

[9] Seven logical divisions of the watershed were delineated and are referred to as sub-watersheds (Figure 1-5) for the

hydrologic analysis. These same sub-watersheds were used to facilitate the mass wasting, surface erosion, and sediment budget analyses.

[10] Two other gauges are located within the Elk Creek drainage, but their periods of record are too short for meaningful comparisons.

Rain-on-Snow Modeling

The standard methodology (WFPB, 1995) was used to model the effects of forest cover removal on peak flows during mid-winter rain-on-snow events. The reference condition for this analysis is the "fully forested" condition. For more information on the model, its assumptions, and its input parameters, the reader is referred to WFPB (1995).

Model inputs

Vegetation conditions were modeled using vegetative seral stage information shown in Figure 1-6. These vegetation condition categories were grouped into three Hydrologic Condition categories (mature,intermediate, immature) based on their ability to intercept snow and reduce wind at the snow surface. For each Hydrologic Condition category, a forest canopy cover factor (F_C) was assigned according to the standard methodology (see Table 3-7).

For "usual" winter conditions, the Manual suggests using the wind speed that is exceeded 50% of the time, as recorded at representative weather stations in the area during mid-winter storms. A value of 4.5 m/s was used in this analysis. For the "unusual" modeled condition, a value of 6.8 m/s was used, representing the 16% exceedance value. These values were developed by Boise Cascade (1998) based on extensive analysis of local data. We confirmed that these wind speeds were reasonable for this analysis by comparing them to regional wind speed values reported by WFPB (1995), where wind speed for nearly all western and eastern Washington weather stations analyzed were less than those used in this analysis for Trail Creek, resulting in conservatively high estimation of snow melt (WFPB Figures C-6a and C-6b).

The regional temperature lapse rate equation reported in the Elk Creek watershed analysis (Boise Cascade Corp., 1998) was also used for this analysis. This relationship was used to calculate a storm temperature for each precipitation zone. For the "unusual" modeled condition, one standard error (assumed to be 2 ^{o}C) was added to the modeled temperature for each precipitation zone:

Average storm:T \EC) = 12.9 – 0.003 E
Unusual storm:T \EC) = 14.9 – 0.003 E
(E = elevation in meters)

Rain-on-snow potential zones were determined by elevation based on the general procedures of Brunengo et al. (1992), consistent with information obtained from the Elk Creek watershed analysis (Boise Cascade Corp., 1998); these zones are shown in Figure 3-10.

The NOAA Atlas (Miller et al., 1973) was used to determine the 24-hour precipitation intensity for various recurrence intervals for the watershed (see Table C-2).

Average January snowpack data was obtained for a total of 13 snow survey sites. This data was then used in a linear regression to obtain snow water equivalent (SWE) as a function of elevation (see Figure C-2). For "unusual" conditions, one standard error of the estimate was added to the calculated SWE.

To translate Water Available for Runoff (WAR) in the model to a resultant discharge, the standard methodology was used. This approach requires calculation of flood magnitudes of various return intervals for each sub-watershed (see Table C-3, derived from Harris, et al., 1979). A linear regression was then run for flood magnitude versus 24-hour precipitation of the corresponding recurrence interval (see Table C-4). This same input versus output relationship was then used to translate the "enhanced" WAR (from rain-on-snow) into streamflow. The USGS predictions of discharges for each sub-watershed are summarized in Appendix C.

Results

The results for the ROS model simulation are presented in Table C-5 (Appendix C). The first portion of each table deals with predictions of Water Available for Runoff (WAR) for each recurrence interval for each sub-watershed. The data are summarized for a fully forested condition, the current condition, and for a completely clearcut condition. In the lower part of each table, predicted discharges for each recurrence interval are calculated for each sub-watershed. As with WAR, the discharge calculations are presented for the fully forested, current, and fully clearcut condition. Percentage increase calculations above a fully forested condition are shown for the current condition and the fully clearcut condition.

In this simulation, three sub-watersheds (Lower East Fork, Lower Trail Creek, and Lower West Fork) did not generate WAR values in excess of the 24-hour precipitation for the average storm scenario. This resulted because these sub-watersheds include very little area in the ROS elevation zone; therefore, within the simulation, there is no snow to be melted from the Lowland and Rain Dominated zones, irrespective of forest vegetative condition.

Four sub-watersheds generated WAR in excess of the 24-hour precipitation; these were higher elevation sub-watersheds with at least some area in the rain-on-snow zone: Chicago Creek, Upper East Fork, Upper West Fork, and Wall Creek.

The predicted increases in peak flows for the current condition ranged from 0% to 1.8% for the average storm (Table 3-8), and from 1.4% to 8.1% for the unusual storm. With regard to the fully clearcut condition, predicted increases in discharge ranged from 0% to 6.1% for the average storm, and 4.1% to 25.2% for the unusual storm. The most responsive sub-watershed was Wall Creek; this is to be expected, since it has the highest percentage of its area within the higher elevation rain-on-snow precipitation zone.

Hazard Calls

The Washington Watershed analysis methodology assumes that there are no adverse effects associated with peak flow increases of up to 10%. This assumption is made because of the inherent error in the modeling, and because changes in peak flows less than 10% are typically below the detection limits using standard stream gauging techniques. All sub-watersheds in the Trail Creek watershed, as well as the entire watershed as a whole, have predicted increases in peak flows of less than 10% for both the average and unusual storm simulations. Therefore, all sub-watersheds have been assigned a low sensitivity to peak flow increases.

Conclusions and Discussion

Simulation of mid-winter rain-on-snow conditions for the Trail Creek watershed reveals that current rain-on-snow flood magnitudes are not substantially different than the reference condition. Sub-watersheds with the highest percentage of area in the ROS zone were predicted to be most sensitive, but no substantial effects were indicated by the simulation results for current conditions. For the average and unusual storm

scenarios, current vegetation conditions produced relatively small increases in peak flows. Proportionately small sub-watershed area that is in a hydrologically immature condition, and small area in the ROS zone, explains the current condition response.

Amount, timing, and delivery of water, sediment, and wood from the forested parts of this watershed are not changed appreciably from the reference conditions due to forest harvest effects on peak flows.[11] Compaction of road surfaces generates overland flow of water, and surface runoff from roads can change the normal flowpaths of forest slope runoff to some degree; however, it is unlikely that these effects on peak flows in the Trail Creek watershed are large enough to affect stream processes because of the limited length of road that discharges water to the stream network (see Erosion section, Roads section). Substantial removal of forest vegetation has occurred in riparian areas adjacent to most of the major tributaries in the watershed, particularly at lower elevations and along the main stem of Trail Creek and the West Fork. Deforestation of these riparian areas can be expected to have major effects on routing of water, sediment, and wood in these streams.

Low flow volume and total water yield in streams draining the forested portions of the watershed (where unaffected by water withdrawals) are likely to exceed quantities that would be produced in the theoretical fully-forested condition. All studies of forested watersheds have demonstrated small increases in low flows and water yield due to removal of vegetation, with only two exceptions that are relevant to the watershed. Decreased low flows have been observed for several years following clearcutting of riparian areas followed by dense regrowth of riparian hardwoods, and decreased low flows have been recorded following old-growth harvest in watersheds subject to heavy fog and low cloud cover, conditions not common to the Trail Creek watershed.

Water withdrawals for domestic use and limited pasture irrigation uses occur along the main stem of Trail Creek and the West Fork, and low flows may be critically low in some years. Withdrawals are pumped from the streams; there are no known surface flow diversions.

One approximately two-acre impoundment, previously used as a sawmill log pond, is located adjacent to the West Fork, but it is unlikely that the pond currently affects streamflows measurably. Numerous small ponds of much less than one acre are scattered throughout the watershed, as are a few areas labeled as marshes. No other wetlands are noted on the USGS maps, and only small isolated wet areas were observed during the field work for this analysis. Even within Riparian Reserve areas, wet areas are limited: headwater channels and adjacent slopes are typically steep, and mainstem channels are well entrenched in most areas Changes in ponds and wetlands from the reference condition are unknown. Hot springs or other sources of geothermal water with potential to affect stream temperatures are not known to occur within the watershed. Eight springs, four of which are named, are shown within the watershed on the USGS 1:24,000 scale topographic maps. Three are shown as feeding perennial streams, three feed intermittent streams, and two appear to be isolated from the stream network. Although some of these springs are named, evidently all of them are small; Streamflow becomes quite low in the West Branch and Trail Creek during the late summer and early fall, and water temperatures are warm evidencing no affect of springs within the watershed.

Confidence in Work Products

Caution should be used with regard to the results of the peak flow analysis. The sensitivity of the modeling results to input parameters and the assumptions inherent in the modeling do not lend themselves to a high degree of confidence in the absolute magnitude of the predictions. However, the model does provide a means of assessing the relative potential for forest cover removal to increase peak flows in the watershed in comparison to the fully-forested reference conditions.

11 Substantial changes in delivery of sediment and wood have occurred due to other mechanisms, including effects from roads and riparian management practices.

TABLE 3-8
Predicted Increases in Peak Flows Under Current Vegetative Conditions

	2-year		5-year		10-year		100-year	
Sub-Watershed	**average**	**unusual**	**average**	**unusual**	**average**	**unusual**	**average**	**unusual**
Chicago Creek	1.0%	8.1%	0.8%	6.4%	0.6%	5.5%	0.4%	3.3%
Lower East Fork	0.0%	3.9%	0.0%	3.0%	0.0%	2.5%	0.0%	1.4%
Lower Trail Creek	0.0%	4.3%	0.0%	3.3%	0.0%	2.7%	0.0%	1.6%
Lower West Fork	0.1%	5.7%	0.0%	4.3%	0.0%	3.6%	0.0%	2.1%
Upper East Fork	1.6%	6.9%	1.2%	5.4%	1.0%	4.6%	0.5%	2.8%
Upper West Fork	1.8%	6.4%	1.3%	5.0%	1.1%	4.3%	0.6%	2.6%
Wall Creek	1.8%	7.6%	1.4%	6.0%	1.1%	5.1%	0.7%	3.1%
Total	0.9%	6.6%	0.7%	5.0%	0.6%	4.2%	0.3%	2.4%

(pp 3 - 19 to 3 - 24, Trail Creek Watershed Analysis).

4.3 Hydrologic Change

Potential effects of human uses on low flows, water yield, and peak flows were examined. Effects of forest cover removal on rain-on-snow (ROS) peak flows in the watershed were assessed with the Washington Forest Practices Board Standard Methodology for Conducting Watershed Analysis, Version 3.0 (WFPB, 1995).

The predicted increases in peak flows for the current condition ranged from 0% to 1.8% for “average” return interval storm conditions (Table 3-8), and from 1.4% to 8.1% for conditions during severely warm and windy conditions. Wall Creek was found to be the most responsive sub-watershed because it has the highest percentage of its area within the higher elevation rain-on-snow precipitation zone. Conversely, the Lower East Fork, Lower Trail Creek, and Lower West Fork sub-watersheds were found to be least responsive.

These results indicate that current rain-on-snow flood magnitudes are not substantially different than the reference condition. Sub-watersheds with the highest percentage of area in the ROS zone (elevation 3,600 to 4,800 feet) were predicted to be most sensitive, but no substantial effects were indicated by the simulation results for current conditions. Current vegetation conditions produce relatively small increases in peak flows. Proportionately small area that is in a hydrologically immature condition, and small area in the ROS zone, explains this limited response. Amount, timing, and delivery of water, sediment, and wood from the forested parts of this watershed are not changed appreciably from the reference conditions due to forest harvest effects on peak flows. Effects will remain inconsequential unless large areas of forest are harvested or burned in the near future. Effects of future harvesting, prescribed fire, or potential wildfire scenarios can be examined using the peak flow modeling approach developed for Trail Creek and its sub-watersheds. The procedure is recommended if effects of harvest or fire need to be examined in detail for future management alternatives analysis.

Roads can change the normal flowpaths of forest slope runoff through two mechanisms. Compaction of soil results in lower infiltration capacity and increased overland flow (Reid and Dunne, 1984; Luce and Cundy, 1994), and shallow subsurface flow can be intercepted by road cutslopes and converted to surface runoff (Burroughs et al., 1972; Megahan, 1972; King and Tennyson, 1984). However, roads have been found to increase flows in some studies and watersheds (King and Tennyson, 1984; Jones and Grant, 1996; Harr et al., 1975), to decrease flows in other watersheds (King and Tennyson, 1984), and to have no effect upon peak flows in yet other studies and watersheds (Rothacher, 1970; 1973; Ziemer,1981; Wright et al.,1990; King and Tennyson, 1984; Thomas and Megahan, 1998). However, to the degree that roads have any effect on peak flows, potential effects are most likely related to the total distance of road length that discharges water directly into the stream network via road ditches. Reduction of road length directly discharging to streams is recommended for the Trail Creek road system as a means of cost-effectively reducing sediment delivery. To the degree that this recommendation is employed to reduce sediment delivery, potential for road effects upon water delivery and peak flows will also be reduced.

Substantial removal of forest vegetation has occurred in riparian areas adjacent to most of the major tributaries in the watershed, particularly at lower elevations and along the main stem of Trail Creek and the West Fork. Deforestation of these riparian areas can be expected to have major effects on routing of water, sediment, and wood in these streams. Reforestation of these areas is encouraged, and through time, could be expected to reverse adverse effects. However, BLM ownership adjacent to these stream reaches is limited, and treatment of private lands will be necessary to achieve substantial results.

Low flow volume and total water yield in streams draining the forested portions of the watershed (where unaffected by water withdrawals) may exceed quantities that would be produced in the theoretical fully-forested condition. However, water withdrawals for domestic use and limited pasture irrigation uses occur along the main stem of Trail Creek and the West Fork, and low flows may be critically low in some years. (pp 4 - 7 to 4 - 8, Trail Creek Watershed Analysis).

Chicago Creek
Summary of Peak Dicharge Estimates
(Taken from Table C.5, Hydrology Apendix, Trail Creek Watershed Analysis)

Recurrence Interval (yr)	Storm Intensity	Fully Forested Discharge (cfs)	Current Condition % Increase	Fully Clearcut % Increase
2	Average	214	1.0%	3.2%
2	Unusual	269	8.1%	24.2%
5	Average	286	0.8%	2.4%
5	Unusual	341	6.4%	19.1%
10	Average	345	0.6%	2.0%
10	Unusual	400	5.5%	16.3%
100	Average	597	0.4%	1.1%
100	Unusual	653	3.3%	10.0%

Lower East Fork Trail Creek
Summary of Peak Dicharge Estimates
(Taken from Table C.5, Hydrology Apendix, Trail Creek Watershed Analysis)

Recurrence Interval (yr)	Storm Intensity	Fully Forested Discharge (cfs)	Current Condition % Increase	Fully Clearcut % Increase
2	Average	404	0.0%	0.1%
2	Unusual	458	3.9%	13.2%
5	Average	554	0.0%	0.1%
5	Unusual	608	3.0%	10.0%
10	Average	675	0.0%	0.1%
10	Unusual	730	2.5%	8.3%
100	Average	1,201	0.0%	0.0%
100	Unusual	1,256	1.4%	4.8%

Lower Trail Creek
Summary of Peak Dicharge Estimates
(Taken from Table C.5, Hydrology Apendix, Trail Creek Watershed Analysis)

Recurrence Interval (yr)	Storm Intensity	Fully Forested Discharge (cfs)	Current Condition % Increase	Fully Clearcut % Increase
2	Average	509	0.0%	0.0%
2	Unusual	584	4.3%	11.3%
5	Average	701	0.0%	0.0%
5	Unusual	776	3.3%	8.5%
10	Average	857	0.0%	0.0%
10	Unusual	932	2.7%	7.1%
100	Average	1,532	0.0%	0.0%
100	Unusual	1,608	1.6%	4.1%

Lower West Fork Trail Creek
Summary of Peak Dicharge Estimates
(Taken from Table C.5, Hydrology Apendix, Trail Creek Watershed Analysis)

Recurrence Interval (yr)	Storm Intensity	Fully Forested Discharge (cfs)	Current Condition % Increase	Fully Clearcut % Increase
2	Average	763	0.1%	0.1%
2	Unusual	906	5.7%	16.1%
5	Average	1,057	0.0%	0.1%
5	Unusual	1,201	4.3%	12.2%
10	Average	1,298	0.0%	0.1%
10	Unusual	1,441	3.6%	10.1%
100	Average	2,335	0.0%	0.0%
100	Unusual	2,478	2.1%	5.9%

Upper East Fork Trail Creek
Summary of Peak Dicharge Estimates

(Taken from Table C.5, Hydrology Apendix, Trail Creek Watershed Analysis)

Recurrence Interval (yr)	Storm Intensity	Fully Forested Discharge (cfs)	Current Condition % Increase	Fully Clearcut % Increase
2	Average	578	1.6%	4.8%
2	Unusual	729	6.9%	24.0%
5	Average	778	1.2%	3.5%
5	Unusual	929	5.4%	18.8%
10	Average	941	1.0%	2.9%
10	Unusual	1,093	4.6%	16.0%
100	Average	1,643	0.5%	1.7%
100	Unusual	1,799	2.8%	9.7%

Upper West Fork Trail Creek
Summary of Peak Dicharge Estimates
(Taken from Table C.5, Hydrology Apendix, Trail Creek Watershed Analysis)

Recurrence Interval (yr)	Storm Intensity	Fully Forested Discharge (cfs)	Current Condition % Increase	Fully Clearcut % Increase
2	Average	407	1.8%	5.8%
2	Unusual	508	6.4%	25.0%
5	Average	543	1.3%	4.4%
5	Unusual	645	5.0%	19.7%
10	Average	654	1.1%	3.6%
10	Unusual	757	4.3%	16.8%
100	Average	1,132	0.6%	2.1%
100	Unusual	1,239	2.6%	10.3%

Wall Creek
Summary of Peak Dicharge Estimates
(Taken from Table C.5, Hydrology Apendix, Trail Creek Watershed Analysis)

Recurrence Interval (yr)	Storm Intensity	Fully Forested Discharge (cfs)	Current Condition % Increase	Fully Clearcut % Increase
2	Average	599	1.8%	6.1%
2	Unusual	755	7.6%	25.2%
5	Average	805	1.4%	4.5%
5	Unusual	962	6.0%	19.8%
10	Average	972	1.1%	3.7%
10	Unusual	1,130	5.1%	16.8%
100	Average	1,694	0.7%	2.1%
100	Unusual	1,857	3.1%	10.2%

Trail Creek
Summary of Peak Dicharge Estimates
(Taken from Table C.5, Hydrology Apendix, Trail Creek Watershed Analysis)

Recurrence Interval (yr)	Storm Intensity	Fully Forested Discharge (cfs)	Current Condition % Increase	Fully Clearcut % Increase
2	Average	2,693	0.9%	3.0%
2	Unusual	3,323	6.6%	21.4%
5	Average	3,766	0.7%	2.2%
5	Unusual	4,400	5.0%	16.2%
10	Average	4,641	0.6%	1.8%
10	Unusual	5,277	4.2%	13.5%
100	Average	8,418	0.3%	1.0%
100	Unusual	9,065	2.4%	7.8%

(Appendix C, Trail Creek Watershed Analysis).

APPENDIX H

Fire Behavior Fuel Model 10

The fires burn in the surface and ground fuels with greater fire intensity than the other timber litter models. Dead-down fuels include greater quantities of 3-inch (7.6-cm) or larger limbwood resulting from overmaturity or natural events that create a large load of dead material on the forest floor. Crowning out, spotting, and torching of individual trees are more frequent in this fuel situation, leading to potential fire control difficulties. Any forest type may be considered if heavy down material is present; examples are insect- or disease-ridden stands, wind-thrown stands, overmature situations with deadfall, and aged light thinning or partial-cut slash.

The 1978 NFDRS fuel model G is represented and is depicted in photographs 28, 29, and 30.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	12.0
Dead fuel load, ¼-inch, tons/acre	3.0
Live fuel load, foliage, tons/acre	2.0
Fuel bed depth, feet	1.0

The fire intensities and spread rates of these timber litter fuel models are indicated by the following values when the dead fuel moisture content is 8 percent, live fuel moisture is 100 percent, and the effective windspeed at midflame height is 5 mi/h (8 km/h):

Model	Rate of spread *Chains/hour*	Flame length *Feet*
8	1.6	1.0
9	7.5	2.6
10	7.9	4.8

Fires such as above in model 10 are at the upper limit of control by direct attack. More wind or drier conditions could lead to an escaped fire.

Photo 28. Old-growth Douglas-fir with heavy ground fuels.

Photo 29. Mixed conifer stand with dead-down woody fuels.

Photo 30. Spruce habitat type where succession or natural disturbance can produce a heavy downed fuel load.

Fire Behavior Fuel Model 6

Fires carry through the shrub layer where the foliage is more flammable than fuel model 5, but this requires moderate winds, greater than 8 mi/h (13 km/h) at mid-flame height. Fire will drop to the ground at low wind speeds or at openings in the stand. The shrubs are older, but not as tall as shrub types of model 4, nor do they contain as much fuel as model 4. A broad range of shrub conditions is covered by this model. Fuel situations to be considered include intermediate stands of chamise, chaparral, oak brush, low pocosin, Alaskan spruce taiga, and shrub tundra. Even hardwood slash that has cured can be considered. Pinyon-juniper shrublands may be represented but may overpredict rate of spread except at high winds, like 20 mi/h (32 km/h) at the 20-foot level.

The 1978 NFDRS fuel models F and Q are represented by this fuel model. It can be considered a second choice for models T and D and a third choice for model S. Photographs 15, 16, 17, and 18 show situations encompassed by this fuel model.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	6.0
Dead fuel load, ¼-inch, tons/acre	1.5
Live fuel load, foliage, tons/acre	0
Fuel bed depth, feet	2.5

Photo 15. Pinyon-juniper with sagebrush near Ely, Nev.; understory mainly sage with some grass intermixed.

Photo 16. Southern hardwood shrub with pine slash residues.

Photo 17. Low pocosin shrub field in the south.

Photo 18. Frost-killed Gambel Oak foliage, less than 4 feet in height, in Colorado.

Fire Behavior Fuel Model 5

Fire is generally carried in the surface fuels that are made up of litter cast by the shrubs and the grasses or forbs in the understory. The fires are generally not very intense because surface fuel loads are light, the shrubs are young with little dead material, and the foliage contains little volatile material. Usually shrubs are short and almost totally cover the area. Young, green stands with no dead wood would qualify: laurel, vine maple, alder, or even chaparral, manzanita, or chamise.

No 1978 NFDRS fuel model is represented, but model 5 can be considered as a second choice for NFDRS model D or as a third choice for NFDRS model T. Photographs 13 and 14 show field examples of this type. Young green stands may be up to 6 feet (2 m) high but have poor burning properties because of live vegetation.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	3.5
Dead fuel load, ¼-inch, tons/acre	1.0
Live fuel load, foliage, tons/acre	2.0
Fuel bed depth, feet	2.0

Photo 13. Green, low shrub fields within timber stands or without overstory are typical. Example is Douglas-fir–snowberry habitat type.

Photo 14. Regeneration shrublands after fire or other disturbances have a large green fuel component, Sundance Fire, Pack River Area, Idaho.

APPENDIX H

Shrub Group

Fire Behavior Fuel Model 4

Fire intensity and fast-spreading fires involve the foliage and live and dead fine woody material in the crowns of a nearly continuous secondary overstory. Stands of mature shrubs, 6 or more feet tall, such as California mixed chaparral, the high pocosin along the east coast, the pinebarrens of New Jersey, or the closed jack pine stands of the north-central States are typical candidates. Besides flammable foliage, dead woody material in the stands significantly contributes to the fire intensity. Height of stands qualifying for this model depends on local conditions. A deep litter layer may also hamper suppression efforts. Photographs 9, 10, 11, and 12 depict examples fitting this fuel model.

This fuel model represents 1978 NFDRS fuel models B and O; fire behavior estimates are more severe than obtained by models B or O.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	13.0
Dead fuel load, ¼-inch, tons/acre	5.0
Live fuel load, foliage, tons/acre	5.0
Fuel bed depth, feet	6.0

Photo 9. Mixed chaparral of southern California; note dead fuel component in branchwood.

Photo 10. Chaparral composed of manzanita and chamise near the Inaja Fire Memorial, Calif.

Photo 11. Pocosin shrub field composed of species like fetterbush, gallberry, and the bays.

Photo 12. High shrub southern rough with quantity of dead limbwood.

APPENDIX H

Timber Group

Fire Behavior Fuel Model 8

Slow-burning ground fires with low flame lengths are generally the case, although the fire may encounter an occasional "jackpot" or heavy fuel concentration that can flare up. Only under severe weather conditions involving high temperatures, low humidities, and high winds do the fuels pose fire hazards. Closed canopy stands of short-needle conifers or hardwoods that have loafed out support fire in the compact litter layer. This layer is mainly needles, leaves, and occasionally twigs because little undergrowth is present in the stand. Representative conifer types are white pine, and lodgepole pine, spruce, fir, and larch.

This model can be used for 1978 NFDRS fuel models H and R. Photographs 22, 23, and 24 illustrate the situations representative of this fuel.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch, dead and live, tons/acre	5.0
Dead fuel load, ¼-inch, tons/acre	1.5
Live fuel load, foliage, tons/acre	0
Fuel bed depth, feet	0.2

Photo 22. Surface litter fuels in western hemlock stands of Oregon and Washington.

Photo 23. Understory of inland Douglas-fir has little fuel here to add to dead-down litter load.

Photo 24. Closed stand of birch-aspen with leaf litter compacted.

APPENDIX I

T_R_S	EA UNIT	ACRES	Soil Type	Alternative 2 Treatment	Alternative 2 Harvest System	Alternative 3 Treatment	Alternative 3 Harvest System	Alternative 4 Treatment	Alternative 4 Harvest System
32S-01W-19	19-1	20	20E	DM	heli	DM	heli	DM	cable
32S-01W-19	19-1	2	20E	Rip/DM	heli	Rip/DM	heli	Rip/DM	heli
32S-01W-19	19-1	3	20E	Rip/DM	heli	Rip/DM	heli	Rip/DM	heli
32S-01W-19	19-2	12	70G	DM	cable	DM	cable	DM	heli
32S-01W-19	19-2	2	63E	DM	tractor	DM	cable	DM	tractor
32S-01W-19	19-2	2	63E	Rip/DM	cable	Rip/DM	cable	Rip/DM	cable
32S-01W-19	19-3	5	63E	DM	cable	DM	cable	DM	cable
32S-01W-19	19-4	2	69G	DM	cable	DM	cable	DM	heli
32S-01W-19	19-5	6	63E	DM	heli	DM	heli	DM	cable
32S-01W-19	19-6	7	119F	DM	cable	DM	cable	DM	heli
32S-01W-19	19-7	16	119F	DM	tractor	DM	tractor	DM	tractor
32S-01W-19	19-8	4	69G	DM	heli	DM	heli	DM	cable
32S-01W-19	19-9	3	63E	DM	cable	DM	cable	FMZ	HAND
32S-01W-21	21-2	6	185G	DM	cable	DM	cable	DM	heli
32S-01W-21	21-3	7	185G	DM	tractor	DM	tractor	DM	tractor
32S-01W-21	21-5	3	185G	DM	cable	DM	cable	DM	cable
32S-01W-21	21-6	12	67G	DM	heli	DM	heli	DM	cable
32S-01W-28	28-2	11	184G	DM	heli	DM	heli	DM	cable
32S-01W-29	29-1	6	58E	DM	tractor	DM	tractor	DM	tractor
32S-01W-29	29-1	2	58E	Rip/DM	bull-line	Rip/DM	bull-line	Rip/DM	bull-line
32S-01W-29	29-15	6	57E	SGFMA_Regen	cable	Select	cable	SGFMA_Regen	cable
32S-01W-29	29-15	3	58E	SGFMA_Regen	tractor	Select	tractor	DM	tractor
32S-01W-29	29-3	3	67G	SGFMA_Regen	cable	Select	cable	DM	heli
32S-01W-29	29-6	3	58E	DM	tractor	DM	tractor	SGFMA_Regen	cable
32S-01W-29	29-6	1	58E	Rip/DM	bull-line	Rip/DM	bull-line	Rip/DM	bull-line
32S-01W-29	29-9	3	191G	SGFMA_Regen	cable	Select	cable	SGFMA_Regen	tractor
32S-01W-31	31-1	9	66E	drop		DM	tractor	SGFMA_Regen	cable
32S-01W-31	31-10	3	66E	DM	tractor	DM	tractor	NGFMA_Regen	heli
32S-01W-31	31-11	6	66E	drop		DM	heli	DM	tractor
32S-01W-31	31-12	7	63E	drop		DM	heli	DM	tractor
32S-01W-31	31-2	9	67E	drop		DM	heli	NGFMA_Regen	heli
32S-01W-31	31-3	5	63E	drop		DM	cable	drop	
32S-01W-31	31-4	12	66E	DM	tractor	DM	tractor	DM	heli
32S-01W-31	31-5	6	66E	DM	tractor	DM	tractor	NGFMA_Regen	tractor
32S-01W-31	31-6	5	63E	drop		DM	tractor	drop	

32S-01W-31	31-8	5	66E	drop		DM	heli	DM	tractor
32S-01W-32	32-1	27	67G	NGFMA_Regen	heli	Select	heli	NGFMA_Regen	heli
32S-01W-32	32-2	9	69E, 69G	NGFMA_Regen	heli	Select	heli	DM	heli
32S-01W-32	32-3	10	116G	DM	heli	DM	heli	DM	cable
32S-01W-32	32-4	6	64E	DM	tractor	DM	tractor	DM	tractor
32S-01W-32	32-5	3	64E	DM	heli	DM	heli	DM	cable
32S-01W-32	32-6	60	116G, 119F	DM	heli	DM	heli	drop	
32S-01W-32	32-7	6	64E	DM	tractor	DM	tractor	FMZ	HAND
32S-01W-32	32-8	16	64E	NGFMA_Regen	heli	Select	heli	DM	heli
32S-01W-33	33	4	119F	FMZ	HAND	FMZ	HAND	DM	heli
32S-01W-33	33-1	8	119F	DM	tractor	DM	tractor	DM	tractor
32S-01W-33	33-1	1	119F	Rip/DM	bull-line	Rip/DM	bull-line	Rip/DM	bull-line
32S-01W-33	33-12	3	67G	NGFMA_Regen	heli	Select	heli	DM	heli
32S-01W-33	33-13	3	67G	FMZ	HAND	FMZ	HAND	NGFMA_Regen	heli
32S-01W-33	33-14	6	64E	DM	cable	DM	cable	drop	
32S-01W-33	33-3	4	119F	NGFMA_Regen	tractor	Select	tractor	SGFMA_Regen	tractor
32S-01W-33	33-4	13	119F	NGFMA_Regen	tractor	Select	heli	drop	
32S-01W-33	33-5	7	64E,67E	DM	cable	Select	cable	FMZ	HAND
32S-01W-33	33-6	1	64E	DM	heli	DM	heli	NGFMA_Regen	heli
32S-01W-33	33-7	5	64E	DM	cable	DM	cable	drop	
32S-01W-33	33-8	3	64E	NGFMA_Regen	heli	Select	heli	drop	
32S-01W-34	33-11	34	67G	DM	heli	DM	heli	DM	cable
33S-01W-10	10-1	9	183E	SGFMA_Regen	cable	Select	cable	NGFMA_Regen	heli
33S-01W-10	10-10	2	116E	SGFMA_Regen	heli	Select	heli	DM	heli
33S-01W-10	10-11	4	183E	DM	heli	DM	heli	DM	heli
33S-01W-10	10-11	1	183E	Rip/DM	heli	Rip/DM	heli	Rip/DM	bull-line
33S-01W-10	10-12	3	70E	SGFMA_Regen	tractor	Select	tractor	DM	heli
33S-01W-10	10-13	2	63E	SGFMA_Regen	cable	Select	heli	DM	heli
33S-01W-10	10-2	9	66G, 183E	SGFMA_Regen	cable	Select	cable	DM	heli
33S-01W-10	10-3	8	67G	SGFMA_Regen	cable	Select	cable	DM	tractor
33S-01W-10	10-4	8	183E	DM	cable	DM	cable	slash buster	MECHANICAL
33S-01W-10	10-4	1	183E	SGFMA_Regen	heli	Select	heli	DM	tractor
33S-01W-10	10-5	15	190G	SGFMA_Regen	heli	Select	heli	slash buster	MECHANICAL
33S-01W-10	10-6	2	182E	SGFMA_Regen	cable	Select	cable	slash buster	MECHANICAL
33S-01W-10	10-7	6	67G	DM	heli	DM	heli	NGFMA_Regen	heli
33S-01W-10	10-8	3	183E	DM	tractor	DM	tractor	DM	tractor
33S-01W-10	10-9	10	67G, 63E	SGFMA_Regen	heli	Select	heli	DM	tractor

33S-01W-10	10-9	3	67G, 63E	SGFMA_Regen	heli	Select	heli	DM	tractor
33S-01W-15	15-1	15	119F	DM	heli	DM	heli	DM	heli
33S-01W-15	15-1	4	119F	Rip/DM	heli	Rip/DM	heli	NGFMA_Regen	heli
33S-01W-15	15-3	10	126f	DM	heli	DM	heli	DM	tractor
33S-01W-17	17-1	14	63E	FMZ	HAND	FMZ	HAND	slash buster	MECHANICAL
33S-01W-17	17-1	14	63E	FMZ	HAND	FMZ	HAND	FMZ	HAND
33S-01W-17	17-10	7	63E	drop		DM	heli	SGFMA_Regen	heli
33S-01W-17	17-10	24	63E		n/a	Rip/DM	heli	slash buster	MECHANICAL
33S-01W-17	17-2	21	63E, 114E, 116E	FMZ	HAND	FMZ	HAND	slash buster	HAND
33S-01W-17	17-2	19	63E, 114E, 116E	FMZ	HAND	FMZ	HAND	FMZ	HAND
33S-01W-17	17-2	3	63E, 114E, 116E	FMZ	HAND	FMZ	HAND	SGFMA_Regen	heli
33S-01W-17	17-4	6	63E	FMZ	HAND	FMZ	HAND	slash buster	HAND
33S-01W-17	17-5	29	63E	drop		Select	heli	SGFMA_Regen	cable
33S-01W-17	17-6	31	63E	drop		DM	heli	FMZ	HAND
33S-01W-17	17-7	30	63E	FMZ	HAND	FMZ	HAND	SGFMA_Regen	cable
33S-01W-18	18-1	19	185G	drop		drop		slash buster	MECHANICAL
33S-01W-18	18-2	25	115E	SGFMA_Regen	heli	drop		slash buster	HAND
33S-01W-18	18-4	7	124F, 115E	SGFMA_Regen	heli	drop		SGFMA_Regen	heli
33S-01W-19	S19-1	9	63E	NGFMA_Regen	heli	Select	heli	FMZ	HAND
33S-01W-19	S19-2	9	63E	NGFMA_Regen	tractor	Select	tractor	FMZ	HAND
33S-01W-21	S21-1	23	114G	DM	heli	DM	heli	DM	heli
33S-01W-21	S21-2	48	114G	drop		DM	heli	slash buster	MECHANICAL
33S-01W-29	S29-1	2	63E	NGFMA_Regen	cable	Select	cable	slash buster	MECHANICAL
33S-01W-29	S29-2	67	63E, 66G	DM	heli	DM	heli	SGFMA_Regen	heli
33S-01W-29	S29-3	14	64E,183E	DM	cable	DM	cable	DM	tractor
33S-01W-29	S29-4	1	63E	NGFMA_Regen	cable	Select	cable	SGFMA_Regen	cable
33S-01W-29	S29-5	10	114E, 114G	NGFMA_Regen	tractor	Select	tractor	DM	cable
33S-01W-29	S29-6	8	63E	DM	tractor	DM	tractor	DM	heli
33S-01W-29	S29-7	4	183E	DM	heli	DM	heli	slash buster	MECHANICAL
33S-01W-29	S29-8	4	183E	DM	tractor	DM	tractor	slash buster	HAND
33S-01W-29	S29-9	5	66G	NGFMA_Regen	heli	Select	heli	FMZ	HAND
33S-01W-3	3-3	35	67G,64E	DM	heli	DM	heli	SGFMA_Regen	cable
33S-01W-3	3-4	8	64E,67G	NGFMA_Regen	heli	Select	heli	SGFMA_Regen	cable
33S-01W-3	3-4	10	64E	NGFMA_Regen	heli	Select	heli	FMZ	HAND
33S-01W-30	30-1	11	63E	DM	tractor	DM	tractor	SGFMA_Regen	heli
33S-01W-31	S31-1	48	119F,183E	SGFMA_Regen	cable	Select	cable	FMZ	HAND
33S-01W-31	S31-10	3	119F	SGFMA_Regen	heli	Select	heli	FMZ	HAND

33S-01W-31	S31-11	12	182E	SGFMA_Regen	tractor	Select	tractor	FMZ	HAND
33S-01W-31	S31-2	7	184G	SGFMA_Regen	cable	Select	cable	FMZ	HAND
33S-01W-31	S31-3	5	184G	SGFMA_Regen	tractor	Select	tractor	Select	heli
33S-01W-31	S31-4	1	123F	SGFMA_Regen	tractor	Select	tractor	FMZ	HAND
33S-01W-31	S31-5	9	182E	SGFMA_Regen	cable	Select	cable	DM	heli
33S-01W-31	S31-6	7	182E, 185G	SGFMA_Regen	cable	Select	cable	FMZ	HAND
33S-01W-31	S31-7	11	63E	FMZ	HAND	FMZ	HAND	DM	heli
33S-01W-31	S31-7	20	63E	slash buster	MECHANICAL	slash buster	MECHANICAL	drop	
33S-01W-31	S31-8	32	64E	SGFMA_Regen	tractor	Select	tractor	FMZ	HAND
33S-01W-31	S31-9	11	182E	SGFMA_Regen	tractor	Select	tractor	Rip/DM	heli
33S-01W-33	33-10	3	64E	DM	heli	DM	heli	DM	heli
33S-01W-5	5-1	34	119F	DM	tractor	DM	tractor	drop	
33S-01W-5	5-2	14	64E	slash buster	MECHANICAL	slash buster	MECHANICAL	FMZ	HAND
33S-01W-5	5-4	42	119F, 66E	slash buster	MECHANICAL	slash buster	MECHANICAL	FMZ	HAND
33S-01W-7	7-1	6	119F,182E,183E	slash buster	HAND	slash buster	HAND	DM	heli
33S-01W-7	7-1	2	119F,182E,183E	slash buster	HAND	slash buster	HAND	slash buster	MECHANICAL
33S-01W-7	7-1	45	119F,182E,183E	slash buster	MECHANICAL	slash buster	MECHANICAL	DM	heli
33S-01W-7	7-2	82	182E,115E,63E,119F	slash buster	MECHANICAL	slash buster	MECHANICAL	DM	heli
33S-01W-7	7-3	6	119F	FMZ	HAND	FMZ	HAND	slash buster	MECHANICAL
33S-01W-7	7-3	1	119F	FMZ	HAND	FMZ	HAND	slash buster	MECHANICAL
33S-01W-7	7-3	1	119F	FMZ	HAND	FMZ	HAND	FMZ	HAND
33S-01W-7	7-3	62	119F	slash buster	MECHANICAL	slash buster	MECHANICAL	slash buster	MECHANICAL
33S-01W-7	7-4	9	183E,119F,116&117E	FMZ	HAND	FMZ	HAND	Select	heli
33S-01W-7	7-4	42	183E,119F,116&117E	FMZ	HAND	FMZ	HAND	slash buster	MECHANICAL
33S-01W-7	7-4	78	183E,119F,116&117E	slash buster	HAND	slash buster	HAND	slash buster	MECHANICAL
33S-01W-7	7-4	6	183E,119F,116&117E	slash buster	HAND	slash buster	HAND	Select	tractor
33S-01W-7	7-5	8	184G	FMZ	HAND	FMZ	HAND	drop	
33S-01W-7	7-6	9	115E	FMZ	HAND	FMZ	HAND	FMZ	HAND
33S-01W-7	7-7	74	182E	slash buster	MECHANICAL	slash buster	MECHANICAL	FMZ	HAND
33S-01W-7	7-7	6	182E	slash buster	MECHANICAL	slash buster	MECHANICAL	Select	cable
33S-02W-1	1-1	11	70E,64E,119F	DM	heli	DM	heli	Select	heli
33S-02W-1	1-1	3	70E,64E,119F	DM	tractor	DM	tractor	slash buster	MECHANICAL
33S-02W-1	1-1	27	70E,64E,119F	DM	tractor	DM	tractor	DM	heli
33S-02W-1	1-3	2	64E	DM	tractor	DM	tractor	Select	tractor
33S-02W-1	1-5	1	67G	DM	heli	DM	heli	slash buster	MECHANICAL
33S-02W-1	1-5	3	67G	DM	heli	DM	heli	FMZ	MECHANICAL
33S-02W-1	1-6	8	64E	DM	heli	DM	heli	Select	cable

33S-02W-1	1-7	32	119F	DM	tractor	DM	tractor	slash buster	MECHANICAL
33S-02W-1	1-8	2	115E	DM	tractor	DM	tractor	slash buster	MECHANICAL
33S-02W-23	23-1	36	182E	DM	tractor	DM	tractor	FMZ	HAND
33S-02W-23	23-2	73	182E	DM	tractor	DM	tractor	FMZ	HAND
33S-02W-23	23-2	14	182E	Rip/DM	bull-line	Rip/DM	bull-line	slash buster	HAND
33S-02W-23	23-3	14	70E,64E,119F	drop		DM	cable	FMZ	HAND
33S-02W-23	23-5	14	70E,64E,119F	DM	tractor	DM	tractor	DM	tractor
33S-02W-23	23-6	20	70E,64E,119F	drop		DM	cable	slash buster	MECHANICAL
33S-02W-23	23-7	77	67G	drop		DM	tractor	FMZ	HAND
33S-02W-23	23-8	2	67G	drop		DM	cable	slash buster	MECHANICAL
33S-02W-25	25-1	5	64E	FMZ	HAND	FMZ	HAND	FMZ	HAND
33S-02W-25	25-1	60	119F	FMZ	HAND	FMZ	HAND	slash buster	MECHANICAL
33S-02W-25	25-2	11	63E, 66G	slash buster	MECHANICAL	slash buster	MECHANICAL	DM	cable
33S-02W-25	25-2	18	63E, 66G	slash buster	MECHANICAL	slash buster	MECHANICAL	DM	heli
33S-02W-25	25-2	34	63E, 66G	slash buster	MECHANICAL	slash buster	MECHANICAL	FMZ	HAND
33S-02W-25	25-2	22	63E, 66G	slash buster	MECHANICAL	slash buster	MECHANICAL	DM	tractor
33S-02W-25	25-3	17	64E, 66G	slash buster	MECHANICAL	slash buster	MECHANICAL	FMZ	HAND
33S-02W-25	25-4	25	64E	slash buster	MECHANICAL	slash buster	MECHANICAL	FMZ	HAND
33S-02W-25	25-5	28	64E	slash buster	MECHANICAL	slash buster	MECHANICAL	SGFMA_Regen	cable
33S-02W-25	25-6	2	185G	FMZ	MECHANICAL	FMZ	MECHANICAL		
33S-02W-25	25-7	11	63E	slash buster	MECHANICAL	slash buster	MECHANICAL		
33S-02W-25	25-8	8	67G,64E	FMZ	HAND	FMZ	HAND	FMZ	HAND
33S-02W-25	25-8	15	67G,64E	FMZ	HAND	FMZ	HAND	slash buster	MECHANICAL
33S-02W-25	25-8	3	67G,64E	FMZ	HAND	FMZ	HAND	SGFMA_Regen	tractor
33S-02W-25	25-8	4	67G,64E	FMZ	HAND	FMZ	HAND	FMZ	HAND
33S-02W-25	25-8	20	67G,64E	FMZ	HAND	FMZ	HAND	slash buster	MECHANICAL
33S-02W-25	25-9	10	64E	FMZ	HAND	FMZ	HAND	FMZ	HAND
33S-02W-35	35-1	39	183E	DM	tractor	DM	tractor		
33S-02W-35	35-1	9	183E	Rip/DM	bull-line	Rip/DM	bull-line		
33S-02W-35	35-10	1	183E	DM	heli	DM	heli	FMZ	HAND
33S-02W-35	35-11	9	183E	DM	heli	DM	heli		
33S-02W-35	35-11	20	183E	Rip/DM	heli	Rip/DM	heli		
33S-02W-35	35-12	31	183E	DM	heli	DM	heli		
33S-02W-35	35-12	53	183E	Rip/DM	heli	Rip/DM	heli	FMZ	HAND
33S-02W-35	35-2	16	184G	Select	heli	Select	heli	SGFMA_Regen	tractor
33S-02W-35	35-3	7	183E	DM	heli	DM	heli	SGFMA_Regen	tractor
33S-02W-35	35-4	7	183E, 185G	DM	heli	DM	heli		

33S-02W-35	35-4	3	183E, 185G	DM	heli	DM	heli	SGFMA_Regen	cable
33S-02W-35	35-4	2	183E, 185G	Rip/DM	heli	Rip/DM	heli	SGFMA_Regen	tractor
33S-02W-35	35-4	2	183E, 185G	Rip/DM	heli	Rip/DM	heli	FMZ	HAND
33S-02W-35	35-5	5	119F, 183E	DM	cable	DM	cable		
33S-02W-35	35-5	5	119F,183E	Rip/DM	cable	Rip/DM	cable	SGFMA_Regen	cable
33S-02W-35	35-6	7	183E	DM	heli	DM	heli	SGFMA_Regen	cable
33S-02W-35	35-8	11	183E	DM	heli	DM	heli	FMZ	HAND
33S-02W-35	35-8	12	183E	Rip/DM	heli	Rip/DM	heli		
33S-02W-35	35-9	7	114G,119F	DM	heli	DM	heli		
33S-02W-35	35-9	2	114G,119F	Rip/DM	heli	Rip/DM	heli	SGFMA_Regen	tractor
34S-01W-5	S5-1	15	119F	SGFMA_Regen	heli	Select	heli	FMZ	HAND
34S-01W-5	S5-2	8	119F	SGFMA_Regen	tractor	Select	tractor	FMZ	HAND
34S-02W-1	S1-1	9	184 & 185G	DM	tractor	DM	tractor	FMZ	HAND
34S-02W-1	S1-1	3	184 & 185G	Rip/DM	bull-line	Rip/DM	bull-line	FMZ	HAND
34S-02W-1	S1-10	13	184G, 115E	DM	tractor	DM	tractor	slash buster	MECHANICAL
34S-02W-1	S1-2	4	115E	SGFMA_Regen	tractor	Select	tractor	Rip/DM	bull-line
34S-02W-1	S1-3	15	119F	DM	tractor	DM	tractor	Rip/DM	bull-line
34S-02W-1	S1-3	1	119F	Rip/DM	bull-line	Rip/DM	bull-line	DM	tractor
34S-02W-1	S1-4	12	115E	DM	tractor	DM	tractor	FMZ	HAND
34S-02W-1	S1-6	4	115E	DM	tractor	DM	tractor	SGFMA_Regen	tractor
34S-02W-1	S1-7	14	115E	DM	tractor	DM	tractor	FMZ	HAND
34S-02W-1	S1-8	11	115E	DM	cable	DM	cable	FMZ	HAND
34S-02W-1	S1-8	1	115E	Rip/DM	bull-line	Rip/DM	bull-line	FMZ	HAND
34S-02W-1	S1-9	9	119F	DM	tractor	DM	tractor	DM	tractor
34S-02W-1	S1-9	3	119F	Rip/DM	bull-line	Rip/DM	bull-line	DM	tractor
34S-02W-3	S3-1	6	119F	DM	tractor	DM	tractor	DM	cable
34S-02W-3	S3-1	2	119F	Rip/DM	bull-line	Rip/DM	bull-line	DM	tractor
34S-02W-3	S3-2	4	119F	DM	tractor	DM	tractor	DM	tractor
34S-02W-3	S3-2	1	119F	DM	tractor	DM	tractor	SGFMA_Regen	tractor
34S-02W-3	S3-2	3	119F	DM	tractor	DM	tractor	Rip/DM	bull-line
34S-02W-3	S3-2	22	119F	Rip/DM	bull-line	Rip/DM	bull-line	Rip/DM	bull-line
34S-02W-4	4-1	5	119F	DM	tractor	DM	tractor	Rip/DM	bull-line
34S-02W-4	4-1	2	119F	Rip/DM	bull-line	Rip/DM	bull-line	DM	tractor

Trail Creek Projects
Soil Types

Mapping Unit #	Mapping Unit Name	Percent Slope	Aspect	Slope
20E	Bybee-Taouche complex **(FP)**	12 - 35	south	
57E	Farva very cobbly loam	12 - 35		north
58E	Farva very cobbly loam	12 - 35		south
63E	Freezner gravelly loam	12 - 35	north	
64E	Freezner gravelly loam	12 - 35	south	
66E	Freeezner- Geppert complex	12 - 35		north
66G	Freezner- Geppert complex	35 - 60		north
67E	Freezner- Geppert complex	12 - 35		south
67G	Freezner- Geppert complex	35-60		south
69E	Geppert very cobbly loam	12 - 35		north
69G	Geppert very cobbly loam	35 - 70		north
70E	Geppert very cobbly loam	12 - 35		south
114E	McNull loam **(FP)**	12 - 35		north
114G	McNull loam **(FP)**	35 - 60		north
115E	McNull gravelly loam **(FP)**	12 - 35		south
116E	McNull- McMullin complex **(FP)**	12 - 35		south
116G	McNull- McMullin complex **(FP)**	35 - 60		south
119F	McNull- Medco (high precip.) **(FP)**	12 - 50		all
123E	Medco clay loam **(FP)**	12 - 50	north	

124F	Medco clay loam **(FP)**	12 - 50	south

Mapping Unit #	Mapping Unit Name	Percent Slope	Aspect	Slope
126F	Medco- McNull **(FP)**	12 - 50		all
182E	Straight ex-gravelly loam	12 - 35		north
183E	Straight ex-gravelly loam	12 - 35		south
184G	Straight- Shippa complex	35 - 70		north
185G	Straight- Shippa complex	35 - 70		south
190G	Tatouche gravelly loam **(FP)**	35 - 65		north
191G	Tatouche gravelly loam **(FP)**	35 - 65		south

(FP) = Fragile pyroclastic soil types with high clay content

For a detailed description and soil behavior for each soil type see the Jackson County Soil Survey

APPENDIX J

Pre-project Inventories, Surveys and Reviews

a) Cultural resources--locations would be protected.
b) Wildlife - T&E Sensitive species--spotted owl activity centers would not be entered.
Appropriate seasonal restrictions would be implemented.
Survey & Manage
c) Visual Resources Management (VRM)--meets RMP VRM standards
d) Mining--no active mining claims in the area
e) Road Closures
f) Vascular and Non-vascular Plant Surveys - Threatened & Endangered, Bureau Sensitive and Survey & Manage
g) Stand Exams
h) Road inventories
i) Fish presence/absence surveys
j) Stream & Riparian surveys