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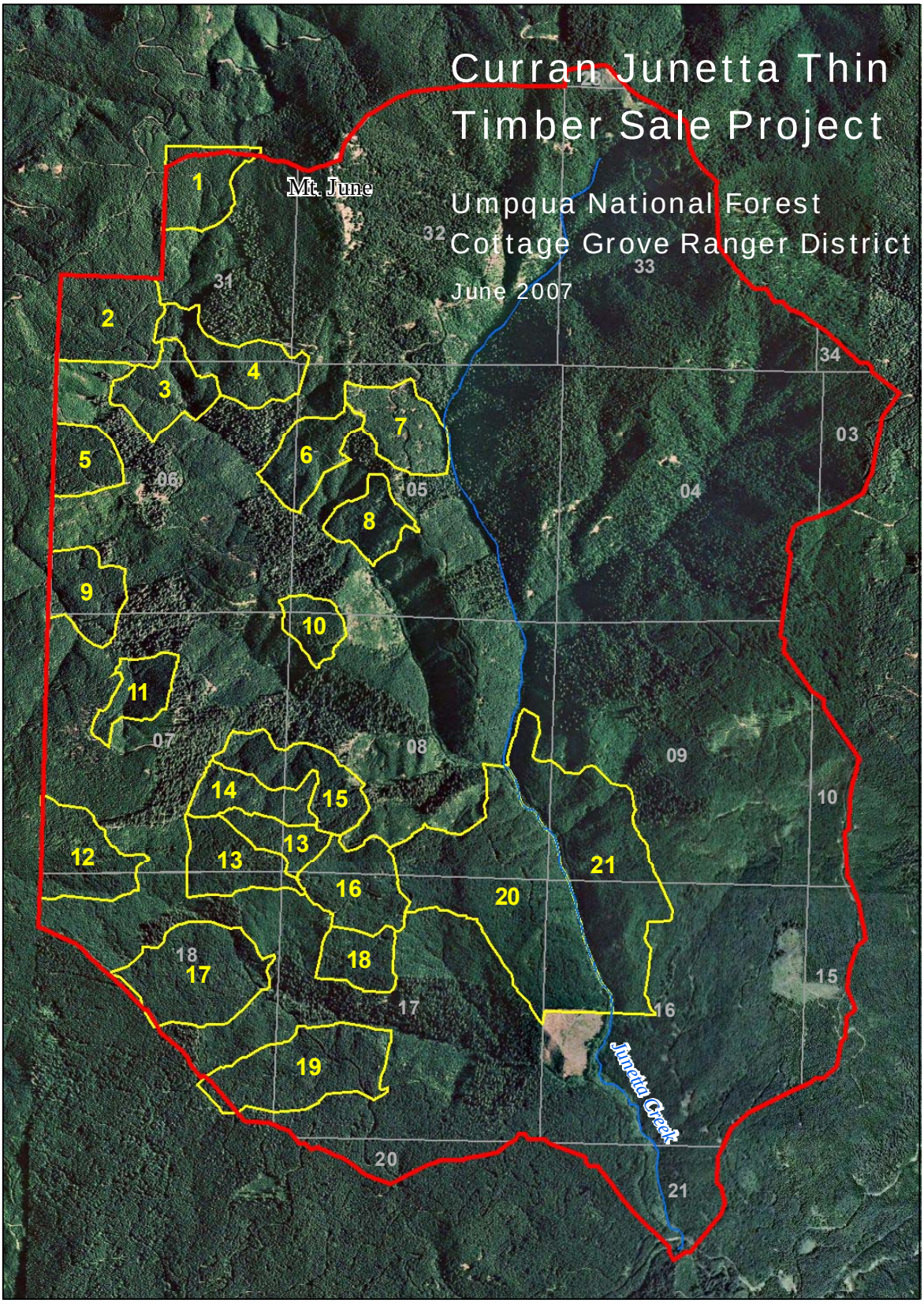

CURRAN JUNETTA THIN

TIMBER SALE PROJECT

ENVIRONMENTAL ASSESSMENT

Lane County, Oregon

June 2007

Lead Agency: USDA Forest Service, Umpqua National Forest

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Abstract

This Environmental Assessment (EA) documents the alternatives considered for commercially harvesting timber, treating activity generated fuels, conducting road improvement, road construction/reconstruction and road maintenance and implementing connected actions within the matrix and riparian reserve land allocations of the Layng Creek Subwatershed on the Umpqua National Forest, Cottage Grove Ranger District. Alternative Three has been identified as the preferred alternative.

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CHAPTER ONE

PURPOSE AND NEED FOR ACTION

INTRODUCTION

This Environmental Assessment (EA) documents the analysis of a range of alternatives, including the proposed action, for timber harvest and associated activities in the 42,195-acre Layng Creek subwatershed of the Row River located on the Cottage Grove Ranger District of the Umpqua National Forest.

Chapter One describes the purpose, need, and the proposed action for the Curran Junetta Thin Timber Sale Project. The chapter also identifies the project area, outlines applicable management direction, addresses the scope of the decision, summarizes the scoping process, and lists the issues identified during scoping.

The 6,870 acre Curran Junetta Planning Area is located within the Layng Creek subwatershed, which is a tributary to the Row River (Figure 1). Layng Creek is a municipal watershed for the city of Cottage Grove. A special set of standards and guidelines in the Umpqua National Forest Land and Resource Management Plan (LRMP) addresses watershed management and the protection of water quality (LRMP Appendix G). The lower eight miles of Layng Creek is listed on Oregon Department of Environmental Quality's Final 2002 303(d) Water Quality Limited Stream List for temperature concerns. Curran Creek flows into Junetta Creek, which enters Layng Creek at river mile 3.4 within the listed section.

The planning area is in the western hemlock climax plant association with highly productive growing conditions. Managed and fire-regenerated stands dominate the landscape. The major overstory tree species are Douglas-fir, western hemlock, western redcedar, red alder and bigleaf maple. Western hemlock and western redcedar are the primary regenerating species. Shrubs species include vine maple, Pacific rhododendron, salal, and Oregon-grape.

ENVIRONMENTAL SETTING AND RELATIONSHIP TO OTHER PLANNING DOCUMENTS AND ANALYSES

The 1990 Umpqua National Forest Land and Resource Management Plan (LRMP) and its amendments to date, including the 1994 Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl, provide broad management direction for the Layng Creek subwatershed. This document that amended the LRMP in 1994 is also referred to as the Northwest Forest Plan.

The planning area is within Management Area 10 (MA 10), (Figure 2) as established in the 1990 LRMP. The primary objective of MA 10 is to produce timber on a cost-efficient, sustainable basis consistent with other resource objectives. Another management area relevant to the planning area is the Big Game Winter Range (MA 11). This area is designed to provide for big game winter range and timber production consistent with other resource objectives. Other noteworthy management areas are MA 1 Semi-

Primitive Unroaded Recreation and MA 14 Undeveloped Ecosystem; both are in the northern-most reaches of the planning area. No thinning units are proposed within MAs 1 or 14.

Under the 1994 Northwest Forest Plan, over half of the planning area lays within the Matrix land allocation, where the majority of timber harvest and silviculture treatments are to occur. Less than half of the planning area is in the riparian reserve land allocation where riparian dependant resources receive primary emphasis (Figure 2). An important component of the Northwest Forest Plan is the Aquatic Conservation Strategy, which is a landscape-scale approach based on maintaining the natural disturbance regime (USDA/USDI, 1994). Multiple hundred-acre late-successional reserve areas for the northern spotted owl are located within the planning area; there are no units within these reserves.

This analysis tiers to the Final Environmental Impact Statement of the 1990 Umpqua National Forest LRMP as amended and the 2005 Final Environmental Impact Statement for the Pacific Northwest Region Invasive Plant Program. It also incorporates by reference the recommendations in the 1995 Layng Creek Watershed Analysis (WA) and the 2005 iteration of the Layng Creek Watershed Analysis, along with the 2006 Curran Junetta Roads Analysis.

The U.S. Fish and Wildlife Service has designated Critical Habitat Units (CHU) across the range of the northern spotted owl. The physical and biological features (referred to as the primary constituent elements) that support nesting, roosting, foraging, and dispersal are essential to the conservation of the species (Department of Interior, 1992). Proposed Units 1-4, 6-8 and 21 are partially or entirely within CHU OR-20, and management proposals would be reviewed with respective agencies.

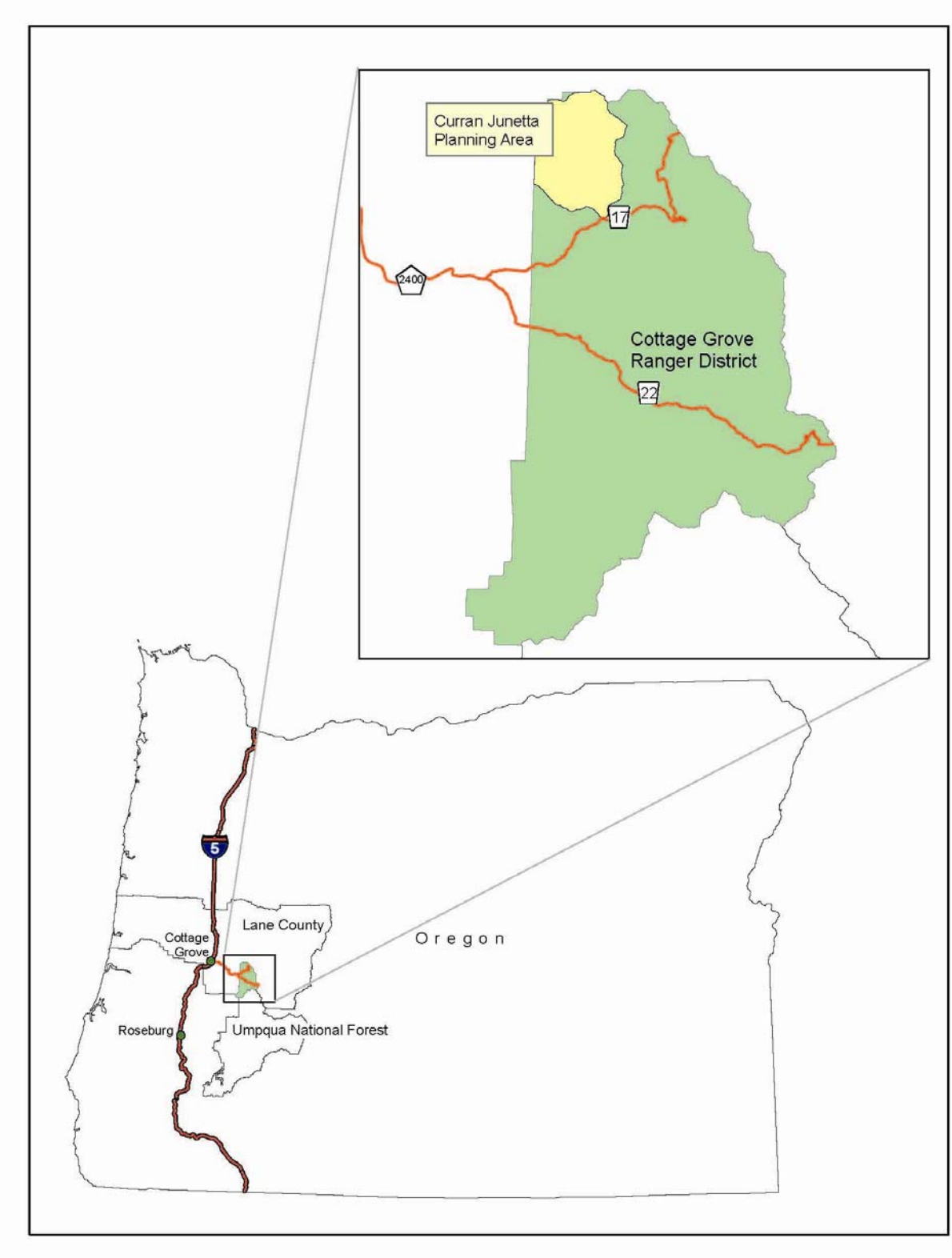

Figure 1. Location of the Curran Junetta Planning Area

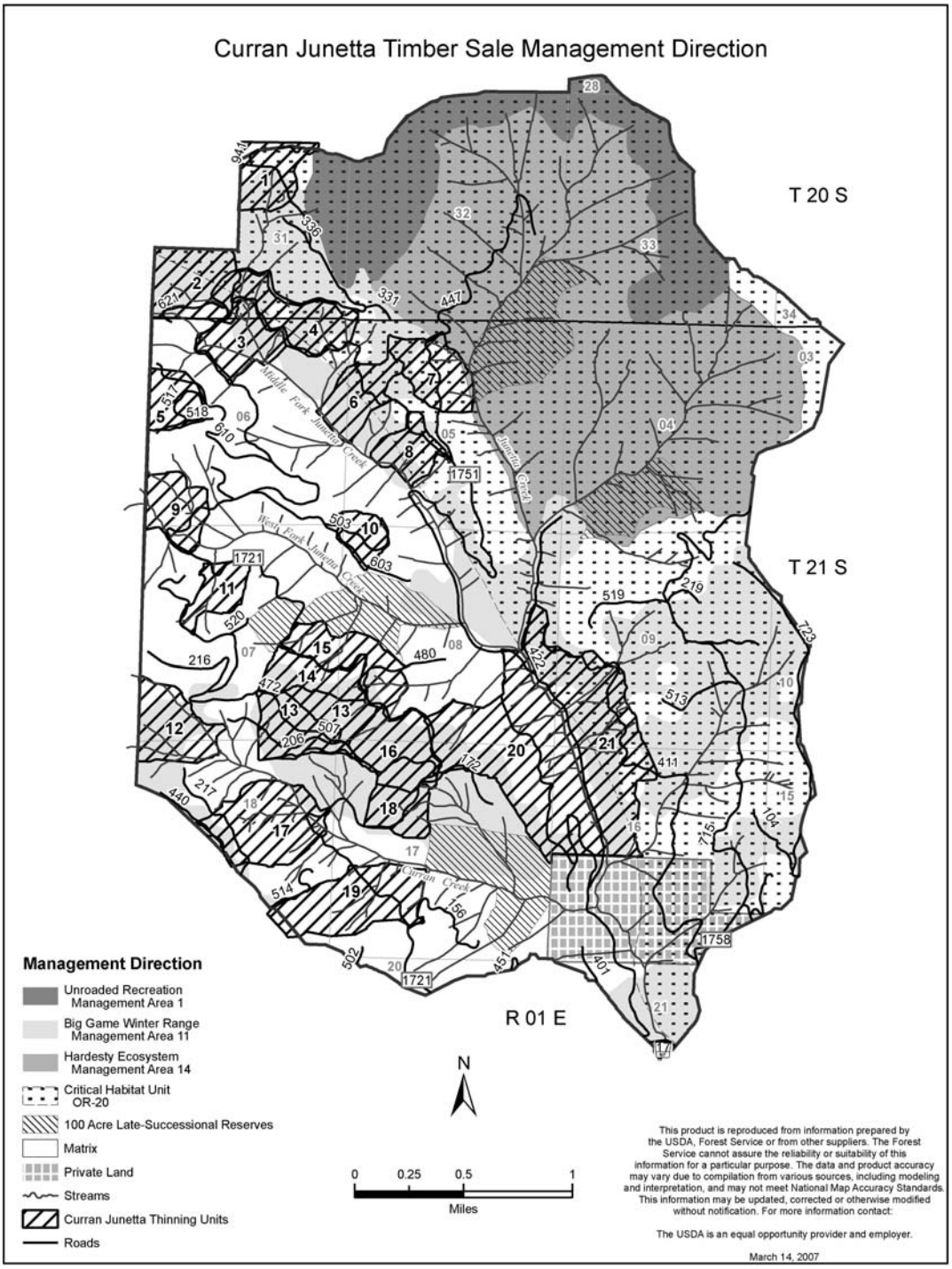

Figure 2. Management Direction for the Curran Junetta Planning Area[1]

1 From the 1990 Land and Resource Management Plan including the allocations from 1994 Northwest Forest Plan.

Layng Creek Watershed Analysis

The Northwest Forest Plan states that a watershed analysis is an on-going, iterative process that should expand as appropriate to consider additional available information. The federal guide for watershed analysis describes it as a stage-setting process; the results of a watershed analysis establish the context for subsequent decision making processes (USDA/USDI 1994). The original 1995 Layng Creek Watershed Analysis was updated in 2005 with its first iteration. This iteration expands upon the original WA by incorporating new information. The main changes are associated with a landscape analysis (recommended in the 1995 WA) and an assessment of fire risk prompted by national direction to assess fire regime condition class. These new land strata were also used as the basis for updating certain recommendations for snags and down wood in conjunction with the results of an inventory of these habitat structures and the use of the decayed wood advisor (DecAID). Original WA recommendations related to the Aquatic Conservation Strategy (ACS), were clarified, deleted, or replaced based on recent literature regarding riparian area management.

Silviculture objectives for matrix land, as described in the 1995 Layng WA include: implementing a sustainable harvest program for this very productive subwatershed while stressing species diversity, and stand structural diversity. The 1995 Layng WA also recommended the use of landscape level techniques to determine priorities, connectivity, and patch size.

Landscape Objectives

The Layng Creek subwatershed consists of four broad landscape areas that are based on relationships between forest vegetation, climate, and physiography (Figure 3). The delineations in Figure 3 represent broad areas of land that tend to have similar disturbance processes. Inclusions of landforms that differ from this rule can be found at this scale of mapping. The units in the Curran Junetta thinning project primarily fall into three of the landscape areas—the gentle valley bottom, gentle mountain slope, and the steep landscape areas.

The gentle valley bottom landscape area is the most likely area to be a refuge from fire. The ancient landslide deposits that filled valley bottom areas retain high moisture levels through the growing season. Historically, surface fire dominated with limited amounts of crown fire. The gentle mountain slope areas are upper slope areas with lower moisture levels, fewer barriers to fire spread, and historic evidence of larger patches of stand replacement fire compared to the gentle valley bottoms. The steep landscape area is dominated by steep slopes where fire intensity is generally greater and stand replacement fire is more frequent than in the other landscape areas.

The landscape analysis provides information about landscape scale disturbance and vegetation patterns. This information is useful in developing management strategies that consider disturbance processes. This approach is based on the principle that when an ecosystem element moves outside its historic range the element, and those elements depending upon it, may not be sustained. This is in keeping with the Aquatic Conservation Strategy of restoring disturbance regimes and managing landscape-scale features.

Two recommendations from the WA iteration are relevant for the Curran Junetta project:

- At the landscape scale, enlarge patches[2] to approximate the acreage of large-scale disturbance events in order to reduce the current amount of landscape fragmentation. Treat groups of adjacent patches simultaneously to accelerate structural development and ultimately reduce the effects of fragmentation.
- At the stand scale, focus vegetation treatments in the mature and stem exclusion stages to restore missing species and structural diversity.

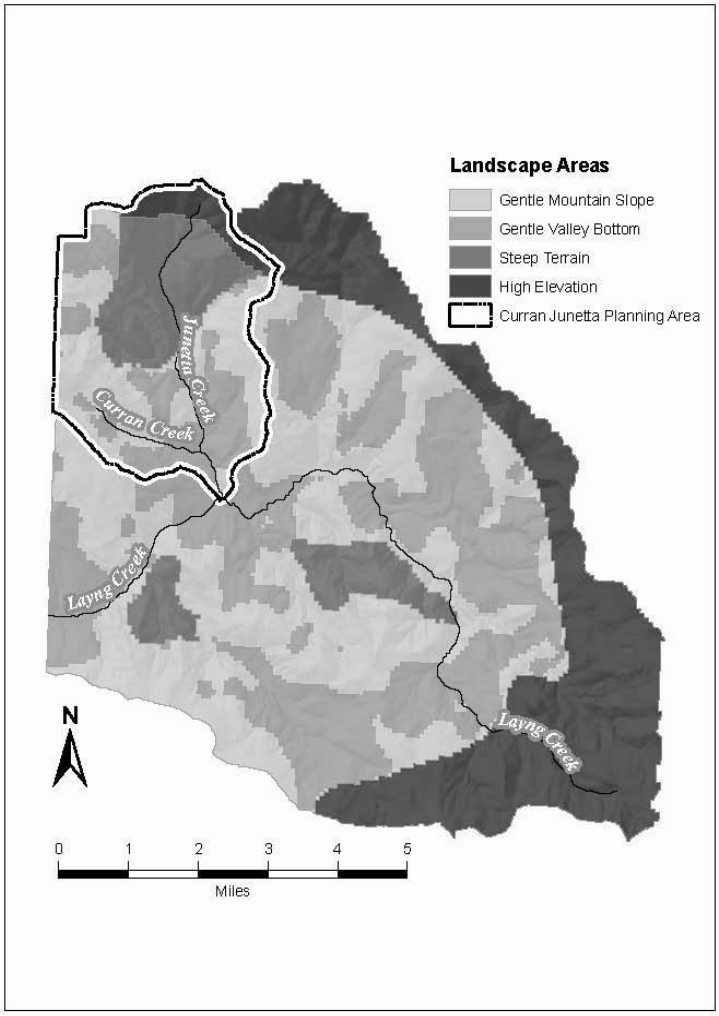

Figure 3. Landscape Areas in the Federal ownership of Layng Creek[3].

2 Landscape patches are patches of vegetation that differ from one another by their vegetative structure. For instance an area may contain several scattered 20-50 acre plantations (patches) embedded in a matrix of old-growth forest.

3 The area to the west of the vertical line equates to about 5,000 acres of private ownership in the Layng Creek subwatershed.

The following 2005 WA recommendations are relevant to proposed treatments in the following landscape areas:

Gentle Valley Bottom Landscape Area

1) Thin stem exclusion patches that are adjacent to late-successional patches in order to accelerate stand development and decrease fragmentation.

2) Apply thinning treatments and create small canopy gaps (¼ to ½ acres) in early seral, stem exclusion, and mature structural stages in order to restore species and structural diversity that is characteristic of a mixed (moderate) severity fire regime.

3) Where appropriate, initiate an uneven-aged management strategy that would culture a shade tolerant understory layer.

4) Allow higher levels of larger diameter fuels relative to the other landscape areas based on the results of the Layng Creek Coarse Woody Debris (CWD) inventory (USDA, Umpqua NF, 2005a).

Gentle Mountain Slope Landscape Area

1) Apply thinning, canopy gap creation (¼ to ½ acres), and underburning to restore structural and species diversity characteristic of a mixed (moderate) severity fire regime in areas of stem exclusion, mature, and unnaturally dense understories of older stands.

2) Use prescribed fire (i.e. underburning) to create snags and coarse woody debris.

3) Manage for moderate levels of larger diameter fuels based on the results of the Layng Creek CWD inventory (USDA, Umpqua NF, 2005a).

Steep Landscape Area

1) Manage all forest stages to improve resilience to fire by opening canopies and raising canopy base heights.

2) Manage stands to maintain even-aged characteristics.

3) Manage for lower levels of larger diameter fuels based on the Layng Creek CWD inventory (USDA, Umpqua NF, 2005a).

Not every project would implement all watershed analysis recommendations and objectives, and the desired condition may not be reached with the implementation of a single project. In addition, some of the watershed analysis objectives may not be implemented consistently across the land. The Curran Junetta project focuses primarily on the watershed analysis objectives and recommendations for stands of second growth timber in the stem exclusion stage of development[4].

4 The stem exclusion stage occurs in 20 to 80 year old stands where new species do not appear and some present species are dying from competition. The average tree diameter is about 10" DBH and canopy closure is ≥53%. Thinning accelerates stand development out of this stage.

NEED FOR ACTION

The purpose of the project is to reduce tree density in second growth timber (stem exclusion stands) in order to restore species and structural diversity, and to improve the condition class in the municipal watershed by improving stand fire resiliency, while providing wood products to the local community. Previous clearcutting and fire suppression practices over the last several decades have created young forests that lack the structure and species diversity they would otherwise have if exposed to the natural processes of a moderate severity fire regime (USDA, Umpqua NF 2005).

A goal of the Aquatic Conservation Strategy of the Northwest Forest Plan is to maintain the natural disturbance regime (ROD B-9). As recommended in the 2005 Layng Creek watershed analysis, management practices would include the use of timber harvest and fuels treatments to restore a pattern of vegetation structure and composition that approximates landscape patterns associated with a moderate severity fire. Conducting thinning and fuel treatments on larger, more contiguous blocks of land would be more economically efficient than the individual, fragmented patches established by the past pattern of clearcutting (USDA, Umpqua NF 2005).

The difference between the existing and desired conditions defines the need for action in terms of elements that can be measured. These elements are:

Element 1: Stand Density

The 40-50 year old stands in the Curran Junetta planning area (both in the uplands and in the riparian reserves) are densely-stocked and dominated by Douglas-fir trees of the same age class. In the stands that were pre-commercially thinned, shade tolerant conifers and hardwoods were routinely cut, leaving most of today's stands in simplified conditions. Stand densities exceed 500 trees per acre. Most stands lack natural canopy gaps and associated understory diversity. Some stands, located on the most productive moist sites, and have receding tree crowns that are susceptible to toppling.

The desired condition for both upland and riparian second-growth stands is for more open conditions that approximate what would typically exist in a moderate severity fire regime. Removing some of the standing trees in the matrix and riparian reserve land allocations would reduce stand density and canopy closure, open up the stands and allow the development of understory layers. This would in turn improve stand stability in the wettest locations, and improve fire resiliency in the drier locations.

Element 1 would be measured by:

•Acres of second growth thinned to improve conditions for species and structural diversity.

•Acres of improved fire resiliency.

Element 2: Timber Production

In order to produce a sustained yield of timber from the matrix land allocation, harvest needs to occur on a regular basis. This is particularly true in stem exclusion stands where salvaging the predicted suppression mortality improves the growth potential of the leave trees. If left untreated, increased suppression mortality, declines in growth, and

lost economic opportunities would continue in these unnaturally dense, stem exclusion stands.

Element 2 would be measured by:

•Board feet of timber produced by commercial thinning.

•Cost-efficient thinning measured by benefit/cost ratio and net present value.

PROPOSED ACTION

The proposed action (Alternative Two, Figure 4) was designed to meet the purpose and need of reducing tree density within second growth stands in order to restore species and structural diversity and improve stand fire resiliency, while providing wood products to the local community. Applicable Standards and Guidelines were applied as the proposed action and its alternatives were developed. The most relevant Standards and Guidelines are listed in Chapter Three; others are incorporated by reference.

In Chapter Two of this EA, Alternative Two is thoroughly detailed and terms used are defined. Alternative Two includes:

- Commercial thinning of 1,236 acres of 1,549 acres of timber stands using helicopter, ground-based, and skyline logging systems in both the matrix and riparian reserve land allocations generating about 14.0 million board feet of timber. No thinning would occur on 313 acres of riparian or unique habitat areas, or where protection of rare plant species and soils are a concern.
- Treating activity-created fuels on 783 of thinned acres by underburning, machine piling, and hand pile and burning.
- Building five new landings for helicopter logging.
- Building a total of 0.24 miles of new system roads to provide access for long-term stand management.
- Building 3.42 miles of temporary spur road to access thinning areas then obliterating them (subsoiling[5] and pulling displaced soil and woody debris over the surface) after use, as necessary.
- Reconstructing five miles of existing system roads including the replacement of surface rock and undersized or deteriorated stream crossings, the addition or replacement of ditch relief culverts, and the reconstruction of ditches as needed in portions of the roads.
- Maintaining 41.74 miles of existing roads including the grading and shaping of existing road surfaces, ditch maintenance as needed, and the cutting of intruding vegetation along roadsides.
- Utilizing the existing Doris rock pit as the rock source for the road work.
- Implementing numerous similar and connected actions such as tree planting in canopy gaps, precommercial thinning, road decommissioning, road inactivation,

5Subsoiling is the process of loosening soil that has been compacted from previous ground-based logging or road building.

subsoiling, instream large wood placement, culvert upgrades, snag creation, and invasive weed management methods (including herbicide use).

- Implementing two project-level amendments to the 1990 Forest Plan:
    1. Thinning up to the boundary of hardwoods stands designated as unique habitat, and
    2. Conducting thinning that differs from several of the guidelines in the Layng Creek Municipal Watershed Plan (LRMP Appendix G) that was designed primarily for old-growth harvest rather than second-growth thinning.

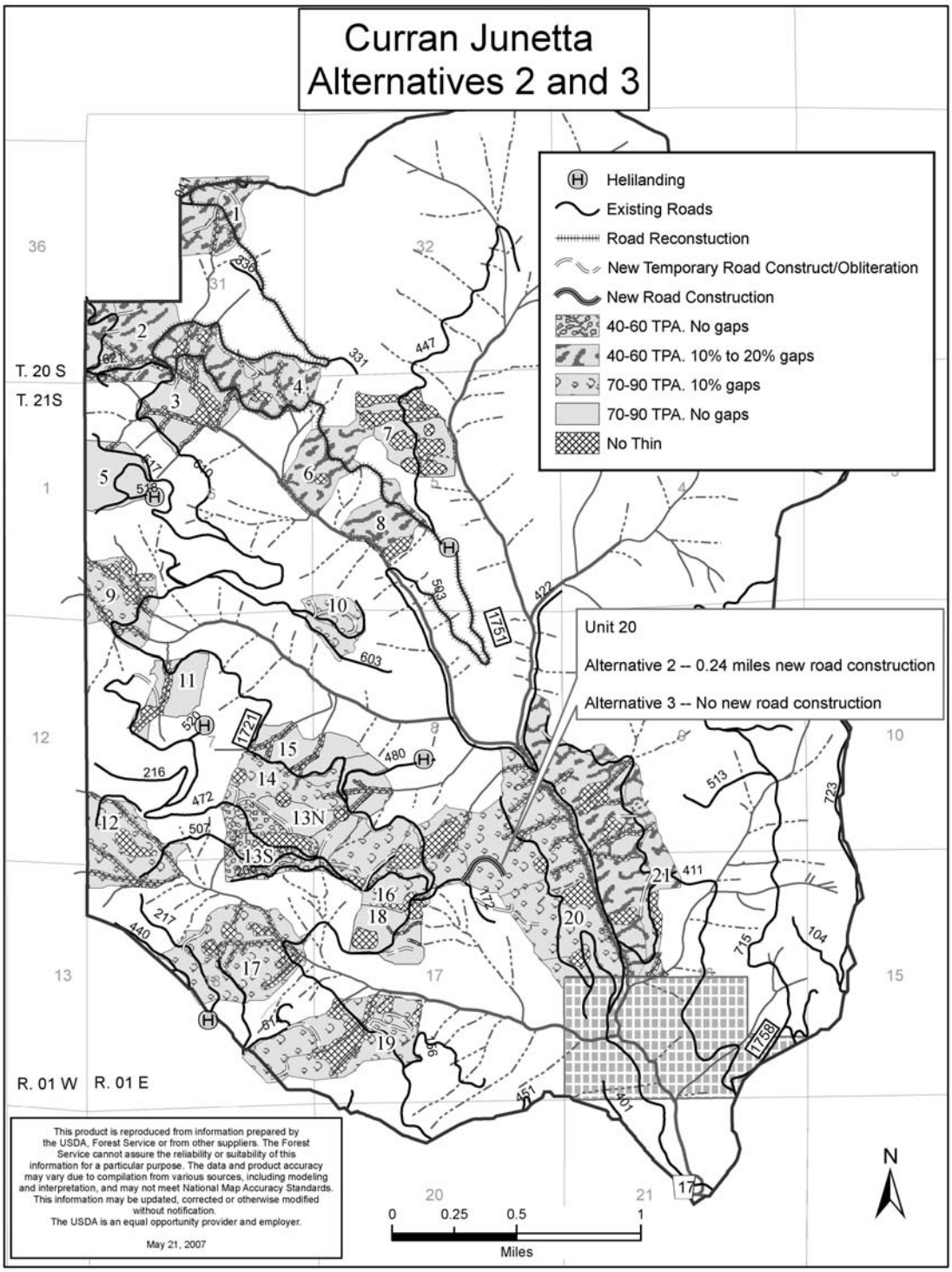

Figure 4. Curran Junetta Proposed Action – Alternative Two

DECISION TO BE MADE

Based on the analysis documented in this environmental assessment, the Forest Supervisor of the Umpqua National Forest will decide the following:

- To implement the project as proposed, to implement a modified version of the project (an alternative) that addresses unresolved issues, or to not implement the project at this time (no action).
- If the project is implemented, the mitigation measures, management requirements, monitoring, and water quality best management practices that are necessary to achieve resource goals, objectives, and the desired future condition.
- Whether to amend the Forest Plan as proposed.
- Whether there is a significant effect on the human environment that would require preparation of an Environmental Impact Statement.

SCOPING

The Forest Service listened to all input and addressed as many concerns as possible during development of the proposed action. An early involvement process was initiated concurrently with the Shrimp Stewardship Project, and potential restoration projects were generated for the Curran Junetta area (See Chapter Four). Formal scoping (a process used to surface issues) began after the proposed action was developed when the project was first listed in the January 2007 Umpqua National Forest Quarterly Schedule of Proposed Actions (SOPA). A scoping notice and field trip announcement was sent to the public in early January 2007 with the intent of introducing the proposed action and soliciting issues. Seven members of the public attended a January 2007 field trip, which resulted in numerous comments and concerns that were raised that day, as well as follow-up letters, e-mails and phone conversations. The Curran Junetta project Project File contains a scoping summary that details the scoping comments received for the project.

ISSUES

Significant issues associated with a proposed action are the focus of an environmental assessment because they provide the basis for formulating and comparing alternatives to the proposed action (40 CFR 1502.14). Significant issues may also be used to prescribe mitigation and monitoring measures, and may be used for analyzing environmental effects. Significant issues are based on unresolved conflicts concerning alternative uses of available resources. An issue is a point of disagreement, debate, or dispute about the proposed action based on effects identified through scoping. Scoping identified a number of issues and concerns (non-issues) related to the proposed thinning in the planning area.

The following significant issue was used to develop an alternative to the proposed action:

Issue 1: Less Road Building

Cascadia Wildlands Project, and Oregon Wild (formerly ONRC) state that building 0.24 miles of new system road and 3.4 miles of new temporary spur roads may cause numerous environmental impacts including erosion, channeling water, spreading noxious weeds, and reducing wildlife habitat. To help quantify and track this issue through the analysis, the following indicator were developed:

- Miles of temporary road and system road built.

Issues that did not drive alternatives

Several other issues were resolved by clarifying the proposed action, developing mitigation measures to address them, or in further discussions with the people who raised them. As such these issues did not drive the development of an alternative to the proposed action. These are discussed below by category:

Issues resolved by clarifying the proposed action:

Snag Protection

The stands proposed for thinning lack snags due to past clearcutting practices. However, some remnant snags may be present. One such snag was viewed on the January 26, 2007 field trip in Unit 19. The District personnel who visited this stand believe the snag was used as a spar pole tree for the original logging operation in the 1950s. General practice in those days was to fall these trees after use. Consequently, few of these snags remain or have been found in other stands. A landing is planned at the site the snag in unit 19 was found.

This issue was resolved by modifying the proposed action; the landing was moved to another location. Mitigation measures would address snag maintenance by requiring the operator to fall thinned trees away from this and any other snags when feasible during logging operations. However, Oregon OSHA rules require safe working conditions during harvest operations and snags may occasionally need to be felled.

Issue resolved through the development of mitigation measures:

Large Down Woody Debris Protection

Matthew Hall stated “Large woody debris on the forest floor should be disturbed as little as possible. Fuel treatments should be undertaken so that large woody debris is not burned up in the process, wherever possible.” The proposed action includes fuels treatments of underburning and grapple piling which may impact large woody debris.

This issue is resolved by the standard practices of spring burning and by utilizing slash specifications that omit piling of large diameter CWD.

Issues resolved as a result of further discussion and clarification:

Road Decommissioning, Inactivation and Reconstruction

Oregon Wild would like the Forest Service to consider closing or decommissioning some of the unneeded roads in the project area.

In a phone conversation with Chandra LeGue, Pat Williams clarified the proposed action. In addition to decommissioning 0.82 miles of road it includes approximately 16 miles of road inactivation. Road 1751-422 is currently not drivable due to vegetation growth and lack of maintenance. This road was evaluated for providing access for fire suppression activities and other resource issues and was determined to be unnecessary; it would be decommissioned. Road decommissioning includes removing all culverts where practical, and re-contouring to natural slope and subsoiling for revegetation requirements. Inactivation of roads means they would be closed to vehicular travel and the culverts removed. Though this would reduce the need for continued road maintenance costs, they would still be able to be reopened for potential future resource needs and fire access.

Another concern raised discussed by Oregon Wild was the reconstruction of five miles of the 1751 road. The Forest Service clarified that the proposal is to only add a four inch lift of rock on this section of road and not rebuild it.

Large Gap Sizes for Big Game

Jacob Groves, field forester for American Forest Resource Council was contacted regarding his comments about creating larger gap sizes to provide forage for big game within the CJ Planning area. The District wildlife biologist provided information on the current condition of habitat for the existing big game within the planning area and some of the benefiting factors expected for big game from the existing proposed action. His reply was that this is something that they include in all their comments because they believe big game forage production should be considered based on the projected trend for future forest management and what has occurred over the last decade on the National Forest lands throughout western Oregon (generally a reduction in early seral habitat). He did not believe this should be a driving issue for another alternative, but would like the Forest Service to consider increasing big game forage whenever opportunities arise in this or future projects.

A proposed solution for this planning area is to convert temporary roads and helicopter landings to long-term forage openings for big game; these openings can also be used again in the future as helispots for logging and fire suppression.

False Brome Noxious Weed Eradication and Herbicide Use

Jim Delapp suggested contacting the City of Cottage Grove and to explain the proposal and demonstrate the safeguards the Forest Service would be taking to minimize any potential impacts to water quality. This suggestion was made in the context of maintaining a good working relationship with the City of Cottage Grove and others who might be skeptical of herbicide use in Layng Creek, which is presently a major component of the City's water supply.

This issue was resolved in further discussion with Ray Pardee and Jan Wellman. In general, they do not want the Forest Service to use herbicides in wet areas. The City of Cottage Grove wants to be notified when spraying would occur.

Variable Density Thinning

The proposed variable density thinning would be accomplished through the placement of canopy gaps within areas that are thinned from below (harvesting the smaller trees and leaving the largest trees), and by varying the levels of leave trees. Under the proposed action, harvest prescriptions would vary between units based on a site's disturbance regime and other resource concerns such as spotted owl habitat needs and fuels reduction requirements.

Cascadia Wildlands Project and Oregon Wild wrote that variable density thinning should result in "skips and gaps" (i.e. no-thin areas), and varying densities within every stand.

This issue was resolved in discussion with Josh Laughlin of Cascadia Wildlands Project and Fabian Lawrence during the field review of an unthinned area. It was determined that the between-unit variability was appropriately scaled given the different disturbance regimes used to apply the unit prescriptions. Furthermore, it was determined that the unthinned areas scattered throughout each stand, intermixed with thinned areas and gaps, would achieve the desired within-unit variability.

Non-significant issues:

There was one main issue raised during scoping that were dismissed as non-significant issues. Non-significant issues include those that are outside the scope of the proposed action, are already decided by law, regulation, Forest Plan, or other higher level decision.

The issue was a desire to use the stewardship authority. The District, along with interested private parties has invested time and implemented a stewardship project, and may propose another stewardship project in the future. However, according to FSH 2409.19, 61.1g "Stewardship contracting is a tool for meeting resource objectives and should not be included in the NEPA document and decision notice as a requirement of the project." Therefore, requiring stewardship contracting as a part of this NEPA process is outside the scope of the project.

PROJECT-LEVEL FOREST PLAN AMENDMENTS

Two project-level Forest Plan amendments are proposed to be implemented. Most of the standards and guidelines in the 1990 Umpqua LRMP were developed in the context of even-aged harvest of most of the remaining old-growth forest. They were crafted to protect areas from high impacts of logging and site preparation, and to retain areas of old growth timber to help mitigate loss of habitat and risks associated with disturbance. The level of disturbance associated with thinning and gap creation in dense second-growth stands is substantially less than that of clearcutting and broadcast burning old growth. With this changed context, the following project-level Forest Plan amendments are proposed in order to meet the purpose and need in practical and cost-effective ways.

- The first project level Forest Plan amendment would allow thinning up to the boundary of hardwood stands designated as unique habitat. Yarding through these stands may occur. Currently, prescription C5-1 states that no timber harvest is permitted within 150 feet of inventoried openings; hardwood stands are included in the Umpqua LRMP as unique habitat. Vegetation manipulation or structural improvement may occur if it is designed to enhance wildlife (LRMP IV-200). In the case of the hardwood stands within the harvest units, leaving a 150 foot no cut buffer adjacent to the hardwood stands would arbitrarily exclude these areas from thinning, which would preclude and or retard development of the larger diameter trees that may otherwise enhance structural diversity. The project level Forest Plan amendment would allow for thinning adjacent to and yarding through these hardwood habitats to help develop the desired condition described in the Propose and Need.
- The second proposed amendment applies to four of the management guidelines in the Layng Creek Municipal Watershed Plan (Appendix G of the LRMP).The guidelines to limit turbidity in Layng Creek were developed in the context of old-growth, even-aged management. The following guidelines would be amended for the Curran Junetta project:

  1) Disturbed Area guidelines E2 and E3 of the Municipal Watershed Plan (LRMP Appendix G-7) established an annual threshold of no more than 350 acres of newly disturbed area. Disturbed area acres include all new activities where new areas of soil exposure would have less than 50% residual ground cover vegetation the first winter following the creation of new cut and fill slopes on roads, rock pit work, landings, waste disposal sites and any harvest areas where less than 50% crown closure exists. No more than 20% (70 acres) of such new disturbance is to occur as a result of road or landing construction or road reconstruction. Approximately 798 acres of the 1,236 acres proposed for thinning and gap creation would potentially result in overall unit canopy closures of less than 50%. In these units canopy closures would likely range from about 40%-47%, including the areas in gaps, and the thinned and unthinned areas within each unit. In addition, thinned overstory canopies begin to close at an average of two percent per year (Chan, et al. 2006).

  The proposed Forest Plan amendment increases the threshold to 800 aces of area disturbance associated with the thinning acres, while the annual acres of disturbance associated with road construction, reconstruction, and landing construction would remain under 70 acres as detailed in Appendix G. These disturbed areas would receive treatments (best management practices) as described in Chapter Two to further mitigate the likelihood of sedimentation.

  It is unlikely that all 798 acres of the heavier thinning prescription would be thinned within one year; if it were, the unit canopy closures would not be substantially lower than the 50% level. The Municipal Watershed Plan estimated an average removal of 55,000 board feet of timber per acre. The heaviest thinning prescriptions in the Curran Junetta units would remove about 20,000 board feet per acre under partial harvest conditions, which is less than half of what was assumed in the Plan. Based on observations following similar types of thinning prescriptions and site preparation, adequate levels of effective ground cover in the form of slash and residual undisturbed ground cover has been present. This in conjunction with the no treatment stream buffers paralleling all perennial streams helps mitigate the delivery of surface erosion to streams. This

project-level Forest Plan amendment would allow the disturbed acres (from thinning) to exceed 350 acres in any one year in order to achieve the desired riparian and upland stand density conditions in an economically feasible way, while meeting the watershed protection objectives set forth in the Plan.

2) Yarding guideline #3 of the Municipal Watershed Plan (LRMP Appendix G-12) requires a no-equipment zone of 100 feet on each side of stream channels. However, heavy equipment would be allowed in riparian units (RU)[6] "at designated crossings or for specifically planned and authorized activities" (Riparian Unit Guidelines – Part I; Constraints #2 – Heavy Equipment).

Ground based yarding would generally be restricted to designated skid trails located on existing skid trails created in the last harvest entry of the 1950s and 1960s. Other safe guards are: operations restricted to slopes less than 30 percent and during dry weather conditions. An amendment proposes allowing such operations within 100 feet of streams during the dry operating periods, thereby achieving desired riparian stand conditions in an economically feasible way.

3) Timber guideline #3B of the Municipal Watershed Management Plan (LRMP Appendix G-12, G-27) requires directional felling in riparian areas to place slash as far uphill as possible and to minimize tree breakage and logging debris in streams. This guideline is applicable for the harvest of old-growth timber, not second-growth timber of the size proposed in the Curran Junetta project. Directional felling (tree lining) is typically cost-prohibitive in second-growth stands. Second-growth timber is not as susceptible to breakage as larger, taller, heavier old-growth. Moreover, the smaller tree crowns of these younger partially harvested stands would result in substantially less logging debris entering streams. The proposed amendment would allow falling to be conducted in a manner that would limit trees and slash from entering streams by falling trees across the slope to the extent feasible, thus attaining desired riparian stand conditions in an economically feasible way.

PROJECT IMPLEMENTATION

Should one of the action alternatives be selected, the Forest Service would implement most of the timber harvest, road construction and reconstruction through timber sale contracts. Either action alternative would likely result in two separate timber sale contracts.

The Forest Service may also choose to use a new contracting tool. Stewardship contracting was authorized by Congress and spelled out under the December 12, 2005 Forest Service Washington Office Directive (FSH 2409.19, Chapter 60). Stewardship contracting is used to accomplish resource restoration management projects in collaboration with interested parties, where goods are exchanged for services.

Service contracts or construction contracts can also be used to accomplish some of the connected actions funded by timber sale receipts or other sources. Examples of these

6 Riparian Units are defined in the Layng Creek Municipal Watershed Plan (Appendix G of the 1990 Umpqua National Forest Land and Resource Management Plan) as riparian areas designated to protect watercourses from the impacts of soil and vegetation disturbances adjacent to watercourses as well as upslope from disturbed areas.

include fish passage improvement project on Curran Creek, noxious weed control and precommercial thinning.

In the course of implementing complex projects with many acres of harvest, fuel treatment, and several connected actions, minor changes may be needed during implementation to better meet on-site resource management and protection objectives. For example, fuels prescriptions may be modified if site conditions dictate and other resource objectives can be met. Minor adjustments to unit boundaries may be needed during final layout for resource protection, to improve logging system efficiency, or to better meet the intent of the resource prescriptions. Changes in logging systems, including locations of temporary spur roads, may be required to better facilitate logging systems and provide for resource protection. Many of these minor changes would not present sufficient potential impacts to require any specific documentation or action to comply with applicable laws.

In determining whether and what kind of further NEPA action is required to document any changes, the criteria for whether to supplement an existing Environmental Assessment (FSH 1909.15, sec. 18) would be followed.

CHAPTER TWO

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

INTRODUCTION

The National Environmental Policy Act (NEPA) requires analysis of a proposed action and other reasonable alternatives, including no action. The no action alternative provides a baseline for estimating environmental effects. Three alternatives, including no action, are considered in detail in this document. The proposed action was developed to meet the purpose and need established by the District Ranger and will be approved by the Forest Supervisor. Alternative Three was developed in response to a significant issue identified during scoping. Another alternative was considered, but eliminated from detailed study.

ALTERNATIVES CONSIDERED, BUT ELIMINATED FROM DETAILED STUDY

An alternative was considered to utilize a grass-specific herbicide rather than a broad spectrum herbicide. The only grass specific herbicide approved for use in Region 6 is sethoxydim[7]. Sethoxydim is a selective herbicide used to control annual and perennial grass weeds. It is not a strongly effective herbicide for some grasses, however. Sethoxydim is moderately mobile in soil, posing risks of leaching and runoff. In contrast, the herbicide glyphosate has a low risk of runoff and leaching through soils due to its strong adsorbence to soil particles. Glyphosate has been proven an effective late season herbicide treatment for false brome (Clark et al. 2004). Therefore, because glyphosate meets the purpose and need with lower risks, this alternative was eliminated from study.

ALTERNATIVE ONE – NO ACTION

Under Alternative One, no thinning, fuel treatment, road construction, reconstruction, or maintenance, or other similar or connected activities, including tree planting, pre-commercial thinning, subsoiling, fish passage improvement, or instream wood placement would take place. No ground-disturbing activities would take place and no timber would be offered for sale. On-going activities, including road maintenance, recreation use, and noxious weed control would continue to occur (Table 7). Future activities, such as those described in Table 8 would also occur.

7 (Risk assessments for herbicides approved for use in Region 6 were done by Syracuse Environmental Research Associates, Inc. (SERA) and are available for viewing at the Forest Service Regional Office in Portland, Oregon, or they can be viewed online at the Forest Service website: http://www.fs.fed.us/r6/invasiveplanteis/Risk-Assessments/Herbicides-Analyzed-InvPlant-EIS.htm. Refer to the ROD for Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants, 2006)

ALTERNATIVE TWO - PROPOSED ACTION

(**Figure 4, Tables 1 and 2**)

This alternative is the proposed action used in the scoping process. The proposed action was developed to meet the purpose and need. It includes the following:

- Commercial thinning 1,236 acres of 1,549 acres of timber stands using helicopter, ground-based, and skyline logging systems in both the matrix and riparian reserve land allocations generating about 14.0 million board feet of timber. No thinning would occur on 313 acres interspersed throughout the timber stands where riparian areas, unique habitat, or rare plant species and soils require protection.
- Treating activity-created fuels on 783 thinned acres by underburning, machine piling, and hand piling and burning.
- Building five new landings for helicopter logging.
- Building a total of 0.24 miles of new system roads to provide access for long-term stand management.
- Building 3.42 miles of temporary spur roads to access thinning areas then obliterating them (subsoiling[8] as necessary, and pulling displaced soil and woody debris over the surface) after use.
- Reconstructing five miles of existing system roads, including replacement of surface rock and undersized or deteriorated culverts for stream crossings, the addition or replacement of ditch relief culverts, and the reconstruction of ditches as needed.
- Maintaining 41.74 miles of existing roads including grading and shaping existing road surfaces, ditch maintenance as needed, and cutting of intruding vegetation along roadsides.
- Utilizing the existing Doris rock pit as the rock source for road work.

The Forest Plan Amendments described in Chapter One would be included in Alternative Two. The specific treatments on a unit-by-unit basis for Alternative Two are as follows (Table 1):

8Subsoiling is the process of loosening soil that has been compacted from previous ground-based logging or road building.

Table 1. Alternative Two unit summary[9].

Unit	Thin Acres	Harvest Rx (trees per acre left)	MBF Volume Removed	Logging Systems	Fuels Prescription
1	49	40-60, 10% gaps ½ ac	665	skyline, ground based (loader)	underburn, machine pile, handpile adjacent to private
2	70	40-60, 20% gaps ¼ acre	995	skyline, ground based	underburn, machine pile, handpile adjacent to private
3	31	70-90	510	skyline	hand pile road
4	55	40-60, 20% ¼ acre gaps	767	Skyline (+multispan), ground based	underburn, machine pile
5	39	70-90	268	ground based	machine pile, handpile adjacent to private
6	44	40-60, 20% ¼ acre gaps	672	skyline, helicopter	underburn
7	26	70-90	226	helicopter	no treatment
8	32	40-60, 20% ¼ acre gaps	483	helicopter, skyline/multispan	underburn
9	33	70-90, 10% ½ acre gaps	439	skyline, helicopter	machine pile, hand pile adjacent to private, handpile road, handpile ½ ac gaps
10	27	70-90, 10% ¼ acre gaps	202	skyline, ground based	machine pile
11	27	40-60	137	helicopter, skyline	handpile road
12	48	70-90, 10% ½ acre gaps	352	Skyline (+multispan), helicopter, ground based	machine pile, handpile adjacent to private, handpile ½ ac gaps
13n	37	70-90	186	Skyline (+multispan)	no treatment
13s	37	40-60	268	ground based	machine pile
14	39	70-90, 10% ¼ acre gaps	283	Skyline/multispan, ground based	machine pile, hand pile road
15	53	70-90	781	skyline, ground based	machine pile, hand pile road
16	56	70-90, 10% ¼ acre gaps	391	Skyline (+multispan), ground based	machine pile, hand pile road

9Acres and volumes were rounded; column totals may not exactly add up, but are within +/- 10% variance.

Unit	Thin Acres	Harvest Rx (trees per acre left)	MBF Volume Removed	Logging Systems	Fuels Prescription
17	78	70-90, 10% ½ acre gaps	1014	Skyline (+multispan), heli., ground based	machine pile, hand pile road, hand pile ½ ac gaps
18	29	70-90	573	skyline, ground based	machine pile, hand pile road
19	78	70-90, 10% ¼ acre gaps	1443	skyline, ground based	machine pile, hand pile road
20	188	70-90, 10% ¼ acre gaps	1408	skyline, ground based	underburn, machine pile, hand pile road, hand pile adjacent to private
21	160	40-60, 10% ¼ acre gaps	2614	skyline, ground based	underburn, machine pile, hand pile road, hand pile adjacent to private
Tot.	1236	~117 ac. in gaps (¼&½)	14677	Skyline – 765 ac; Helicopter – 116 ac; Ground based– 355 ac.	783 ac fuel treatment 453 ac no treatment

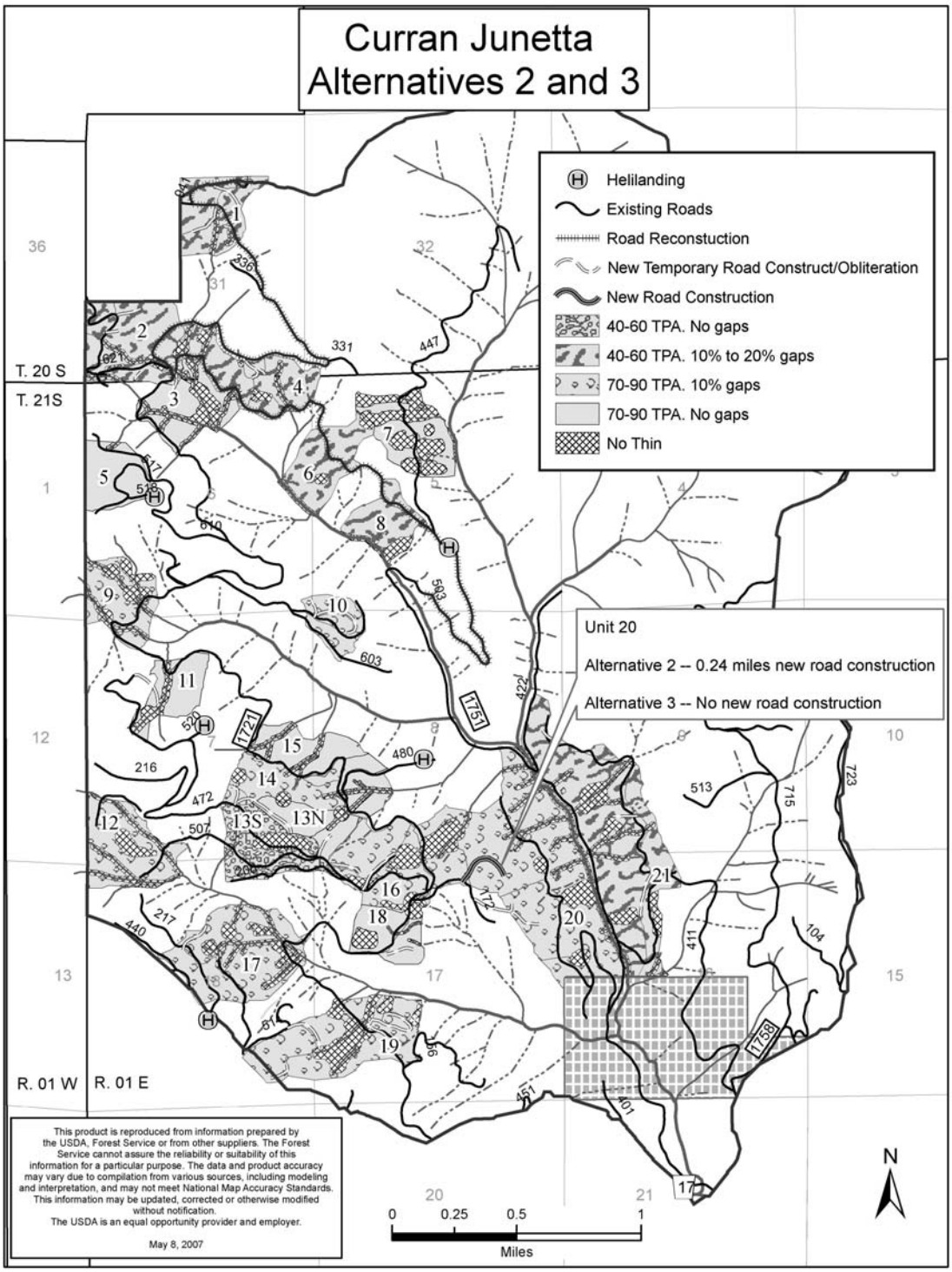

Figure 5. Alternatives Two and Three.

Road construction necessary to access stands for thinning on a unit-by-unit basis for Alternative Two is displayed in Table 2.

Table 2. Alternative Two. Summary of road construction and reconstruction[10].

Unit #	Temp. Rd. Const.	New System Road Construction
1	0.34 Miles	None
2	0.23 Miles	None
3	0.07 Miles	None
4	0.13 Miles	None
10	0.30 Miles	None
11	0.14 Miles	None
13	0.37 Miles	None
14	0.10 Miles	None
16	0.25 Miles	None
17	0.13 Miles	None
19	0.70 Miles	None
20	0.33 Miles	0.24 miles of new construction of system road 1721
21	0.33 Miles	None
Total	**3.42 Miles**	**0.24 miles** of new construction of system road on undisturbed ground (no prior disturbance); **5.00** miles of system road reconstruction located on portions of the 1721, 1721-941 and 1751 roads. This work consists of surface rock replacement.

Permanent System Road Construction

The 0.24 miles of new system road construction under Alternative Two would provide long-term access into unit 20 for future stand management. Rock would be applied to portions of the road with steeper grades. This new system road would be blocked following the harvest since future use would not occur for more than a decade.

Temporary Roads

The 3.42 miles of temporary road to be constructed under Alternative Two would be native surface roads (no rock added) constructed on side-slopes under 30% and would have grades under 10%. Temporary roads are typically constructed with a tractor, and after logging would be obliterated with an excavator equipped with a "winged ripper" that de-compacts the soil. Any excavated material, including soil and woody material, would be pulled back over the road to re-establish the original contour as much as feasible, and entrances would be blocked.

Road Reconstruction

Road reconstruction on existing system roads would take place in order to meet standards and guidelines of the Northwest Forest Plan to accommodate flood flows, minimize the disruption of natural water flow pathways, and lessen risk of erosion, (ROD C 32-33), while providing for safe, cost-effective timber haul. The reconstruction would include:

10 Summary of road construction and reconstruction for logging access by individual unit.

- Reconstruction of five rusted and damaged culverts at existing stream crossings. Reconstruction would help to either eliminate the potential for stream diversion or to accommodate 100-year flood flows on road 1721 at mileposts 2.49, 9.89, 8.53, 12.75 and 13.50;
- The replacement of 24 deteriorated ditch relief culverts on roads 1721, 1751 and 1751-411;
- The addition of four inches of new rock to five miles of roads including the entire length of road 1721-941 and portions of the 1721 and 1751 roads. Rock would be hauled from the existing Doris rock quarry. Quarry work is necessary to generate an estimated 6,000 cubic yards of rock needed for the road work. The quarry work would occur within the limits of the existing development. A rock crusher would reduce material down to crushed rock aggregate specifications. Blasting would occur within the quarry and would be designed to avoid damage to landscape features located outside the limits of the existing pit.

Road maintenance

An estimated 41.74 miles of road maintenance done by timber sale purchasers would occur on 23 different road segments that would be used for timber haul (refer to the Project File for more detail). This would include road-side mowing of vegetation, grading and shaping the road prism and ditch pulling and cleaning. Hazard trees would be identified along the haul routes (in compliance with the Biological Opinion (1-15-2006-F-0035), and felled (and left on site) as needed to meet Occupational Safety and Health Administration (OSHA) requirements.

Connected and Similar Actions

(Figure 6)

Connected actions, which means that they are closely related to the proposed alternatives and similar actions having to do with timing and geography must be considered in determining the combined impacts of a project. Connected and similar actions may be financed by funds collected from the sale of timber to be used for the improvement of renewable resources or funds appropriated from Congress. Depending on cost-benefit analysis, connected and similar actions that may qualify for funding include:

- 21 acres of reforestation in openings that are ½ acre in size;
- Estimated 12 acres of the noxious weed false brome would be eradicated by the herbicide glyphosate (Refer to Rationale discussion, below);
- 4,190 snags to be created by inoculation with heart rot fungus and 2,220 snags created from underburning and girdling;
- 12 acres of revegetation of bare ground for erosion control.
- 255 acres of predicted noxious weed treatments within harvest units and other new areas of disturbance;
- 45 acres of competitive planting where noxious weed treatments create bare ground;
- 19 acres of subsoiling of previously compacted ground in units 2, 5, 11, 14, 17, 20 and 21;

- 30 acres of preexisting noxious weed treatments in existing roadways, quarries, pullouts and landings;
- 0.82 miles of active road decommissioning of existing system road 1751-422, which would involve the removal of culverts or other crossing structures, outsloping, subsoiling and permanent removal from the Forest transportation system;
- 13.53 miles of road inactivation of existing system roads 1721-156 (0.49), 1721-172 (0.40), 1721-206 (0.50), 1721-216 (0.30), 1721-217 (0.70), 1721-331 (0.10), 1721-336 (0.20), 1751-422 (0.82), 1721-480 (0.53), 1721-502 (0.87), 1721-503 (0.76), 1721-507 (0.60), 1721-514 (0.50), 1721-517 (0.50), 1721-518 (0.14), 1721-520 (0.10), 1721-547 (0.30), 1721-603 (0.50), 1721-621 (0.30), 1751-447 (1.70), 1758-411 (2.41) 1758-513 (0.40) and 1758-519 (0.41) which would involve removing culverts, installing water bars, and blocking entrances;
- 89 acres of precommercial thinning in young plantations;
- One mile of instream wood placement in Junetta Creek involving the placement of approximately 40 pieces of large wood**;**
- Two migration barrier culverts would be replaced to help to improve aquatic habitat connectivity. These culverts are located where Curran and West Fork Junetta streams cross the 1751 road;
- 2.90 miles of road inactivation of existing system roads 1721-451 (1.45), 1751-401 (0.80), 1758-104 (0.35), 1758-216 (0.10), 1758-219 (0.20) which would involve removing culverts, installing water bars, and blocking entrances; and
- Five fire sumps to be maintained including the addition of rock to sump access roads, the excavation of filled-in gravel, soil, and vegetation within the existing sumps, vegetation brushing and mowing along sump access roads, and the falling of hazard trees.

Rationale for use of herbicide glyphosate to treat false brome:

False brome was discovered on the district along Road 1721 in 2002. The initial population was very localized and estimated at about 3 acres. During subsequent years treatment methods have included hand pulling, grubbing, repeated mowing, and heat treatment. Unfortunately, these treatments have had no observable effect on the rate of spread of the infestation. The species has continued to expand into the adjacent forest, along the road sides and into ditches and roadcuts, along closed unused spur roads, and along game trails. Estimated acreage of the infestation now exceeds 8 acres and the plant has moved along several miles of road shoulder. (Figure 7)

Results from herbicide tests on false brome have indicated that control can be attained through application any time between August and October. In a study conducted in the Willamette Valley, applications during the late season showed good control of false brome while having little effect on dormant native plants (Clark, et al. 2006).

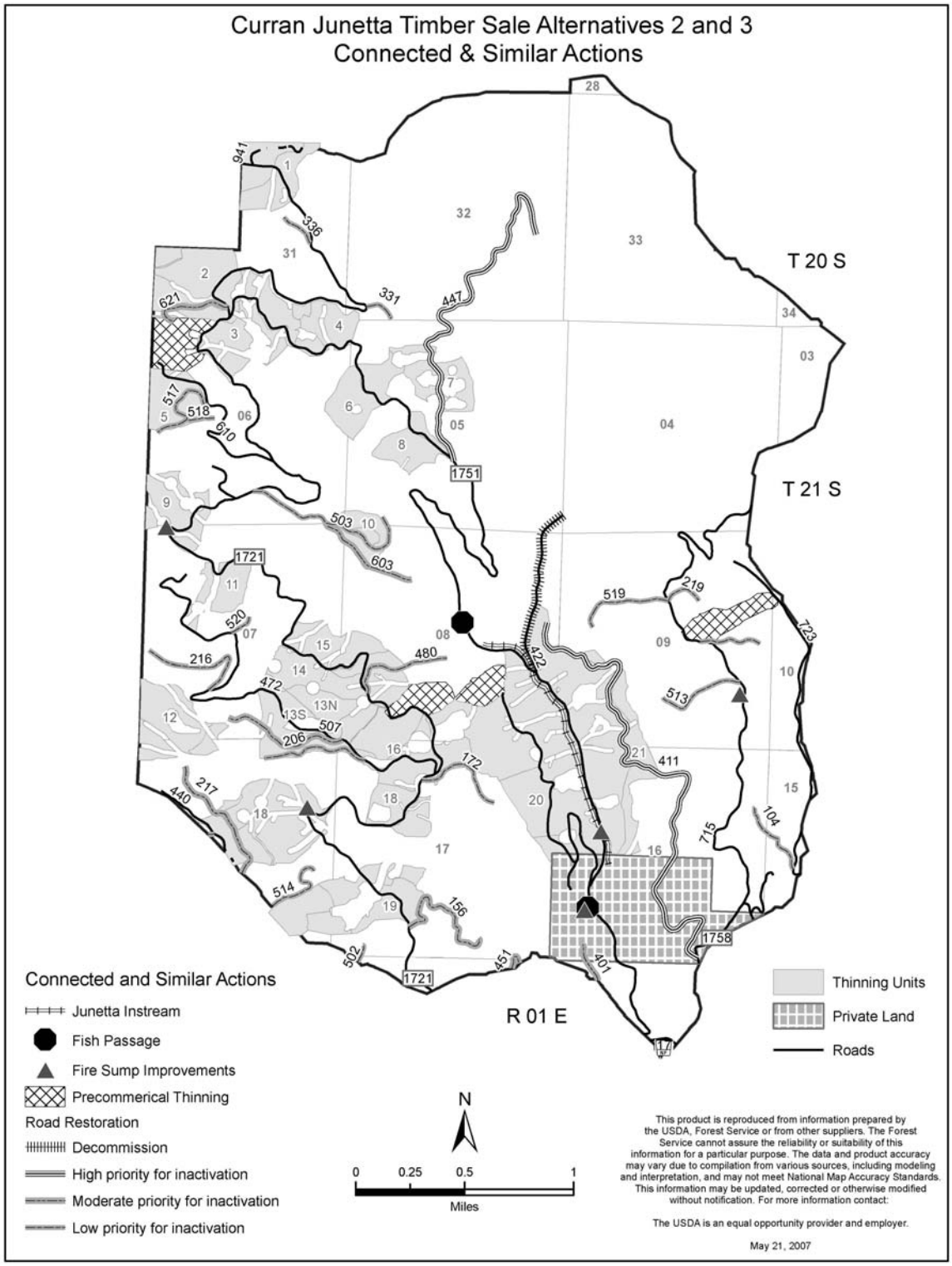

Figure 6. Connected and Similar Actions (Alternatives Two and Three)

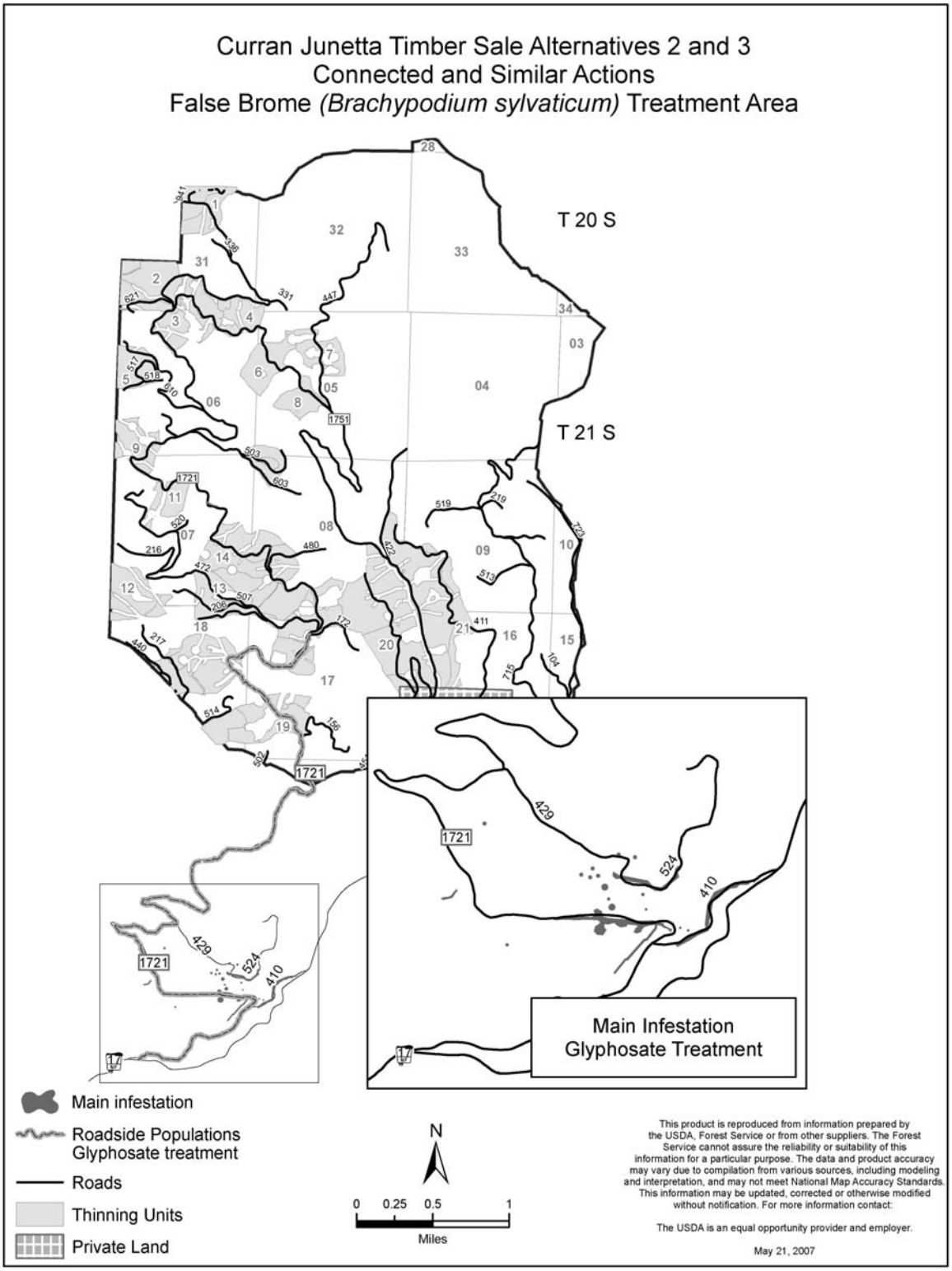

Figure 7. False Brome Treatment Area[11]

11 False Brome Treatment Area11 Associated with Connected and Similar Actions for Alternatives Two and Three.

ALTERNATIVE THREE

(Figure 5, Table 3)

Alternative Three was developed to meet the purpose and need and to respond to the issue of road building. Alternative Three would build no new system roads and the same amount of temporary roads, with a shift to more helicopter logging as compared to Alternative Two.

Specifically, Alternative Three differs from Alternative Two by building no new system roads, which equates to 0.24 fewer miles of new system road than proposed in Alternative Two. With fewer roads, Alternative Three would increase the use of helicopter logging by 50 acres over that in Alternative Two.

The harvest units and the silvicultural prescriptions associated with Alternative Three would be the same as Alternative Two with the same timber output of approximately 14 million board feet.

Alternative Three includes the following:

- Commercial thinning 1,236 acres of 1,549 acres of timber stands using helicopter, ground-based, and skyline logging systems in both the matrix and riparian reserve land allocations generating about 14.0 million board feet of timber. No thinning would occur on 313 acres interspersed throughout the timber stands in riparian, unique habitat, or areas where rare plant species and soils require protection.
- Treating activity-created fuels on 783 thinned acres by underburning, machine piling, and hand piling and burning.
- Building five new landings for helicopter.
- Building 3.42 miles of temporary spur roads to access thinning areas, then obliterating them (subsoiling as necessary, and pulling displaced soil and woody debris over the surface) after use (Table 3).
- Reconstructing five miles of existing system roads, including replacement of surface rock, undersized or deteriorated culverts for stream crossings, the addition or replacement of ditch relief culverts, and the reconstruction of ditches as needed.
- Maintaining 41.74 miles of existing roads, including grading and shaping existing road surfaces, ditch maintenance as needed, and cutting of intruding vegetation along roadsides.
- Utilizing the existing Doris rock pit as the rock source for road work.

The Forest Plan Amendments described in Chapter One would be included in Alternative Three. The various stand treatments on a unit-by-unit basis, and road construction necessary to access stands for thinning on a unit-by-unit basis for Alternative Three is as follows (Table 3):

Table 3. Alternative Three Summary.

Unit	Thin Acres	Harvest Rx (trees per acre left)	MBF Volume Removed	Logging Systems	Fuels Prescription
1	49	40-60, 10% gaps ½ ac	665	skyline, ground based	underburn, machine pile, handpile adjacent to private
2	70	40-60, 20% gaps ¼ acre	995	skyline, ground based	underburn, machine pile, handpile adjacent to private
3	31	70-90	510	skyline	hand pile road
4	55	40-60, 20% ¼ acre gaps	767	Skyline (+multispan), ground based	underburn, machine pile
5	39	70-90	268	ground based	machine pile, handpile adjacent to private
6	44	40-60, 20% ¼ acre gaps	672	skyline, helicopter	underburn
7	26	70-90, 20%	226	helicopter	no treatment
8	32	40-60, 20% ¼ acre gaps	483	helicopter, skyline/multispan	underburn
9	33	70-90, 10% ½ acre gaps	439	skyline, helicopter	machine pile, hand pile adjacent to private, handpile road, handpile ½ ac gaps
10	27	70-90, 10% ¼ acre gaps	202	skyline, ground based	machine pile
11	27	40-60	137	helicopter, skyline	handpile road
12	48	70-90, 10% ½ acre gaps	352	Skyline (+multispan), helicopter, ground based	machine pile, handpile adjacent to private, handpile ½ ac gaps
13n	37	70-90	186	Skyline (+multispan)	no treatment
13s	37	40-60	268	ground based	machine pile
14	39	70-90, 10% ¼ acre gaps	283	Skyline/multispan, ground based	machine pile, hand pile road
15	53	70-90	781	skyline, ground based	machine pile, hand pile road
16	56	70-90, 10% ¼ acre gaps	391	Skyline (+multispan), ground based	machine pile, hand pile road

Unit	Thin Acres	Harvest Rx (trees per acre left)	MBF Volume Removed	Logging Systems	Fuels Prescription
17	**78**	**70-90, 10% ½ acre gaps**	**1014**	**Skyline (+multispan), heli., ground based**	**machine pile, hand pile road, hand pile ½ ac gaps**
18	**29**	**70-90**	**573**	**skyline, ground based**	**machine pile, hand pile road**
19	**78**	**70-90, 10% ¼ acre gaps**	**1443**	**skyline, ground based**	**machine pile, hand pile road**
20	**188**	**70-90, 10% ¼ acre gaps**	**1408**	**Alt. 2 Skyline, ground based** **Alt.3 Helicopter, skyline, ground based**	**underburn, machine pile, hand pile road, hand pile adjacent to private**
21	**160**	**40-60, 10% ¼ acre gaps**	**2614**	**skyline, ground based**	**underburn, machine pile, hand pile road, hand pile adjacent to private**
Tot.	**1236**	**~117 ac. in gaps (¼&½)**	**14677**	**Skyline – 715ac; Helicopter – 166 ac; Ground based– 355ac.**	**783 ac fuel treatment 453 ac no treatment**

Permanent System Road Construction
There would be no permanent system road construction under this alternative.

Temporary Road Construction
Same as alternative 2

COMPARISON OF ALTERNATIVES

Table 4 compares the alternatives by the elements of the purpose and need, the issue indicators, and summarizes other activities, actions and effects that would occur.

Table 4. Comparison of Alternatives.

	Alt. 1	Alt. 2	Alt. 3
Element 1 –Stand Density • Acres of second-growth thinning to improve conditions for species and structural diversity and stand stability • Acres of improved stand fire resiliency in the gentle mountain slope (GMS) and steep landscape areas	0	**1236** **216 – GMS** **85 – Steep**	**1236** **216 – GMS** **85 – Steep**
Element 2 –Timber Production and Cost Efficiency of Thinning • Million board feet (MMBF) of timber produced by commercial thinning • Benefit/Cost ratio • Net Present Value	0 0 0	14.0 MMBF **1.22** **$1, 326,440**	14.0 MMBF **1.19** **$1, 153,350**
Issue 1 – Road Building • Miles of temporary and system roads built	0	▪ 3.42 miles temp ▪ 0.24 miles system ▪ 5.0 miles system reconstruction	▪ 3.42 miles temp ▪ 0.00 miles system ▪ 5.0 miles system reconstruction

	Alt. 1	Alt. 2	Alt. 3
Comparison of Activities/Effects			
Logging systems			
▪ Skyline	0	765	715
▪ Helicopter	0	116	166
▪ Ground based	0	355	355
Fuels Treatments			
▪ Underburn	0	328 acres	328 acres
▪ Handpile along paved road	0	61 acres	61 acres
▪ Hand Pile Gaps	0	11 acres	11 acres
▪ Hand Pile Private Buffer	0	31 acres	31 acres
▪ No Treatment	0	482 acres	482 acres
▪ Machine Pile/Burn		352 acres	352 acres
Landings for Helicopter Logging			
▪ New Landings	0	1	1
▪ Existing Landing Use	0	4	4
Riparian Reserve – Road Impacts			
• New permanent roads (acres)	0	0 acres	0 acres
• Existing non-system road created into a system road and inactivated	0	1.6 acres	1.6 acres
• New temporary roads* (acres)	0	1.0 acres (obliterated following use)	1.0 acres (obliterated following use)
• Inactivation of existing roads	0	1.8 acres	1.8 acres
• Decommission existing roads	0	1.4 acres	1.4 acres
• *Change from existing condition*[12]	*0*	*-1.4 acres of permanent road in riparian reserve*	*-1.4 acres of permanent road in*

12 Temporary roads and roads proposed for inactivation are not factored into the calculation of change from existing condition because all temporary roads would be obliterated immediately following the logging.

	Alt. 1	Alt. 2	Alt. 3
		removed	*riparian reserve removed*
Instream Activity ▪ New Road/Stream Crossings* ▪ Existing Crossings Removed ▪ Stream Crossings Upgraded ▪ Large Wood Placement	0 0 0 0	0 13[13] 9[14] 1.0 mile	0 13[8] 9[9] 1.0 mile
Herbicide Treatment	0	12 acres	12 acres

13 From inactivated roads – 9 high priority, 3 moderate, 1 low

14 Five on system roads, two on non-system existing roads, two migration barrier upgrades. All newly constructed stream crossings would be removed following logging, resulting in no long-term net increase in system road in riparian reserves.

Best Management Practices, Mitigation Measures, Management Requirements, and Monitoring

The following measures address the laws, regulations and policies that relate to reducing potential environmental effects. These requirements apply to both action alternatives, unless otherwise stated. Mitigation measures are defined as actions that:

- avoid the impact all together (such as avoiding harvest on unstable land);
- minimize impacts by limiting the degree or magnitude of the action;
- rectify the impact via rehabilitation or restoration activities;
- reduce the impact over time through recurring operations such as road maintenance.

General Water Quality Best Management Practices (BMPs) are symbolized by a (✓), and are mitigation measures prescribed to protect the beneficial uses of water and to address water quality objectives as required by the Federal Clean Water Act and the 1990 Forest LRMP. The BMPs are listed by codes used in the Pacific Northwest Region's General Best Management Practices Guide (USDA, Forest Service, 1988). A complete BMP checklist is included in the Project Record.

Other management requirements not related to compliance with the Clean Water Act are indicated by a bullet (•). Monitoring is delineated by a lightning bolt (↯). Forest Plan Standards and Guidelines (S&Gs) are listed, where they apply.

LOGGING EROSION CONTROL MEASURES

BMPs T-8, T-13, T-14, T-15, T-16; Forest Plan S&Gs IV-60-5; IV-68-2; IV-71-13, IV-72-16, and Appendix G-20, items 1-5.

OBJECTIVE: Ensure any increase in sedimentation is minimized during and after logging or associated activities. Logging methods are described in the Project File.

ACTIONS:

✓ Stream course protection would be used on all stream classes.

✓ Erosion control measures would be identified where project areas have the potential to produce erosion or sedimentation that may affect water quality and beneficial uses of surface waters. The installation and application of appropriate erosion control measures would be applied on designated soil gouges in skyline corridors, and on ground based equipment skid trails that may reroute or concentrate runoff, spread water and allow soil infiltration.

✓ All water bars would be located and flagged by the Forest Service before construction (LRMP Appendix G).

✓ All skid roads would be made self-maintaining at the end of each operation season in which road is constructed or used (LRMP Appendix G).

✓ Cut-and-fill slopes would have full erosion control work completed the same year as constructed (LRMP Appendix G).

✓ All required erosion control work shall be completed before October 15 each year (LRMP Appendix G).

✓ Over-steepened landing debris should be pulled back to slope gradients of 70% or less to minimize failure risk (LRMP Appendix G).

✓ The requirement to not create any more than 350 acres of new disturbed area, including any harvest areas with less than 50% crown closure, is waived since this Forest Plan guideline (Appendix G-7) is proposed for amendment as described in Chapter One.

LOGGING PRACTICES

BMPs T-11, T-12, T-1, T-16; Forest Plan S&Gs IV-60-5, IV-60-2, IV-67-1, IV-68-2.

OBJECTIVE: Minimize timber harvest impacts to water quality and soil productivity to the extent practical.

ACTIONS:

✓ To reduce the number of skyline corridors, skyline roads would be no closer than 150 feet at the outer unit boundary of all units, or as required in order to protect green trees prior to felling.

✓ Location of all skid roads, at an average of 100 feet apart, would be agreed to prior to felling, unless otherwise agreed to in writing.

✓ Locate landings so that timber can be yarded with minimal disturbance to riparian reserves.

✓ Landing size should be no larger than needed for a safe, efficient yarding and loading operations.

✓ The tree lining requirement in riparian units in the Layng Creek Municipal Watershed Plan (Appendix G-12) is waived since this Forest Plan guideline is proposed for amendment as described in Chapter One.

✓ The requirement to keep all equipment 100 feet away from each side of stream channels is waived since this Forest Plan guideline (Appendix G-12) is proposed for amendment as described in Chapter One.

CONTROL OF PURCHASER OPERATIONS

BMPs T-5, T-10, T-11, T-13, T-14, T-15, T-18, T-19, T-21, T-22, R-3, R-19, R-20, W-4; Forest Plan S&Gs IV-83-3, IV-82-5, IV-61-9.

OBJECTIVE: Enable the Forest Service to exercise control of operations to prevent impacts which could have detrimental results to water quality.

ACTIONS:

✓ To prevent damage to water quality during the operating period, restriction of equipment shall be enforced through the use of appropriate Timber Sale Contract (TSC) provisions when conditions for timber harvest, road construction, or road use are such

that excessive damage would result. The kind and intensity of erosion control work done by the purchaser shall be adjusted to ground and weather conditions and the need for controlling runoff.

✓ Restrict ground base yarding to slopes less than 35% (LRMP Appendix G).

✓ All skid roads locations would be approved by the Forest Service prior to use (LRMP Appendix G).

✓ Erosion control work shall be kept current immediately preceding expected seasonal periods of precipitation or runoff. Any soil disturbed during the rainy season in excess of 0.5 acres would have effective ground cover placed on site in order to minimize erosion potential.

✓ Purchaser erosion control structures and maintenance work must be inspected prior to acceptance by the Forest Service, and would be specified in the TSC.

✓ Pollutants from logging or road reconstruction equipment would be kept from entering waterways during servicing or refueling by selecting areas at least 100 feet away from wet areas and surface water, and by using berms around sites to contain spills. If the volume of fuel exceeds 660 gallons in a single container or a total on-site storage of 1320 gallons, a Spill Prevention Control and Countermeasures (SPCC) Plan is required, and necessary equipment would be on site during operations. The purchaser shall take appropriate preventative measures to ensure that any spill does not enter any stream. Any spill that occurs must be reported to the Contracting Officer.

✓ Roadwork contractors would have spill prevention and recovery equipment on site during all road construction operations as agreed to by the Forest Service.

✓ No dust abatement would be applied on roads within 25 feet of perennial stream crossings.

✓ All landing locations would be approved by the Forest Service prior to landing construction. Agreed upon plans for the landing shall insure water quality protection.

✓Military training route IR-346 lays directly above the Curran Junetta planning area. It enters the Forest at T21S-R1E-19 SW/SW (43.43.5 N. Lat, 122.45 W Lon.) and proceeds directly east to exit at T21S-R2E-29 NE/NE (43.43.2 N Lat., 122.35.5 W Lon.). This line denotes only the centerline; the route's width extends approx. 4 nautical miles both north and south of this line. Airspeed is subsonic above 360 knots ground speed, and allows operation by pilots visually (VFR) between 200 ft. above ground level (AGL) during the day, and 800 AGL at night. Navy aircraft may operate between 500 AGL and the **minimum obstruction altitude** regardless of weather, both day and night. it is essential that any activities related to this timber sale take this active route into consideration. This may include but is not limited to cables spanning canyons, yarders that protrude above the surrounding canopy or terrain, helicopter work or any activities that may include blasting.

RIPARIAN AREAS WITHIN OR ADJACENT TO CUTTING UNITS

BMPs T-4, T-7, T-8; Forest Plan S&Gs IV-60-4, 5, 6; IV-33-5.

OBJECTIVE: Establish riparian area protection zones to minimize stream temperature increases, protect channel bank structure, provide a debris filter for sediment and debris which could enter the channels, and maintain a source of large woody debris for continued stream channel stability and structural diversity.

ACTIONS:

✓ Wetlands would be protected from microclimate change or ground disturbance by applying the following: a 50-foot no-cut buffer; no yarding through the buffers or wetlands (cables ok); and not igniting fire in the buffers or wetlands during fuel treatment.

✓ Apply no-cut buffers to all perennial streams following guidance in the Northwest Forest Plan Temperature TMDL Implementation Strategies (USDI/USDA 2005) to protect the primary shade zone from harvest.

Height of Tree	%Hill Slope <30	%Hill Slope 30 to 60	%Hill Slope >60
Trees < 20 feet	12' buffer	14' buffer	15' buffer
Trees 21 to 60 feet	28' buffer	33' buffer	55' buffer
Trees 61 to 100 feet	50' buffer	50' buffer	60' buffer

✓ Burning within the riparian zone to reduce fuel hazard near stream channels would be carefully controlled by allowing fire to back into the no-cut buffers (from previously ignited areas outside the buffers) to minimize fire intensity and mortality of fire-susceptible species such as hemlock, cedar and true fir (LRMP Appendix G).

WATERSHED PLANNING AND MONITORING

BMPs W-1, W-7.

OBJECTIVE: To repair degraded watershed conditions, improve water quality and soil stability, and track the long-term water quality trends in the watershed.

ACTIONS:

✓ Use interdisciplinary analysis of road management needs and aquatic/watershed trade-offs to recommend opportunities for road improvement, closure and decommissioning (Roads Analysis in the Project File).

✓ Water quality monitoring would continue with the long-term turbidity monitoring in the main stem of Layng Creek at the City of Cottage Grove Water Treatment Plant (LRMP Appendix G).

FISHERIES/WATERSHED

BMP R-14; Forest Plan S&Gs IV-65-3,

OBJECTIVE: Minimize turbidity and other risks to water quality while implementing aquatic restoration projects.

ACTIONS:

✓ All road work that involves working in or around a stream channel, such as culvert replacements and culvert removals would be completed during low flow conditions when the potential for delivery of construction-related sediment can be minimized.

✓ The instream work that would occur to place approximately 40 logs into Lower Junetta Creek would occur within the Oregon Department of Fish and Wildlife (ODFW) in-water

work period (July 1 – October 15), unless otherwise approved by the ODFW District Fisheries Biologist.

✓ The equipment used instream would be free of any leaks including hydraulic lines, diesel, oil, etc.

✓ The contract COR or inspector or other designated Forest Service personnel shall be present at all times during the wood placement project to monitor compliance with the BMPs and track whether any leaks or spills occur with heavy equipment usage in the stream or on stream banks.

✓ Absorbent pads would be deployed at all times during fueling of the equipment that would be placing logs into Junetta Creek. Refueling would occur no closer than 100 feet from the stream.

✓ If available, use a "stream machine" excavator to place the logs instream. This excavator is designed to be used in streams and uses hydraulic fluid that is more "water friendly".

✓ The felled mature guyline trees in Unit 3 and the helicopter landing near the south west boundary of unit 17 would not be included timber in the Timber Sale contract (approximately 15 trees). Where feasible, the Sale Administrator would work with the purchaser and the District Fisheries Biologist to see that such guyline trees are felled where they can be accessed for later use in the connected instream project.

✓ In the larger perennial streams, remove woody debris that could be mobilized during high flows and contribute to downstream problems (such as at culvert crossings, etc.) (LRMP Appendix G).

TEMPORARY AND SYSTEM ROAD CONSTRUCTION, ROAD RECONSTRUCTION, AND ROAD MAINTENANCE

BMPs R-2, R-3, R4, R5, R-6, R-7, R-9, R-15, R-23; Forest Plan S&G IV-83-6 and Appendix G-5(3), Appendix G-15 thru 18 items 1-5, Appendix G-29(5).

OBJECTIVE: To minimize sedimentation, the effects of water concentration on roadbeds, cut slopes or fill slopes, and subsequent production of sediment associated with the construction of 0.24 miles of new system road for Alternative Two; reconstruction of 5.0 miles for Alternatives Two and Three; and maintenance of approximately 41.74 miles for Alternatives Two and Three. In addition, temporary roads would be constructed to facilitate harvest operations and then obliterated after logging is completed. Safety of the road system would be maintained.

ACTIONS:

✓ All new temporary road construction would be done using outslope designs, with drain dips and grade sags as needed, so that no new ditch lines would be built.

✓ When possible, all new system road construction would be done using outslope designs, with drain dips and grade sags as needed. This would help minimize the need to build new ditch lines.

✓ Develop an erosion control plan to be included in the TSC.

✓ Where appropriate, native-surfaced system roads would have water bars installed and road barriers placed to prevent damage after commercial use is complete. Aggregate

surfaced system roads to be closed following use would be barricaded and treated with water bars if needed to prevent drainage problems.

✓ Avoid blading ditches that are functioning and effectively draining. Grading of roads would be done in accordance with maintenance specification. Apply water during blading when sufficient moisture is not present.

✓ During system road construction and reconstruction activities, waste material shall be placed in areas agreed to by the Forest Service. These areas shall generally avoid riparian reserves, and avoid affecting fish, wildlife, cultural, and botanical resources.

✓ Gravel would be placed on access roads into water sources to reduce sedimentation to streams, as needed.

✓ Utilize stable natural benches and ridges wherever possible. Avoid slumps, slides, and wet spots.

✓ All proposed system roads would have Forest Service engineering and watershed specialist review before construction.

✓ End-hauled material would be disposed of only at Forest Service approved waste sites on stable areas with slopes less than 55 percent and outside riparian areas.

✓ Provide relief culverts as needed, but not to exceed 400-foot spacing.

✓ Provide relief culverts within 150 feet of any natural defined channel to minimize the cumulative road drainage entering a stream-course.

✓ Construction activities that may expose new soil (including clearing, grubbing, excavating, and fill placement), would be limited to June 1 to September 30. However, construction activities may be suspended anytime during wet weather to protect water quality of affected streams.

✓ Surface rock placement may be done outside June 1 to September 30 as weather and road conditions permit.

✓ All roads would be rocked or blocked for winter wet season before October 15. Earth-surface roads, including uncompleted roads to be rocked, would be cross drained before October 15.

✓ Relief culvert locations would be located, flagged, and approved by the Forest Service before installation.

✓ Required erosion control work would be completed each season before October 15.

✓ Cut-and-fill slopes would have required erosion control treatments completed the same year they are constructed even if they are not completed to final acceptance specifications. If the same area requires further disturbance to complete the road construction, it would be re-vegetated as needed to insure surface soil protection.

✓ All road cut slopes, fill slopes, and ditch lines would be stabilized with grass/forbs.

✓ Heavy vehicles would be restricted to all-weather roads outside June 1 to September 30. Commercial truck traffic may be suspended based on (1) road condition and (2) turbidity increases in natural channels influenced by the truck haul route. Both conditions are defined in the Umpqua National Forest's road rules (04/08/2005).

✓ During construction, temporary roads would have the surface A-horizon (8 to 12 inches) removed and stored in a manner that would not cause surface water flow to concentrate behind it.

✓ Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water.

✓ All temporary roads would be reviewed prior to treatment to initiate and finalize the treatment prescription; the effectiveness of the temporary road restoration prescription in preventing erosion and providing suitable plant habitat may be monitored by a resource specialist.

✓ Hazard trees would be identified along the haul routes and felled as needed (and left on site) to meet OSHA requirements. If hazard trees are identified within a Critical Habitat Unit, first coordinate with the District Wildlife Biologist.

ROCK SOURCE DEVELOPMENT

BMP R-22, R-17

ACTIONS:

✓ Rock pit benches, access roads, and work areas within the Doris rock pit would be out-sloped at 5% to provide for adequate drainage.

FIRE SUPPRESSION AND FUELS MANAGEMENT

General Water Quality BMPs F-1, F-2, F-3; UNF LRMP S&Gs IV-68-2 & 3; IV-92-4, 7, 8; Appendix G-28(4), G-35 & 36 items 1-4; NWFP ROD S&Gs C 35-36, FM-1, FM-4, FM-other.

OBJECTIVE: Improve stand fire resiliency while reducing the potential water quality degradation and/or subsequent flooding and soil displacement caused from prescribed or wild land fire. Reduce fuel loads to reduce wildfire effects to soil productivity, minimize erosion, and prevent ash, sediment, nutrients and debris from entering water bodies.

ACTIONS:

✓ Burn plans would include water quality objectives and burning would be carried out when fuel moistures are sufficient to ensure retention of effective ground cover where needed.

✓ Levels and methods of fuels treatment would be guided by the protection and resource objectives within the management area.

• Burning plans would be prepared in advance of ignition and approved by the appropriate line officer for each prescribed fire.

• Air quality would be emphasized during prescribed fire planning. Mitigating measures would be considered including extending the burning season to spread emissions throughout the year. All burning would be planned and conducted to comply with applicable air quality laws and regulations and coordinated with appropriate air quality regulatory agencies.

• Burning would be conducted to meet air quality standards as outlined by Oregon DEQ, and air quality monitoring would be conducted in conjunction with the DEQ.

• General burning guidelines are designed to minimize the erosion and are presented in Table G-11 of the LRMP (Slash Burning Guidelines to Minimize Potential Soil Erosion).

• As needed, fire lines would require water bars at slopes greater than 30%. Fireline water bars would deflect surface run-off from the trail down slope onto stable material such as rock surface cover. Fireline would not be constructed through sensitive areas like unique habitats. Fire lines would be constructed in portions of Curran Junetta stand #'s: 1, 2, 4, 6, 8, 20, and 21.

• Whip felling, pruning and relocating slash concentrations would be utilized to separate fuels between the bottom of the tree crowns and the ground. These treatments would help separate surface fuels from canopy fuels on about 3% of the treated acreage before fuel reduction treatments are applied. The layer of vegetation affected would be the shrubs, the seedlings and saplings of conifer species and all the hardwood species, if this material is concentrated in the immediate vicinity of desirable retention trees.

• Hand piles would generally be constructed about 4x6 feet in size and not more than 6-feet high with slash material less than 6" on the large end and not more than 6 feet in length. They should also be covered with plastic sheeting to facilitate pile burning.

• Sump improvement work would be accomplished on five pump chances within the project area. The work required would include: felling of hazard trees affecting the pump chance; gravel placement on sump spurs and landings; brushing of ingress/egress areas; signing location and updates and gravel cleanout. If it is determined as gravel cleanout occurs, there is not a stable place to deposit sediments, end haul shall occur to a designated waste area. The sumps near units 9 and 17 are of particular concern. The intent is to avoid having these sediments leaching back into adjacent stream channels causing an increase of turbidity. To avoid weed infestation and erosion, all bare soils, including the waste area, would be vegetated with native seed and weed free mulch. This shall occur during fall months as described in the Revegetation mitigation measures section.

• Tops may be left in the woods and treated with machine piling, hand piling, and jackpot burning or underburning.

• Equipment used to pile slash would be track mounted with ground pressure not to exceed 7 pounds per square inch (psi) and would meet the following specifications: capability of reaching 25 feet; climbing ability up to 30% slope; pivot-operator cab, engine, and arm shall be able to swing 360 degrees while tracks remain stationary; and machine shall be equipped with a brush grapple or articulating brush grapple mechanism.

• Equipment used to machine pile slash would use legacy skid trails, and temporary and permanent roads on slopes less than 35% as much as possible in units 1, 2, 4, 5, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, and 21.

Soils would be protected in several ways, including avoiding intense burning by jackpot burning in the spring and by creating well constructed and covered hand piles that would burn quickly and completely.

Burn plans would address fire intensity in areas of invasive weed populations and other mitigations as specified by the district botanist.

SILVICULTURE AND VEGETATION MANAGEMENT

BMP T-20

OBJECTIVE: To manage and protect desired vegetation and to reforest all suitable land within five years after harvesting.

ACTIONS:

• Under the action alternatives the gaps would be located based on the following criteria: ¼ acre gaps would be dispersed in units 2, 4, 6, 8, 10, 14, 16, and 19-21; ½ acre gaps would be dispersed in units 1, 9, 12, and 17. These ½ acre gaps would also be located at the limits of access where skyline yarding is prescribed. Do not locate gaps on mapped Conditionally Unsuitable soils. Gaps would not be located closer than 50 feet slope distance from any stream channel.

✓ The Silviculturist would review marking guides, designate by description (DxD) prescriptions with the presale crew prior to marking, and will monitor for quality on a sample of each type of prescription, as funding and staffing allows. It is expected the prescriptions meet plus or minus 10 percent of the target. If not, remarking or amending the silvicultural prescription would be necessary.

• Animal damage protection, including netting or big game repellant, would be applied after planting, as needed.

• Reforestation activities would occur on 21 acres within the ½-acre canopy gaps in units 1, 9, 12, and 17. One-half acre gaps would be planted with western redcedar or incense cedar.

• Minimize damage to residual live trees during the bark slippage. This is a period of time during which the sap of a tree is flowing and the tree is susceptible to damage (bark removal/slippage from the connective cambium tissue) from logging operations. Protection measures would be required from April 15th through July 1st.

SOIL AND SITE PRODUCTIVITY

BMP T-9, T-12; Forest Plan S&Gs IV-67-1, 2, 3, IV-71-12 Appendix G-12(4).

OBJECTIVES: To prevent soil erosion, reduce soil compaction and improve site productivity.

ACTIONS:

✓ All new landings, skid roads and temporary roads used by the purchaser would be subsoiled to increase water infiltration and reduce surface water runoff to streams. Subsoiling would occur to a depth of 20 inches or to a rock limiting depth using an excavator with winged subsoiler attachments. The edge of the compacted road surface shall be fractured 3 feet beyond the edge of the prism with the majority of the subsoiling made at an angle that crosses the road to disperse surface water runoff. Equipment shall not operate on top of the treated soil once it has been subsoiled. An exception may be given to areas where the sale administrator determines slash concentrations are too high to allow for subsoiling. Work includes six acres of subsoiling of previously compacted ground in units 2, 5 and 14.

✓ For ridge top roads, the soil conditions associated with these roads are typically a shallow depth soil (some occurrence of moderately deep soil). Subsoil to a depth of at least 20 inches, unless otherwise agreed to by the Forest Service. All subsoiling would

be covered with available harvest slash or other suitable organic material. Stabilization of soil surface with organic material is done to prevent resulting subsoiled surface from soil crusting.

✓ While subsoiling skid trails, the purchaser would pull available harvest slash or other suitable organic material onto the un-compacted surface. This would help stabilize the soil surface with organic material and prevent resulting subsoiled surface from soil crusting.

✓ Prior to the sale closing, a maximum total of 21 acres of temporary roads, skid trails, and landings used by the purchaser would be subsoiled in units 2 (5ac), 13 (4ac), 14 (4ac), 17 (3ac), 21 (5ac) to mitigate for existing legacy disturbances to meet standards and guidelines for soil disturbance and long-term site productivity .

✓ Skid trails would be designated by the purchaser and approved by the Forest Service. When possible, skid trail location should be in previously disturbed areas (on legacy skid trails).

✓ Landing slash piles created by the purchaser would be placed on pre-disturbed (compacted) soil such as legacy skid trails, landings, or roads and away from waterways and ditches.

✓ During the rainy season (November 1 - April 30), no more than ½ acre of exposed soil (S&G#13, LRMP pp. IV-71), including landings, skid trails, and temporary roads would exist at any time without erosion control that is effective in preventing sediment from reaching streams or any concentrated surface flow in excess of 1.0 cubic feet per second (cfs). Note: silt fencing is not effective at flows in excess of 1.0 cfs (Brown et al. 1986).

✓ Designate and locate skid trails to minimize the area affected by logging operations; use pre-existing skid trails whenever possible. Locate skid trails away from areas identified as having sensitive soils (Project File – Soils)

✓ Restrict ground based logging to lands less than 35% slope.

✓ Maintain at least 85% or more effective ground in categorically unsuited areas (CU); in all other areas maintain at least 65% effective ground cover in order to maintain soil productivity and prevent soil erosion.

✓ The levels of effective ground cover would be monitored as the project progresses by the sale administrator and fuel treatment teams. If monitoring determines that effective ground cover goals are not met then site specific recommendations would be developed by a soil scientist and the fire management officer. Monitoring would include representative samples of each yarding method, fuels treatment, subsoiling mitigation, and tree mortality along treatment areas to determine if soil management objectives are being met (S&G#11, LRMP IV-71). Units 2, 3, 18, 19, and 21 shall be given high priority for soils monitoring.

✓ In order to mitigate effects to soils, where practical, slash piles would be placed on new, and existing skid trails, and landings. When machines are used to pile slash, soil restoration and piling operations would be implemented together in a single pass with equipment that is suited for both operations (i.e. excavator with a combination subsoiler and brush-rake attachment).

REVEGETATION – BEST PRACTICES

All revegetation requirements would be met using genetically local native species (Umpqua NF Policy Memo 3/8/2002). Seed would be certified weed free (Umpqua NF Integrated Weed Management DN/FONSI, p. 4 #6).

Place waste material only in stable areas and at least 50 feet away from stream channels. Contour waste piles to about 1.5:1 slope to minimize potential for surface erosion or mass soil movement. Seed or plant waste areas with native species approved by the District or Forest Botanist.

✓ To prevent erosion all temporary roads and adjacent landings, along with three of the helicopter landings (located on the 1721-440, 1721-480, and 1721-610-517) would be planted with a big game forage mix and mulched. All other landings along system roads would be planted with native vegetation and mulched.

✓ Initial seeding of disturbed areas with inadequate plant cover would normally be done in the fall seeding period (LRMP Appendix G).

✓ Seed shall be applied to areas that are prone to erosion and that have been disturbed by purchaser's operations in order to establish an adequate cover of grass or other herbaceous vegetation. Seeding should precede expected periods of rain. The seed mix to be used would be provided or agreed to by the Forest Service.

✓ Revegetate all areas of exposed soils including landings, roadsides and waste areas as soon as possible. To enhance weed exclusion, broadcast grass seed at heavy rates (40-50 lbs./ac) and mulch.

BOTANY

Invasive Plant and Noxious Weed Mitigation Measures

PNW Invasive Plant Program ROD, October 2005 Standards and Guidelines, USDA Forest Service Guide to Noxious Weed Prevention Practices 2001, Umpqua National Forest Integrated Weed Management DN/FONSI 2003.

OBJECTIVE: Minimize the creation of conditions that favor invasive plant introduction, establishment and spread during land management actions and land use activities.

ACTIONS:

Bulleted practices in this section are Forest Plan Standards contained in the Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision (2005).

<u>Project-wide weed management</u>

- Actions conducted or authorized by written permit by the Forest Service that would operate outside the limits of the road prism (including public works and service contracts) require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands (PNW S&G # 2, and B/BT6.35).

- Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested

sources before any use of pit material. Use only gravel, fill, sand, and rock that are judged to be weed free by District or Forest weed specialists (PNW S&G # 7).

✓ Treat or require treatment of high priority weeds before any use of infested pit material. Starting with the highest slopes that have invasive vegetation growing in previously disturbed areas, scrape off the top several inches of soil and rock to remove the entire seed bank. Stockpile this material in a location at the quarry where it would not be disturbed (i.e. no machinery should drive over the pile). This contaminated material would be monitored and covered as necessary to ensure it does not become a future source of weeds at the quarry.

✓ Forest Service would map all known locations of invasive weeds prior to work commencing. Forest Service would provide the contractor with a map indicating where the known infestations are located. Maps would also be provided to all Forest Service personnel working on the project. Any unmapped high priority weeds found during pre-sale or harvest operations should be reported to the district weed coordinator.

✓ To prevent creation of conditions that promote the spread of weeds, maintain existing roadside native vegetation and minimize areas of soil disturbance during all harvest activities including spur road construction and re-opening, road reconstruction, etc.

- To prevent spread of seeds, infestations of Scotch broom and blackberries within active project areas would be brushed in late spring or early summer.

✓ Avoid weed infested sites when parking and operating vehicles and off-road equipment, including ATV's, fire and timber sale equipment.

- Only Oregon certified weed-free straw or hay may be used on projects conducted or authorized by the Forest Service, on National Forest System Lands. (PNW S&G # 3) Consider the use of other weed free mulches such as Woodstraw, or wood chips.

✓ Treat weeds in the project area for up to three years after sale closure with the exception of false brome. Chemical, mechanical and manual treatments of false brome should be carried out until the population has been eradicated.

<u>High Priority Weed Practices (Infestations of false brome)</u>

✓ The following activities are prohibited within 30 feet of identified high priority weed infested sites, unless such activities are unavoidable due to safety requirements. These areas would be identified on weed maps and would be marked on the ground with carsonite posts.

- o stockpiling of raw materials
- o temporary placement of spoil material
- o excavation work or extraction of material
- o parking of vehicles and off-road equipment
- o temporary storage of equipment & materials
- o turning around vehicles

- ✓ Due to heavy infestation of false brome, do not store equipment, park or use turnouts along the first 6 miles of Road 1721 unless required to avoid hazards.

- ✓ Road blading, brushing and ditch cleaning along Road 1721 would be conducted in consultation with District or Forest-level invasive plant specialists (PNW S&G # 8). Units 17, 18, and 19 are bisected by roadside populations of false brome. Roadside populations of false brome would be treated with herbicide for at least two consecutive seasons prior to road or harvest related activities.

- ✓ Slash pile sites in close proximity to populations of false brome and Scotch broom should be revegetated as soon as possible to prevent invasion of scorched soils.

- ✓ To reduce the risk of proliferation of false brome and other invasive species into harvested units, delay construction of fireline within 100 feet of mapped locations of false brome, diffuse knapweed, meadow knapweed, and Scotch broom until the firelines are needed. Revegetate fireline on units two and four as soon as possible.

False Brome Herbicide Treatment
PNW Invasive Plant Program ROD October 2005 Standards and Guidelines, Umpqua National Forest Integrated Weed Management DN/FONSI 2003

OBJECTIVES: The following project design criteria (PDC) were developed to reduce or eliminate potential impacts the various treatments may cause. PDC define a set of conditions or requirements that an activity must meet to avoid or minimize potential effects on sensitive resources. All PDC are required for both Alternatives Two and Three. PDC are not optional and are incorporated in the effects analysis.

ACTIONS:

Bulleted practices in this section are Forest Plan Standards contained in the Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants DN/FONSI (2005).

- ✓ The City of Cottage Grove's Public Works Department would be contacted at least one week prior to herbicide treatments.
- Application of any herbicides to treat invasive plants would be performed or directly supervised by a State or Federally licensed applicator.
- Prior to implementation of herbicide treatment projects, National Forest system staff would ensure timely public notification. Treatment areas would be posted to inform the public and forest workers of herbicide application dates and herbicides used. If requested, individuals may be notified in advance of spray dates (PNW S&G # 23) . Signs notifying the public of herbicide treatments would be placed at access points to treatment areas prior to initiating treatment a minimum of one week in advance of herbicide treatment.
- Use only adjuvant (e.g. surfactants, dyes) and inert ingredients reviewed in documents such as Forest Service and Syracuse Environmental Research Association, Inc. (SERA), 1997a, 1997b; Bakke, 2003 (PNW S&G # 18) hazard and risk assessments.
- ✓ A pre-operations briefing would be required annually prior to treatment between a USDA Forest Service project coordinator knowledgeable about weed treatments and the lead contractor or employee who would be implementing the treatment. This session would be documented, and would serve to brief spray personnel on the

location of sensitive resources (streams, lakes, wetlands, sensitive plants) and to review all operational details. The briefing would include safety issues, location, timing, treatment method, herbicides approved for use, project design criteria, and other pertinent topics. To minimize herbicide application drift, use low nozzle pressure, apply as a coarse spray, and use nozzles designed for herbicide application that do not produce a fine droplet spray.

- ✓ Applications would only be allowed during the drought months of July-September when vulnerable native herbaceous species are dormant and when the chance of rain following application is very low.
- ✓ No herbicide applications would occur when wind velocity is greater than 5 mph, when it is raining or when the forecast has a greater than 70% chance of rain within 36 hours of spraying.
- ✓ Treatment would not occur within 25 feet of a perennial stream, open water, wetlands or ditch lines with standing water.
- ✓ Applicators would have an Herbicide Transportation, Handling, and Emergency Spill Response Plan, approved by the USDA Forest Service, on-site during treatments. The plan would identify reporting procedures, project safety planning, methods to clean up accidental spills, a process for reporting spills to the appropriate regulatory agency, and information regarding a spill kit contains and location.
- ✓ Contract application workers and all agency personnel involved with the project implementation would review the spill plan prior to beginning work. Spill kits would be required in both Forest Service and contractor's vehicles. This BMP would reduce risks associated with accidental spills.
- ✓ Herbicides would be used and disposed of in accordance with label instructions except where more restrictive measures are required as described below.
- ✓ Spray equipment would be calibrated prior to seasonal start-up and periodically throughout the season to assure accuracy of application. Non-toxic colorants or dyes would be added to the herbicide mixture to determine placement and length of drift.
- ✓ Equipment used for transportation, storage, or application of herbicides would be maintained in a leak-proof condition.

Unique Habitats
Umpqua LRMP Prescription C5-1

OBJECTIVES: To provide maximum protection for areas of high wildlife and plant values (Ch. 2 FEMAT 1994, USDA, Umpqua NF 1990)

ACTIONS:

Table 5. Habitat Buffers

Unit	Habitat	Buffer Description
2	wet shrubland	50' no entry
3	wetlands	50' no entry
4	wetland,	50' no entry
6	wetland	50' no entry
7	dry meadows with seeps dry meadows, rocky outcrops	150' no entry uphill, otherwise 50' no entry

Unit	Habitat	Buffer Description
8	hardwood wetland/riparian dry meadow	no yarding 50' no entry
9	wetland	50' no entry
10	hardwood stand	minimize disturbance
12	hardwood stand	no entry
13	hardwoods	none
14	Rocky cliff	no buffer
16	diverse hardwood stand chinquapin stand wet meadow	minimize disturbance 150' buffer
17	wet areas	50' no entry
18	wet shrubland wet areas	150' no entry buffer 50' no entry
19	wetlands	50' no entry
20	rocky outcrop/cliff dry meadow, scree	no entry no entry
21	dry meadows	30' no entry buffers

Protection of TES Species Sites
OBJECTIVE: To ensure that Forest Service actions do not contribute to loss of viability of any native or desired plant or contribute towards the Federal listing of any species. (Forest Service Manual 2672.41).

ACTIONS:
- ✓ Thirteen populations of pacific felt lichen (*Peltigera pacifica)* occur within six of the proposed thinning stands. These populations would be buffered by 100' radius buffers. Whenever possible, trees should be felled away from these buffers, and there would be no yarding, fuels treatment, or other entry permitted.

✓ Unique habitats that meet the habitat requirements for Thomson's mistmaiden (*Romanzoffia thomsonii)* would be protected by 150' no entry buffers to the uphill direction and 50' no entry buffers around the remaining perimeter. These areas are within proposed unit seven and surrounding harvest is by helicopter to minimize impacts to the unique habitats. Whenever possible, trees should be felled away from these buffers, and there would be no yarding, fuels treatment, or other entry permitted.

WILDLIFE MANAGEMENT

ACTIONS:

- ✓ Retain and protect (during harvest and burning) all existing down wood (>6 inches small end diameter) and snags to the extent practical from disturbance during treatment which might otherwise destroy the integrity of the substrate.
- ✓ To mitigate for a decreased rate of large snag recruitment caused by thinning suppression mortality, two trees per acre would be inoculated within the Matrix land allocation in units 3, 5, and 9-21. Five trees per acre would be inoculated within northern spotted owl Critical Habitat Unit OR-20 (CHU) in units 1, 7, portions of units 2, 4, 6, and 8.
- ✓ To mitigate for a decreased rate of snag recruitment caused by thinning and harvest activities within CHU OR-20, six snags per acre would be created by fire during fuels reduction activities. In unit 7 mitigation would be done by girdling trees (>15 inch diameter breast height (dbh) or largest trees available) to achieve 6 trees per acre within the thinned portions of the unit.
- ✓ All trees damaged during harvest operation, such as intermediate support trees or line damage trees would be retained to mitigate for a decreased rate of snag recruitment caused by thinning and harvest activities.
- ✓ No trees felled for guyline tail-holds would be removed from Riparian Reserves, northern spotted owl CHU OR-20 or spotted owl cores. Those associated units are: 1, 2, 4 and 15. Guyline trees felled outside of those land allocations may be used for other restoration activities without further analysis.
- ✓ A seasonal restriction for the northern spotted owl (March 1st through July 15th) is required on units 7, 15, the southeast portion of unit 18, and the northeast portion of unit 19.

RECREATION, VISUALS, AND HERITAGE RESOURCES

ACTIONS:

- ✓ Safety signs would be maintained on the main travel routes during logging operations.
- ✓ Gaps or created openings would not be located in Preservation Visual Quality Objective (VQO) areas (east edge of unit 7).
- ✓ Portions of unit 1 (east corner) and unit 20 (northern tip) are within VQO areas of retention and partial retention. Gap size in these areas is to follow Umpqua LRMP standards for created openings according to the applicable distance zone (refer to Table 40). Gaps or created openings in these units are to be no larger than one-half acre in size and should be located at least 100’ from the Mount June trail corridor.
- ✓ In the event that an unknown historic or prehistoric site is discovered in the course of the project, the activity would be stopped and the appropriate measures would be taken to stop any adverse effects to the site resulting from the activity. Any adverse effects, should they occur, shall be mitigated.
- ✓ Known heritage site would be mitigated with a 100 foot minimum no-entry buffer around the site boundary. No ground disturbance of any kind would occur within this buffer.

- ✓ Dense vegetation and duff in some units hampered field survey for heritage resources. Implementation of the timber sales under this EA may expose soil, thereby providing better ground visibility than was typical during surveys. Therefore the following high probability areas would be scheduled for monitoring during and/or after project implementation in order to protect undiscovered heritage resources:
- ✓ Thinning unit #9, approx. 9 acres on east side (also known as Heritage survey unit #8)
- ✓ Thinning unit #18, approx. 20 acres on east side (also known as Heritage survey unit #17)
- ✓ Thinning unit #21, approx. 20 acres on east side (also known as Heritage survey unit #11)

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CHAPTER THREE

AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

INTRODUCTION

This chapter describes the components and scope of the human environment that may be affected by implementation of the alternatives outlined in Chapter Two and discloses the potential consequences of implementing each alternative including the mitigation measures, watershed best management practices and management requirements associated with each alternative. A complete description of each alternative is found in Chapter Two.

This chapter presents the scientific and analytic basis for the comparison of alternatives. The effects are discussed in terms of social and environmental changes from the current condition and include quantitative assessments where possible as well as qualitative assessments. All discussions are tiered to the Umpqua National Forest Final Environmental Impact Statement, as amended. In addition, many of the discussions in this chapter utilize the information found in the supporting documents, such as the 1995 Layng Creek Watershed Analysis, the 2005 Layng Creek Watershed Analysis Iteration 1.1, and the 2006 Curran Junetta Roads Analysis.

ACTIVITIES THAT MAY CONTRIBUTE TO CUMULATIVE EFFECTS

Tables 6-8 document the relevant past, present, and reasonably foreseeable activities that may contribute to cumulative effects for the Curran Junetta project. Recently, the Council on Environmental Quality issued a memo stating that agencies are not required to "catalogue or exhaustively list and analyze all individual past actions" (CEQ memo, June 24, 2005). Instead, agencies should use scoping to focus on relevant past actions and discuss their relevance in terms of the cause and effect they had on a resource. This direction is followed in the Curran Junetta project; the following tables are displayed to summarize information known about the Layng Creek subwatershed. Discussion of these activities occurs throughout this chapter, where relevant.

Table 6. Past Activities in Layng Creek.

Activity	Decade	Acres	Method
Regeneration Harvest Forest Service	1910's	950	Unknown
	1920's	1858	Unknown
	1930's	71	Unknown
	1940's	1696	Unknown
	1950's	427	Highlead
		97	Skyline
		4661	Unknown
	1960's	279	Highlead
		139	Tractor
		3550	Unknown
	1970's	236	Balloon
		113	Helicopter
		980	Highlead
		1595	Skyline
		70	Tractor
		952	Unknown
	1980's	605	Highlead
		1538	Skyline
		17	Tractor
		353	Unknown
	1990's	24	Highlead
		320	Skyline
		27	Tractor
		8	Unknown
	2000's	179	Skyline
		1	Helicopter
		20,745	**TOTAL**
Regeneration harvest BLM & private	1990-2006	**3,691**	Unknown
Final Overstory Removal	1970's	87	Tractor
	1980's	185	Skyline
		58	Highlead
	1990's	77	Skyline
		407	**TOTAL**
Commercial Thinning	1970's	228	Skyline
		22	Tractor
		517	Helicopter
	1980's	1745	Skyline
	1990's	386	Skyline
	2000's	342	Skyline
		3,240	**TOTAL**

Activity	Decade	Acres	Method
Pre-commercial Thinning (PCT)	1910's	492	N/A
	1920's	71	N/A
	1930's	71	N/A
	1940's	873	N/A
	1950's	4383	N/A
	1960's	3340	N/A
	1970's	2967	N/A
	1980's	861	N/A
	1990's	2727	N/A
	2000's	1008	N/A
		16,793	**TOTAL**
Reforestation	1910's	950	N/A
	1920's	1818	N/A
	1930's	71	N/A
	1940's	1696	N/A
	1950's	5185	N/A
	1960's	3968	N/A
	1970's	4237	N/A
	1980's	2707	N/A
	1990's	368	N/A
	2000's	180	N/A
		21,180	**TOTAL**
Animal Damage Control	1950's	52	Chemicals
	1960's	625	Baiting/repellants/chemicals
	1970's	15	Netting
	1980's	957	Netting/repellants/tubing
	1990's	979	Netting/repellants/tubing
	2000's	150	Netting
		2,778	**TOTAL**
Fertilization	1940's	940	Unknown
	1950's	3677	Unknown
	1960's	1962	Unknown
	1970's	466	Unknown
	1980's	1902	Unknown
	1990's	386	Unknown
		9,333	**TOTAL**
Burning	1920's	71	Broadcast/Slash Burning
	1930's	71	Broadcast/Slash Burning
	1940's	1047	Broadcast/Slash Burning
	1950's	4775	Broadcast/Slash Burning
	1960's	3611	Broadcast/Slash Burning
	1970's	3370	Broadcast/Slash Burning
	1980's	2850	Broadcast/Slash Burning
	1990's	898	Broadcast/Slash Burning
	2000's	442	Broadcast/Slash Burning

Activity	Decade	Acres	Method
		17,135	**TOTAL**
Pruning	1990's	**861**	N/A
Road Building (planning area only)	1940's to present	826 acres/ (70 miles)	ML1* - 18.25 miles; ML2 - 45.6 miles; ML3 - 0 miles; ML4, - 6.42 miles
Dinner Dam Removal	2003	N/A	Dinner Dam removed, opening up about 2 miles of habitat upstream. Located about 500 feet upstream of Dinner Creek's confluence with Layng Creek, dam removal involved use of an excavator to remove the concrete structures.
Layng Creek culvert replacement	2004	Paterson Ck and Saltpeter 7th fields	Layng Creek culvert replacement; Replacement of two major culverts with stream simulation culverts

*ML is an acronym for maintenance level. ML 1 roads are closed roads that are used intermittently and that may require basic custodial maintenance focused on the maintenance of drainage facilities and runoff patterns; ML 2 roads are open roads that are maintained to only accommodate high clearance vehicles; ML 3 roads are open roads that are maintained for travel by a standard passenger cars; and ML 4 roads are maintained to provide a moderate degree of user comfort and convenience at moderate travel speeds.

Table 7. Present and on-going Activities in Layng Creek.

Activity Type	Total Acres/Miles	Location
Dinner Thin Timber Sale	793 acres of commercial thin harvest	Upper and Lower Dinner 7th field watersheds
Dessert Timber Sale	208 acres of commercial thin harvest	Harvey 7th field watershed
Salty Timber Sale	127 acres of commercial thin	Patterson Cr & Saltpeter 7th field watersheds
Road Work	Road maintenance to continue as needed.	Blading, ditch clean out, and maintenance as budgeted. Scattered throughout the Layng Creek 6th field watershed
PCT	200-300 acres	Throughout the 6th field Layng Creek watershed
Noxious weed work	30-50 acres	Throughout the 6th field Layng Creek watershed

Table 8. Reasonably Foreseeable Activities in Layng Creek.

Activity Type	Total Acres/Miles	Notes
Private timber harvest	200 – 600 acres per year	Ongoing regeneration harvest by private land owners.
Road Work	Road maintenance to continue as needed.	Blading, ditch clean out, and road maintenance as budgeted. Scattered throughout the Layng Creek watershed
Campground maintenance	Rujada Campground	Maintenance of camp sites/facilities and travel routes
Commercial Thinning	1000 acres FY08 1200 acres FY09	Doris Timber Sale to be planned by the Forest Service in FY 2008 includes commercial thinning of about 1000 acres, as well as road work and other connected actions; Holland/Moonsalt Timber Sale, to be planned in FY 09, includes commercial thinning of about 1200 acres, as well as road work and other connected actions
Layng Creek Instream Work – City of Cottage Grove	1 acre	The city of Cottage Grove is planning to remove their water treatment facility adjacent to Layng Creek on the district and construct a new facility on Layng Creek about 1/2 mile west of the Forest boundary. This is proposed to occur in the next two years and would result in short term instream impacts from removing a couple of dams, intake facilities, pipeline, etc.
Instream Enhancement Work – Layng and Harvey Creeks	2 miles	Install instream structures to enhance aquatic habitat.
Road Rehabilitation	2.5 miles	Various road decommission activities which are identified in the Dessert Timber Sale Area Improvement Plan.
Sale Area Improvements	Variable	Typical improvements to Dinner Thin, Salty and Dessert timber sales include understory burning, snag creation, noxious weed treatments, timber stand improvement and a variety of other activities. See Dinner Thin and Salty timber sale environmental assessments and sale area improvement plans for more detailed descriptions.

Social Environment

ROAD BUILDING AND ACCESS – TRACKED AS A SIGNIFICANT ISSUE

Existing Condition

The transportation system in the Curran Junetta planning area includes 39.23 miles of roads and 10.9 miles of hiking trails. The 39.23 miles of road in the planning area equates to a density of 3.92 miles/ sq. mile of land.

The transportation system provides access for commercial users, including forest product harvesters. Recreation use focuses on hunting, fishing, and driving for pleasure, with the majority of the use in the fall.

A project-level roads analysis (RA) is included in the Project File and is incorporated by reference. A complete description of the current road system, and the risks associated with it, are listed in the roads analysis.

Relevant Standards and Guidelines

Transportation system standards and guidelines are listed on pages IV-81 to IV-85 of the LRMP. Of particular note are the following:

- Road density should be the most economical system necessary to meet land management objectives. Evaluation of road development alternatives would be made for the planned uses considering safety, costs of transportation, and the effects upon lands and resources.
- Assure short-term (temporary) roads are closed within one year of when the timber purchaser has completed contractual requirements for the portion of the timber sale served by the road. Re-establish vegetation cover to put land back into production within ten years of contract, lease, or permit termination on roads not remaining a permanent part of the Forest transportation system.
- Forest development roads (system roads) would generally be open to use by vehicles licensed for highway travel, except when closed for one of the following reasons:

    1. The mode of access causes unacceptable damage to, or negates adequate protection and management of, Forest resources.

    2. Safety hazards to the road user exist.

    3. Prescriptions in the Forest Plan recommend closures in elk winter range.

    4. To provide security to contractors/cooperators, special use permittees, private land owners, and Forest Service administrative facilities.

    5. Road maintenance costs to keep a road open are high compared to existing or expected use of the road.

- Roads closed for one of the above reasons may be closed either seasonally or year-around. Seasonal closures are preferred over year-around closures, wherever feasible, consistent with Forest Plan prescriptions, and where the objectives of the closure can be met.

Watershed Analysis and Roads Analysis Recommendations

The Layng Creek Watershed Analysis (USDA, Umpqua NF, 1995) and the Project-level Roads Analysis (USDA, Umpqua NF, 1995) made several recommendations in order to improve the current condition. Specific recommendations for this project are to:

- Reconstruct rusted and damaged culverts at five existing stream crossings to either eliminate the potential for stream diversion or to accommodate 100-year flood flows (locations are on the 1721 road at mileposts 2.49, 9.89, 8.53, 12.75 and 13.50).
- Replace 24 deteriorated ditch relief culvert on roads 1721, 1751 and 1751-411.
- Add surfacing and drainage improvement to road 1721-941 and portions of the 1721 and 1751 roads.
- Evaluate roads that are not "primary" or "secondary" according to the listed criteria to determine what roads would be classified as open, closed, or decommissioned.

Direct and Indirect Effects

Cascadia Wildlands Project and Oregon Wild (formerly ONRC) state that building 0.24 miles of new system road and 3.4 miles of new temporary spur roads may cause numerous environmental impacts including erosion, channeling of water, spread of noxious weeds, and reduced wildlife habitat. Oregon Wild also asked that the trade-offs of accessing thinning stands by temporary roads versus thinning by other methods be displayed (this is tracked by efficiency, as displayed in the economics section).

To help quantify and track this issue through the analysis, "miles of temporary and system road built" was developed as an indicator..

Table 9. Summary of Road Activities Associated with Each Alternative.

Alt	New road construc-tion (miles)	Road decom-missioning (miles)	Road inactiv-ation (miles)	Total road (miles)	Temporary road construction/ obliteration (miles)	Road reconstruction and improvement (miles)	Roads maintained by purchaser (miles)
1	0	0	0	39.23	0	0	0
2	0.24	0.82	16.43	38.65	3.42	5.0	41.74
3	0	0.82	16.43	38.41	3.42	5.0	41.74

The overall change in the number of total road miles in the planning area is small (<1%) for any of the action alternatives, compared to Alternative One. In response to the issue, the first indicator focuses on mileage of roads built. As displayed in Table 9, Alternative Two builds 0.24 miles of new road, while Alternative Three builds no new road. For temporary roads, Alternatives Two and Three would build and subsequently obliterate 3.42 miles of temporary road. Neither action alternative would increase access for forest users, as all new road construction would be blocked and all temporary roads would be obliterated after use. Alternative One would not increase access, as no roads would be built.

In terms of overall road access, the greatest change to total road miles would be with Alternative Three; this alternative would build no new permanent roads and decommission the same miles of road as under Alternative Two. Based on the baseline conditions found under Alternative One, there would be fewer miles of road within the planning area under Alternatives Two and Three because of road decommissioning. The overall total road miles are decreased more under Alternative Three than under Alternative Two. In terms of direct effects to access, neither action alternative affects access for forest users, as the road proposed for decommissioning is currently a dead end spur and is blocked. Overall, the action alternatives represent a reduction of about 4% in the total miles of road in the planning area.

Road reconstruction is generally intended to fix specific drainage concerns, perform deferred maintenance items, and bring the road surface to the design standard so it can facilitate timber haul. The reconstruction identified for each alternative in Chapter Two addresses the specific recommendations of the Watershed and Roads Analyses. Both Alternatives Two and Three include the replacement and upgrade of five rusted and damaged culverts at existing stream crossings and replacement of 24 deteriorated ditch relief culverts. The reconstruction and maintenance work would provide for safe and economical timber haul, as well as improved drainage capacity and reduced risk of failure.

Road maintenance is important for user comfort and safety, and protection of resources and the road facility. The Umpqua Forest-level Roads Analysis (USDA, Forest Service 2003) describes the current situation of declining budgets for road maintenance, the reduction in timber sale-related maintenance and the amount of maintenance that needs to be done on the Forest. The Project-level Roads Analysis estimated annual maintenance needs for the planning area at about $24,300. Maintenance that would be performed by timber purchasers could provide a substantial portion of the total needs for several years. Alternatives Two and Three would provide equal amounts of maintenance and improve the road conditions in the planning area at a cost to the purchaser of about $34,246 annually for three years; Alternative One provides for no purchaser maintenance. Improved road maintenance results in higher degrees of user comfort and safety. In addition, well-maintained roads reduce the risk of road failures and the resulting ecological and economic effects.

Cumulative Effects

The Layng Creek Subwatershed is the scale at which cumulative effects are analyzed for roads. Very little changes to the road system have occurred in the past in the subwatershed in terms of decommissioning and road closures. Both Alternatives Two and Three propose decommissioning 0.82 miles of road; this road is a dead-end spur that would not contribute to a cumulative effect of reduced access, as it is currently closed. While future projects may propose decommissioning of roads, it is unlikely any of these roads would restrict or reduce access to the point of negatively effecting road users.

ECONOMICS

This economic analysis focuses on the direct, indirect, and induced costs and benefits of the alternatives described in Chapter Two. Net present value and benefit/cost ratio are the primary criteria used to compare the direct effects of the alternatives to the Federal

Government, and are termed the economic efficiency analysis. Impacts to the general economy of the area are modeled using IMPLAN Professional, an input/output model developed by the Forest Service. Assumptions regarding the economic analysis are footnoted where appropriate.

Most timber sales from the Cottage Grove Ranger District are purchased and operated by individuals and companies based in Lane County. Total mill capacity in Lane County in 2001 stood at just over 1 billion board feet/year (Spelter 2001). This number is used to estimate the contribution of each alternative towards meeting demand. Final demand is assumed to be wood products ready for shipment at the mill yards.

Lane County Economic Situation

Total employment in Lane County is difficult to quantify exactly, as the Oregon Labor Market Information System (OLMIS), Census Bureau, and IMPLAN use different criteria to measure employment. Because of this, percentages and relative differences are used for analysis where possible instead of absolute numbers.

The county has diversified its economy in recent years, particularly the manufacturing sector, as the timber industry has declined. Still, the forestry and wood products sectors provide 4.5% of Lane County's employment, and 8.5% of the overall industrial output, according to the 2002 IMPLAN data.

The trends in employment in Lane County continue to show a shift from logging and wood products manufacturing toward retail sales and service sectors (Stevenson 2003). Although overall employment is expected to grow by 13.6% between 2002 and 2012, logging occupations are expected to decline by 3.6%. The average wages paid in the retail and service sectors ($21,465 and $23,020 respectively) are less than the logging and wood products average wage ($29,040 and $49,375 respectively) based on the 2002 IMPLAN data.

Benefit/Cost Analysis

The direct effects of the alternatives in the context of the benefit/cost analysis are displayed in Table 10. The standard criterion for deciding whether a government program can be justified on economic principles is net present value (NPV), which is the discounted[15] monetized[16] value of expected net benefits (OMB A-94).

Both of the action alternatives produce revenue for the Federal Treasury and associated projects, and exceed the associated direct costs.

15 Discounting is the process of calculating the present value of a future amount of money. 4% is the standard discount rate for long-term projects (OMB A-94).

16 Lit. "to give the character of money to." A cost or benefit is monetized when it is expressed in terms of money.

Table 10. Economic Efficiency Analysis.

	Alt 2	Alt 3
Timber Volume (MBF)	14,677	14,677
Acres by Harvest Method		
Helicopter	116	166
Skyline	765	715
Ground based	355	355
Total Acres	1,236	1,236
Volume (MBF)/Acre	11.87	11.87
Total Present Value Benefits		
Gross Benefits	$8,169,805	$8,169,805
Value/MBF	$556.64	$556.54
Value/Acre	$6,609.87	$6,609.87
Total Present Value Costs		
FS Prep & Admin	$400,384	$397,816
Logging	$4,175,019	$4,376,094
Slash Disposal	$857,871	$857,871
Road Work	$193,472	$190,000
Reforestation	$15,456	$15,456
Sale Area Improvements (SAI)[17]	$1,055,182	$1,055,182
Total Cost	$5.936.487	$6,109,578
Cost/MBF	$404	$416
Cost/Acre	$4,803	$4,943
Net Present Value	$1,326,440	$1,153,349
NPV/MBF	$90.38	$78.58
NPV/Acre	$1,073	$933.13
Stumpage	$2,840,705	$2,643,101
Return to the Treasury	$1,770,067	$1,572,464
B/C Ratio[18]	1.22	1.19

Forest Service planning costs are not included in the benefit/cost analysis since they are considered sunk (OMB A-94). It is estimated that this project has cost about $323,000 to plan over the last two years. Based on the expected return to the Federal government shown in Table 10, all action alternatives are above-cost. Alternative One (not

17 SAI are connected and similar actions (ref. Chapter Two)

18 B/C Ratio is the benefit/cost ratio, another standard criterion for economic efficiency. It is the product of the present value of benefits divided by the present value of costs.

displayed) is considered below-cost since there would be no return to the U.S. Treasury with expenditures for planning of about $323,000.

Either action alternative would be marketed as two or more individual timber sales. These sales would be offered in a public auction to achieve the highest return possible[19]. It is anticipated that all post-sale requirements and sale area improvement work would be paid for by adequate stumpage[20] from the timber sales. Both action alternatives are positive and would be considered advantageous to the U.S. government from an economic standpoint.

Log prices fluctuate due to a variety of market forces, many of which are external to Lane County and Oregon. This analysis used log prices from the 3rd quarter of 2006. The 3rd quarter typically yields the lowest log prices of the year. Subsequent analysis shows that NPV stays positive even if log prices were to drop by 21%. Although log prices could drop that much during the timeframe of this project, it is unlikely. Log prices have shown a steady gain since 2001, and are currently up from a recent low in 2003.

Economic Impact Analysis

The economic impact analysis using IMPLAN considers changes in employment and income due to changes in the economic activity of the county from each alternative. In past periods of non-declining, even-flow of timber from federal land, an individual timber sale may not have substantially changed the overall economic activity of the county, since the total amount of volume would be sold each year. The conditions today and into the foreseeable future are not the same. The Umpqua has not sold a consistent level of volume, or levels approaching the probable sale quantity (PSQ) in the Forest Plan since 1990, although over the last two years, timber sales have been offered at a level close to expected quantities. Overall, new timber sales can be treated as an actual increase in the raw material available for the local industry, allowing an increase in production up to the full level of mill capacity.

Table 11 displays the results of the economic impact analysis by alternative. In general, the increase in timber volume to the local economy would result in increased employment in the logging and wood products manufacturing sectors, increases in forestry services (slash treatment, planting, etc.) and indirect and induced increases in many other sectors. The business taxes paid to Federal, State, and local governments would also increase.

Other direct, indirect, and induced benefits are derived from road construction, reconstruction, decommissioning and other connected activities described in Chapter Two that would be funded by timber sale receipts. These work activities are treated as costs in the benefit/cost analysis since they reduce the revenue to the Treasury, but they have economic benefits to the local community since most are contracted services. These benefits are included in the economic impact analysis and in the numbers reported in Table 11. The spreadsheets that document the complete analysis by sector are kept on file at the Cottage Grove ranger District Office.

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19 Individual timber sales would be appraised and offered at fair market value, or the minimum to cover reforestation costs and a $0.50/ccf return to the Treasury, whichever is higher.

20 Stumpage is the value of the timber "on the stump." It is the timber sale contract minimum value and is determined by subtracting logging, road work, and slash disposal costs from the delivered log price. Timber sale purchasers may bid more in a competitive auction. The actual monetary return to the U.S. Treasury is determined by subtracting all post sale costs from the stumpage.

The numbers in Table 11 are not intended to be absolute. The analysis should be used to compare the relative differences of the alternatives. The value of each activity included in the impact analysis was estimated from the cost and benefit analysis spreadsheets. An estimate was made of the percent of each activity's value that would be spent locally. The value to the wood products manufacturing sector was estimated to be 40% of the delivered log price, reflecting the difference between end product value and log cost to the mill. This difference can be widely variable based on mill efficiency and the choice of end products, but it approximates the value given for all of Oregon in 1998 (Gebert 2002). The percentage of value assigned to sawlog and veneer production is 75% and 25%, respectively, based on the 1998 data.

Table 11. Economic Impact Analysis

	Alt 2		Alt 3	
	Value*	**%**	**Value***	**%**
% of County Mill Capacity	1.3%		1.3%	
Change in Total Industrial Output	+$11,156	0.08	+$11,212	0.08
Change in Employment	+110	0.06	+111	0.06
Change in Employee Income	+$3,193	0.06	+$3202	0.06
Change in Proprietor Income	-$821	0.20	-$828	0.20
Change in Other Property Income	+$1,437	0.07	+$1,449	0.07
Change in Indirect Business Taxes	+$269	0.05	+$270	0.05

* Dollar values are in thousands of dollars. Employment is number of jobs.

Direct, Indirect, and Cumulative Effects

Alternative One is not shown in Table 11 since by definition it would not change the conditions or level of economic activity in the county. This alternative may, however, contribute to the decline in the local timber industry, since it would keep federal timber from the market, at least in the short-term. No attempt was made to quantify that impact, as it would be speculative to estimate the current and reasonably foreseeable timber supply in the local area.

Both action alternatives provide relatively small beneficial, direct effects to the local economy. The numbers shown for Proprietor Income indicate losses to the business owners, primarily in the veneer and plywood manufacturing sectors, since this timber supply would not contribute to those businesses due to the small size of the timber. These losses are expected to be reduced in future years as the economy improves and demand for wood remains high. In contrast, the action alternatives would have

beneficial indirect effects to other local sectors, such as schools, through contributions in taxes to those sectors.

Implementation of the action alternatives may contribute to a beneficial cumulative effect to the local economy, depending on implementation timelines. This project, when combined with the overlapping implementation of the Umpqua National Forest's Crawdog, Dinner Thin and Tugboat Timber Sales, and the reasonably foreseeable Doris Timber Sales, may increase income and tax revenue to the Lane County and Cottage Grove area, which would help improve the economic outlook for the area.

The need to produce timber from the matrix land allocation was identified as an element of the purpose and need in Chapter One and is displayed in Table 4 in Chapter Two. Thousand board feet of timber produced was the measurement used to determine how each alternative meets the need. Table 10 displays the volume produced; both action alternatives remove identical amounts of timber, 14,677 thousand board feet – or 14 million board feet. By providing a supply of timber from matrix land, both action alternatives equally and fully meet the need for action. No timber would be produced under Alternative One; therefore, this alternative would not meet the purpose and need.

An additional measure of the Purpose and Need is the cost-efficiency (as measured by net present value and benefit/cost ratio) of the thinning. This cost-efficiency is also relevant in terms of the issue discussed in Chapter One (less road building). Alternative One, as described above, only expends money (sunk costs) and has a negative net present value and benefit/cost ratio; therefore, Alternative One is not a cost-efficient alternative and does not meet the purpose and need. Both action alternatives are cost efficient and thereby meet the purpose and need. As displayed in Table 10, Alternative Two is slightly more cost-efficient and has a higher net present value than Alternative Three. This efficiency is primarily because Alternative Two has lower costs associated with implementation, mostly due to fewer acres that would be thinned using a helicopter.

While both alternatives access the same number of acres for thinning, Alternative Two does so more efficiently and is likely to result in higher bid prices than Alternative Three. Jet fuel prices have risen substantially since April of 2005. According to the DOE Energy Information Administration website[21], current spot prices are 27% higher than April of 2005 (EIA/DOE). This dramatically affects the cost of helicopter logging. Alternative Three includes more helicopter logging than Alternative Two in order to avoid road construction, and as such, would be more sensitive to increases in jet fuel prices. If fuel prices continue the current trend, Alternative Three may result in lower stumpage value and potentially no bids for the timber sale.

Terrestrial Environment

A detailed description of the terrestrial environment can be found in the Layng Creek Watershed Analysis (USDA, Umpqua NF 1995) and its 2005 iteration (USDA, Umpqua NF 2005). Site-specific field work and analysis for this project produced additional information, which is provided in the following sections.

21 EIA/DOE website at:

http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/weekly_petroleum_status_report/current/pdf/table15.pdf

FOREST VEGETATION

Two spatial scales are used in the following discussion: (1) the landscape-scale; and (2) the stand-scale. The landscape-scale focuses on larger scale conditions (such as forest vegetation patterns) as seen from an airplane. The stand-scale refers to an area of 20 to 200 acres in size. Stand exam and other field data were used to characterize stand-scale conditions. Existing and future conditions were quantified and modeled using the stand exam data and the Forest Vegetation Simulator Model (Donnelly and Johnson, 1997). Chapter One outlines the relevant WA recommendations.

Existing and Desired Landscape Conditions

Forest age classes that develop after disturbances such as wildfire or clearcutting are often used to characterize stages of forest structural conditions. Four such forest stages are:

1. Stand initiation – in this stage the stand is young and has an open canopy.
2. Stem exclusion – in this stage the stand has developed into a dense, closed canopy forest where new trees are prevented from establishing and existing live trees may die due to competition for sunlight, water, and nutrients.
3. Maturation – in this stage the trees have reached their maximum height growth potential and are typically 80-150 years old. This stage includes the "understory re-initiation stage" where the understory begins to develop in response to small openings in the canopy (Oliver and Larson, 1990).
4. Old growth – in this stage the stand is typically over 150 years old and includes the "transition stage" and "shifting gap stage" as defined by the Northwest Forest Plan. Stand characteristics include large live trees, multiple canopy layers, coarse woody debris accumulation, and small gap-type disturbances. (USDA/USDI 1994)

Stands in the maturation and old growth stage are often combined into a "late-successional stage" because natural stands of mixed ages make separation of these older stages difficult with remote sensing. For this analysis, late-successional stands are generally 80 years and older.

Today, late-successional forest occupies approximately 54% of the Layng Creek subwatershed[22]. It is composed of smaller patches, compared to the larger patches present in the 1930s. The smaller patches and the abundance of the stem exclusion stage reflect the pattern established by staggered small clearcuts that occurred from the 1940s through the 1980s. The action alternatives propose commercial thinning and gap creation in the stem exclusion stage stands (Figure 8).

22 The 1995 Layng Creek WA documents that late-successional forests encompass 37% of the subwatershed and used 1988-1989 aerial photos and other imagery available at the time. The 54% late-successional forests described for this document was derived using 1998 satellite imagery.

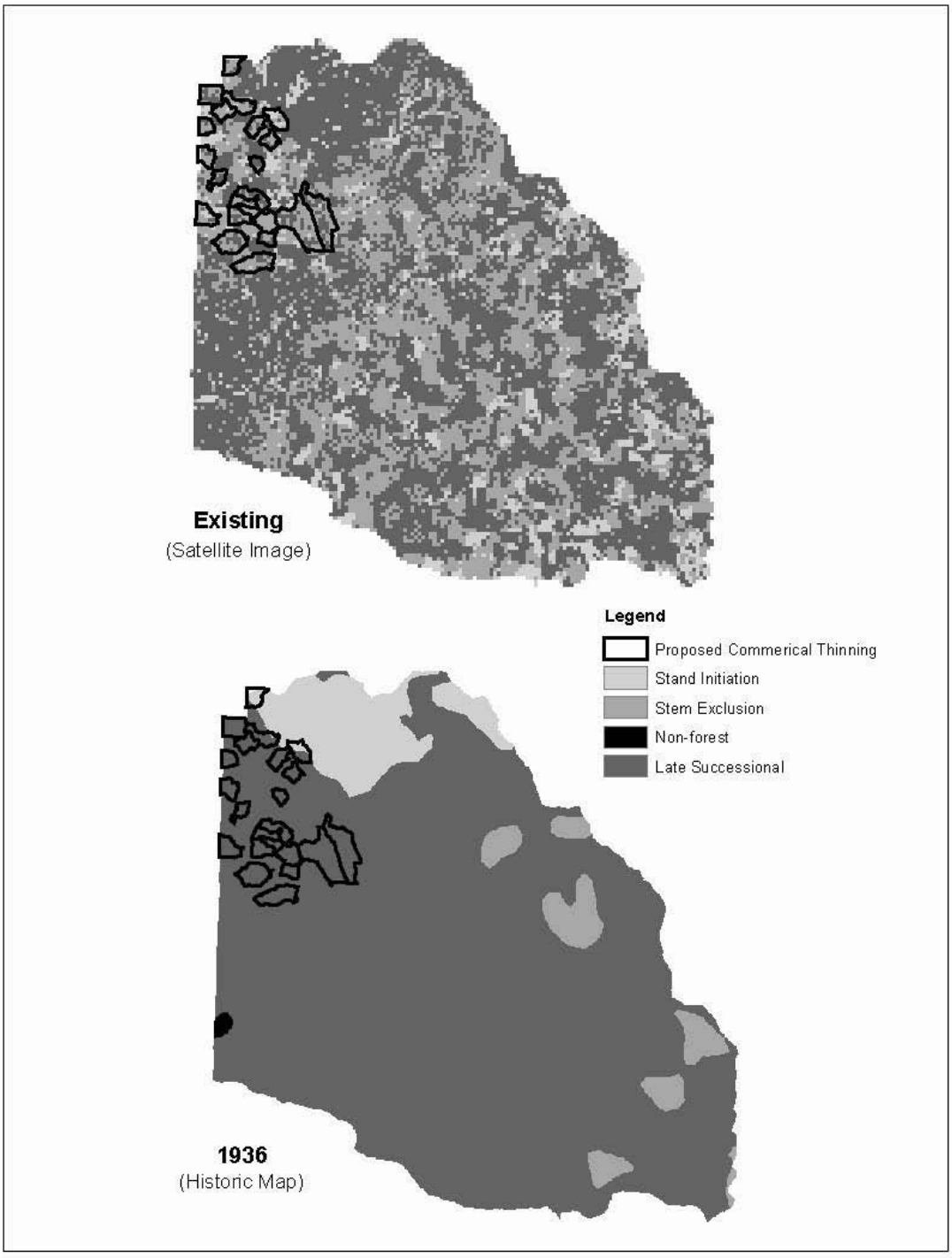

Figure 8. Existing (1998) and historic vegetation[23] .

23 Existing (1998) and historic (1936 from Harrington, 2003) vegetation23 maps for the federal ownership in the Layng Creek subwatershed.

As described in Chapter One, the Layng Creek subwatershed was stratified into four broad landscape areas based on relationships between forest vegetation, climate, and physiography (Figure 3). The landscape areas represent broad areas of land that tend to have similar vegetation types and disturbance processes. These landscape areas help place individual stands into a broader context. Silvicultural prescriptions can then be designed to approximate disturbance processes that operate at the larger scale.

The use of landscape areas in designing vegetation treatments is in keeping with the Aquatic Conservation Strategy of restoring disturbance regimes. It is also consistent with ACS objective #1, which calls for the restoration of the distribution, diversity, and complexity of landscape scale features (such as vegetation patterns). In order to provide a context for the current vegetation patterns, a range of historic landscape patterns is useful. The use of reference ranges is based on the principle that when an ecosystem element moves outside its range the element, and those elements depending upon it, may not be sustainable naturally. The 1936 historic map and fire regime condition class data (FRCC) used in the 2005 Layng Creek watershed analysis iteration 1.1 provide a range of reference conditions for vegetation (Figure 9). The concept of "improvement" under the Aquatic Conservation Strategy, relates to restoring biological and physical processes within their ranges of natural variability (USDA/USDI, 1994. p. B-10).

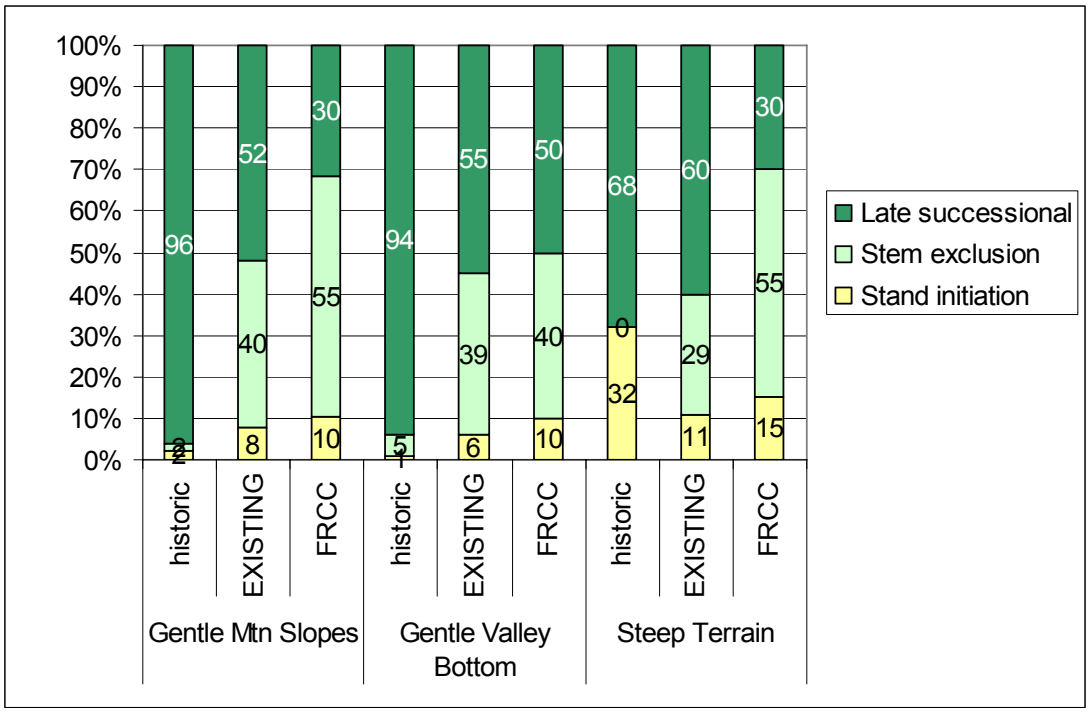

Figure 9. Distribution of Forest Age Classes[24] in Landscape Areas

24 Distribution of forest age classes24 in landscape areas of Layng Creek subwatershed (federal land). The existing condition for each landscape area is bracketed by a reference range. The historic bars are based on the 1936 vegetation pattern and the FRCC bars are based on a generalized historic disturbance of representative vegetation types.

Figure 9 shows that at the landscape scale, the stem exclusion stage covers proportionately more of the Layng Creek subwatershed than it did during the 1930s, but is still within the reference range. The amount of late-successional forest present today in the subwatershed is near the low end of the reference range in both the gentle mountain slope and gentle valley bottom landscapes.

The desired landscape condition would have larger patches in the different forest structure conditions compared to today's pattern. Desired patch sizes would approximate the infrequent historic fire events that covered thousands of acres. The desired pattern of vegetation patches would be less fragmented, as was produced by moderate severity fire effects. This landscape desired condition is consistent with the 2005 WA recommendations listed in Chapter One, and with objective #1 of the Aquatic Conservation Strategy, which calls for the restoration of the diversity and complexity landscape scale features such as vegetation patterns.

Existing and Desired Stand Conditions

The proposed commercial thinning stands are Douglas-fir plantations created after clearcut harvesting 40-60 years ago. Most of the stands were pre-commercially thinned in the 1970's and 1980's and fertilized with nitrogen ten years later to promote tree growth. Today the stands are dense plantations of mostly Douglas-fir with scattered western hemlock, western redcedar and, to a lesser extent, incense cedar in the understory. Hardwood trees are also scattered throughout the units. Red alder and bigleaf maple are dominant in many riparian areas, whereas golden chinquapin is common in drier areas. The shrub layer is dominated by vine maple, dwarf Oregon-grape, salal, and swordfern. Scattered small gaps, created by root rot pockets and snow down, can be found in the units. Suppression mortality of the smaller diameter trees is beginning to occur, generally in trees six to ten inches in diameter, and at an average of seven trees per acre. Average stand conditions can be found in Table 12 below.

Table 12. Curran Junetta Stand Conditions

	Age (total years)	Overstory diameter (inches)	Overstory height (feet)	Overstory trees per acre (≥7" dbh)	Total trees per acre	Total canopy closure
Average	52	14	83	175	310	64%
Range	41-59	11-17	50-106	120-299	155-505	54-74%

The stands range in elevation from 1600 to 3700 feet within the moist, mild western hemlock zone which dominates the Westside Cascades of Northwest Oregon. The two primary plant associations identified in the stands generally occur on the drier and warmer sites of the western hemlock zone and are considered moderately productive. These plant associations assist in describing the plant communities and potential natural vegetation pathways. In general, the stands with a predominantly south facing aspect tend to fall into the western hemlock/Dwarf Oregon grape/salal-dry association. Sites

with this association are dominated by dry-site shrubs like ocean spray and poison oak; soils tend to be rocky, and the average site index for Douglas-fir is 138. The stands with a predominantly north facing aspect tend to fall into the western hemlock/dwarf Oregon grape/swordfern plant association. Sites with this association are slightly moister; the understory is dominated by dwarf Oregon grape and vine maple, and the average site index for Douglas-fir is slightly higher at 141. (McCain and Diaz, 2002)

As shown in Table 13, the stands fall into three of the four landscape areas described in Chapter One. These landscapes areas were delineated using broad scale mapping, and many of the stands fall into multiple areas. As an example, Unit 15 was mapped as laying within all three landscape areas. Stands were ultimately classified into only one landscape area based on field knowledge and which area the majority of the stand falls in. The stands were further classified as to whether they were predominantly south-facing or north-facing in aspect. This distinction was identified because, as stated previously, the plant associations or potential natural vegetation pathways tended to align with the stands' general aspect.

Table 13. Two Criteria Used to Classify Stands

Units by Landscape Area		**Predominant Aspect of Units**	
Landscape Area	Units	Aspect	Units
Gentle Valley Bottom	2,3,4,9,17,19,20,21	North-facing slopes	5,7,11,12,13 north,14,15,16,17,19,20
Gentle Mountain Slope	1,5,11,12,13,14,15, 16,18	South-facing slopes	1,2,3,4,6,8,9,10, 13 south,18,21
Steep Terrain	6,7,8,10		

Recent studies of old growth forest development in western Oregon suggest that today's young managed stands are much denser than most historic early seral stands. The dominant old growth trees originally developed in stands of lower tree densities, allowing them to develop old-growth structural conditions sooner than if they had developed under more crowded conditions. The fast growing young trees that eventually became the dominant trees in the old growth study stands developed at densities of about 40 to 50 trees per acre (Poage and Tappeiner, 2002). The old growth study stands also developed by a gradual establishment of trees over time, probably in conjunction with intermittent disturbance. Thus, under historic conditions evidence indicates that the regeneration of old growth in western Oregon occurred over a prolonged period, at lower tree densities, and with less self-thinning than managed stands today (Tappeiner et al, 1997).

In an inventory of late-successional stands on the Cottage Grove Ranger District, Zenner found that canopy gaps tended to be created by partial stand replacement fire effects in the past. In his model of forest succession, understory re-initiation in tree-size gaps of mature Douglas-fir stands was largely driven by wildfire events. Zenner's

premise is that in a moderate fire severity regime, fire was the primary disturbance agent that historically created gaps in older forests. (Zenner, 2005)

Desired stand conditions would have lower, more variable densities that mimic the natural stand development processes of a moderate severity fire regime. In the absence of wildfire, setting a course for stand development that leads to more the uneven structure characteristics of the historic late-successional forest in Layng Creek would require thinning and gap creation.

Proposed Thinning and Gap Treatments

Commercial thinning within the twenty-one managed stands is proposed to meet the purpose and need, achieve desired conditions, and fulfill several watershed analysis recommendations (as described above and summarized in Chapter One). The proposed thinning is designed to set a course for stand development that mimics fire disturbance and natural successional development. The use of landscape areas and a stand's predominant aspect (northerly or southerly) help to tie to those disturbance processes and vegetation potentials. Emphasis is placed upon the creation of an uneven structure using canopy gaps, no-thin areas, and thinning areas to diversify homogenous stands.

These types of treatments set the stage for the development of late-successional conditions in the riparian reserves, begin a trend toward species and structural diversity in the matrix land allocation, and help provide for important ecological functions in the future as well as timber production in accordance with the Northwest Forest Plan direction (USDA, 1994).

Four treatments are proposed to reduce tree density and increase species and structural diversity (see Table 14 for unit by unit description):

1. Moderate thinning from below (70-90 trees per acre) with gaps
2. Moderate thinning from below (70-90 trees per acre) without gaps
3. Heavy thinning from below (40-60 trees per acre) with gaps
4. Heavy thinning from below (40-60 trees per acre) without gaps

Gaps are prescribed in 14 of the 21stands because they are important structural components in older, natural stands (Coates et al., 1997). They are a tool that can be used to promote diversity by providing variable density across the stands and allow for understory development. Gap characteristics would vary among prescriptions in the following ways:

1. Two sizes of canopy gaps, ¼ and ½ acre, are prescribed for the action alternatives to mimic natural variation in gap sizes across the landscape.
2. Gap intensity among units would range from 10-20% to also mimic that natural variation found across the landscape.
3. Within each gap, one dominant tree is retained to promote the development of large diameter trees with deep crowns.

Table 14. Unit Prescriptions by Landscape Area

Unit	Aspect	Thinning Prescription	Gap Size	Gap Intensity	Key Considerations[25]
Gentle Valley Bottom:					
2	S	40-60	1/4 acre	20%	CHU/BGWR
3	S	70-90			BGWR (north1/2)
4	S	40-60	1/4 acre	20%	CHU/BGWR
9	S	70-90	1/2 acre	10%	BGWR
17	N	70-90	1/2 acre	10%	BGWR
19	N	70-90	1/4 acre	10%	BGWR/OC
20	N	70-90	1/4 acre	10%	OC
21	S	40-60	1/4 acre	10%	BGWR/CHU
Gentle Mountain Slope:					
1	S	40-60	1/2 acre	10%	CHU/BGWR
5	N	70-90			
11	N	40-60			OC
12	N	70-90	1/2 acre	10%	BGWR
13north	N	70-90			BGWR/OC
13south	S	40-60			OC
14	N	70-90	1/4 acre	10%	OC
15	N	70-90			OC
16	N	70-90	1/4 acre	10%	OC
18	S	70-90			OC
Steep Terrain:					
6	S	40-60	1/4 acre	20%	CHU/BGWR
7	N	70-90			CHU/OC
8	S	40-60	1/4 acre	20%	CHU/BGWR
10	S	70-90	1/4 acre	10%	BGWR/OC

25 As part of the interdisciplinary process, the following key considerations were incorporated into silvicultural treatment prescriptions: CHU = stand within a Critical Habitat Unit, BGWR = stand within a big game winter range, OC = stand within ½ mile of owl core

In addition to the landscape and silvicultural objectives, other resource objectives were incorporated into the thinning treatments. For example, within a half mile of owl habitat core areas a higher residual canopy was generally maintained in order to reduce owl's susceptibility to predation. Half acre gaps were placed in big game winter range areas to provide short term forage. All perennial streams have no cut buffers; other special habitats also have buffers. See the other resource sections for specific information.

A mixture of thinning intensities and gaps would diversify existing stand structure and species composition across the stands, and would provide diversity at the broader, landscape scale. Figure 10 displays the proposed treatment on Unit 9 as an example of a thinning treatment intermixed with gaps and no treatment areas.

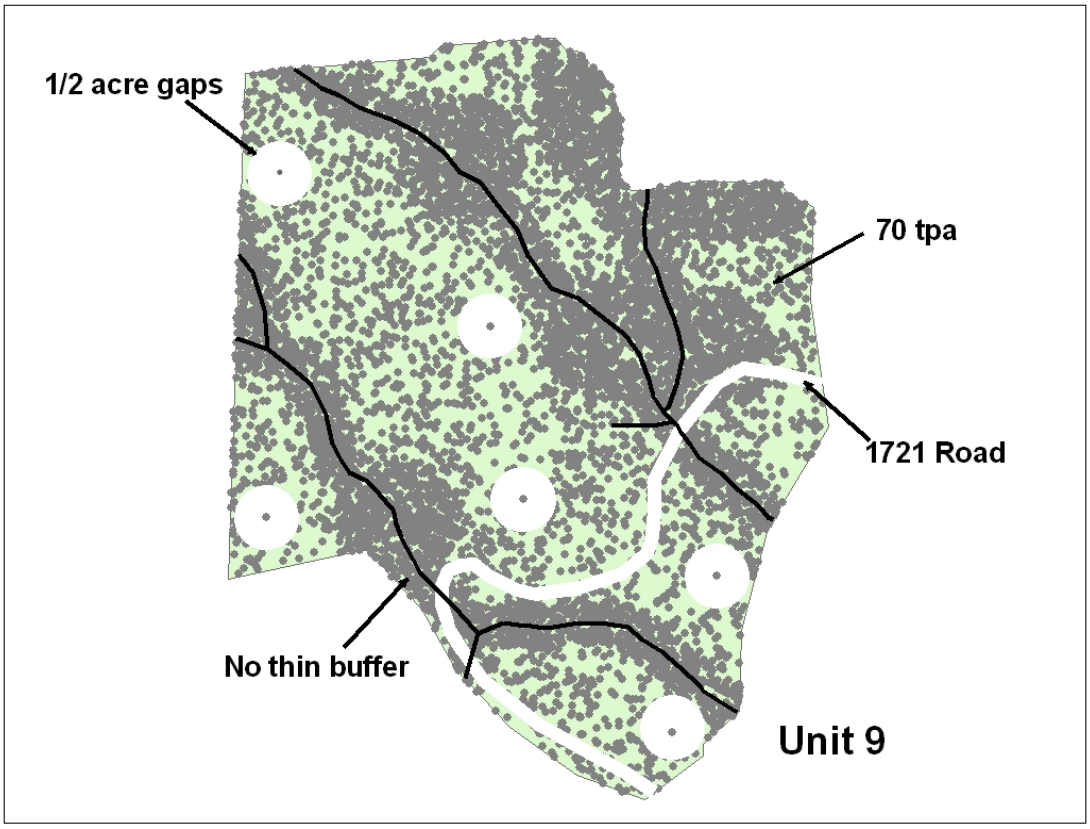

Figure 10. Unit 9 Depiction of Thinning[26]

Direct and Indirect Effects

The immediate direct effects of the action alternatives would include reduced stand densities and canopy closure. Average stand canopy closure in the treated areas would move from an existing range of 54 to 74% in Alternative One to a range of 35 to 55% in

26 Unit 9 depiction of thinning26 to approximately 70 trees per acre intermixed with 1/2 acre gaps. Overall the unit would have a total stand average of approximately 88 trees per acre and total canopy closure of 44% (including the area in gaps plus the area in no thin buffers).

Alternatives Two and Three. The action alternatives would increase variation in stand densities within and between stands, meeting element one of the purpose and need (Table 4) "to improve conditions for species and structural diversity and establish stand trajectories to meet desired conditions." The effects of Alternatives Two and Three would be the same because the vegetation management prescriptions and treatment acres are the same.

The long-term indirect effects of the action alternatives would include accelerated growth of residual vegetation and altered stand structure. Indirect effects are evaluated over the next 20 to 100 years. The average age of the stands proposed for thinning and gap treatments is currently 52 years. During the next 30 to 100 years, stands of this age would typically transition from stem exclusion ito late-successional stands.

Table 15 uses Unit 9 as an example of the average overstory stand diameter growth, modeled at age 80, between no thinning and the thinning treatments. Unit 9 is used as a sample stand because it is considered representative of the other twenty stands in terms of species composition, tree size, and tree density. This table shows that diameter growth rates would increase as a direct effect of thinning. Reducing overstory tree density through thinning and gaps would also allow more light underneath to promote understory development.

Table 15. Unit Prescriptions by Landscape Area

	No thin (166 trees per acre)	Moderate thin (80 trees per acre)	Heavy thin (50 trees per acre)
At age 55 in 2007	15.1" DBH	18.0" DBH	18.5" DBH
At age 80 in 2029	18.4" DBH	22.1" DBH	23.3" DBH

At the landscape scale, the treatments would have the indirect effect of accelerating the development of late-successional structures, and would shift the landscape pattern of vegetation toward larger, late-successional patches. Unit 9 was modeled over 100 years to show differences between the no thinning and thinning treatments in the development of four key attributes called a late-successional structure index (see Table 16 for definition). Figure 11 shows, using a late-successional structure index, that reducing stand density accelerates the development of late-successional structures. Over the 100 year analysis period, both thinning options of the action alternatives obtain all four key attributes; the no action alternative does not develop the multiple canopy layer attribute, and only obtains three of the four attributes.

Table 16. Definition of late-successional structure index[27]

Key Attribute	Definition for Modeling	Reference
Large diameter living trees	At least 8 trees per acre >31" in diameter	Franklin J.F. et al, 1986. Research Note PNW-447
Multiple canopy layers	At least 20 trees per acre of western hemlock or western redcedar >7" in diameter	Andrews, L.S. et al, 2005
Large dead trees	At least 5 snags (>5 meters in height) greater than 10" in diameter and at least 5 snags (>5 meters in height) greater than 20" in diameter	Mellen, et al, 2005 DecAID
Large woody material on the forest floor	Greater than 20 tons/acre of large wood that is >3" diameter	Mellen, et al, 2005 DecAID

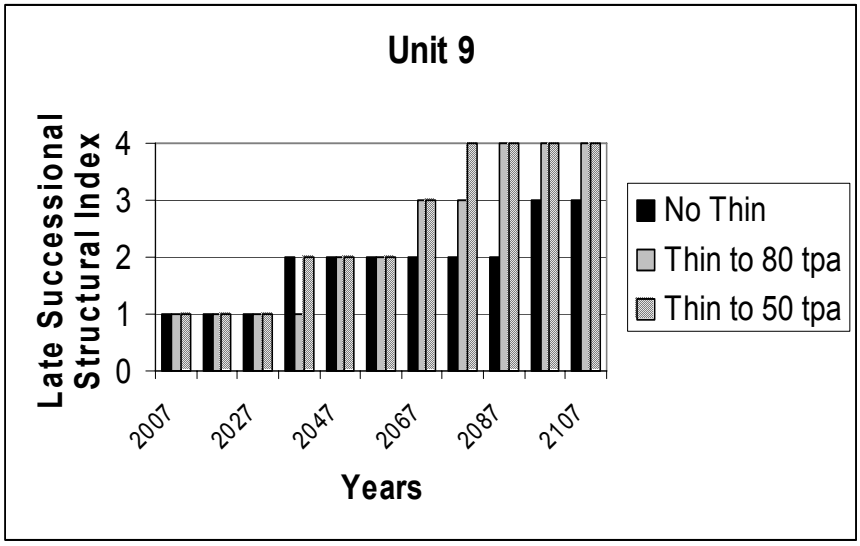

Figure 11. Comparison of Development of Late-successional Attributes over Time[28]

Under the action alternatives, the variation in thinning intensity and gap sizes would create variability in stand density and structure in the landscape. Alternative One (no action) would not accelerate the successional development needed to attain desired stand or landscape conditions, nor would it meet element one of the purpose and need (Table 4) to improve conditions for species and structural diversity. Under Alternative

27 The late-successional structure index is used for stand modeling.

28 Comparison of the development of late-successional attributes over time28 in Unit 9 between the no thinning and thinning treatments. The bars reaching the top of the graph attain all four attributes described in Table E. Thinning accelerates the development of these late-successional attributes.

One, stands would remain densely stocked with a high level of canopy closure. There would be little change in species and structural diversity in the near-term and over the long term, the rate of individual trees growth would continue to decline.

Cumulative Effects

Cumulative effects to forest vegetation are addressed at the scale of the Layng Creek subwatershed. The current distribution of age classes in the various landscape areas of the Curran Junetta planning area is similar to what is found in the larger Layng Creek subwatershed (Figure 10). Based on the information presented in Tables 6, 7, and 8, which show past, present, and reasonably foreseeable activities, approximately 40% of Layng Creek has or would have a regeneration harvest since the 1940s, and is in the stem exclusion stage. Approximately 17% more of Layng Creek has or would have a regeneration harvest since the 1980s and is in the stand initiation stage (see page 64 for vegetation stages).

The current distribution of vegetation stages in Layng Creek is considered within the range of natural variability established by historic and fire regime condition class references (Figure 10). However, without thinning treatments, the area in the stem exclusion stage would approach the upper end and likely exceed the boundaries of the natural range of variability within several decades, because the stand initiation stands would enter the stem exclusion stage while existing stem exclusion stands would not mature into the next stage in the same time period. The action alternatives were designed, in part, to advance stem exclusion vegetation toward mature stages and to accomplish broad landscape objectives that consider natural disturbances. The action alternatives would reduce the existing stem exclusion vegetation by five to ten percent in the next several decades, and would help maintain the amount of stem exclusion within that natural range of variability.

Aquatic Conservation Strategy

As disclosed in the section on Forest Vegetation, the action alternatives would move landscape patterns toward the natural range of variability by helping to advance an over-abundance of stem exclusion vegetation toward mature vegetation. As such, the action alternatives are consistent with objective #1 of the Aquatic Conservation Strategy of restoring landscape-scale features such as landscape patterns.

FUELS

Existing Conditions

Layng Creek is best described as having a moderate severity fire regime, which is characterized by having infrequent fires (25-100 year intervals) that are generally partial stand replacing (i.e. fire creates a mosaic of low, medium and high severity fire effects). The mean fire return interval in Layng Creek is approximately 26 years, with a natural fire rotation of 71 years (Layng Creek WA, 1995).

Portions of the watershed have, over time, been accumulating fuels, primarily due to past fire suppression practices and a lack of prescribed fire. As a result, the potential fire effects in parts of this watershed would resemble those of a high fire severity regime;

more intense, stand replacing events may occur than what would be expected in a moderate severity regime. Increasing surface and crown fuel loads are creating conditions that make stands more susceptible to stand replacement fire.

Current policies applicable to this watershed do not address the management of naturally occurring (lightning) fires under previously described conditions. Over the past century, slash burning (prescribed management ignited fire) after logging[29] has occurred, but not to the extent that it has effectively reduced fuels at the landscape scale. Because fire has either been suppressed or conservatively applied after logging, the results of fires occurring today can be expected to be of higher severity, and would likely occur over a greater area of the watershed, than what occurred in the past. This would be especially true if initial suppression efforts on a summer wildfire were not effective (i.e. the fire escaped control).

Fire played a major role in structural development and ecosystem processes. The Layng Creek WA "fire episodes" maps indicate large areas where partial stand replacement fires burned, as well as several areas where stand replacement fires occurred. Very little of the subwatershed was left unburned between 1600 and 1900.

The Umpqua National Forest Hazard Reduction Standards (1990) recommends a hazardous fuels loading of 12-21 tons/acre across the landscape. This guideline was based on nationally standardized fire behavior models. By staying within these guidelines, the Forest Service manage for conditions that would exhibit a low intensity and safely controllable wildfire, while retaining enough biomass for site productivity. Note that these standards only incorporate the 0-8" fuel size classes.

As there is no statistical variance between units based on land type, aspect, or slope, fuel loadings exist or would be generated fairly uniformly across the planning area.

Currently, most of the stands proposed for harvest in Curran Junetta are within the Hazard Reduction Standard's fuel loading ranges prior to harvest. Three of the units are actually below that threshold, while six are bumping up to, or are exceeding, the upper limit of 21 tons per acre. Harvest activities can be expected to contribute an average of 20-30 tons per acre of 0-8" activity fuels in addition to the pre-harvest loadings of 5-21 tons/acre. Total post-harvest fuel loadings are expected to range from 25 to 51 tons per acre. These units have an additional 4-20 tons per acre of larger (greater than eight inches) coarse woody debris.

Fire regime condition classes[30] (FRCC) are coarse-scale measures of the degree of departure from the natural fire regime (USDA/USDI 2005). This departure results in changes to one or more of the following ecological components: vegetation characteristics; fuel composition; fire frequency, fire severity and pattern; or other associated disturbances processes. Departure is measured in three broad classes: low (FRCC 1), moderate (FRCC 2) and high (FRCC 3) departure from the natural or historical regime. Low departure is considered to be within the natural range of variability, while moderate and high departures are outside of that range. In both FRCC 2 and FRCC 3, one or more fire return intervals have typically been missed. Areas of high departure increase the risk of losing key ecosystem components due to fire effects.

[29] Slash burning (primarily broadcast burning) has occurred on about 17,100 acres (40% of the watershed) in Layng Creek since 1900 (Table 6).

[30] The use of FRCC in planning is a requirement of the 2003 Healthy Forest Restoration Act (HFRA); it allows agencies to compare landscapes based on a standardized nation-wide process.

The delineation of fire regime condition classes for Layng Creek established that there are no areas of high departure (FRCC 3). Both the gentle mountain slopes and steep landscape areas show moderate degrees of departure, and are classified as FRCC 2 (Table 17). Because these two landscape areas have moderate departures from reference conditions, these areas have the greatest need for thinning treatments. Thinning within the gentle valley bottom landscape area would help maintain the current FRCC 1 rating.

Table 17. FRCC ratings for Layng Creek based on Landscape Areas.

Landscape Area	Layng Creek Acres	Curran Junetta Planning Area Units within the Landscape Area	Curran Junetta Planning Area Acres Thinned Under Alternatives 2 and 3	Curran Junetta Planning Area Acres Receiving Fuels Treatment	Current FRCC Rating
Gentle Valley Bottom	12,650	2,3,4,9,17,19,20,21	692	462	FRCC 1
Gentle Mountain Slopes	15,179	1,5,11,12,13,14,15, 16,18	413	216	FRCC 2
Steep	4,216	6,7,8,10	125	85	FRCC 2

The land allocations for this area are Matrix, Big Game Winter Range, and Riparian Reserves. There is private land in section 16 that would affect treatment alternatives selected for stands immediately adjacent to it. The planning area is entirely within the Detection Zone for the municipal watershed's intake system. In the Detection Zone, routine activities are acceptable provided that water contamination is avoided. There is a high probability that retardant drops from aircraft would reach the intakes in detectable quantities. Wildfire suppression activities would be associated with this kind of risk.

The upper edge of the planning area includes an Unroaded Recreation Area (MA 1) and an Ecosystem Study Area (MA 14). Fires beginning in, or entering, these unroaded areas would burn at high intensities. Fires of any size have been very infrequent here (>100 years apart) and when they did occur, tended to be intense stand replacement events. Fuel loadings are very heavy in some parts of this steep, unroaded topography. Treatment alternatives for this planning area should be designed so that in the future, fires that may start in the Curran Junetta planning area are less likely to spread into these fuels.

Desired Condition

The desired fuels condition at the stand scale would be fire resilient stands of Fuel Model (FM) 8, which describes a closed canopy short needle conifer stand with expected total fuel loading of five tons/acre that would cover approximately 60-80% of the area and result in slow-burning surface fires with low flame lengths. The remaining area would be represented by FM 10 (over mature stands with heavy head and down material with a total fuel loading of 12 tons/acre) which would result in surface fires

burning with greater intensity and which produces increased small-scale stand replacement patches (Anderson 1982). Today, the majority of the area is technically represented by timber FM 10. However, the accumulated fuel loadings in the planning area would produce fire intensities that are similar to the intensities of fires burning in slash Fuel Models 11 or 12 (heavy logging slash).

Effective techniques for increasing stand resilience to wildfire include reducing the potential for crown-fires and extreme fire behavior. To accomplish this, management activities can (1) reduce surface fuels, (2) increase canopy base height, (3) reduce canopy bulk densities, and (4) reduce forest canopy continuity (Peterson et al. 2005). These four factors determine the ability of ground fires to reach tree crowns, spread from crown-to-crown, and become stand-replacing fires.

Thinning would reduce canopy bulk density and continuity. Surface fuels can be reduced to a more desirable fuel loading range by treating fuels after commercial thinning activities are completed (i.e. via manipulation or removal of fuels by prescribed fire or mechanical means.)

The desired condition at the landscape scale is a vegetative and fuels pattern that approximates potential fire conditions typically found in a moderate severity fire regime (as described above).

Using the Fuels Characteristic Classification System (Ottmar et al 2007) and Consume 3.0 (Ottmar et al 2006) several of the stands were modeled for predicted fire behavior for the following conditions; current, post-harvest prior to fuels treatment, post harvest no treatment 15 years later, and post-harvest with fuels treatment. Several assumptions are made in this model including a four mile per hour (MPH) midflame wind speed, no slope, fuel moistures such as one might expect in August and September, and ignition randomly started by lightning. The results were fairly consistent across the implementation area.

Currently there is a high level of fuels potential, a moderate to high crown fire potential and fire behavior potential. Flame lengths of 13-15 feet and rates of spread (ROS[31]) of 30 feet per minute were also predicted. In addition, one third of the canopy (live trees) loading was consumed. While this is much higher than would be expected for a FM 8 or FM 10, with the additional accumulation of fuels over the past several decades, the earlier statement indicating that the fire intensities would be more like that of a slash model is supported. Figure 12 shows the results of a wildfire burning through a managed stand prior to any harvest or fuels treatment. Notice the lack of canopy foliage and number of bare limbs. Only approximately five percent of the green foliage remained at the time the photo was taken. Most of the larger logs were consumed, and there is no effective ground cover remaining.

Post-harvest and prior to fuels treatment potential fire behavior, crown fire, and available fuels are high. The other factors vary, which can be expected as there are a variety of harvest prescriptions which would impact the amount of fuel on the ground. Flame lengths vary from 14-40 feet, and rates of spread vary from 21-97 feet per minute. Again, about one third of the canopy would be consumed. While it might be expected that more would be consumed with the increased ground fuels loading, with less standing trees there is more space between canopies, thereby reducing the chance of crown to crown fire spread.

31Rate of Spread measures how many feet per hour the fire would spread at its head.

Fifteen years after harvest, with no fuels treatment, risk levels would still be elevated within these stands. Available fuel potential is still high, crown fire potential is moderate, and fire behavior potential is moderate to high. With some reduction of the fine fuels due to decomposition, lower flame lengths of 10-15 feet and rates of spread of 20-40 feet per minute would be expected. Still, approximately one third of the canopy would be lost.

Finally, stands were evaluated for potential effects of a fire occurring after fuels treatment had eliminated most of the fines and some of the larger fuels. As can be expected, fire behavior potential is low, and crown fire behavior potentials are low to moderate. Available fuel potential is still high, though. This is partially due to the fact that when jackpot burning[32] of fuels occurs, not all of the available fuels are consumed; only the larger accumulations are targeted. In addition, when part of the overstory is removed, shading is reduced, which triggers a growth flush of forbs and herbaceous plants. As they dry during summer months, they contribute to the amount of fine fuel loadings that sustain fire spread.

Flame lengths are a manageable 4-10 feet in these treated stands, and rates of spread range from eight to 24 feet per minute. Canopy consumption is slightly lower at this stage. Figure 13 shows the results of the same wild fire as in Figure 12 but in this case, the fire burned through a stand that had received post-harvest fuels treatment. Both photos were taken at the same fire site and on the same day. Notice the remaining green foliage on the trees in Figure 13. This stand suffered approximately 25% mortality of the smallest trees. The scorching of larger trees burned off the lower limbs[33] but did not kill the trees. Overall, more of the ground cover was unaffected, and larger quantities of coarse woody debris remain.

32 Jackpot burning is a variation of underburning, where only accumulations of fuels are targeted, rather than applying fire uniformly across the area to be burned.

33 The lower limbs of trees are often referred to as ladder fuels, because they supply a way, or “ladder”, for fire to move up into tree crowns.

Figure 12. Herman Fire in Untreated Fuels

This portion of the 2006 Herman Fire burned through a previously untreated stand directly adjacent to Herman Thin Unit #8. Notice the high mortality and no residual ground cover.

Figure 13. Herman Fire in Treated Fuels

This portion of the 2006 Herman Fire burned through a previously harvest and fuels treatment of Herman Thin Unit #8. Low mortality was assumed.

Direct Effects (Stand Scale)

For fire and fuels, direct effects are those that would occur at the stand scale. As Alternative One would not change the current fuels situation, there is no direct effect.

Both action alternatives would thin and remove trees from the stand, thus reducing canopy continuity and the potential for crown fire spread. Both action alternatives would underburn 330 acres, machine pile and burn 344 acres, and would treat 103 acres by hand piling and burning. Both action alternatives would have a direct effect of consuming surface fuels (Table 18), including portions of the litter, duff, 0-3" material, >3" material, and some of the herb and shrub components.

The various fuel treatments would reduce potential fire intensities and increase stand resiliency to fire as the trees grow larger and bark thickness increases. Crown fire potential would be reduced by removing ladder fuels, by reducing crown bulk density, and by increasing crown base height of the stand.

The direct effect of not treating activity-generated fuels would be to leave an increased loading of surface fuels in the harvested stands. This fuel loading would present a higher risk (in terms of potential fire intensity and spread) for at least 15 years after harvest.

In the action alternatives, after harvest the fuel models of the Curran Junetta stands would be modified either to a FM 8 with the fuels treatments, or to a FM 11 or 12 in areas where thinning but no slash treatment occurs (Table 18). The result of this change in fuel models in untreated stands would be a potential increase in surface fire behavior at the stand scale and an overall reduction in fire resiliency. Regardless of whether surface fuels were treated, the thinning and removal of trees would reduce canopy continuity and crown bulk density, which would in turn reduce the potential for crown fire spread.

Both action alternatives would create 32 one-half acre gaps. If slash is not treated (i.e. jackpot burned) within units 9, 12, and 17, higher fuel loads would exist for at least 15 years. To reduce fire risk, hand piling and burning would be completed within these gaps. The direct effects of burning these piles would be to reduce the 0-3" surface fuels, which in turn reduces the potential fire behavior of future fires.

Both action alternatives would also create one-quarter acre sized gaps on up to 10% of units 10,14,16,19 and 20; the slash in these gaps would remain untreated. This would result in an increased risk of more intense fire behavior and higher mortality of the surrounding trees in these gaps for approximately 15 years after harvest should a fire occur.

Fuels would be hand piled along the 1751 and 1721 roads, and along the private boundaries, as well. Burning these piles would reduce fuels and potential fire intensity and spread from fires that may start along travel routes or that move onto the Forest from adjacent private lands.

Table 18. Summary of fuel treatment acres and effects by Alternative.

Treatment type	Alt. 1 Acres	Alt. 2 & 3 Acres	Effects
Jackpot Burn	0	328	Beneficial - reduced 0-3" surface fuels both for the short-term (up to 5 years) and the long-term (greater than 5 years); increased stand resiliency to potential wildfire effects.
Thinning & No Fuel Treatment	0	482	Beneficial - Reduction of standing fuels; separation of crown layers; short and long-term effect of reducing crown fire potential; long-term benefit of increased fire resiliency against crown fire. Adverse - increase in the 0-3" surface fuels with a short-term increased risk for loss due to potential wildfire.
Machine Pile & Burn	0	352	Beneficial - reduced 0-3" surface fuels both for the short-term (up to 5 years) and the long-term (greater 5 years) and increased stand resiliency to potential wildfire effects.
Hand Pile & Burn	0	103	Beneficial - reduced 0-3" surface fuels both for the short-term (up to 5 years) and the long-term (greater than 5 years) and increased stand resiliency to potential wildfire effects.

As a connected action, about 98 acres of pre-commercial thinning (PCT) is proposed to occur within the planning area. The direct effect of the PCT treatments would be a short-term increase in surface fuels (4-25 tons/ac of <3" material) for a period of about 15 years. Over the long term, however, risk of tree and stand mortality would decrease as remaining trees grow and the slash created by pre-commercial thinning decays.

Indirect Effects (Landscape Scale)

Indirect effects are those that would occur at the landscape scale and later in time. In modeling future fire behavior, 50-100 years was used, based on the findings of the Layng Creek Watershed Analysis fire history study.

Thinning and fuels treatment in the Curran Junetta stands would help reduce the current moderate risk of landscape-scale fire and improve the fire resiliency of the stand over the long-term.

Purpose and Need Element #1 in Chapter One is measured by acres of improved stand fire resiliency in both the gentle mountain slopes and steep landscape areas. In response to Element #1, Table 17 shows that for the action alternatives, the gentle mountain slopes and steep landscape areas are moved towards a more fire resilient level within these moderate departure areas through a combination of harvest and fuels treatment. Without pre-commercial and commercial thinning and fuels treatments, a fire occurring under extreme weather conditions would likely result in a mosaic pattern of under story, partial-stand replacing and stand replacement fires.

Under Alternative One, this area would remain at a moderate to high risk for losses to key ecosystem processes from wildfire, as compared to a low to moderate risk for loss if Alternatives Two or Three were implemented.

Pre-commercial thinning would improve overall resiliency to wildfire in the vicinity of the planning area. In the gentle valley bottom landscape area, pre-commercial and commercial thinning satisfies the purpose and need by maintaining FRCC #1 conditions.

Both action alternatives reduce about 36% of surface fuels over the 1,236 acres of the Curran Junetta project, which would effectively reduce fire behavior intensity and severity over the 50-year period of time analyzed.

As a whole, the proposed fuel treatments would reduce fire risk and improve fire resiliency, though when evaluated separately each treatment's effectiveness over time and at the stand and landscape scales would vary. Jackpot burning is the most effective treatment for reducing 0-3" surface fuels, and the changes in fuel loadings within the stands would moderate future landscape fire behavior over the next 50 years. The action alternatives would also increase canopy base height[34] by several feet following harvest, thus resulting in lower crown fire potential over time, when compared to Alternative One.

Cumulative Effects

The analysis area for fuels is the 42,195 acre Layng Creek subwatershed, and is of sufficient size to characterize landscape-level fire behavior and events.

Between the 1920's and present, there have been about 17,135 acres of the subwatershed (about 40%) that have been burned after harvest operations (Table 6). The effect of the past burning treatments was to reduce the total surface fuel loads on those sites.

Between 1960 and present, there have been about 10,903 acres of pre-commercial thinning (PCT) within Layng Creek (Table 6). Pre-commercial thinning reallocated growing space to fewer individual trees, increased the horizontal distance between tree crowns, and increased the vertical distance between tree crowns and the existing ground fuels.

These past practices have reduced fuel loadings over much of the drainage, reducing the risk of stand loss to potential wildfires, and changing the baseline surface fuel conditions of the managed stands.

If implemented, the action alternatives would overlap in time and space with one potential future project (Doris Timber Sale; refer to Table 8). This project would be similar in size to the Curran Junetta project, and is scheduled to occur within the next three to five years. Together, these projects would have the beneficial cumulative effect of reducing surface and standing fuels, reducing fire risk, increasing stand resiliency to fire, and moderating future fire behavior potential on about 2,500 acres (or about 7%) of the Layng Creek subwatershed. Alternative One would not contribute to this beneficial cumulative effect of reducing fuels across the landscape, as no treatment would occur. When taken together with the 1,558 acres of treatment that have occurred with Judy,

34 Canopy base height (CBH) is the lowest height above the forest floor at which there is enough canopy fuel to move the fire from the ground and into the canopy (Scott and Reinhardt 2001). The existing CBH for the stem exclusion/mature stands is about 5-6 feet; to moderate future crown fire potential, these levels would need to be raised several feet.

and Salty Timber Sales, and the Herman, Blim, and recent 1,001 acre Dinner/Desert commercial thinning sales, the FRCC would substantially improve at the Layng Creek Watershed scale.

COARSE WOODY DEBRIS

Relevant Standards and Guidelines

The standards and guidelines in the Northwest Forest Plan were designed, in part, to maintain ecological components such as down logs, snags, and large trees (ROD B-2) through time. The goal for management of forest stands in the matrix land allocation is for timber and other commodity production while maintaining these ecological components at appropriate levels (ROD B-6) and well distributed throughout the landscape (ROD C-40). Provisions for retention of snags and logs should normally be made, at least until the new stand begins to contribute coarse woody debris (ROD B-8).

When the Northwest Forest Plan was implemented in 1994, the standards and guidelines for snags and logs were meant to provide initial guidance (ROD C-41). Future refinement of standards and guidelines was expected as new information became available (ROD C- 42, E-12). More current information (Rose et al. 2001, Mellen et al. 2005) indicates that the biological population potential models (dating back to the 1970s and 80s) that most standard and guidelines were based on may now be out of date.

The Northwest Forest Plan requires site-specific analysis and the application of models for computing down wood information (ROD C-40) and snag recruitment (ROD C-46) to take into account tree species, diameters, falling rates, and decay rates, to determine appropriate tree and snag species mixes and densities to achieve the objectives stated above. The Fire and Fuels Extension to the Forest Vegetation Simulator model (FVS v6.21, revision 1/19/06) was used to analyze existing and future levels of snags and down wood. This model recently incorporated the latest information on snag fall rates, decay rates, and height loss rates for the western Cascades.

DecAID (Mellen et al. 2005) was used to determine what levels would be ecologically appropriate for the specific habitat and structure types that the proposed harvest units occur in. DecAID is an internet-based synthesis and summary of the published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience concerning snags and down wood. It provides information on estimating or evaluating sizes and densities or amounts of dead wood that provide habitat for many species and ecological processes (Mellen et al. 2005). DecAID provides three tolerance levels (30%, 50% and 80%) for snag and down wood sizes, densities and percent ground cover used by wildlife species. Tolerance levels indicate a level of assurance for providing habitat that meets the needs of the species. The higher the tolerance level for the species, the more individuals in the population are being provided a habitat.

Watershed Analysis Recommendations

To supplement the broader Forest Plan standards and guidelines and provide site specific data, a snag and log inventory was conducted in the Layng Creek subwatershed (USDA, Umpqua NF, 2005a). The results of this inventory are used to refine

management of coarse woody debris in this area in accordance with the standards and guidelines in the Northwest Forest Plan (ROD C-41).

Existing and Desired Conditions

The abundance of snags and logs varies substantially across forested landscapes in the Pacific Northwest (Ohmann and Waddell 2002). While the majority of the landscape usually supports moderate levels of snags and logs (Mellen et al. 2005), a fairly large portion (about one-third of the landscape in the Western Cascades of Oregon) can have little to no dead wood, while a smaller portion would have a great deal (White et al. 2002, Ohmann and Waddell 2002). The Layng Creek inventory showed similar trends.

The results of the Layng Creek inventory show 22% of the local landscape is devoid of snags ≥10 inch dbh and about 3% of the landscape has snag densities ≥18 snags/acre. There is currently an excess of forested land in this area without snags (roughly 5 times higher than what DecAID recommends) and a deficiency in areas with high snag densities (roughly 12% of what DecAID recommends). Management prescriptions should allow for these extremes because they are ecologically important (White et al. 2002, Mellen et al. 2005). Common natural disturbances that produce areas with high levels of dead wood include wildfire, insects and disease, and wind (blow down) events.

Within the harvest units, both inventory and stand exam data show current average snag densities between 1.8 to 3.4 snags/acre (90% confidence interval) for snags ≥10 inch dbh and 0.5 to 1.5 snags/acre for larger snags (≥20 inch dbh). Down wood levels are between 3.3 to 9.6 percent ground cover (90% CI), with an average ground cover of 6.4 percent. When compared to local inventory data in unmanaged stands of similar age, levels of CWD in the harvest units were about 75% less than what was found for snags in the unmanaged stands, and the amount of down wood was twice that of the unmanaged stands (USDA, Umpqua NF, 2005a). In summary, when compared to the advice in DecAID, current snag levels are lower than what is advised, but down wood (percent cover) is within the appropriate range.

Direct and Indirect Effects

The direct and indirect effects to CWD are analyzed at two scales; 1) within the stands being thinned (stand-scale), and 2) within the landscape of Layng Creek as described in the snag and log inventory (landscape-scale). The direct effects are the immediate changes that occur at these two scales. The indirect effects focus on how the alternatives would modify the stand CWD dynamics over the next 100 years. The actions that would have the largest effect on CWD are thinning and post harvest fuel reduction treatments.

The action alternatives cause a decrease in stand levels of snags and down wood caused by incidental falling of snags for logging or safety reasons, and consumption of down wood during the fuels reduction treatments. Thinning would then reduce the amount of suppression mortality within the thinned portions of stands, indirectly affecting future recruitment of CWD. Existing snags and logs would be protected to the extent practical and safe. However, it is probable that the action alternatives would lower levels of these structures (to approximately one to two snags per acre) through mechanical disturbance from tree falling and harvesting. This project would affect dead wood mainly in the small tree structural conditions. It is estimated that approximate three snags > 10

inches would be created from fire and damage from harvest operation within the harvest units during and after treatment. All trees damaged during harvest operation, such as intermediate support trees or line damaged trees, would be retained to mitigate the decreased rate of snags caused by thinning and harvest activities. To mitigate for effect on large snags, the action alternatives would include the inoculation of two trees per acre on 857 acres and five snags per acre on 379 acres (within CHU OR-20) with locally collected native heart rot fungus. Inoculated trees begin to develop heart rot within five years as they continue to grow (Duncan, 1999), eventually producing larger trees with cavities and future snags that remain standing longer than if girdled. Inoculation is a management tool being used to offset the reduction of suppression mortality caused by thinning and to maintain a component of decadence within these managed stands. Additional snag mitigation would occur within CHU OR-20; six snags per acre would be created by fire during fuels reduction activities. In unit seven, mitigation would occur by girdling trees (>15 inch dbh or largest trees available) to achieve six snags per acre within the thinned portions of the unit.

The changes to levels of snags and down wood at the stand-scale are shown in Figures 14, 15 and 16. These graphs show how the alternatives would change CWD trajectories over the next 100 years using the latest models. The changes vary with treatment type; the levels shown in these graphs are stand averages.

Under the action alternatives, levels of CWD are not predicted to drop below the 30% tolerance level as advised in DecAID (the bottom edge of the gray band) for the next 100 years. Over the next 100 years, the CWD levels would begin to change into a larger diameter class with a reduction in smaller diameter CWD. The models indicate that snag and down wood levels remain within the levels advised for by DecAID, and are also consistent with CWD levels found in Layng Creek. The action alternatives, with mitigation, would have the effect of maintaining suitable habitat for wildlife, plants, fungi, liverworts, mosses, lichens, and ecological processes that require CWD.

Large snag (≥20” DBH) densities within the stands are currently below the levels advised for in DecAID (4.7 snags/acre – 30% tolerance level). Under the no action alternative this level of snags would not be achieved for another two decades (Figure 15). The action alternatives would delay reaching this level by an additional 10 to 30 years (10 years for units thinned to 70 to 90 trees per acre, 30 years for units thinned to 40 to 60 trees per acre). However, the action alternatives would provide other ecological benefits by allowing trees to grow larger and faster, and to develop other suitable wildlife habitat characteristics (e.g., large limbs, crowns, etc.). The gray areas on the graphs below represent the 30 to 80% tolerance levels from DecAID.

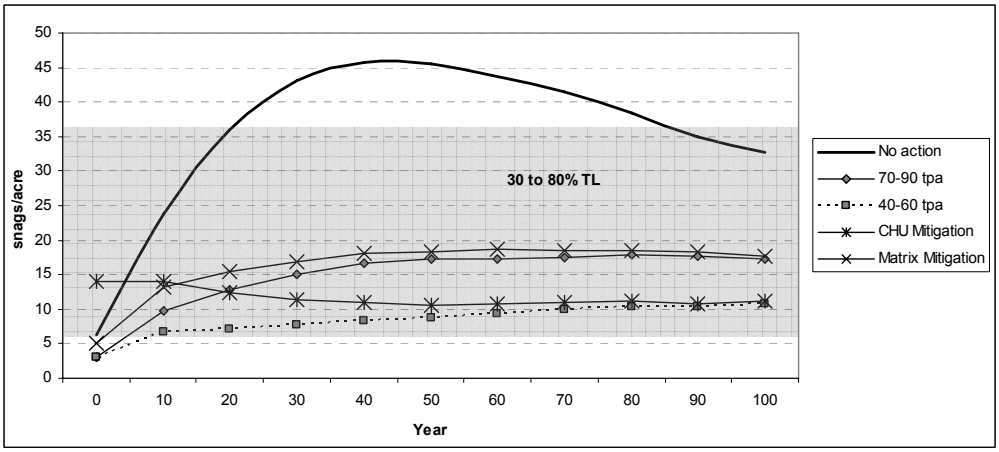

Figure 14. Short and long-term changes to ≥10" dbh snags.

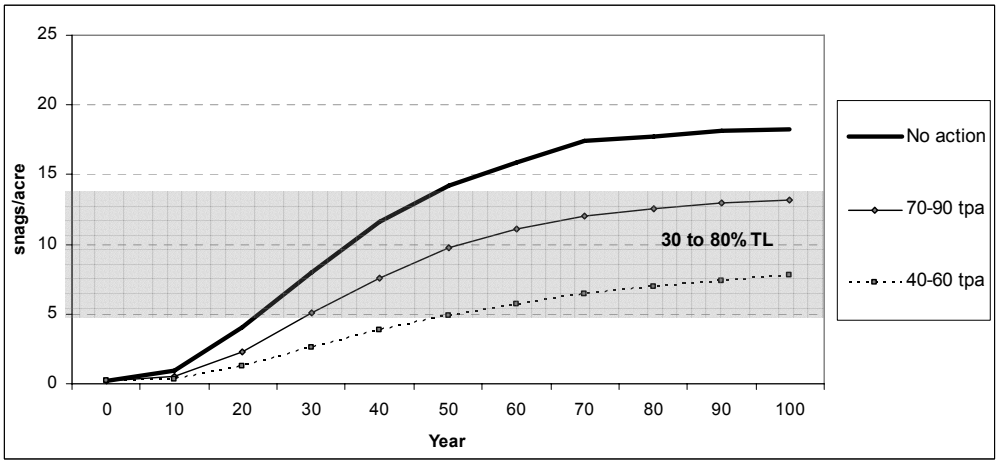

Figure 15. Short and long-term changes to ≥20" dbh snags.

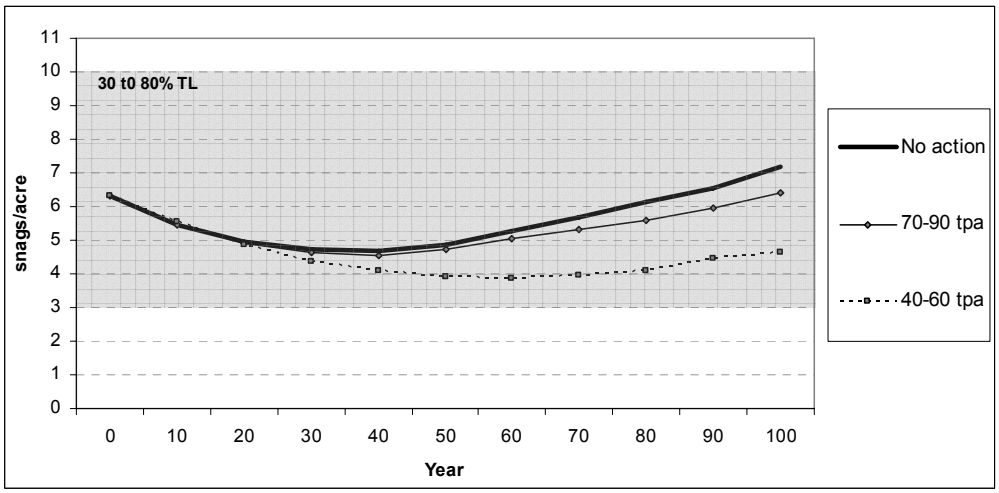

Figure 16. Short and long-term changes to ≥6" diameter down wood.

Cumulative Effects

Substantial adverse impacts to levels of CWD at both the stand and landscape-scale have resulted from past clearcut timber harvesting, road building, roadside salvage and fire exclusion. The Layng Creek inventory showed an overabundance of land area with no snags, and a deficit of land area with high snag densities (caused by fire exclusion). It would take several decades to restore snag and log conditions to within the ranges advised for in DecAID at these two extreme ends of the range of CWD.

Down wood levels are expected to vary both in time and across the land, but should remain within the reference range. The action alternatives do not add to this existing condition at the stand level because they maintain snag and down wood levels within natural ranges as identified in DecAID and the Layng Creek inventory. At the landscape-scale the action alternatives do not add to the cumulative loss of snags.

SOIL PRODUCTIVITY

The maintenance of soil productivity during forest management activities is critical to maintaining a healthy forest. Consequently, soil productivity is addressed in the Umpqua Land and Resource Management Plan (LRMP) with several standards and guidelines. The primary focus of this analysis centers on past and predicted soil disturbances and the maintenance of ground cover.

Relevant Standards and Guidelines

The most relevant standard and guidelines from the Umpqua Land Resource Management Plan (LRMP) related to soil productivity include:

Soil Productivity S&G #1, p IV-67: Requires that the combined total amount of unacceptable soil conditions in proposed activity areas (compaction, displacement of surface soil and severe burning) would not exceed 20 percent, including areas in roads and landings.

Soil Productivity S&G #2, p IV-68: Requires maintenance of ≥25% effective ground cover on areas with low erosion hazards and ≥45% in areas with moderate erosion hazards to prevent loss of topsoil through erosion.

Soil Productivity S&G #3, p IV-68: Requires maintenance of ≥65% ground cover for surface organic material (defined as litter, duff and wood) on mineral soils with cold climatic conditions, low nutrient levels, and/or low water holding capacities.

Soil productivity standards 4, 5, 10, 11, and 12 and other NWFP requirements also apply and are described in this section or are listed as mitigation measures or monitoring requirements in Chapter Two.

Existing and Desired Conditions

Past timber harvest activities (prior to 1975) primarily utilized ground skidding using tractor and highlead yarding methods. During highlead operations logs were yarded both down and uphill without suspension and often resulted in severe soil displacement. Tractor yarding on the moderate slopes (35-55%) disturbed about 30-40% of the ground, and required cutting skid trails into the slope. These skid trails often crossed swales where ground water could be intercepted and redistributed as surface flow, which down-cut new channels. In many cases skid trails and smaller haul roads were placed across swales that contained buried streams, which later opened up and are now stream

channels. Slash treatment following harvest often resulted in relatively high intensity fires that left the upper slopes bare. Generally, all non-merchantable material remained on-site, accumulating in large concentrations in swales and the lower third of steeper harvest units.

Around 1975, skyline harvest was primarily used to harvest the moderate to steeper slopes in the subwatershed, greatly reducing the soil disturbance to three percent or less of the harvest area, as well as reducing soil compaction (monitoring records). The effects of tractor yarding were also reduced after 1985 by restricting ground skidding to designated skid trails over approximately 15% of the area harvested. Skid trails were also designated away from streams during this period.

Soil interpretations for the planning area were made using the Umpqua Soil Resource Inventory (USDA 1976) and field review. This inventory provides landscape-scale soils information on broadly mapped areas (average size = 250 acres) that have distinctly unique geology, landform and soils that affect the growth and development of forest vegetation. This information was reviewed for each landform and provides useful information for sale planning. The geology of Layng creek is associated with rock units of the Western Cascades, general consisting of a complex mixture of volcanic and sedimentary units (Layng Creek WA, 1995). By far the most predominant rock unit mapped is basalt. The largest concentrations are identified in Junetta Creek on the south side of Dinner Creek and upper Layng Creek. There are also tuffaceous rocks which tend to be well cemented and resistant to weathering along the steep dissected terrain along Junetta Creek. Other rock units of localized intrusions of granitic type material are prominent peaks such as Hardesty Mountain and Mt. June. Approximately 95% of the proposed units are located on soils that have a moderately high to high resiliency to soil disturbance.

The desired condition for soils is to keep compaction and displacement to less than 20% of the treatment area and to maintain at least 65% effective ground cover of surface organic material for soil productivity.

Direct and Indirect Effects

The direct and indirect effects are discussed at the scale of the treatment units (1,236 acres). Direct effects would occur immediately as a result of thinning, fuel treatment, and road work while indirect effects would occur in the future as a result of potential wildfires.

Under Alternative One, legacy soil displacement and compaction would remain at around 112 acres (9%) of the treatment units (Table 19). The action alternatives would use approximately 70% of the previous compacted temporary roads, along with many of the pre-existing skid trails and landings. Consequently, Alternatives Two and Three are estimated to result in a relatively low amount of new soil disturbance (approximately 9.4 and 9.0 acres, respectfully.) Mitigation would include subsoiling of approximately 26 acres. Concentrated areas of legacy soil compaction were given priority for subsoiling. The increase of 0.4 acres of disturbed soil in Alternative Two (from the proposed new road construction) is considered minor, resulting in similar effects to both action alternatives.

The mitigation measure of subsoiling has the direct effect of reducing disturbance. Combined with past and proposed activities, portions of Units 2, 13, 14, 17, and 21 would exceed standards and guidelines for unacceptable soil disturbance in areas

scheduled for ground-based harvest. However, following subsoiling, all units would meet soil standards and guidelines for unacceptable soil disturbance for both compaction and effective ground cover, thus complying with soils S&G #1 and erosion risk S&G #2.

Table 19. Unacceptable soil disturbance estimates.

Type of Soil Disturbance	Alt 1	Alt 2	Alt 3
Legacy Compaction	112 ac	112 ac	112 ac
New Compaction (perm roads)	0	0.4 ac	0
New Compaction (harvest, landings, roads)	0	9.0 ac	9.0 ac
Subsoiling (mitigation)	0	-26 ac	-26 ac
Estimated total compaction after subsoiling	**112 ac**	**95.4 ac**	**95 ac**
Severely Burned Soils (fuel treatments)	0	31ac	31 ac
Severely Burned Soils (modeled wildfire)	371 ac (30%)	45 ac (4%)	45 ac (4%)

Table 19 assumes the fuels treatments would occur during spring like conditions. Of the 680 acres that would be treated with a jackpot burn or machine pile and burn, approximately 15%[35] (102 acres) are estimated to result in bare soils, of which 30%(Table 20[36]), or 31 acres, are estimated to be severely burned soils. These deep soil acres, scattered throughout the fuels treatment areas, are highly resilient and expected to recover in less than two years.

The action alternatives would result in a long term (> 10 years) benefit to reduce severely burned soil from potential wildfires. This reduction is primarily due to effective treatment such as machine piles and jackpot burning. Hand piling, and areas with no fuels treatment, would not be considered effective measures. Treatments such as hand piling and thinning can be effective in reducing the spread of wildfire, but would not adequately reduce fuel loading to prevent wildfire effects to soil from ground fire effects. Alternatives Two and Three would effectively treat more acres and therefore would have a higher potential long-term (10-year) benefit for reducing soil effects from future wildfire.

Effective ground cover (EGC) is defined as all herbaceous or dead woody materials, synthetic materials and rock fragments >0.75" diameter that cover the surface of the ground and prevent soil surface erosion (LRMP IV-68). Minimum ground cover recommendations have been prescribed to address both the risk of soil erosion (LRMP IV-68 S&G's #2 and #3) and the need to maintain soil organic matter for long-term site productivity.

Carbon (standing and down woody material, litter, soil organic matter) is a critical element to site productivity and soil development. Most plant available nutrients are retained by the organic fraction in the upper ten inches of forest soils. Fine roots and

36 These percentage estimates were derived from the First Order Fire Effects Model used in the Dinner Thin EA which analyzed the Layng Subwatershed.

mychorhizal fungi activity occurs at the litter-soil interface and in the surface two inches of soil. Fine root development plays an important role in soil carbon sequestration (Lal, 2005) and long-term soil fertility. Forest soils that are low in organic matter are also less productive. Increase carbon storage in forest soils can be achieved through forest management including site preparation, fire management, and species management and selection.

Table 20 displays effective ground cover predictions. When comparing action alternatives, the additional 0.4 acres from new road construction in Alternative Two is too minor to result in a measurable difference. Consequently both action alternatives have a similar effect. The combined affects of harvest, landings, and fuels treatment would potentially expose soil an average of 15% of the unit acres. This amount of disturbance would be considered acceptable for maintaining long-term soil productivity (LMRP IV-68). The action alternatives are expected to result in little to no effect on soil carbon. Therefore disruption of natural processes would not be expected to occur under any of the action alternatives.

The risk of wildfire would be a potential indirect effect of maintaining fine fuels and litter. Under Alternative One, a future wildfire would potentially reduce the effective ground cover by 72% (Table 20). This would increase the possibility for erosion and would potentially reduce long-term site productivity on less resilient sites such as portions of the steep side slopes with shallow soils. This risk is lower for the action alternatives.

Table 20: Summary of effective ground cover predictions.

	Alt 1	Alt 2	Alt 3
Exposed Soil from Harvest and Fuel Treatments	0	185 ac	185 ac
Exposed Soil from New Permanent Road	0	0.4 ac	0 ac
Total acres of Exposed Soil		**185.4 ac (15%)**	**185 ac (15%)**
% Effective Ground Cover	100%	85%	85%
Predicted Exposed soil from a Wildfire	890* ac (72%)	531* ac (43%)	531* ac (43%)

Alternative One may result in a larger and possibly more severe future wildfire. Instead of storing carbon and maintaining soil organic matter, a wildfire would release carbon into the atmosphere. A potential wildfire would be expected to consume greater than 80% of the litter and duff layer over 28% to 40% of the burn area, and may expose 60% to 72%[37] of the soils. Depth-of-mortality[38] (60^{o}C) would be expected to reach a depth of three inches of the soil surface with mixed severity. This type of fire occurring in the steeper landscapes with shallower soils would have a detrimental effect on soil organic matter due to increased soil loss through erosion (Hatten et al. 2005). There are no direct or indirect effects associated with connected actions.

37 First Order Fire Effects results using 6% soil moisture and 20% duff on SAF-Douglas-fir – western hemlock.

38 Depth of mortality can be defined as the depth of soil heating where the soil reaches 60oC, which is a generalized temperature used to estimate tissue death and provide an indicator of potential soil effect.

Cumulative Effects

The Curran Junetta planning area is in a moderate severity fire regime dominated by soils that are relatively resilient to disturbance. All action alternatives are within the parameters of acceptable disturbance and therefore would not add to any past soil impacts that result in any adverse cumulative effects to soil.

Considering recent and foreseeable activities in the Layng subwatershed, there would be a cumulative net beneficial effect to long-term soil productivity. Other sales that have been implemented in the subwatershed in the past ten years have addressed existing levels of legacy compaction, including decommissioning and subsoiling. In addition, fuels treatments have resulted in low impact, low intensity, short duration burns that result in acceptable levels of soil disturbance[39] while reducing the future potential wildfire risk.

The action alternatives, along with other present, recent past and reasonably foreseeable timber sale thinnings and fuels management activities within the Layng Creek subwatershed (Tables 6, 7 and 8), reduce the risk of severe wildfire effects to soils and result in a beneficial cumulative effect. Conversely, because Alternative One has the potential to result in severe soil effects from a wildfire, it may cumulatively add to adverse soil impacts in the Layng subwatershed.

FOREST WILDLIFE

LANDBIRDS

Population declines of some landbirds have resulted in a Landbird Strategic Plan (USDA 2000) that set management goals and actions for providing sustainable landbird habitat. A conservation strategy for landbirds in coniferous forests of western Oregon and Washington was developed to guide land management planning efforts to help ensure functional ecosystems with healthy populations of landbirds (PIF 1999). These plans and strategy documents are not regulatory, but provide management recommendations for reversing declining population trends and achieving stable or increasing trends within the next couple of decades. A Presidential Executive Order (signed January 10, 2001) required the Forest Service to enter into a memorandum of understanding with the US Fish and Wildlife Service (signed January 17, 2001) to incorporate recommendations from these types of landbird conservation plans into forest planning. The species listed in Table 21 are the focal species described in the USFS Landbird Strategic Plan that are suspected to occur within the Layng Creek watershed. Their preferred habitat attributes and forest condition are shown.

39 Fuel Monitoring soil summaries, 1998. Umpqua National Forest.

Table 21. Focal Species in the USFS Landbird Strategic Plan

Forest Condition	Habitat Attribute	Focal Species
Old-growth/Mature Forest (Multi-layered)	Large snags, Large trees, Deciduous canopy trees, Mid-story tree layers, Conifer cones	Pileated Woodpecker, Brown Creeper*, Pacific-slope flycatcher*, Varied thrush**, Red crossbill
Forest Condition	**Habitat Attribute**	**Focal Species**
Mature/Young Forest (Multi-layered/ Open mid-story Understory Reinitiating)	Closed Canopy Deciduous understory Forest floor complexity	Hermit warbler Hammond's flycatcher Wilson's warbler* Winter wren*
Young/Pole Forest (Understory Reinitiating/ Stem Exclusion	Deciduous canopy trees Deciduous subcanopy/ understory	Black-throated gray warbler Hutton's vireo
Early-Seral Forest (Stand Initiation)	Residual canopy trees Snags Deciduous vegetation Interspersion of shrubs/ Herbaceous openings Nectar-producing plants	Olive-sided flycatcher* Western bluebird* Orange-crowned warbler* Mountain quail Rufous hummingbird*
Riparian	Instream and stream bank	American dipper Harlequin duck
Forest Inclusions/ Unique habitats	High elevation meadows Berry-producing shrubs Large hollow snags Mosaic forest meadows Alpine	Lincoln's sparrow Band-tailed pigeon* Vaux's swift** Blue grouse American pipit

* Statistically significant decline in population trends in Southern Pacific Rainforest or Cascade Mountains physiographic areas.

** Statistically significant decline in population trends in Southern Pacific Rainforest and Cascade Mountains physiographic areas.

The Forest Plan has no specific recommendations for landbirds other than for cavity nesters (discussed in the next section), raptors (which are protected from human disturbance until nesting and fledging is complete), and federal laws that govern threatened or endangered bird species.

Watershed Analysis Recommendations

There are no specific recommendations for landbirds in the Layng Creek Watershed Analysis.

Existing Conditions

The scope for analyzing effects to landbirds is at the Layng Creek watershed scale. There are two Cascade Mountain breeding bird survey (BBS) routes in this general area that have been used to monitor landbirds on an annual basis for many years. The Winberry BBS Route (69019) is located about ten miles north of the Layng Creek watershed and has been monitored since 1968. The Warner Mountain BBS Route (69219), which is located about 14 miles to the southeast, has been monitored annually since 1992.

The conservation strategy for the coniferous forests of western Oregon and Washington (PIF 1999) describes the conditions found within the proposed harvest stands as "pole forest - stem exclusion" as described below (PIF 1999):

> "These forest conditions are structurally simple and characterized by an even-aged, single-layered, closed-canopy with little or no understory development. Where understory vegetation exists, it is generally low growing and dominated by one or two shade-tolerant species. Stands may range from sapling trees with high foliage ratios that have attained canopy closure, to large pole trees that are densely stocked and have low foliage ratios and a high degree of canopy lift. These forest conditions are relatively depauperate in land bird species composition and richness".

The conservation strategy identifies two focal bird species for this forest type; the black-throated gray warbler and Hutton's vireo (Table 21). It also identifies the hermit warbler as a younger forest, closed-canopy associated species. Monitoring data from the local BBS routes show increasing trends for the warblers and a stable (<2% change per year) to decreasing trend for the vireo in this area. Long-term (1966-2005) and short-term (1980-2005) population trends for the Cascade Mountains show stable populations for the warblers, and increasing population trends for the vireo.

Recent studies are leading research scientists to conclude that commercial thinning in young Douglas-fir plantations can increase diversity of breeding songbirds in these conifer-dominated stands (Hayes et al. 2003, Hagar et al. 2004). A variety of thinning intensities and patterns ranging from no thinning to very widely spaced residual trees is recommended to maximize bird diversity at the landscape scale, and to maximize structural diversity both within and among stands (Hagar et al. 2004). Land bird species exhibit a dramatic response to the height, seral stage, canopy structure, and spatial distribution associated with forest habitat, where greater numbers of birds are associated with more complex heterogeneous forested landscapes (Altman 1999).

Direct and Indirect Effects

The stands proposed for thinning are even-aged, single-layered and closed-canopy with little or no understory development. Effects to local landbird populations would be caused by timber harvest and fuels treatment activities that would result in both immediate and gradual changes to landbird habitats that would occur over the next 10-20 years. The majority of habitat changes would occur within approximately 474 acres of

proposed harvest units that would be heavily thinned (40 to 60 trees per acre), and units with quarter-acre canopy gaps. Some of the fuels reduction treatments would occur in late spring, and may cause some localized disruption of nesting on about 328 acres for both action alternatives, for one season. The forested and open ecotonal habitat characteristic throughout the project area should be attractive for use by a variety of avian species (Gilbert and Allwine 1991). There are no direct or indirect effects associated with connected actions.

The black-throated gray warbler, one of the two focal species for this habitat type is associated with overstory deciduous trees and the other, Hutton's vireo is associated with the understory shrubs. These species can be highly associated with this forest condition if there are deciduous canopy trees and deciduous subcanopy/understory shrubs present. The stands proposed for thinning are even-aged Douglas-fir trees, single-layered and closed-canopy with little or no understory development or deciduous canopy trees.

Hutton's vireo is a resident species that breeds throughout coniferous forest in western Oregon and Washington, primarily below 2,000 feet elevation and predominantly in coastal forests. A light thinning that allows for understory development yet retains a relatively dense overstory would provide suitable habitat for this species (PIF 2000). The proposed thinning of 762 acres to 70-90 trees per acre would have immediate direct benefit this species with the development of a shrubby understory while still providing a relatively dense overstory canopy. Stands lower down in the drainage thinned with a similar prescription in the late 1980s are still providing a robust deciduous understory.

Approximately 474 acres would be thinned to 40 to 60 trees per acre; this thinning would reduce the existing canopy closure to a range of 35 to 47% canopy closure outside the no-thin area (see Forest Vegetation, Direct and Indirect Effects). This reduction would have immediate direct adverse effects to this species. The current canopy closure averages 65%, with an expected two percent gain (Chan 2006) in canopy closure per year after thinning. It would take approximately 10 years before the canopy would regain its current condition. Within that time the stand would be expected to have a well developed understory of deciduous shrubby species favoring the Hutton's vireo.

The black-throated gray warbler is a long-distance, neotropical migrant that breeds throughout coniferous forests of western Oregon and Washington, primarily at low to moderate elevations (<3,500 ft). It is most abundant in young (40-80 years) stands with broadleaf trees (Gilbert and Allwine 1991). In Douglas-fir/oak dominated forests at the interface of the Wouldamette Valley and Oregon Coast Range, it is highly associated with areas of relatively high oak cover (Morrison 1982). Abundance was positively associated with California hazel cover and density of conifers in 40-55 year-old managed stands in the central and northern Oregon Coast Range (Hagar et al. 1996). In southwestern Washington Cascades and Coast Ranges south of the Olympic Peninsula, it was more abundant along riparian corridors of 3rd and 4th order streams than adjacent uplands (PIF 2000). At the landscape level, abundance was negatively correlated with amount of unmanaged late-successional forest in the landscape in the southern Washington Cascades (Lehmkuhl et al. 1991). Like the vireo, it also is more abundant in unthinned (198 trees/ac) than moderately thinned (146 trees/ac) 40-55 year-old Douglas-fir stands 5-15 years post-harvest in managed stands in the central and northern Oregon Coast Range (Hagar et al. 1996). The conservation plan for this species is to retain deciduous trees and/or conduct thinning to open-up the canopy and

allow for development of deciduous trees where appropriate (e.g., wet sites). Thinning should occur in patches and be variable-spaced rather than uniform to minimize negative effects of reduced overstory canopy closure by maintaining some areas with high canopy closure. (e.g., riparian no-cut buffers).

The Layng Creek watershed supports few deciduous trees, and where small stands occur they are consider a unique feature/habitat. Douglas-fir/oak dominated forests occur outside the District boundary, interfacing with private ownership. Most of the deciduous trees are located within the floodplain of Layng Creek, with a composition of bigleaf maple, black cottonwood, red alder and Oregon ash. Red alder and Oregon ash are found in wet slumps dispersed throughout the watershed, and clumps of chinquapin and red alder can be found in upland areas. Within this watershed deciduous trees can be prominent during early seral development, but may only exist for fifty to sixty years because Douglas-fir out compete and overshadow them. Thinning of Douglas-fir can temporarily maintain their presence, if they are not destroyed during harvest, or if they are included as a dominate tree in a created gap. Thinning accelerates the growth of Douglas-fir by reducing competition between them. Accelerating the growth of Douglas-fir ultimately has an adverse affect on existing hardwoods trees within the stand. The proposed thinning of 762 acres to 70-90 trees per acre may have some benefit to this species. Provided existing deciduous trees are not destroyed during harvest they should also benefit from thinning adjacent trees. The benefits of thinning are expected to be of short term (10 to 20) years, the ¼ to ½ gaps would begin to close in by that time and Douglas-fir trees would begin to over shadow deciduous hardwoods trees within the stands. Thinning to 40 to 60 trees per acre with gaps on 474 acres would afford a greater opportunity for deciduous hardwoods trees to be maintained within the stand and may provide for suitable habitat in the future after a component of the canopy closure regains it self.

Hayes et al. (2003) and Hagar et al. (2004) have recorded declines (but not extirpations) in both black-throated gray warblers and Hutton's vireo after commercial thinning. Therefore, it is assumed that the action alternatives would likely cause short-term declines in these species over the next 5 years, because timber harvesting and fuel reduction treatments would have a physical negative impact on deciduous shrubs and trees shortly following the treatments. Over time, however, shrubs and trees would respond positively to the more open and less dense stand conditions and begin to recover, eventually taking up a larger percentage of the stand. As this recovery occurs, it is expected that both these species would benefit and begin to increase in local numbers over the next 20 years. To help mitigate the short-term impact, deciduous hardwoods trees would be retained in the silvicultural marking guide as feasible.

Direct Effects from Disturbance

Some proposed activities would likely occur during the breeding season for these species. Direct effects from logging activity on nesting birds may cause some localized disruption of nesting on 1,236 acres for one or more breeding seasons. There is an expected negative effect from habitat modification such as temporary loss of some potential nesting habitat, or disturbance such as temporary displacement of individuals or their prey from prescribed burning and harvest activities. The number of individuals or species potentially affected by proposed activities is unknown and is considered unquantifiable without reliable survey data and a known/restricted activity

implementation plan. The proposed harvest activities from this project should not affect this group of species such that their ability to persist in the vicinity of the project area or throughout their ranges would be compromised.

Cumulative Effects

Given the broad geographic range of some of these landbird species, it is difficult to determine the cumulative impact this project would have on them. However, the action alternatives provide direct and indirect effects that are consistent with landbird conservation management strategies and would improve habitat conditions, perhaps helping to offset the declining trends for four of the six landbirds listed in Table 21. The foreseeable future activities in Layng Creek that would impact landbird habitat on federal land are similar to this project in scale and impacts (e.g., Doris Thinning). Forest management on private industry lands would continue to provide habitat for younger forest species and grass/forb/shrub species.

MANAGEMENT INDICATOR SPECIES

The Umpqua National Forest Land and Resource Management Plan (LRMP) (USDA, Forest Service 1990) has identified a number of terrestrial wildlife species with habitat needs that are representative of other wildlife species with similar habitat requirements for survival and reproduction. The LRMP identified the following species/groups as management indicator species (MIS) for various forest habitats: northern spotted owl, bald eagle, peregrine falcon, Roosevelt elk, black-tailed deer, pine marten, and pileated woodpecker and primary cavity excavators. The northern spotted owl, pine marten, and pileated woodpecker represent mature and old growth conifer habitats. Primary cavity excavators represent the dead and defective tree habitat. Big game winter range is represented by Roosevelt elk and the black-tailed deer. The bald eagle and peregrine falcon are sensitive species that require special management; however, they are not present in the planning area and this project does not impact their habitat; therefore, they are not discussed further. Effects to northern spotted owls are discussed under the sensitive species section and are not repeated here. The planning area is located in the lower elevations of the forest. Pine marten occur in the higher elevations and true-fir, mountain hemlock and lodgepole pine forest types; therefore, the pine marten are not discussed further.

PRIMARY CAVITY EXCAVATORS

Primary cavity excavators are defined as bird species that actually construct, forage, or create nesting cavities in snags and large trees.

Relevant Standards and Guidelines

Several Forest Plan standards and guidelines apply to primary cavity excavators and snag habitat. Most of the relevant ones that apply to this project have already been listed under the Coarse Woody Debris section. An additional standard and guideline required the Forest to manage for a 60% potential population capacity (PPC), which provides an indicator of the number of cavity-nesting species likely to be present on the Forest in comparison to the Forest's total potential (USDA, Forest Service 1990).

Watershed Analysis Recommendations

Refer to the Coarse Woody Debris section for relevant watershed analysis recommendations.

Existing Conditions

Habitat for primary cavity excavators such as woodpeckers and sapsuckers consists of dead or defective trees (snags) of the proper size and in adequate numbers to support breeding birds. It was believed that these birds would survive on the Forest if at least 20 percent of the potential habitat is retained and well distributed across the Forest (USDA Umpqua NF 1990). The Oregon Department of Fish and Wildlife criterion for Forest planning suggested a 60 percent level for snag habitat. More recent information suggests higher levels are needed (Mellen et al. 2005). The primary cavity excavators found in the planning area and surrounding forest are listed in Table 22 along with monitoring trends from local and regional breeding bird surveys (Sauer et al. 2005).

Table 22. Primary cavity excavators and population trend data.

Primary Cavity Excavators	PPC S&G	Population Trends (1992-2004)		
		Winberry[3]	Warner Mtn[4]	Cascades
Red-breasted Sapsucker	.27	Decreasing	Increasing[1]	Stable[2]
Hairy Woodpecker	1.15	Increasing	Decreasing	Stable[2]
Northern Flicker	.29	Increasing	Decreasing	Stable[2]
Pileated Woodpecker	.04	Increasing	Decreasing	Increasing[1]

[1]Statistically significant ($p<0.05$)
[2]Stable is considered a <2% change per year
[3]This 26 mile breeding bird survey route is located about 12 miles north of the planning area.
[4]This 24 mile breeding bird survey route is located about 14 miles southeast of the planning area.

Hagar et al. (2004) recorded increases in population density of red-breasted sapsuckers and hairy woodpeckers associated with heavy thinning on the Willamette National Forest. Hayes et al. (2003) noted a three-fold increase in hairy woodpeckers within five years following similar commercial thinning treatments in the Coast Range of Oregon. The reasons for these increases may be related to the attraction of these species to trees damaged during thinning (Hagar et al. 2004). Both species can utilize smaller diameter trees. Bate (1995) found both species mostly using >18” dbh hard snags; populations declined in densely stocked conifer stands with small (<10” dbh) trees. Pileated woodpeckers are mostly associated with late-successional forest and primarily use larger snags than exist in the proposed units.

Direct and Indirect Effects

The direct and indirect effects to primary cavity nesters were analyzed at the planning area scale. The actions that have the largest direct effect on primary excavators would be thinning and snag creation. The indirect effects are the long-term changes in future snag recruitment caused by both thinning and inoculations. These indirect effects would occur over the next 100 years as the stands develop into older forests.

Alternative One would maintain snag levels in smaller diameters and at higher densities (Figure 4). Larger diameter snags would develop more slowly, and would not reach appropriate levels for another 20 years. The action alternatives would cause a slight decrease (estimated one to five per acre) in small diameter snags through timber harvesting impacts. Timber harvesting and fuels treatments would also damage some remaining trees, creating some new snags (estimated at three to six snags per acre). Snag models estimate that small snag levels (Figure 4) would remain above the 30% tolerance levels as recommended in DecAID. Large snags would develop more slowly than the no action alternative and would not reach levels recommended by DecAID for another 30 to 50 years.

Inoculation of a native heart rot fungus (Phellinus pini or Fomitopsis spp.) of two to five trees per acre would help accelerate this process. These changes in snag levels would have very little negative effects on primary cavity excavators because they maintain adequate numbers of snags in the short and long term. Based on recent research (Hayes et al. 2003, Hagar et al. 2004), populations of red-breasted sapsuckers and the hairy woodpecker are expected to increase after thinning. The creation of gaps would also benefit the northern flicker because this bird primarily feeds on the ground in open areas and forest edges (Elchuk and Wiebe 2003).

Pileated woodpeckers are the largest woodpecker in the Pacific Northwest (17") (Sibley 2000) and prefer mature to old growth stands (>70 years) (Bull and Meslow 1977). Across their range, pileated woodpeckers use a variety of tree species for foraging and nesting. On the west side of the Cascades, they prefer large diameter (>20") conifers.

The pileated woodpecker would be indirectly affected by the thinning and inoculations because these actions would change the rate of large snag recruitment over time (Figure 5). The thinning prescriptions and inoculation in the action alternatives would achieve desired late-successional forest structure more quickly than the no action alternative section (refer to Forest Vegetation section). There are no direct or indirect effects associated with connected actions.

Cumulative Effects

Currently the Oregon Natural Heritage Program (ONHP), The Nature Conservancy (TNC), and the Oregon Department of Fish and Wildlife (ODFW) show the status of the pileated woodpecker to be secure, which suggests that the changing trend in timber management (that has occurred within the past decade and projected for the future) may positively influence occupancy of suitable habitat by this species as previously harvested stands redevelop, and more emphasis is placed on retention of key structural components in unharvested stands (USDA 1985, USDA 1994).

The local and regional cumulative population trend data for other primary cavity excavators do not indicate a major problem with those populations. The planning area is roughly located between the Winberry and Warner Mountain Breeding Bird Surveys (BBS) routes; decreasing trends in one area is offset by increasing trends (Sauer, et al. 2005) in the other, suggesting stable populations in this area. The only "statistically significant" documented (Sauer, et al. 20050 trends are local increases for red-breasted sapsuckers and regional increases for pileated woodpeckers (Table 24**)**.
The trend in clearcut harvesting on federal forest lands that caused the concerns for decreasing populations of primary cavity excavators has largely been halted (or at least dramatically decreased) by the NWFP. Now, about 50% of the federal forests in this

area are in a reserved land allocation. The primary type of timber harvesting occurring on the Umpqua National Forest and surrounding federal lands is commercial thinning, with mitigations for snag recruitment. The action alternatives would help to offset the past effects of timber harvesting and fire exclusion in this area by accelerating forest succession. Activities proposed by this project include measures that maintain and protect habitat components important to the group of cavity excavators listed as MIS. Implementing project activities as proposed would result in no additional cumulative effect on these species such that their ability to persist within the project area or throughout their ranges would be compromised. Given the current standards and guidelines and management approach to timber harvesting in this area, populations of primary cavity excavators are expected to stabilize and increase in the foreseeable future.

ELK AND DEER - BIG GAME WINTER RANGE

Certain areas of the forest were identified as big game winter range under the Umpqua LRMP (USDA, Forest Service 1990). Designated as "Management Area 11", these areas were designed to provide for big game winter range habitat and timber production consistent with other resource objectives. They emphasize winter range management achieved through forage and cover production on land used or suitable for occupancy by deer and elk. Timber harvest is encouraged to provide stable production of forage and cover. A habitat ratio of 60% forage to 40% cover was once considered optimum for winter range (Thomas et al. 1979, Brown 1991), but more recent studies suggest smaller ratios may be suitable as long as the interspersion of forage and cover is good (Jones 1991, Larkin et al. 2004). Ultimately however, forage is the most limiting factor.

Relevant Standards and Guidelines

The 1990 LRMP has several standards and guidelines that apply to elk and deer (big game) winter range. The relevant ones that apply to this project include the use of a habitat effectiveness[40] model ("A Model to Evaluate Elk Habitat in Western Oregon" or similar model) to compare the impact of various alternatives on big game habitat (LRMP IV-38) and direction for management of deer and elk winter range areas described in Forest Plan Prescription C4-I.

Existing Conditions

The planning area makes up about .006% of the 1.2 million-acre Indigo Wildlife Management Unit (WMU). There are 2,606 acres of big game winter range within the planning area, Which accounts for about 38% of its total area. The current ratio of forage to cover in the planning area is 9.7:89.3. The trend in forage is decreasing due to a shift away from clearcut timber harvesting. The trend in cover is increasing as old clearcuts grow back into forest.

Currently there is a small herd of elk that utilize the area west of Junetta Creek, and a small herd in the Herman drainage that utilizes a portion of the planning area east of Junetta Creek. There appears to be adequate forage for the current number of animals. Past management closed and seeded roads to assist in controlling erosion, inadvertently providing forage and security for these animals. Because of these roads, and nearby past harvest units, forage has not been an issue. However, recent stem exclusion within

40 HEI is an index of elk habitat quality ranging from 0-1, where 0 = non-viable habitat and 1 = optimal habitat (Wisdom et. al. 1986).

the old harvest plantations and the lack of recent timber harvest and fire activity may, in the future, result in concerns as to the adequacy of forage for this species.

Deer sign was readily noticeable throughout the planning area. The same benefits derived from past management for elk also benefited black-tail deer. Deer tend to be more solitary, prefer heavier cover, and forage on more shrubby species, whereas elk prefer more open habitat composed of grasses and forbs.

Habitat for both species is greatly enhanced either by natural events or management activities that provide cover and forage in close proximity.

Direct and Indirect Effects

The direct and indirect effects to big game winter range were analyzed at the planning area scale.

Alternative One (no action) would maintain the current forage-to-cover ratio and the declining trend in forage habitat. Alternative One would result in poorer future forage habitat and winter range conditions compared to the action alternatives.

Under both action alternatives, the largest effect would be the creation of the ½-acre gaps and forage seeding of temporary roads and helicopter landings for a total of approximately 31 acres. The forage-to-cover ratio would increase slightly to 10:90. This would change the interspersion of forage and cover for the next 10-20 years, resulting in a slight improvement of habitat effectiveness from 0.79 to 0.80 (which is highly viable or very good habitat). This improvement on the spatial arrangement of forage located within areas of cover would have a beneficial effect on elk and deer.

The smaller ¼-acre gaps were not considered to be large enough to be defined as forage habitat. These smaller gaps together with the thinning that surrounds them would modify the stand's structure enough to slightly increase the amount of forage plants in the understory, but would retain enough trees (40 to 90 trees per acre) to qualify as cover. Both thinning and small gap creation would increase the amount of sunlight to reach the shrub/forb/grass component of the harvested units. The effect of this is increased production of elk and deer forage over the next 10-20 years, which would then begin to decline as the gaps and stands begin to develop larger trees and tree crowns begin to expand and close in again. The action alternatives would result in an overall increase of forage on about 1,240 acres, or 18% of the planning area. This would in turn provide a beneficial indirect effect on the health of deer and elk herds within the planning area.

This project has the potential to substantially improve forage habitat at a local scale based on the diversity of native forage currently present, and in the long-term would provide forage in gaps and heavy thinned areas. Beneficial effects to big game forage from proposed thinning should not be overrated, however. The expected gain on winter range associated with a project that is relatively small in size should only be recognized for the local benefits provided to a limited number of animals. The effects should not be used to suggest the potential for any noticeable population response unless applied to the landscape at a scale greater than proposed by this project.

Roads affect how elk and deer use their range (Rowland et al. 2004, Wisdom et al. 2005). There are approximately 39.2 miles of open road within the planning area; the current open road density is 3.92 mi/mi^2. This equates to a marginal habitat (or low

quality) effectiveness road index rating of about 0.20. Alternative Two would build an additional 0.24 miles of permanent system road. Alternative Three would build no new system roads. The proposed road is not located within a designated winter range area (MA-11). This new system road would be blocked following the harvest since future use would not occur for more than a decade. Therefore, the action alternatives would not cause a change in open road densities, and the influence roads would have on winter range habitat is neutral.

Direct and indirect disturbance effects are largely limited to potential temporary displacement of individuals occurring in habitat during implementation of proposed activities. There are no direct or indirect effects associated with connected actions.

Cumulative Effects

The cumulative effects of this project are analyzed at the WMU-scale, for that portion that is National Forest land.[41] This is the spatial scale at which elk populations are monitored by Oregon Department of Fish and Wildlife. At this scale, about 52% of the Federal Forest Land is in a reserved land allocation (e.g. late-successional reserve land allocation), and clearcut harvesting within this allocation is not expected to occur in the foreseeable future. This suggests a continued decline in the amount of forage habitat within this WMU over the next one to two decades. Most of the larger patches of forage habitat would occur on private forest land and be concentrated in the southeastern third of the WMU, although there are two 7,000-10,000-acre private forest in-holdings in the eastern portions of the WMU. In the Layng Creek subwatershed, it is reasonabe to assume that on private lands, up to 600 acres of clearcutting would occur in the next few years.

Thinning on federal forest lands (matrix and LSR) that are similar to the proposed action would likely occur over the next one to two decades at a scale of about 1,000 to 3,000 acres per year. This would provide small, incremental additions of forage in the form of small gaps, and an improvement of understory forage vegetation similar in scale to this project. Given the past, present and foreseeable actions, the direct and indirect effects of the action alternatives (when cumulatively added on to foreseeable future actions) would not be enough to stop the declining trend in forage habitat and forage-to-cover ratios within the WMU.

SURVEY AND MANAGE WILDLIFE SPECIES/HABITAT

Species listed in Table 23 were compiled from the 2001 Annual Species Review (IM-OR-2004-034) and incorporates those vertebrate and invertebrate species whose known or suspected range includes the Cottage Grove Ranger District according to the following documents: Survey Protocol for the Great Gray Owl within the range of the Northwest Forest Plan v3.0, January 12, 2004; Survey Protocol for the Red Tree Vole v2.1, October 2002; Survey Protocol for S&M Terrestrial Mollusk Species From the Northwest Forest Plan v3.0, 2003. The following list includes category A and C species; there are no known category B, D, E, or F species to consider in this area.

41 This WMU contains about 700,000 acres of National Forest Land and 135,000 acres of BLM-managed forest and is located in the western Cascades east of Interstate 5, south of State Highway 58 and north of State Highway 138.

Table 23. Survey & Manage Wildlife Species Known or Suspected on the District

Species	S&M Category[42]	Survey Triggers			Survey Results			Site Management
		Within Range of the Species?	Project Contains Suitable habitat?	Project may negatively affect species habitat?	Surveys Required?	Survey Date (month/year)	Sites Known or Found?	
Vertebrates								
Great Gray Owl (*Strix nebulosa*)	A	Yes	No	No	No	NA	NA	NA
Red Tree Vole (*Arborimus longicaudus*)	C	Yes	No	NA	NA	NA	NA	NA
Mollusks								
Crater Lake Tightcoil (*Pristiloma arcticum crateris*)	A	Yes	Yes	No	No	No	No	NA

Pre-disturbance surveys and management of known sites required by protocol standards developed to comply with the 2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines were either completed or not required for the this project.

Relevant Standards and Guidelines

Survey and manage is a standard and guideline within the NWFP that is intended to mitigate impacts of land management actions on species that are closely associated with late-successional or old-growth forests, and whose long-term persistence is a concern. It includes 1) surveys prior to ground-disturbing activities, 2) management of known sites, and 3) regional strategic surveys.

Habitat-disturbing activities requiring surveys and management of sites are defined as those disturbances likely to have a 'significant negative impact' on the species' habitat, its life cycle, microclimate, or life support requirements (USDA/USDI 2001). The evaluation of the scale, scope, and intensity of the anticipated negative impact should include an assessment of the type, timing, and intensity of the disturbing activity.

Line officers determine the need for surveys and management based on site-specific information that considers the probability of the species being present on the project site, as well as the probability that the project would cause a 'significant negative effect' on the species habitat or the persistence of the species. There are three criteria for determining the need for pre-disturbance surveys (USDA/USDI 2001):

1. The proposed activity (project) is within the known or suspected geographic range of the species;
2. Suitable habitat that may potentially contribute to a reasonable assurance of persistence occurs within the proposed project area (ROD S&G, p 23); AND

42 Refer to ROD, UDSA 2001, for definitions of categories.

3. The proposed activity has the potential to a "cause 'significant negative effect on the species habitat or the persistence of the species at the site" (ROD S&G, p 22).

If all 3 of these criteria are met, then pre-disturbance surveys should be conducted following the guidelines established in survey protocols.

GREAT GRAY OWL

Nesting habitat for great gray owls are characterized as mature stands of timber with more than 60 percent canopy closure (Bull and Henjum 1990). Nesting suitable habitat includes large diameter nest trees, forest for roosting cover, and proximity [within 200m] to openings that could be used as foraging areas (Survey Protocol for the Great Gray Owl within the range of the Northwest Forest Plan v3.0, January 12, 2004). Bull and Henjum (1990) recorded an average nest snag diameter of 31" DBH.

Initially thought (in 1993) to be restricted to elevations above 4,000 feet, they are now found in western Oregon as low as 500 feet. They prey primarily on voles and pocket gophers that inhabit meadows or other grass/forb openings. The nearest known site is located about 1.5 miles north of the planning area near the summit of Mount June (4,600 ft. elevation).

The proposed harvest units are young plantations that are approximately 50 years old and have no remaining suitable nesting habitat structure (large trees/snags) that meets the definition of habitat.

Direct and Indirect Effects

Skyline logging of some units would require falling about 39 guyline trees in adjacent mature forest and six trees at a helicopter landing that meets the current definition for nesting habitat. However, none of the proposed areas for guyline trees are located within close proximity (¼ mile) to natural openings > 10 acres.

No surveys were conducted for the great gray owls for this project because proposed activities would not have ''significant negative impact'' on the species' habitat, its life cycle, microclimate, or life support requirements. Because the proposed project would not effect large trees, snags, or mature forests that are near suitable meadow habitat, there would not be a negative effect on the owl's nesting habitat. Further, there would be no impacts to meadow habitats; therefore, there would not be ''significant negative impact'' to foraging habitat. There are no direct or indirect effects associated with connected actions.

Criteria Summarization

The following lists the results for the three criteria used to determine the need for pre-disturbance surveys for this species:

Criteria 1 = Yes.

Criteria 2 = No. Units are clearcut plantations (approximately 50 years of age) and do not meet the definition of habitat.

Criteria 3 = No. Indirect effects are beneficial.

Based on these criteria it is determined that the action alternatives would not cause a 'significant negative effect' on the great gray owl's habitat or the persistence of the species in the planning area. Therefore, surveys were not conducted for this project.

Cumulative Effects

Cumulative impacts are analyzed at the scale of Layng Creek. Little is known of numbers or changes in great gray owl populations in Oregon. There is no evident population decline in the vast majority of the range, but actual population data are lacking for many areas (NatureServe 2005). It was assumed to be declining because of loss of required habitat (Scheuering 2002). Trends in late-successional forest in Layng Creek are locally stable to increasing. Given the lack of impacts to forest within proximity of large natural openings and the low density of known owl sites in Layng Creek (only one site), this project would not provide cumulative impacts to great gray owl habitats in this area.

RED TREE VOLE

The Oregon red tree vole is endemic to moist coniferous forests of western Oregon and extreme northwest California. Its known and suspected range extends from the Columbia River south through western Oregon, and the Siskiyou Mountains south to the Salmon and Klamath Rivers in northern California. Active nests have been found in remnant older trees in younger stands, indicating the importance of legacy structural characteristics (Biswell et al. 2002).

The proposed harvest units are clearcut plantations and do not meet the definition of mature/old growth forest nor do they contain remnant older trees.

Direct and Indirect Effects

The no action alternative would have no direct impact on the red tree vole because no trees would be cut.

The action alternatives would fall small diameter trees within approximately 50 year-old clearcut plantations. They do not meet the definition of mature/old growth forest, nor do they contain remnant older trees. However, skyline and helicopter logging of some units would require the need to fall about 45 trees in adjacent mature forest which does meet the current definition for red tree vole habitat. There would be from two to four guyline trees per yarding tower, and landings would be spaced along existing or temporary roads. The trees would be within 100 feet of the stand's edge and in most cases range from 16-20 inch dbh. These trees would be scattered across the planning area in five different locations.

Some of these larger felled trees might contain red tree voles (nests), but the scope of this is small. The action alternatives would impact <1% of forest stands that meet the current definition of red tree vole habitat. Thinning plantations would provide indirect benefits to this species by accelerating the development of future habitat (as described in the forest vegetation section) and also by improving crown development of leave trees within the stands. There are no direct or indirect effects associated with connected actions.

Criteria Summarization

The following lists the results for the three criteria used to determine the need for pre-disturbance surveys for this species:

> Criteria 1 = Yes, within the Northern Mesic Zone.
>
> Criteria 2 = Yes. The units are clearcut plantations and do not meet the definition of habitat. However, skyline and helicopter logging of some units would require the need to fall about 45 trees in adjacent mature forest that meets the current definition for red tree vole habitat.
>
> Criteria 3 = No. The impact of falling 45 trees is not expected to cause a major change to the stand's canopy strata, as it occurs along the stand's edge. Given the scale of the impacts, it would not cause a major change to the stand's structure. Guyline trees, tail holds and lift trees are identified as examples of activities that might be exempt from pre-project surveys in the red tree vole survey protocol (v2.1).

Based on these criteria it is determined that the action alternatives would not cause a measurable negative effect on the red tree vole's habitat or on the persistence of the species in the planning area. Therefore, surveys were not conducted for this project.

Cumulative Effects

The cumulative impacts to red tree voles are analyzed at the Layng Creek subwatershed scale. The past clearcutting of 24,646 acres of habitat had the largest impact to this species. Even so, based on local surveys, red tree voles appear to be widespread in this and surrounding watersheds. They have also been documented to use older clearcut plantations.

This action alternative would cumulatively add to the 3,529 acres of past commercial thinning within the subwatershed that have caused similar impacts as described above. This and future commercial thinning would accelerate the development of future habitat and reduce the risk of future loss of habitat to wildfire by making the stands more fire resilient. Future clearcut harvesting on private land (est. 200-600 acres per year) would not impact habitat because this harvest is occurring in second-growth plantations. There is no future clearcutting expected to occur on Forest Service lands in the foreseeable future. Therefore, no cumulative impacts are expected to occur.

CRATER LAKE TIGHTCOIL SNAIL

This species is sparsely distributed throughout the Oregon Cascades at moderate to high elevations over 2,000 feet (Duncan 2004). Habitat is defined as perennially moist, mature conifer forests and meadows among rushes, mosses and other surface vegetation, or under rocks and woody debris within 33 feet of open water in wetlands, springs, seeps and streams. It generally occurs in areas which remain under snow for long periods in the winter.

Loss or degradation of wetland habitat leading to loss of populations at sites occupied by the Crater Lake tightcoil is considered to be the major threat to the species. Activities that compact soils or snow, disturb ground vegetation and litter, remove woody debris, alter temperature and humidity of the micro site, or alter the water table could be deleterious to the habitat of this species (Duncan 2004).

Direct and Indirect Effects

The direct and indirect effects are analyzed at the stand-scale. Alternative One has no impact on the species, since ground disturbing activities would not occur. Under the action alternatives, thinning and gap creation would open up the stands, allowing in more light and changing the microclimate of the understory. In order to minimize temperature and humidity fluctuations in perennial wet areas and maintain natural understory vegetation, organic litter and coarse wood debris on the ground, this project implements a minimum 50-foot non-harvest buffer along perennial streams and wetlands to avoid impacts to potential habitat. This design exceeds the Conservation Assessment recommendation for 33-foot buffers on perennial waters and would prevent impacts to the species from microclimate changes.

Three narrow (<15 foot wide) yarding corridors would be needed to cross at least one stream in Unit 18 with full suspension of second-growth logs. These yarding corridors may cause some indirect impacts, but since the corridors are narrow and are approximately 100 feet apart, they are unlikely to cause major changes in riparian stand structure or alterations to microclimates. Given the small-scale of this impact and the low probability that this species occurs in this area (it was not found during surveys), the impact is considered to be unlikely and minor. Implementing project activities as proposed should have no direct or indirect effect on these species such that their ability to persist within the project area or throughout their ranges would be compromised. There are no direct or indirect effects associated with connected actions.

Cumulative Effects

Cumulative effects are analyzed at the Layng Creek subwatershed scale. Given the low probability of this species occurring within the subwatershed (based on thousands of acres of surveys, resulting in no known sites) and the small-scale of possible impacts to microclimates associated with the riparian habitat, this project is not expected to add to past impacts (Table 6). In addition, given the low likelihood that this species occurs in the subwatershed, there are no reasonably foreseeable activities (Table 8) that would add to a cumulative effect to this species.

Criteria Summarization

The following lists the results for the three criteria to determine the need for conducting pre-disturbance surveys for this species:

> Criteria 1 = Yes
>
> Criteria 2 = Yes, in riparian areas adjacent to proposed thinning unit 18.
>
> Criteria 3 = No, because of implementation of no-harvest buffers of at least 50 feet in width, which are consistent with and exceed the Conservation Assessment for this species (Duncan 2004).

Based on these criteria it is determined that the action alternatives would not cause a negative effect on Crater Lake Tightcoil habitat or the persistence of the species in the planning area. Therefore, surveys were not conducted for this project.

In addition to being listed as a "Survey and Manage species", this species is also listed as a sensitive species. Based on the direct, indirect and cumulative effects, it is determined that the action alternatives would not impact this species.

THREATENED, ENDANGERED AND SENSITIVE WILDLIFE SPECIES

Regional Foresters are responsible for identifying and maintaining a list of sensitive species occurring within their Region. This list includes species for which there is a documented concern for viability in one or more administrative units within the species' historic range (FSM 2670.22, WO Amendment 2600-95-7). These species may require special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing.

The Forest Service Manual (FSM 2672.4) requires a biological evaluation to determine potential effects of proposed ground-disturbing activities on sensitive species. This evaluation analyzes the proposed action and the importance of potential adverse effects on the population or its habitat within the area and on the species as a whole. It makes recommendations for removing, avoiding, or compensating for adverse effects. It must include: (1) sensitive species that may be present; (2) identification of occupied and unoccupied habitat; (3) an analysis of the effects of the proposed action on the species or its habitat; (4) a discussion of cumulative effects; (5) a determination of no effect, beneficial effect, or may affect; and, (6) recommendations for avoiding or mitigating any adverse effects if needed.

A pre-field review was performed to determine which sensitive species are most likely to be impacted by the proposed alternatives. Table 24 lists Region 6 sensitive wildlife species relevant to the Curran Junetta Planning Area, summarizes the presence or absence and potential impacts on these species or their habitat within or adjacent to the proposed timber harvest units and ground disturbance areas.

This review is based on the latest documented survey and occurrence data, field reconnaissance, scientific literature review and GIS analysis. Impact or effect determinations are made for each species based on this review. If a substantial, measurable impact or effect is anticipated, further analysis and discussion of the direct, indirect and cumulative effects is provided in the following sections.

Table 24. Region 6 Sensitive Wildlife Species[43]

Sensitive Species	Is species or habitat in or adjacent to project?	Is there a conflict with implementation of the project to species or habitat?	Will the project impact individual or result in loss of viablity or trend?
Northern Spotted Owl *Strix occidentalis caurina*	Suitable nesting habitat adjacent and dispersal habitat within the project	Yes; see discussion.	Impact to individuals and habitat; NLAA - Consultation with USFW required.
Northern Bald Eagle *Haliaeetus leucocephalus*	No suitable habitat within or adjacent to project	No	The project would result in no effect to this species
Harlequin Duck *Histrionicus histrionicus*	Suitable habitat within perennial stream adjacent and within the project	Presence assumed; no conflict to species orhabitat with no cut protection buffers adjacent to streams and timing restriction	The project would result in no impact to species viablity
Peregrine Falcon *Falcon peregrinus anatum*	No suitable habitat within or adjacent to project	No	The project would result in no impact to species viablity
Black Swift *Cypseloides niger*	No suitable habitat within or adjacent to project	No	The project would result in no impact to species viablity
Pacific Shrew *Sorex pacificus cascadensis*	Suitable habitat adjacent to perennial stream/wet areas and within the project	Presence assumed; conflict to species and habitat	Project may result in death or injury to individuals but would not result in viabilty concerns
Fisher *Martes pennanti*	Suitable habitat in old growth stands adjacent to the project	No	The project would result in no impact to species viablity
Pacific Fringe-tailed Bat *Myotis thysanodes vespertinu*	Suitable habitat within and adjacent to project	Presence assumed; conflict to species and habitat	Project may result in death or injury to individuals but would not result in viabilty concerns
Southern torrent salamander *Rhyacotriton variegatus*	Suitable habitat within and adjacent to perennial stream/wet areas adjacent and within the project	Presence assumed; conflict to species and habitat	Project may result in death or injury to individuals but would not result in viabilty concerns
Foothill Yellow-legged Frog *Rana boylii*	No suitable habitat within or adjacent to project	No	The project would result in no impact to species viablity
Northwestern Pond Turtle *Clemmys marmorata marmorata*	No suitable habitat within or adjacent to project	No	The project would result in no impact to species viablity
Crater Lake Tightcoil *Pristiloma arcticum crateris*	Suitable habitat within and adjacent to project	Presence assumed; no conflict to species with protection buffers adjacent to perennial wet areas	The project would result in no impact to species viablity

43 Region 6 Sensitive Wildlife Species43 relevant to the Curran Junetta Planning Area; summarizes the presence or absence and potential impacts on these species and their habitat.

SOUTHERN TORRENT SALAMANDER

This species occurs in small, cold (usually 46º-55ºF), and clear, coniferous forest streams, springs and seeps with gravel-dominated substrates and low sedimentation (Nussbaum et al. 1983, Good and Wake 1992, Leonard et al. 1993). The upper elevation range on the Umpqua National Forest appears to be around 3,550 feet (local survey data). Usually, this salamander is not found more than a few meters away from streams (Nussbaum et al. 1983). However, observations of adults have occurred up to 165 feet from water (Good and Wake 1992, Vesely 1997). The southern torrent salamander is still present throughout its historic range, most of which has undergone large-scale road construction, timber harvesting and localized extirpations, and reductions in abundance are believed to have occurred (USDI, USFWS, Federal Register, 29 June 1995; USDI 2000).

No southern torrent salamanders were found during field reconnaissance. Other species of salamanders were found, however. (e.g., Pacific giant and clouded). The nearest known torrent salamander sites are located about five miles to the southeast in the Brice Creek subwatershed and five miles to the north in the Lookout Point Reservoir subwatershed, which is one of the northernmost watersheds in the salamander's range in the Cascades. Currently, there are no known sites within Layng Creek subwatershed, but they likely occur within it, primarily in unmanaged, late-successional forest streams.

Direct and Indirect Effects

The direct and indirect effects are analyzed at the stand scale. Harvest operation could occur all year long, therefore injury or death may occur to torrent salamanders that are dispersing or foraging outside of the 50 foot riparian buffer during wetter months. As stated previously, this salamander is associated with the aquatic environment and is not found more than a few meters away from streams, though adults have been observed up to 165 feet from streams when environmental conditions are favorable. The associated stream channels provide less than ideal habitat though; because of past impacts from logging the likelihood of their presence within the adjacent harvest stands is low. Indirect effects of the action alternatives are very similar to those discussed above for the Crater Lake tightcoil. The primary indirect effect would occur from the three yarding corridors that extend through riparian buffer within unit 18. Yarding through the riparian buffer would result in mechanical impacts from yarded logs, and would be minimized by full suspension of logs. Impacts are expected to be limited in scale, as stated above.

Alternative One would have no effect on the species, as no ground disturbing activities would occur. There are no direct or indirect effects associated with connected actions.

Cumulative Effects

The cumulative impacts to the southern torrent salamanders are analyzed at the Layng Creek subwatershed scale. Past harvesting of perennial stream shade occurred up until about the mid 1980's in the subwatershed (Table 6). This loss of stream shade contributed to elevated stream temperatures in planning area until it recovered. Alternatives Two and Three would protect the effective shade along perennial streams to avoid stream temperature increases and turbidity effects. Therefore, no cumulative temperature or turbidity effect that would impact the salamander's habitat would result from these action alternatives.

Determination of Impact

Considering the information above concerning potential direct, indirect and cumulative impacts, it is determined that the action alternatives "may impact individuals or habitat, but are not likely to contribute to a trend toward federal listing or loss of viability of the species" because of the small scale of disturbance caused by yarding corridors and the low likelihood that this species is present in the adjacent stream channels. The no action alternative would not result in any impact this species.

NORTHERN SPOTTED OWL (NSO)

Nesting, roosting, and foraging habitat (NRF) for the spotted owl is strongly associated with late-successional forests containing large conifers with broken tops or cavities for nesting, multiple canopy layers for thermal regulation and protection from predation and adequate amounts of large dead wood on the forest floor to support populations of prey (Thomas et al. 1990). Recent studies have documented nesting and use of stem exclusion and younger mature second-growth forests (Irwin et al. 2000). Amounts of coarse woody debris and large-diameter trees in these forests influenced their use by owls. For this analysis, NRF habitat is defined as mature understory reinitiation and transitional old growth forests from the current vegetation map.

Large contiguous blocks of NRF habitat were believed to be necessary for nesting success and survival. In the western Cascades, a 1.2-mile radius circle around an owl activity center is often used to represent the owl's home range and 40% NRF within this circle (1,182 acres) was once considered the minimum acceptable amount of habitat for long-term owl survival. There are four historic owl activity centers within the planning area.

Areas critical to the recovery of the spotted owl called critical habitat units (CHUs) were designated under the Endangered Species Act by the US Fish and Wildlife Service in January 15, 1992 (FWS, 1992a). There is portion of designated CHU-OR-20 within the planning area. Approximately 379 acres are being proposed for treatment.

Critical habitat is defined as specific areas within the geographical area occupied by a listed species where physical or biological features (or primary constituent elements) are found that are essential to the conservation of the species and that may require special management considerations or protection. Also, critical habitat includes specific areas outside of the geographical area occupied by a listed species that may be essential for the conservation of the species. Primary constituent elements include, but are not limited to, 1) space for individual and population growth and for normal behavior; 2) food, water, air, light, minerals or other nutritional or physiological requirements; 3) cover or shelter; 4) site for breeding, reproduction, and rearing or development of offspring; and 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species. However, habitat designation may not include the entire habitat necessary for the recovery of a species, and therefore areas outside of designated habitat may also be important for a species' recovery (FWS, 2006).

Foraging and dispersal habitats may be in younger, more open and fragmented forests than those associated with nesting and roosting (FWS, 1992a). NSO feed primarily on small mammals, especially northern flying squirrels and wood rats in southwestern Oregon (citations in Anthony et al., 2006). Dispersal habitat for spotted owls satisfies

needs for foraging, roosting and protection from predators and is characterized by forests that have a minimum average tree diameter of 11 inches and greater than 40% canopy cover. Maintenance of dispersal habitat on a minimum of 50% of federal lands within a given area (e.g. quarter-township) is a conventional threshold for adequate owl dispersal conditions. The proposed harvest units are considered dispersal habitat.

Direct and Indirect Effects to Habitat

The direct and indirect effects are analyzed at the stand and planning acre scales. The action alternatives proposed to thin 1,236 acres of homogenous, even-age stands of Douglas-fir, in dispersal habitat. The proposed thinning and fuel treatments would change the condition of these stands. The immediate change would be a decrease in average canopy closure from about 65% to between 35-54%. The average stand tree diameter would remain above eleven inches dbh. The proposed thinning units would have two general prescriptions. Thinning on 762 acres would retain 70 to 90 trees per acre with a canopy closure ranging from 38 to 54 percent. These units would still function as dispersal habitat for the owls after harvest. Thinning on 474 acres would retain 40 to 60 trees per acre with a canopy closure ranging from 35 to 47 percent. After treatment over 76 acres of two of the proposed units (unit 11 and 1), the canopy cover would fall below the 40% threshold for dispersal condition. Unit 11 consists of approximately 27 acres with an estimated residual canopy closure of 35%. Unit 1, located in CHU OR-20, consists of approximately 49 acres with an estimated canopy closure of 39%. After treatment there is an expected gain in canopy closure of 2% per year (Chan, 2006). Therefore, canopy closure would recover to the 40% threshold for dispersal condition on these 76 acres in one-to-three years. Removing 76 acres of dispersal habitat would reduce the total amount of that habitat from 83% to 82.5% on federally managed lands within the planning area, which is above the minimum 50% threshold. However, the proposed silvicultural treatment is expected to accelerate the development of NRF habitat within the units within a few decades. Consequently, the proposed action would have an indirect beneficial effect to the spotted owl and critical habitat in the long-term.

The thinning prescription objectives did consider possible effects to the spotted owl when they were developed. Those considerations are discussed below.

Owl home ranges that had poor NRF conditions (less than 50% suitable NRF within 0.7 miles of an activity center and less than 40% suitable NRF within the 1.2 mile home range) retained 70 to 90 trees per acre with ¼ acre gaps in proposed units that are within 0.5 miles of an owl core. Twenty-six of those acres are within CHU-OR-20. The objectives for this prescription are to enhance prey diversity by creating gaps while retaining canopy cover sufficient to decrease susceptibility to air-borne predators, and by protecting foraging and owls dispersing from the activity center.

The gap–based approach to thinning would restore variable density in stands that are now generally homogeneous in structure and composition. Thinning and gap creation combined would accelerate the development of stand attributes that distinguish mature and late-seral vegetation by sustaining dominant tree growth. Thinning and gap creation also would invigorate the growth of the shrub layer and stimulate the growth of advanced understory trees (Tappeiner, 1997), and affect changes in species composition that would provide habitat for a variety of plant and animal species (Muir et al, 2002). Some plants and animals thrive in relatively open conditions, whereas others find desirable

habitat in relatively closed-canopy forests. The retention of remnant old trees, logs, hardwoods and un-thinned areas would enhance the diversity of habitats and microclimates.

Thinning units that retained 40 to 60 trees per acre were located in owl home ranges that had greater than 40% NRF and greater than 50% suitable habitat within 0.7 miles of the owl core or greater than 0.5 miles from the owl core.

Anthony and Andrews (2004) show that demographic parameters of survival and fecundity are affected by habitat. For example, Franklin et al. (2000) showed that survival was positively correlated with the amount of interior older forest habitat, and also concluded that owls in territories of higher habitat quality had greater survival during inclement weather than those in poorer quality habitat. Olson et al. (2004) and Anthony et al. (2002) have documented benefits of spotted owls using higher quality habitat. The objective for this prescription was to accelerate the development of NRF (refer to the silvicultural section for more details).

Three harvest units (units 3, 4 and 15) and one helicopter landing are directly adjacent to NRF habitat and in one case, a 100-acre owl core. Based on the proposed logging systems, approximately 45 trees (39 guyline trees plus 6 trees at the helicopter landing) in adjacent NRF would need to be felled for safety reasons. Six of the 39 guyline trees are within a 100 acre owl core and 24 are within CHU-OR 20. Trees felled within riparian reserves, CHUs or in the owl core would remain on-site to function as habitat. Some of the remaining trees may be collected and transported to Junetta Creek for instream placement for both fish and wildlife habitat. The guyline trees would range in diameter from 16-24 inches dbh. Use of old-growth trees would be avoided if possible.
Overall, guyline tree felling represents a minor direct degradation of NRF habitat at a limited scale. Guyline trees would not continue to function as potential nest or roost trees in these stands, but they would remain on site to serve as habitat for prey. Tree falling is an ongoing progression of natural ecological processes within spotted owl nesting, roosting, foraging and dispersal habitat. When these events occur naturally, small gaps are created in the forest canopy. Unless a nest tree falls or its exposure is substantially increased to the point of rendering a previously suitable nest cavity or platform unsuitable, the stand's ability to provide for spotted owl nesting is not typically measurably modified by these natural events. In an analysis conducted by US Fish & Wildlife Service's, they concluded spotted owl nesting density in relation to the density along roads/edges was low (page 60 of FY06-07 BO), and therefore there is a low likelihood that there would be any effects to breeding spotted owls from the removal of a nest tree. Affected stands are expected to continue to function as NRF following project implementation.

Direct and Indirect Effects to Prey Species

Foraging success for spotted owls may be optimal in stands with a mix of canopy gaps and patchy ground cover (Irwin et al. 2000). Additionally, foraging conditions may be diminished as prey species habitat is removed (snags, down wood and cover) or altered, making it more difficult for adults to successfully raise their young.
Dense, closed-canopy second-growth forest without structural legacies (large trees and snags) is poor habitat for owl prey species (Carey 1995, Carey and Johnson 1995, Carey and Harrington 2001). It is also poorly suited for owl roosting, foraging, or nesting (Carey et al. 1992). This period of low structural diversity can last >100 years (Carey et

al. 1999, Franklin et al. 2002) and can have profound effects on the capacity of the forest to develop biodiversity in the future (Halpern et al. 1999, Carey 2003). Although there is currently no positive proof that thinning has accelerated the development of spotted owl habitat, variable-density thinning holds some promise (Carey 2003). Some disturbance to prey habitat may improve spotted owl forage conditions. Removal of some tree canopy (as would occur as a result of harvest treatments associated with this proposed action) would stimulate the growth of forbs and shrubs which may, in turn, improve habitat conditions for other spotted owl prey species. Also, some minor changes in prey availability are likely because implementation of the action alternative would disturb prey habitat and cause animals to move around in the understory.

Over the long term there is not expected to be a measurable adverse effect to the spotted owl's prey base (See project file for in-depth discussion.).

Direct and Indirect Effects from Disturbance

It is expected that some disturbance activities would occur during the March 1 through September 30 NSO breeding season. Activities occurring after the critical breeding period (March 1 through July15) may disturb NSO but are not likely to disrupt NSO reproductive success. To reduce these effects, tree falling and yarding activities would be restricted to occur outside of the critical egg laying and incubation period (March 1 to July 15) in areas within close proximity to NRF habitat that have a moderate to high potential for nesting activity. The likelihood that a stand of NRF contained an owl nest was estimated by analyzing the amount of NRF habitat within concentric circles of two radii based on Swindle et al. (1999). In the western Cascades, the amount of NRF within 200m and 800m circles was found to be a good predictor of owl nest occurrence. Spotted owls more commonly nest in areas that have greater amounts of NRF within circles of these sizes (refer to Biological Assessment for more detail about this analysis). As a result of this analysis, timber harvest units (or portions of units) that are within close proximity to habitat that meet either of these spatial criteria are recommended for seasonal restrictions. Areas of NRF that do not meet these spatial criteria are assumed to have a low probability of nesting activity and thus harvesting activities in these stands would not pose a substantial threat to the northern spotted owl. Other site-specific information, such as topographic position, knowledge of local owl use, and proximity to roads was applied by the wildlife biologist to determine which timber sale units warranted seasonal restrictions. Thereore, the likelihood of a disturbance resulting in any meaningful consequence to spotted owls is minimal. Units that would have a seasonal restriction from March 1 to July 15 are:

- Unit 7,
- Unit 15,
- The southeast portion of unit 18, and
- The northeast portion of unit 19 east of the 1721 road.

Prescribed fire would be used to underburn/jackpot burn about 328 acres and pile burn approximately 455 acres in the proposed project. These areas would be burned over a period of days in the Junetta Creek drainage, which contains 4 owl cores. There is also unsurveyed suitable habitat immediately adjacent to these areas. It is not practical or desirable to place a March 1 to July 15 seasonal restriction on underburning. It is rarely dry enough to meet burn objectives in the winter (before March 1), and the risk of tree mortality and soil damage in the residual stand is high in the summer and fall (after July 15). Smoke associated with the proposed underburn represents a potential disturbance

effect to the species. There are no direct or indirect effects associated with connected actions.

Cumulative Effects

The cumulative impacts to spotted owls are analyzed at the Layng Creek subwatershed scale. Past clearcutting of habitat (24,646 acres of Forest Service, BLM and private land) has had the largest cumulative impact to this species by removing NRF habitat. Future clearcut harvesting on private land (est. 200-600 acres per year) would not impact NRF habitat because this harvest is occurring in second-growth plantations. Clearcutting is not expected to occur on Forest Service lands in the foreseeable future. The current trend for NRF habitat within the subwatershed is stable to increasing.

This action alternative would add to the 3,529 acres of past commercial thinning within the subwatershed that have caused similar impacts as described above. This and future commercial thinning would accelerate the development of future habitat and reduce the risk of future loss of habitat to wildfire by making the stands more fire resilient.

Effects Determination

After consideration of the direct, indirect and cumulative impacts it is determined that the disturbance related activities of the action alternatives "may affect, but are not likely to adversely affect" the spotted owl, its habitat (dispersal, CHU OR-20 and NRF) and associated prey species. The action alternatives would have a beneficial, indirect effect of accelerating the development of future NRF habitat and making the area more resilient to wildfire.

PACIFIC SHREW (Sorex pacificus cascadensis)

One of the largest shrews in the area, the Pacific shrew is found in humid forests, marshes, and thickets and though it is considered a riparian species (Gomez and Anthony 1998), it has been found as far as 70 feet away from stream banks (Anthony et al. 1987). It is more commonly found in early-successional forests than in stem-exclusion stands. The nearest documented occurrence of this species is approximately one mile to the south of the planning area. This species is believed to be well-distributed throughout the forest. Because surveys result in a high rate of mortality to this species, no surveys were conducted. It is assumed that this species occurs within the planning area.

Direct and Indirect Effects

The action alternatives would thin within 70 feet of streams. Because this species has been found as far as 70 feet from streams, direct impacts may occur to some individuals from logging and fuels reduction treatments (such as burning). Mechanical impacts from logging could also potentially impact down wood that this species uses. The mobility of this species would allow it to move to other areas with dead wood in the riparian corridors. Thinning would result in an increase in understory vegetation, followed by an increase in insects associated with this vegetation (Muir et al. 2002). This would improve the prey base for this species. The no action alternative would have no direct impacts, as no ground disturbing activity would occur. There are no direct or indirect effects associated with connected actions.

Cumulative Effects

This species seems to be adapted to stand disturbance because it is found more often in early-successional riparian forests than in older forests. The action alternatives would not have a major impact on this species or its habitat because of riparian buffers. This action alternative would cumulatively add to the 3,529 acres of past commercial thinning within the subwatershed that have caused similar impacts. However, because of its mobility and the application of no harvest buffers along many of the streams, no measurable cumulative impacts are expected to occur.

Impacts Determination

In considering the direct, indirect and cumulative impacts it is determined that the action alternatives "may impact individuals or habitat but are not likely to contribute to a trend toward federal listing or loss of viability of the species" because of the minor potential of disturbing this species during project activities. The no action alternative would not result in any impact to this species.

PACIFIC FRINGED MYOTIS

This bat is usually described as cave-dwelling (Verts and Carraway 1998, Cristy and West 1993). However, fringed myotis are known to roost in rock crevices, bridges, buildings, large trees and snags (Cross et al. 1996, Weller and Zabel 2001).

Weller and Zabel (2001) documented that habitat use by this species is influenced by the availability of large (>12 inch d.b.h.), tall snags for roosting. Preliminary data from a recent study in the central western Oregon Cascades (Arnett and Hayes 2002) suggests a similar response by *Myotis* spp. and also a numerical response related to snag and roost tree availability. Fringed myotis feed on insects along forest edges and stream corridors. It is an aerial forager, but is known to glean insects from foliage or the ground. Moths make up a large portion of their diet (Verts and Carraway 1998). There are documented occurrences of Pacific fringed myotis within the Layng Creek watershed.

Direct and Indirect Effects

Harvest activities in the action alternatives would cause disturbance to bats if they are roosting in or adjacent to the stands. There are approximately 45 mature trees that may be felled to assist in logging operation, and bats may be roosting in those trees at the time they are felled. Felling of trees or snags during logging operations may cause injury or death to roosting bats. However, trees/snags to be felled generally do not meet the description of typical roost trees. Most roost sites are described as large snags or trees with thick or loose bark or that provide cavities and have good solar exposure. The proposed thinning plantations lack large snag/trees. When selecting guyline trees, dominate trees should be avoided. The expected impact to bats should not be substantial. Although snags would be afforded protection during harvest activities, it is likely that some may have to be felled for safety reasons, or may fall accidentally from logging activities. The no action alternative would have no direct impacts.

Although thinning young-growth stands has been shown to not change moth abundance substantially (Muir et al. 2002), hardwood shrub densities were higher in thinned than in

unthinned young-growth stands, and these hardwoods (e.g., chinquapin and oceanspray) are important food sources for moths. Muir et al. (2002) recommend maintaining a variety of stand types and densities across the landscape to promote a diversity of plant species and associated fauna. All action alternatives meet this recommendation. Based on the available data, the action alternatives would not have a major negative indirect effect on the bat or its prey species. The no action alternative would have no indirect impact. There are no direct or indirect effects associated with connected actions.

Cumulative Effects

Cumulative effects are similar to those discussed in the coarse woody debris discussion. The scale of analysis is the Layng Creek watershed. There is a strong concern that loss of snags and large decadent trees from widespread conversion of old-growth forests to young, even-aged plantations in this region have reduced the availability of potential roosts for this and other bats (USDA/USDI 1994 – Appendix J2-49). The thinning (action) alternatives would accelerate development of large trees and future snags. Cumulative trends in late-successional habitat are positive for the watershed. Snag densities are expected to increase given current management on public forests. Levels of roosting habitat would remain limited on industrial forestlands. No action would prolong the time it takes to develop large trees and the closed canopies, which seem to limit bat utilization of habitat, would be maintained.

Impacts Determination

In considering the direct, indirect and cumulative impacts of the proposed action, it is determined that the action alternatives “may impact individuals or habitat but is not likely to contribute to a trend toward federal listing or loss of viability of the species”.

HERBICIDE USE AND WILDLIFE

Relevant Standards and Guidelines

Refer to the Botany and Aquatics sections for these standards and guidelines.

Existing Conditions

This section would discuss impacts of herbicide use to relevant Management Indicator Species (MIS), Region 6 Threatened, Endangered and Sensitive species (TES), Survey and Manage species, and landbirds suspected species within the Curran Junetta planning area.

Both action alternatives propose to use the herbicide glyphosate to eradicate false brome. Treatment would occur along approximately seven miles of the 1721 road and in a scattering of areas where there are known populations of false brome. Refer to the Botany section for complete project details.

There are several standard toxicity studies in experimental mammals that were conducted as part of the registration process and there is a large body of published information on the toxicity of glyphosate to mammals. The potential toxic effects in wildlife mammalian species most commonly seen are loss of body weight. As in

the human health risk assessment, the potential importance of non-specific toxic effects can be assessed from the available toxicity studies in mammals. Because toxicity data in mammals are available in few species of experimental mammals, the use of these data to assess the potential hazards to large number of diverse mammalian wildlife species is an uncertain process. Nonetheless, there do not appear to be any systematic differences among mammalian species, including humans, when comparable toxicity values are expressed in units of mg/kg/day. While the available data are limited, this apparent consistency among species diminishes concern with the use of data based on a limited subset of species to characterize risk for terrestrial mammals in general.

Glyphosate has been extensively tested for its effect on laboratory animals, primarily rats and mice and other mammals. These tests show none to very low toxicity. It has no major potential to accumulate in animal tissue and does not bioconcentrate in aquatic organisms or bioaccumulate in species in higher tropic levels. Glyphosate is poorly absorbed by the digestive tract and is largely excreted unchanged by mammals. In reproductive studies there was generally no developmental toxicity observed in the fetuses. Mammals fed glyphosate over a wide range of doses showed no cancer-related effects directly due to the compound (USDA, FS, 2006 Pacific Northwest Region Invasive Plant Program EIS and USDA FS 2003 Glyphosate, Human Health and Ecological Risk Assessment).

In addition to the laboratory bioassays or field observations on single species, there are a number of field studies that have assessed the effects of glyphosate on groups of terrestrial organisms, both animals and plants. These studies indicate that effects on terrestrial animals are likely to be secondary to effects on vegetation when glyphosate is applied at application rates comparable to or greater than those contemplated by the Forest Service. In some cases, the effects noted in filed studies appeared to be beneficial to some species under study. In most cases, the effects noted were changes in population density that reflected changes in food availability or suitable habitat (USDA FS 2003).

Concentrations of glyphosate in the soil immediately after application depend on the amount of material intercepted by target plant material, and are typically less than one ppm. It is strongly adsorbed by soil and has a low propensity for leaching. Glyphosate readily and completely biodegrades in soil, and the average half-life of glyphosate is about 47- 60 days. Microbes are primarily responsible for the breakdown of the product. Biodegradation in foliage and organic litter is somewhat faster. In field studies, residues of the herbicide can sometimes be found one to three years after application.

It is the surfactant used with glyphosate that determines the toxicity levels. The surfactant proposed for this project is derived from vegetable oils and is considered to be inert (Refer to the Botany section for complete project details). This is consistent with Standard Objective #18 from the Pacific Northwest Region's Preventing and Managing Invasive Plants Final Environmental Impact Statement (USDA Forest Service, 2005).

Because glyphosate is so tightly bound to the soil, little is transferred by rain to surface waters. One estimate showed less than two percent of the applied chemical lost to runoff; however, the herbicide could move when attached to soil particles in erosion run-off. In water, glyphosate is strongly adsorbed to suspended organic and mineral matter and is broken down primarily by microorganisms (USDA 1984). Its half-life in pond water ranges from twelve days to ten weeks (USEPA 1992).

Direct and indirect Effects

The herbicide glyphosate has been extensively tested regarding its effect on wildlife and has been found to be non-toxic to slightly toxic. These studies predict minimal risk to wildlife and their environment when the product is used according to label directions. The small spatial extent (approximately ten acres along six miles of roadside) of application and the limited time-frames (three annual applications) greatly reduce any impacts the proposed action may have to wildlife within the proposed project area. The first spraying would take place during the summer, followed by a second and third spraying the following summers. The second and third application would target plants or portions of plants that exhibit re-growth from existing seed bank. The extent and amount of the follow-up spray efforts is expected to be less after each application because of expected mortality to existing vegetation and the reduction in seed germination.

The application along the 1721 road crosses perennial streams ten times. A 25 foot no-spray buffer would be required along perennial stream channels. Application would occur during the dry summer months when road ditches are dry and chances of heavy rains are extremely low. Refer to the Aquatic and Botany sections for application details and mitigation measures that would reduce the risk of drift entering stream channels.

There is no expected impact to aquatic or terrestrial invertebrates. When tested at normal application rates, glyphosate was usually slightly toxic to non-toxic, and at most moderately toxic to terrestrial and aquatic invertebrates (e.g., insects, etc.) (Trumbo 2002 and Brooke 1993). Alteration of the vegetation following treatment can result in substantial change in habitats and has been shown to be a principal cause of changes in terrestrial invertebrate populations following glyphosate treatment. Laboratory tests (International Organization for Biological Control - IOBC) examined the effect of glyphosate herbicide on 18 species of beneficial insects and found it to be harmless to 13, slightly harmful to four and moderately harmful to one species. U.S. Environmental Protection Agency categorizes glyphosate as "practically non-toxic" to honeybees based on acute exposure studies (Palmer and Beavers 1997c; Palmer and Krueger, 2001a; Palmer and Krueger,2001b). In addition, studies are available on a relatively wide range of other terrestrial invertebrates including earthworms, isopods, snails, spiders, butterflies, and other terrestrial arthropods (USDA FS 2003 Glyphosate, Human Health and Ecological Risk Assessment). Study results have demonstrated that glyphosate has no adverse effect on soil microflora under normal conditions (EXTOXNET 2001). This project would result in a minor change in habitat condition and the duration of those impacts are likely less than one year.

There is no expected impact to predator species such as spotted owls, great gray owls or martens that prey on other species that may ingest contaminated vegetation from the application of glyphosate. Glyphosate does not bioaccumulate in small mammals and several studies on mice, rats and rabbits indicate that the expected levels of herbicide to be applied at these sites (< 3 kilogram/acre) would have no effect on prey species. Some small mammal species have been found to abandon areas treated with herbicides as a result of habitat changes. Species that require moist habitat (e.g., shrews) were temporarily reduced, whereas species that do not require moist habitat (e.g., deer mice) were not. Roadside generally provide minimal habitat attributes for wildlife, the effects of the proposed herbicide application to habitat and associated species are considered minimal and discountable. Bioaccumulation does not occur with glyphosate therefore no

indirect or cumulative impacts are anticipated for any species, which might consume prey from the treated areas.

In assessing potential effects in birds, the most relevant data for this risk assessment are the standard dietary and bird reproduction studies required for registration as well as the acute oral LD50 studies. The available toxicity studies do not suggest any specific or unique toxicity in birds compared to mammals. As in mammals, there is suggestive evidence that glyphosate may inhibit oxidative phosphorylation and consequently reduce food conversion efficiency. Other studies have shown short-term effects of herbicide application on clearcuts (large-scale habitat alterations) as a result of changes in vegetation, which in turn effects insect populations and prey abundance (Tu et al., 2001). Therefore, some short-term impacts (during the one-to-three year application period) may occur to a small segment of the local land bird population due to impacts in prey species that use edge habitat.

Although no direct application of herbicides is expected to the aquatic ecosystem and though spray drift is likely to be less than 30 feet, there is the possibility that some amount of herbicide may enter the aquatic ecosystem via surface erosion. In this event, some indirect and cumulative exposure of herbicides may occur to sensitive wildlife species such as the torrent salamander or other aquatic associated wildlife species. Studies of the toxicity of glyphosate to several species of amphibians indicate that it is slightly to practically non-toxic to amphibians using the general toxicity classification scheme designed by the U. S. Environmental Protection Agency. Glyphosate has also been tested to detect adverse effects on developing frogs (Frog Embryo Teratogenic Bioassay-Xenopus - FETAX). Results of this test demonstrated that glyphosate produced no effects on the normal development of larval frogs. In addition, the acute toxicity of glyphosate has been investigated in at least four other species of frogs including the leopard frog. Results of these tests indicate that no toxicity would result from proper use of the herbicide (Trumbo 2005). Based on this information (and the short half-life of the herbicide), no indirect or cumulative impacts are anticipated to amphibians species.

Roosevelt elk and black-tailed deer are likely to forage along the six miles of roadside where herbicide application proposed to occur. It is possible that big game may consume some of the herbicides sprayed. Projected effects to big game are essentially unquantifiable on an individual basis relative to the amount of habitat modified or disturbed (12 acres) against the amount available to these species on a daily basis in this species one-to-five mile home range. Glyphosate, when ingested by grazing animals, is quickly eliminated from the body, passing unchanged with the feces and urine. The amount per acre expected from the proposed application is less than three kilograms/acre (kg/ac). This amount is a small fraction of the quantities applied during studies (>25 kg/ac) that did not produce observable effects in grazing animals. It is highly unlikely that big game would be affected by the proposed action.

Cumulative Effects

The herbicide glyphosate has been extensively tested regarding its effect on wildlife and has been found to be non-toxic to slightly toxic. These studies predict minimal risk to wildlife and their environment when the product is used according to label directions. The proposed action is very limited in its spatial extent and duration (three applications, separated by a year, to a maximum of 12 acres along six miles of road). In addition, the

short half-life of the herbicide in the environment makes it unlikely that this proposed action would have any substantial direct, indirect or cumulative impacts or effects on Management Indicator Species, Survey and Manage species, landbirds, or federally listed or sensitive wildlife species or their habitat.

BOTANY

UNIQUE HABITATS

Unique habitats, also referred to as "special habitats", are small, highly localized plant communities that make up less than five percent of the Layng Creek Watershed (Layng Creek WA, 1995), and that are distinctive from surrounding coniferous forest. Examples include hardwood inclusions, forested wetlands associated with springs and seeps, dry to wet meadows, rocky balds, cliffs and rock outcrops. These sites are occupied by a wide variety of vascular plants, mosses, and lichens, and provide habitat for a range of wildlife species. Approximately 85% of the plant species diversity of the Western Cascades is found in these habitats (Hickman 1976), which make up approximately six percent of the Cottage Grove Ranger District land area. Management activities in unique habitats are guided by the Umpqua National Forest Plan as amended by the Northwest Forest Plan, and by policy and direction found in Forest Service Regulations.

Existing and Desired Conditions

There are approximately 158.7 acres of unique habitats scattered within the proposed units as outlined in Table 25 below**.** These areas were surveyed for rare species and noxious weeds during the spring and summer of 2005*.* Hazardous terrain prevented surveys of several steep rocky dry meadows in proposed unit seven. The unsurveyed areas contain seeps and other habitat features that are suitable habitat for the TES plant species *Romanzoffia thomsonii.* In the absence of suitable surveys, it is assumed that the habitat is occupied.

Mesic or moist meadows are generally herbaceous meadows of mixes of forbs, grasses, and sedges; however, these meadows may be dominated by shrubs as well. The soil is generally saturated or moist throughout most of the year. These meadows are often part of a larger landscape of meadow/conifer mosaic.

Dry bunchgrass and shrub meadows in the western Cascades have been described as "balds" (Chappel, et al. 2001). Unlike meadows or prairies, bunchgrass balds are typically on steep southerly aspects and have thin soils and scattered rock outcrops. Balds on the Ranger District are generally dominated by grasses, herbaceous vegetation, dwarf-shrubs, mosses and lichens. Although these areas may be moist in early spring, due to the thin soils and severe summer drought tree invasion is likely to threaten only the smallest bunchgrass openings. The bunchgrass balds are not considered as fire dependent as many other shrub or hardwood ecosystems (Chappell, et al. 2001, Kaye et al. 2004); however, historic wildfires may have maintained larger openings by preventing encroachment along the shaded margins of the meadows. It is assumed that decades of fire suppression have resulted in only the most shallow-soiled driest sites remaining open.

Table 25. Unique Habitat Types and Estimated Acres

Unique Habitat	Unit Location	Acres
Hardwood Inclusions	4,8,9,10,12,13,16,19,20,21	73.5
Dry bunchgrass/shrub meadows	2,3,4,7,8,10,18,20,21	43.1
Rock outcrops and cliffs	4,6,7,13,14,15,16,20,	21.7
Mesic to Moist Meadows (forbs and shrubs)	6,7,9,16,17,18,20	17.1
Wetlands	9,17,20	3.3
Total		158.7

The desired condition for special habitats is to minimize direct and indirect influence from project disturbance, and to maintain microclimatic and site conditions within the historical range of conditions. A large part of maintaining the integrity of special habitats is to preclude the introduction and establishment of non-native invasive weeds. The desired condition for the wetlands and wet meadows to maintain water tables so that the wet areas continue to function in keeping with objective #7 of the Aquatic Conservation Strategy.

Direct and Indirect Effects

Under Alternative One, no herbicide treatment of false brome would occur in the immediate future. There is a high risk of false brome invasion of the natural openings within the Curran and Junetta drainages. Seeds can be easily transported along roadsides and carried by wildlife into different habitats. False brome is considered a "super-invader" (Kaye 2001) and would quickly form monoculture stands replacing most native herbaceous species and native grasses within the unique habitats.

Alternative One could result in an increased of meadows acreage if a stand-replacing wildfire were to burn through the planning area. Without fire or other disturbance, natural succession in mesic openings (meadows and wetlands) is toward forest establishment and eventual canopy closure. Wildfire would hinder tree encroachment into existing meadows by killing young trees.

In contrast, wildfire would create vast areas of suitable habitat for invasive non-native plants. Presently, invasive non-native plants (including noxious weeds) are found along the roadsides throughout the planning area, and risk of spread to burned areas is high due to the seed dispersal capabilities of the weeds. These non-natives often out-compete and replace native plants, resulting in declines of wildlife habitat and reduction of biodiversity. Wildfires also consume the fragile cryptogrammic crust that inhabits the soil surface and rock faces of many of these meadows. The cryptogrammic crust community is important for nutrient cycling, nitrogen fixation, moisture retention, and vascular plant establishment. Recovery of an intact crust after disturbance may take a long time (> 50 years) due to the slow growth of the cryptogam layer. (Belknap, et al. 2001)

Potential impacts to unique habitats were carefully evaluated during the planning of the project, and design measures were developed to protect unique habitats from direct impacts in Alternatives Two and Three. Habitats would be buffered from physical

disturbance in these alternatives (Refer to Mitigation Measures in Chapter Two). The buffers are sufficient to protect the microclimate around the edges of the openings, minimize weed invasion, and minimize the risk of impacts from prescribed fire. Under a scenario of escaped prescribed fire in Units 1, 2, 4, 5, 8, 20, and 21, there is risk of direct impact to unique habitats if the fire is not contained within the buffers.

The existing water table levels in the wetlands would not be affected by the thinning since the wetlands would be buffered, and since the partial harvest of trees is not expected to change ground water levels to any measurable degree. Therefore, the action alternatives would be consistent with objective #7 of the Aquatic Conservation Strategy, which calls for the maintenance of water table elevation in meadows and wetlands.

Alternatives Two and Three could have a direct effect on the meadow unique habitats if a planned prescribed burn were to escape control. As mentioned above, depending on timing and intensity, a fire in these meadows could benefit the systems by removing built-up thatch, destroy invasive plants and their seeds, and retard tree encroachment. Possible adverse effects associated with fire, from burning too intensely and/or at the wrong time, could result in an increase in invasive plants and a decrease in overall biodiversity (Harrod and Reichard 2001). Creating stands that are more resilient to fire is likely to benefit some unique habitats, but may not hinder tree encroachment in meadows.

Cumulative Effects

The scope of analysis for cumulative effects to unique habitats is the Curran and Junetta Creek drainages. Past logging (Table 6) through and adjacent to unique habitats likely prevented or reduced the encroachment of trees into meadows by removing all the trees in the stand. Damage associated with logging and road building has occurred to vegetation, wildlife habitat, and soils in some or all of the unique habitats in these drainages.

Past logging of potential encroachment trees has been countered by decades of fire suppression, which has in turn lead to gradual succession of meadow area to forest. Past management activities have also been a major factor in the introduction and spread of invasive plants into unique habitats.

With the implementation of mitigation measures and connected actions, the cumulative effects of the action alternatives are projected to be beneficial. This overall beneficial effect is associated with prevention of future spread of high priority noxious weeds into unique habitats.

Aquatic Conservation Strategy

As disclosed in this section, no impacts to the wetlands or wet meadows are expected from any of the proposed activities in the action alternatives including road work, thinning, burning, and yarding activities. As such, the water tables associated with project's wet areas would not be affected so wet areas would remain wet, consistent with ACS objective #7.

INVASIVE PLANTS/NOXIOUS WEEDS

Invasive plant species are alien plants whose introduction do or is likely to cause economic or environmental harm, or harm to human health (USDA, Forest Service 2005). Noxious weeds are plant species designated as such by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, or being new or not common to the United States or parts thereof.

The health of native plant communities throughout the Pacific Northwest is at risk by noxious weeds and other invasive plants. Introduced plant species thrive in new ecosystems for various reasons including a lack of predators, change in disturbance regimes, adaptations for growing on nutrient-poor soils, and allelopathic (plants with natural pesticides) abilities. As a result, weeds are capable of out-competing native plants, ultimately altering the structure and lowering the diversity of native plant communities. The frequency of fire can also be altered in ways that are detrimental to natural ecosystems (Harrod and Reichard 2001). Further, different soil organisms predominate under different kinds of vegetation. Replacement of native plant communities with weed species can be expected to change soil microbial populations and nutrient cycling processes.

Weeds are introduced by a variety of agents, most notably highway and off-road vehicles, construction equipment, and wind. They can also be moved by water, animals, and humans. Most weeds take advantage of disturbed areas such as roadsides, trails, logged units, burns, rock quarries, mined sites and areas around human structures. Established populations serve as seed sources for further dispersal, especially along roads, power lines, and trail corridors. Roads are considered the first point of entry for exotic species into a landscape, and serve as corridors along which plants move farther into the landscape.

Relevant Standards and Guidelines

National policy states that preventing the introduction and establishment of noxious weed infestations is a high priority for the agency. The USDA National Strategy for Invasive Species Management (USDA, Forest Service 2001) is predicated on prevention, early detection, rapid response, control and management, rehabilitation, and restoration.

The Invasive Plant Final Environmental Impact Statement (FEIS, 2005a) and Invasive Plant ROD (2005b) provide new Forest Plan direction designed to make new practices, technologies, and chemical formulations of herbicides available for use that would facilitate the reduction in the extent and rate of spread of invasive plants, and help prevent new infestations (Page 3, Invasive Plant FEIS, USDA Forest Service, 2005a). The new direction includes a desired future condition statement; goals and objectives statements; standards for preventing the introduction, establishment, and spread of invasive plants; standards for invasive plant treatment and site restoration; and an inventory and monitoring framework. This direction is detailed in Appendix One of the Invasive Plant ROD (2005b). In addition, the Invasive Plant FEIS (2005a) and Invasive Plant ROD (2005b) update all standards referencing the previous management direction.

The Umpqua National Forest LRMP was amended in 2003 (USDA, Umpqua NF 2003) with the following relevant Standards and Guidelines:

- Integrated weed management prevention and treatment strategies would be used to treat noxious weeds within the constraints of laws, policies and regulations and to meet Forest Management objectives. Methods may include manual (mowing, clipping, grubbing), biological, heated steam, competitive seeding, competitive planting, solarization, prescribed fire, grazing, chemical, or other applicable methods designed to control and/or eradicate the noxious weed. Biological controls tested and sanctioned by the US Department of Agriculture would be allowed to occur. Manual control methods within disturbed sites, such as along roads, trailheads, landings and within administrative sites would be allowed at any time.
- Require all ground disturbing machinery to be washed prior to entering and leaving the Forest, using the appropriate timber sale contract provisions and construction contract requirements.
- Require the use of certified-weed-free seed for all revegetation projects.
- Revegetate disturbed sites as soon as practical using native species unless there is no immediate resource concern and the site is anticipated to revegetate naturally to native species at desired cover standards. Otherwise, non-invasive, non-native seed would be used.

Existing and Desired Conditions

The increase of noxious weed introductions on the Umpqua National Forest is directly related to expanding weed populations on nearby federal, state, and private lands. Populations of extremely aggressive species such as yellow star-thistle, rush skeleton weed, false brome, and spotted knapweed, have become roadside weeds on heavily traveled highways of the State of Oregon and along arterial roads in the Umpqua and Willamette National Forests. The greatest risk of human-caused noxious weed introduction into the project units is from seed-contaminated vehicles and equipment traveling through the planning area.

Surveys for invasive plants were conducted in all proposed thinning units concurrently with the sensitive species surveys. In addition, roadside weed infestations within the planning area were inventoried and mapped by district botanical staff in the summer of 2006.

The most serious weed infestations in the Curran Junetta planning area are false brome *(Brachypodium sylvaticum*), diffuse knapweed (*Centaurea diffusa*), meadow knapweed (*Centaurea pratensis*), Scotch broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus armeniacus*), and evergreen blackberry (*Rubus laciniatus*).

False brome is a clump-forming perennial grass introduced to the U.S. in Oregon about 60 years ago. Unlike most other invasive weeds, this species is tolerant of shady conditions and quickly establishes under open or closed canopy conditions. Once established, it forms monocultures that exclude native vegetation, interfere with tree seedling establishment and threaten rare species (Blakeley-Smith and Kaye 2006). Ultimately, false brome threatens native plant communities, reduces the quality of wildlife habitat and may contribute thatch to the accumulation of fuels on the forest floor.

Diffuse knapweed is established along the side of road 1721 (northern boundary of Unit 4). This is a new invader to the District, although it occurs elsewhere on the Umpqua

National Forest and on adjacent Bureau of Land Management (BLM) managed lands. Diffuse knapweed reproduces through prolific seed production. A single plant can produce up to 18,000 seeds. Seeds mature by mid- to late August. Seeds germinate in both early spring (primarily) and fall. In the fall, diffuse knapweed breaks off at ground level and disperses widely as a tumbleweed.

There are two small populations of meadow knapweed found along the 1721 and 1751 roads within the planning area. Meadow knapweed generally invades roadsides and other open disturbed sites. It is spread by vehicles and windblown seeds. Like diffuse knapweed, meadow knapweed prefers open areas and rapidly invades following disturbance.

Scotch broom is an established vigorous weedy shrub that is found along roadsides, landings, and in very young plantations. It is generally shaded out by a closed canopy. This weed is found in small populations scattered along main roads and at spur road junctions within the planning area. Seeds of Scotch broom can persist in the soil for many decades and would germinate if the soil is disturbed.

Himalayan and evergreen blackberries thrive in open areas and along roadsides. They can persist along the edges of a closed coniferous canopy, and readily invade riparian areas beneath a hardwood canopy. Both species are spread by birds and other animals that eat the berries, and both species spread vegetatively by root tipping. Himalayan and evergreen blackberries are located along roadsides and riparian areas throughout the planning area.

The desired condition is prevention of new invader establishments and containment of weed spread with a subsequent reduction in established weed presence. Through repeated treatments, the desired future condition includes eradication of false brome on the District. Management of disturbed areas to restore a more natural condition helps retain sensitive species habitat and other special native habitats while preventing the invasion of noxious weeds. Implementation of this project would help achieve these conditions by using best management practices, minimizing disturbance where possible, and executing mitigation measures such as invasive weed removal and native species revegetation.

Prevention means limiting, managing, or sometimes eliminating activities on National Forests so that invasive plants do not become established within un-infested areas, and so the potential for reproduction and spread of existing invasive plants is reduced. The primary goal of prevention is to keep un-infested land from becoming infested.

Weed Categories
The Umpqua National Forest has classified its noxious weeds into the following four categories. These classifications vary across the districts depending on distribution.

A Species with limited abundance such that eradication or containment is feasible.
B Species that are locally abundant in places but still actively spreading on the Forest. The objective is to contain the infestations to within the core areas. Satellite infestations would be intensively managed. Biological controls and competitive planting would be used to maintain or reduce the size and extent of major populations.

C Species are nearly ubiquitous on the Forest. Biological controls and competitive planting would be used to maintain infestations as much as is feasible. Intensive treatments would only occur in conjunction with habitat restoration projects.

D Detection species. Species in the vicinity of, but not yet on, the Forest or have occurred in the past but currently appear to be eradicated. Any sites discovered would be subject to immediate eradication as feasible.

O Weeds classified as "Other" are inventoried and mapped as appropriate in conjunction with ongoing noxious weed inventory (this list is by no means a complete list of non-native species on and around the Forest). New invaders and infestations that are isolated and not yet well established are subject to intensive site management actions. Other infestations would only be managed in conjunction with habitat restoration projects.

Table 26. Cottage Grove Ranger District Noxious Weed List.

Common Name	Scientific Name	Cottage Grove
High-Priority Species		
False brome	*Brachypodium sylvaticum*	**A**
Diffuse knapweed	*Centaurea diffusa*	**A**
Meadow knapweed	*Centaurea x pratensis*	**A**
Canada thistle	*Cirsium arvense*	**B**
Bull thistle	*Cirsium vulgare*	**C**
Scotch broom	*Cystisus scoparius*	**A**
English ivy	*Hedera helix*	**D**
St. Johnswort	*Hypericum perforatum*	**C**
Yellow toadflax	*Linaria vulgaris*	**A**
Japanese knotweed	*Polygonum cuspidatum*	**A**
Himalayan Blackberry	*Rubus armeniacus*	**A**
Tansy ragwort	*Senecio jacobaea*	**C**
Medusahead rye	*Taeniatherum caput-medusae*	**C**
Common burdock	*Arctium minus*	**O**
Poison hemlock	*Conium maculatum*	**O**
Common Name	**Scientific Name**	**Cottage Grove**
Oxeye daisy	*Chrysanthemum leucanthemum*	**O**
Chicory	*Cichorium intybus*	**O**
Wild carrot	*Daucus carrota*	**O**
Foxglove	*Digitalis purpurea*	**O**
Common teasel	*Dipsacus fullonum*	**O**
Sweetpea	*Lathyrus latifolius*	**O**
Reed canarygrass	*Phalaris arundinacea*	**O**

Direct and Indirect Effects

Alternative One presents the least risk of spreading pre-existing weeds and introducing new invaders. There would be no ground disturbance and fewer opportunities for weed seed to become established. There is less risk that weeds would spread into the closed canopy stands due to light limitations, and there would be no equipment moving into stands that would potentially move seed from roadsides into the stand.

Under the no action alternative, herbicide treatment of false brome would not occur. Manual and mechanical treatments would continue to occur; however, experience has indicated that these types of treatments of this infestation have been ineffective in controlling the rapid spread of the infestation.

Indirectly, Alternative One could result in the proliferation of new and existing noxious weeds if a wildfire were to burn through the watershed and planning area. The loss of duff and canopy cover, combined with an increase in nutrients associated with the ash, create soil disturbance conditions where noxious weeds thrive.

Alternatives Two and Three

It is a combination of soil disturbance and transport of seed that constitutes the direct effects of timber harvest on weed introduction and spread. Both action alternatives increase the risk of invasive weed spread in the planning area. Thinned stands, roads, landings, helicopter landing sites, and gaps within the thinning units are all suitable habitat for weeds. The risk is reduced where disturbed areas (such as temporary roads and landings) are treated to eliminate existing weeds and planted with native species (such as blue wild rye).

Although care would be taken to treat existing weeds prior to project related activities (including chemical treatment of false brome), the weed seed bank in the soils around pre-existing weed sites would remain in the area. In these alternatives, District botany staff would flag and map a 30-foot no-entry buffer would be established around selected false brome and meadow knapweed sites to prevent spread of seed.

Ground-based heavy equipment used in project operations can spread weed seeds from infested areas (such as roadsides) to uninfested areas within the thinning units. Logs skidded through existing weeds can catch seeds in the bark and in the accompanying slash. Landings can be a collection center for logs and slash where material embedded with invasive plant seeds get sorted for delivery. Debris from trucks, slash bark pieces and mud can spread seeds along roads, where they can establish new populations. Though fuels management activities such as thinning, slash-busting and chipping, pile burning and jackpot or underburning are vital to reducing the intensity and threat of wildfire, they would provide new avenues of invasive plant introduction and spread. Hand pile burning creates soils open to pioneering species, including invasive plants. Burning can help reduce some species of invasives, it can also release seed banks and enhance the growth and competitive advantage of other invasives (Galley and Wilson, 2001)

Mitigation includes post-sale and follow-up treatments on approximately 255 acres. On-going forest-wide noxious weed surveys would continue to document new infestations of noxious weeds within Layng Creek and other watersheds on the forest. Both action alternatives would also include treating, before harvest activities begin, preexisting

occurrences of false brome, Scotch broom, diffuse knapweed, meadow knapweed, selected occurrences of Himalayan blackberry, and any high-priority noxious weeds discovered growing in planning area along roadways, in quarries, and at pullouts and landings, to help attain the desired condition. The action alternatives would also implement competitive planting where the noxious weed treatments create bare ground and disturbed soils.

Both action alternatives include multi-year treatment of false brome. This treatment is expected to contain and eventually eliminate false brome from the Curran Junetta drainages. Direct effects of the chemical treatment include minimal damage or mortality of adjacent native herbaceous vegetation, however the herbicide would be applied in late summer when most herbaceous native plants are dormant. Adjacent woody shrubs may suffer minor damage, however, the shrubs are expected to be resistant to low concentrations of glyphosate.

The spread of invasive weeds would be minimized in both action alternatives through preventative measures taken prior to, during, and after thinning operations. Project design includes buffers around known weed sites, logging equipment washing, post-treatment survey and weed treatment, and pretreatment of existing weed sites. The canopy in the treated stands is expected to close in 10 to 20 years, and this would further reduce habitat for some weed species. Additionally, follow up monitoring to detect new invaders and continued weed treatment would occur after the thinning project is completed. The combined action of these prevention and mitigation measures, as well as intensive treatment of false brome, is expected to minimize risks of weed introduction and spread. These measures cannot be regarded as absolutely effective. Even the best prevention efforts cannot stop all weed spread. Many weed species have wind and/or animal dispersed seed that may escape equipment cleaning (or other measures).

Alternative 2 has a slightly higher potential for weed spread and introduction than Alternative 3. In Alternative Three, there are 50 fewer acres of disturbance from suspension yarding and the 0.24 miles system road would not be constructed.

Cumulative Effects

The action alternatives for the present project would create soil disturbances that favor weed establishment and spread. The rates of spread and densities of invasive weeds in the watershed cannot be predicted with any accuracy. However, numerous measures would be implemented to minimize the potential impacts.

Future road maintenance, continued timber harvest on adjacent private lands, vehicular traffic, recreation-related activities, and movement of wildlife would continue in the foreseeable future and are all actions that are likely to spread or introduce weed seed and lead to new infestations.

Mitigation measures would help minimize these effects but some activities such as recreation traffic and movement of wildlife are not so easily mitigated, so it is likely that invasive species would continue to threaten native plant communities and habitat quality within the planning area. Future weed treatment and prevention measures would help to contain spread and the use of early detection and response methods is anticipated to prevent establishment of new invaders**.**

THREATENED, ENDANGERED, AND SENSITIVE BOTANY SPECIES

Biological Evaluation

As required to complete a botanical biological evaluation (BE), botany surveys were conducted to evaluate the impact of the proposed management actions on plant/fungi species listed or proposed to be listed as Threatened or Endangered by the U.S. Fish and Wildlife Service, or classified as Sensitive by the USDA Forest Service (Forest Service Manual 2672.4 & U.S. Code of Federal Regulations 50 CFR 402.12-13). It is USDA Forest Service policy to "ensure that Forest Service actions do not contribute to loss of viability of any native or desired plant or contribute to a trend towards Federal listing of any species" (Forest Service Manual 2672.41). All botany surveys complied with established protocols and the 2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines. A botanical "Survey and Manage" species discussion is presented later in this chapter.

Pre-field review indicated potential habitat for a number of TES and Survey and Manage species within the project area. This review consisted of consultation and analysis of Umpqua National Forest database records, aerial photos, survey protocols for lichens, bryophytes and vascular species, previous botanical survey records, USGS topographical maps, and working knowledge of the area. Each species on the Umpqua National Forest Sensitive Species list is considered. In addition, species on the Survey and Manage list were also included (Refer to Survey and Manage Botanical Species section, below.)

Field surveys for listed or sensitive botanical species with potential habitat within the project planning area were conducted during the field seasons of 2005 and 2006 (Table 27). All surveys were performed by fully qualified botanists from district and forest level staff. Approximately 1500 acres were surveyed using an intuitive-controlled survey protocol, focusing on areas of potential habitat for various species. Non-suitable habitat in the units was field verified from appropriate vantage points or during travel between suitable potential habitats. Taxonomy and protocols mostly followed: Abrams 1960, Arora 1986, Derr et al. 2003, Hickman 1993, Hitchcock and Cronquist 1973, Hitchcock et al. 1969, Lawton 1971, Lesher et al. 2003, McCune and Geiser 1997, Schofield 1992, USDA Forest Service and USDI Bureau of Land Management 1998 &1999, and Wagner and Christy 1996.

There is a documented site of *Cudonia monticola* within the planning area. *Cortinarius barlowensis* and *Leucogaster citrinus* have been documented within the Layng Watershed; however there are no known sites within proposed unit boundaries, or within the boundaries of the planning area.

Table 27. Documented or Suspected Sensitive Plants & Fungi (includes lichens)[44]

Taxa Group and Species	Umpqua NF Status (Documented or Suspected)	Potential Habitat?	Located or within Zone of Influence	Effects and Notes
Threatened or Endangered Species				
Lupinus sulphureus ssp. *kincaidii*				
Plagiobothrys hirtus				
Sensitive Species				
Bryophytes				
Encalypta brevicolla var. *crumiana*	S	Yes	N	
Rhizomnium nudum	D	Yes	N	
Schistostega pennata	D	Yes	N	
Scouleria marginata	D	Yes	N	
Tetraphis geniculata	S	Yes	N	
Fungi are not targeted during surveys, but incidental findings of sensitive fungi species are documented.				
Boletus pulcherrimus	D	Yes	Unknown (Unk)	May impact individuals, but is not likely to contribute to a loss of viability to the species. See detailed discussion of effects below.
Cortinarius barlowensis	D	Yes	Unk	
Cudonia monticola	D	Yes	Yes	
Gomphus bonarii (=*Turbinellus floccosus*)	D	Yes	Unk	
Gomphus kauffmanii (=*Turbinellus kauffmanii*)	D	Yes	Unk	
Gyromitra californica	D	Yes	Unk	
Leucogaster citrinus	D	Yes	Unk	
Mycena monticola	D	Yes	Unk	
Ramaria amyloidea	D	Yes	Unk	
Ramaria aurantiisiccescens	D	Yes	Unk	
Ramaria largentii	D	Yes	Unk	
Lichens				
Chaenotheca subroscida	D	Yes	No	
Dermatocarpon luridum	D	Yes	No	
Leptogium cyanescens	D	Yes	No	
Leptogium hirsutum	S	Yes	No	

44 Documented or Suspected Sensitive Plants & Fungi (includes lichens)44 with Potential Habitat in Curran Junetta Planning Area. A Project Effects Assessment is also presented. Notes are given for clarification, where needed.

Taxa Group and Species	Umpqua NF Status (Documented or Suspected)	Potential Habitat?	Located or within Zone of Influence	Effects and Notes
(*L. burnetiae* var. *h.*)				
Nephroma occultum	D	Yes	No	
Pannaria rubiginosa	S	Yes	No	
Peltigera neckeri	D	Yes	No	
Peltigera pacifica	D	Yes	No	
Pseudocyphellaria rainierensis	D	Yes	Yes	.Populations are buffered, No impact
Ramalina pollinaria	S	Yes	No	
Usnea longissima	D	Yes	No	
			No	
Vascular Plants				
Asplenium septentrionale	D	Yes	**Vascular Plants**	
Aster vialis	S	Yes	No	
Botrychium lanceolatum ssp. *lanceolatum*	S	Yes	No	
Botrychium minganense	S	Yes	No	
Calochortus umpquaensis	D	Yes	No	
Carex crawfordii	S	Yes	No	
Carex serratodens	S	Yes	No	
Cimicifuga elata	D	Yes	No	
Cypripedium fasciculatum	D	Yes	No	
Enemion stipitatum (= *Isopyrum s.*)	S	Yes	No	
Iliamna latibracteata	D	Yes	No	
Kalmiopsis fragrans	D	Yes	No	
Lupinus sulphureus ssp. *kincaidii*	D	Yes	No	.
Montia howellii	S	Yes	No	
Ophioglossum pusilum	D	Yes	No	
Pellaea andromedifolia	S	Yes	No	
Perideridia erythrorhiza	S	Yes	No	
Polystichum californicum	D	Yes	No	
Romanzoffia thompsonii	D	Yes	No	
Wolffia borealis	S	Yes	Presumed Yes	Habitat is buffered, no impact
Wolffia columbiana	S	Yes	No	

Threatened or Endangered Plants

Kincaid's lupine and rough popcorn flower are not known on the Cottage Grove Ranger District and were not found during surveys. Kincaid's lupine is the only documented federally listed plant on the Umpqua National Forest. It is considered a threatened species. It occurs on the Tiller Ranger District and adjacent lands, and in the Willamette Valley. Rough popcorn flower, a federally listed endangered species, occurs in a few

locations near the western forest boundary on Bureau of Land Management and private lands.

Direct, Indirect, and Cumulative Effects

Because the project's zone of influence is far removed from known populations of Kincaid's lupine and rough popcorn flower there are no direct, indirect or cumulative effects associated with any of the alternatives and connected actions; the alternatives would have "No Effect" on these listed species.

Effects to Sensitive Species

PACIFIC FELT LICHEN (*Peltigera pacifica*)

Pacific felt lichen is a foliose lichen species that is found on soil, moss, rocks, logs, and tree bases in moist, low elevation forests (McCune and Geiser 1997). This species needs constant access to wood in an advanced stage of decay[45]. Although it has a widespread geographic range, it is rare in distribution, and occurs in isolated sites within the Northwest Forest area (See Footnote 33). In addition to the sites in this planning area, there are an additional 25 sites scattered throughout the Umpqua National Forest. In 1993, the total number of known sites was six (See Footnote 33). Riparian Reserves, and possibly Late-Successional Reserves, provide habitat for this species (See Footnote 33). There are 13 sites of Pacific felt lichen located within the planning area. These sites are found associated with units 9, 11, 14, 17, 19, and 20. These sites are all within riparian reserves and would be protected by a 100' radius no-entry buffer.

Direct and Indirect Effects

Alternative One would take longer to develop late-successional forest characteristics, including the development of large woody debris, compared to the action alternatives (Figure 16). Large woody debris is necessary as a primary substrate for Pacific felt lichen. The legacy large woody debris, left at the time when the units were originally logged, provides habitat that is declining as these trees decompose. By not thinning and treating fuels, the densely stocked units are more susceptible to stand replacement fires, which would delay the process of developing late-successional habitat. Delaying successional development is considered an adverse trend to the survival and propagation of Pacific felt lichen in the watershed.

The action alternatives would have no direct or indirect effects due to the implementation of 100-foot no-entry buffers around the known sites of this lichen.

Cumulative effects

The action alternatives would not cause any adverse cumulative effects to Pacific felt lichen since there are no direct or indirect effects.

THOMPSON'S MISTMAIDEN (*Romanzoffia thompsonii*)

Thompson's mistmaiden is a diminutive annual that grows to 10 cm tall (Helliwell 1998). Its flowers are white with a gold-yellow spot at the base of each petal (Helliwell 1998). The flowers can appear from March to August. It grows in vernally moist seeps on rock

45 USDA Forest Service and USDI Bureau of Land Management 2004

outcrops in fully-open to partially-shaded sites at elevations from 1000 to 4500 feet (Helliwell 1998). Currently known from the western Cascades and foothills in Douglas, Jackson, Linn, Lane, and Marian counties.

Potential threats are numerous. They range from non-native species to activities that alter hydrology such as road building, water diversions, logging, and pumping, to development of rock quarries (Helliwell 1998). So far populations appear to be stable, but the species was only described in 1996. It is impossible to assess what the historic population trend has been.

Direct and Indirect Effects

Alternatives One, Two, Three, and the connected actions would have no direct effects to Thompson's mistmaiden. Thompson's mistmaiden populations occur in unique rocky/meadow habitats which have been buffered from harvest activities and connected actions in Alternatives Two and Three. Indirect affects from wildfire are likely to be low risk. If fire were to occur within Thompson's mistmaiden unique habitat during early spring months, the moisture content of the duff and herbaceous layer may result in a slow smoldering fire. In such a case, there would likely be little permanent damage to the habitat or individuals. If fire were to occur during dry periods, it would burn quickly due to thin and flashy fuels. By late summer, Thompson's mistmaiden is in seed or is dormant. The risk of damage to seed is considered low because of the seeps in which the species grows, and the rock outcrops upon which it is found would likely provide some protection. Fire could provide benefits such as invasive plant reduction or removal and reduction of accumulated duff layers that may prevent seeds from germinating. (Kaye et al. 2004).

Cumulative effects

There are no cumulative effects.

FUNGI

In general, the habitats for the sensitive fungi species on the Umpqua National Forest TES are poorly understood. Literature regarding habitat requirements for these species is usually too broad to identify specific potential habitat in large planning areas. As a consequence, the sensitive fungi are assumed to have potential habitat within the project area. Table 28 describes these species and their known habitat requirements.

Table 28 Fungi Habitat Requirements

Mycorrhizal species
Boletus pulcherrimus grows in humus in association with the roots of mixed conifers (*Abies grandis, Pseudotsuga menziesii*) and hardwoods *(Lithocarpus densiflorus*) in coastal forests. There are no known sites on the Cottage Grove Ranger District.
Cortinarius barlowensis grows in coastal to montane conifer forests up to at least 1200 m elevation. This species is not known from the Layng Creek Watershed.
Gomphus bonarii grows in deep humus under *Pinus* and *Abies* spp. There are no known sites on the Cottage Grove Ranger District. Recent work with this species has reduced it to synonmy with the more common *G. floccosus* (Giachini 2007).
Gomphus kauffmanii grows in deep humus under *Pinus* and *Abies* spp. There are no known sites on the Cottage Grove Ranger District.
Leucogaster citrinus grows in associated with the roots of *Abies concolor, A. lasiocarpa, Pinus contorta, P. monticola, Pseudotsuga menziesii*, and *Tsuga heterophylla* from 280 to 2,000 m elevation. This is a truffle-like fungus that fruits below-ground. There is a known site just south of the Layng Creek Watershed boundary.
Ramaria amyloidea, *R aurantiisiccescens*, and *R. largentii* are found in in humus or soil associated with *Abies* spp*., Pseudotsuga menziesii* and *Tsuga heterophylla*. There are no known sites on the Cottage Grove Ranger District.
Saprobic species
Cudonia monticola is reported to grow on coniferous debris. It is known to occur within the Curran Junetta planning area.
Gyromitra californica grows in or adjacent to well-rotted stumps or logs of coniferous trees or on soil rich in brown rotted wood. There are no known sites on the Cottage Grove Ranger District.
Mycena monticola is restricted to conifer forests above 1,000 m elevation, particularly those with *Pinus* spp. There are no known sites on the Cottage Grove Ranger District.

Direct and Indirect Effects

The proposed harvest units are managed 50-60 year old plantations and do not meet the definition of mature/old growth forest.

Alternative One
The Alternative One would not result in any direct impacts to sensitive fungi. Harvest activities and other connected actions would not occur, therefore soil disturbance and associated direct impacts to mycelial networks would not occur.

Indirect effects to sensitive fungi within the analysis area would likely be beneficial. An indirect effect of no action would be natural forest succession which would influence the fungal species composition. As stands age, underground fungal species composition increases in diversity (Visser, 1995; Bradbury et al, 1998; Smith et al, 2002). Coarse woody debris would be abundant as trees die due to overcrowding. Continued fire suppression in the planning area may favor mushroom production (Luoma and Eberhart 2005).

Under the no action alternative, there would be risk of intensive wildfire due to lack of management actions in these dense stands. The intensity and extent of such an event could have substantial and long-term detrimental effects to fungi and their habitat. Intensive fire would consume mycorrhizal host trees, duff, litter and coarse woody debris, and would cause mortality of fungi through the heating of soils.

Alternatives Two and Three
Activities associated with both action alternatives introduce risk of direct effects on mycorrhizal or saprophytic fungi. Activities associated with stand treatments would disrupt the networks of fungal mycelia within the top few inches of the soil (Kranabetter and Wylie, 1998; Amaranthus and Perry, 1994). Individual sites of fungi may be adversely affected by host tree removal, physical disturbance, soil compaction, and disruption of mycelial networks if the fungi are present (Kranabetter and Wylie 1998, Amaranthus and Perry 1994); however, the effects are anticipated to be short term (< 10 years). Reductions in the number of fruiting bodies of chanterelles, a common mycorrhizal species, were noted after initial thinning in similar second growth stands but appear to rebound after several years (Pilz et al. 2006).

Potential host trees would remain in thinned units with the prescribed retention of 40-60 trees per acre over 474 thinned acres, and 70-90 trees per acre over 762 thinned acres. The proposed silvicultural prescriptions maintain tree species diversity and are intended to accelerate the development of late-successional stand characteristics. Thinning and the creation of small canopy gaps would enhance development of understory trees and shrubs, which may in turn benefit the mycorrhizal fungi.

Existing snags and logs would be protected to the extent practical and safe. It is estimated that approximately two to five snags greater than ten inches would be created by fire and by damage from harvest operations within the harvest units during and after treatment. Thinning would reduce the amount of suppression mortality within the thinned portions of stands which would reduce future accumulation of large downed logs. All trees damaged during harvest operations, such as intermediate support trees or line damaged trees, would be retained on site and would contribute to the accumulation of large downed wood. In addition, inoculation is a management tool that would be used to offset the reduction of suppression mortality caused by thinning and to maintain a component of decadence within these managed stands.

There may also be some localized direct effects to mycelia or wood/litter substrate from pile burning. Concentrated burning can result in localized higher fire intensities and

changes in fungal species diversity (Baar, 1999). Prescribed burning in the analysis area would cause loss of litter, which could reduce substrates for litter-dwelling fungi. Bruns et al. (2002) studied short-term effects of ground fire in the Sierra Nevada and found a short-term reduction in the biomass of ectomycorrhizal fungi correlated with incineration of the litter layer but that lower layers, where the greatest species richness occurs, were preserved. Stendell et al., (1999) found a similar pattern in a Sierra Nevada ponderosa pine forest after prescribed fire, where litter and organic species biomass decreased eightfold but no difference was detected in mineral layers. Alternatives Two and Three propose 328 acres of underburning, which represents 26% of the harvest treatment area.

Herbicide applications to treat false brome may have direct effects to sensitive fungi; however, these effects are largely undetermined. Glyphosate was found to inhibit growth of three types of ectomychorrhizal fungi associated with conifer roots at concentrations of 1,000 parts per million in laboratory experiments. Ectomycorrhizal suppression due to herbicides has not been demonstrated in the literature; however the applicability of these studies to field conditions is uncertain given the complexity of fungal communities, soil types, and environmental factors that influence forest ecosystems (USDA ROD, 2006).

Glyphosate applications would occur through backpack spot application on target plants. The target (false brome) is distributed in non-contiguous patches; therefore, herbicide contact with soil organisms would be correspondingly patchy. Under these circumstances, there could be direct or indirect affects to individual fungi, whereas effects to local populations of fungi are expected to be trivial due to the soil adherence characteristics of glyphosate.

Cumulative Effects

The area analyzed for cumulative effects to TES fungi species is the area defined by Curran and Junetta drainages. Alternative One could have an adverse cumulative effect because of the past harvesting of old-growth habitat that has created the current low amount of scattered late-successional habitat in the Layng Creek watershed. Any delay to the development of late-successional habitat by not managing, primarily through thinning, the plantations could hinder the reestablishment or establishment of sensitive species of fungi.

The action alternatives would help to offset the past effects of timber harvesting and fire exclusion in this area by accelerating forest succession. Over several decades (30-100 years), habitat for TES fungi, lichens and bryophyte species within the proposed thinned stands would be enhanced in the action alternatives. As the thinned stands develop late-successional characteristics (snags, downed wood, understory development) species within nearby refugia are expected to re-colonize the thinned stands. Refer to Figure 11 in the Silvicultural discussion and Figures 14, 15 and 16 in the Wildlife section for further detail regarding the development of structure and coarse wood development over time.

In conclusion, the action alternative may affect individuals of sensitive fungi species; however, the project is not likely to result in a trend toward Federal listing or loss of viability for populations or species.

SURVEY AND MANAGE BOTANICAL SPECIES

The list of survey and manage botany species that require documentation for this project are included in Tables 28 and 29. Surveys were conducted as specified above in the Threatened, Endangered, and Sensitive Botany Species surveys, and were consistent with the 2001 ROD for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines of the Northwest Forest Plan. Species found during the field surveys or already known to occur in the planning area are discussed in detail after Table 29.

Table 29. Survey & Manage Species without Pre-project Survey Requirements

Survey & Manage Species (USDA/USDI 2001) without Pre-project Survey Requirements (Categories B, D and E) that have Known Sites in the Curran Junetta Planning area.

Survey and Manage categories are as follows: Category A – Manage all known sites, conduct pre-disturbance surveys, and conduct strategic surveys; Category B – Manage all known sites and conduct strategic surveys (pre-disturbance surveys are not practical); Category C – Manage high priority sites, conduct pre-disturbance surveys, and conduct strategic surveys; Category D – Manage high priority sites and conduct strategic surveys (pre-disturbance surveys are not practical); Category E – Manage all known sites and conduct strategic surveys (status undetermined).

Species	S&M Category[46]	Known Sites	Site Management & Effects Analysis
Fungi			
Clavariadelphus occidentalis *(C. pistillaris)*	B	Yes	Located 170' from unit 18 across existing system road. No effect.
Cudonia monticola	B	Yes	Located >600 feet from nearest project activity. No effect.
Gomphus clavatus	B	Yes	Located in watershed, but not within planning area. No effect.
Gyromitra infula	B	Yes	Located > 1500' from nearest project area. No impacts from project activities.
Hydnum umbilicatum	B	Yes	Located > 2500' from project area. No effect
Neournula pouchetti	B	Yes	Located > 2500' from project area. No effect

Species	**S&M Category**[47]	**Known Sites**	**Site Management & Effects Analysis**
Otidea leporina	B	Yes	Located in watershed, but not within planning area. No effect.
Ramaria rubripermanens	B	Yes	Located 170' from unit 18 on other side of system road. No effect
Ramaria stuntzii	B	Yes	Known site near unit 18 across system road from boundary of unit. No effect.
Sarcosoma latahenense	B	Yes	Located 375 from boundary of nearest unit. No effects.
Sarcosphaera eximia	B	Yes	Located in watershed, but not within planning area. No effect.
Sparassis crispa	D	Yes	Located in watershed, but not within planning area. No effect.
Spathularia flavida	B	Yes	Located > 300' from boundary of Unit 3. Project activities would not affect as there are no roads or connected actions nearby.
Lichens			
Pacific Felt Lichen (*Peltigera pacifica*)	E	Yes	See TES Biological Evaluation at the beginning of this report. No effect.
Ramalina thrausta	A		1. Found in the watershed, but not in any project units. The action alternatives would not affect this species.
Bryophytes			
Buxbaumia Moss *(Buxbaumia viridis)*	D	Yes	Located greater than 150 feet from boundary of unit 11. No effect.

Table 30. Survey & Manage Species with Required Pre-project Surveys.
Survey & Manage Species (USDA/USDI 2001) with Required Pre-project Surveys are within category A, C, or require equivalent-effort surveys (Category B-no strategic surveys completed at this time).

Species	S&M Category	Survey Triggers			Survey Results		
		Project Contains Suitable habitat?	Project may negatively affect species/habitat?	Surveys Required?	Survey Date	Sites Known or Found?	Site Management
Lichens							
Bryoria tortuosa	A	Y	Y	Y	2005	N	N/A
Cladonia norvegica	B	Y	Y	Y	2005	N	N/A
Dendriscocaulon intricatulum	B	Y	Y	Y	2005	N	N/A
Dermatocarpon luridum	B	N					
Hypogymnia duplicata	A	N					
Leptogium burnetiae var*. hirsutum*	A	Y	Y	Y	2005	N	N/A
Leptogium cyanescens	A	Y	Y	Y	2005	N	N/A
Leptogium rivale	B	Y	Y	Y	2005	N	N/A
Lobaria linita	A	N					
Nephroma occultum	B	Y	Y	Y	2005	N	N/A
Platismatia lacunosa	C	Y	Y	Y	2005	N	N/A
Pseudocyphellaria rainierensis	A	Y	Y	Y	2005	N	N/A
Ramalina thrausta	A	Y	Y	Y	2005	N	N/A
Usnea hesperina	B	Y	Y	Y	2005	N	N/A
Bryophytes							
Encalypta brevicolla v. crumiana	B	Y	Y	Y	2005	N	N/A
Herbertus aduncus	B	N					
Scouleria emarginata	B	N					
Racomitrium aquaticum	B	N					
Schistostega pennata	A	N					
Tetraphis geniculata	A	Y	Y	Y	2005	N	N/A
Tritomaria exsectiformis	B	N					

Species	S&M Category	Survey Triggers			Survey Results		
		Project Contains Suitable habitat?	Project may negatively affect species/habitat?	Surveys Required?	Survey Date	Sites Known or Found?	Site Management
Vascular Plants							
Botrichium minganense	A	Y	Y	Y	2005	N	N/A
Botrichium montanum	A	Y	Y	Y	2005	N	N/A
Cypripedium fasciculatum	C	Y	Y	Y	2005	N	N/A
Cypripediium montanum	C	Y	Y	Y	2005 2006	N	N/A
Aster vialis (= *Eucephalus vialis*)	A	Y	Y	Y	2005	N	N/A
Platanthera orbiculata var. orbiculata (=Habenaria orbiculata)	C	Y	Y	Y	2005	N	N/A

HERBICIDE USE AND BOTANICAL SPECIES SUMMARY

The following is a summary of the affects to other botanical species and habitat associated with herbicide use to eradicate the noxious weed false brome. Further detail is provided in the preceding discussion and the project files.

Unique Habitat Effects
Under Alternative One, no herbicide treatment of false brome would occur in the immediate future. There is a high risk of false brome invasion of the natural openings within the Curran and Junetta drainages. False brome is considered a "super-invader" (Kaye 2001) and would quickly form monoculture stands replacing most native herbaceous species and native grasses within the unique habitats. With the implementation of mitigation measures and connected actions, cumulative effects of the action alternatives are projected to be beneficial. This overall beneficial effect is associated with prevention of future spread of high priority noxious weeds into unique habitats.
Invasive Plants/Noxious Weeds Effects
Under the no action alternative, herbicide treatment of false brome would not occur. Direct effects of the chemical treatment include minimal damage or mortality of adjacent native herbaceous vegetation; however the herbicide would be applied in late summer when most herbaceous native plants are dormant. Adjacent woody shrubs may suffer minor damage; however, the shrubs are expected to be resistant to low concentrations of glyphosate. No cumulative effects.
Threatened, Endangered, and Sensitive Botany Species Effects
Because the project's zone of influence is far removed from known populations of Kincaid's lupine and rough popcorn flower there are no direct, indirect or cumulative effects associated with any of the alternatives and connected actions; the alternatives would have "No Effect" on these listed species.
Proposed herbicide treatments are greater than a half mile from known populations of Pacific felt lichen and Thompson's mistmaiden. There are no direct and indirect or cumulative effects to these species.
Herbicide applications to treat false brome may have direct effects to sensitive fungi; however, these effects are largely undetermined. Glyphosate applications would occur through backpack spot application on target plants. The target (false brome) is distributed in non-contiguous patches; therefore, herbicide contact with soil organisms would be correspondingly patchy. Under these circumstances, there could be direct or indirect affects to individual fungi, whereas effects to local populations of fungi are expected to be trivial due to the soil adherence characteristics of glyphosate. In conclusion, the action alternative may affect individuals of sensitive fungi species; however, the project is not likely to result in a trend toward Federal listing or loss of viability for populations or species.
Survey and Manage Botanical Species Effects
No effects to survey and manage species except may effect fungi – see above.

Aquatic Environment

The condition of the aquatic environment and its relationship to the proposed project was assessed during the scoping process. Concerns associated with the condition of the aquatic environment centered on water quality in the Layng Creek Municipal Watershed and physical aquatic habitats. Neither water quality nor aquatic habitat was determined to be a significant issue. This is due to the extensive application of no-cut buffers along streams, the low impact associated with second-growth thinning, and the site-specific best management practices developed to minimize impacts to the aquatic environment. This section of the Environmental Assessment is included for disclosure purposes.

This aquatic analysis focuses on how the Curran Junetta alternatives affect riparian and aquatic physical and biological processes at various scales. This includes site-specific disclosure at the scale of individual streams or thinning units and at various larger scales including the Row River Watershed[48] (Figure 17).

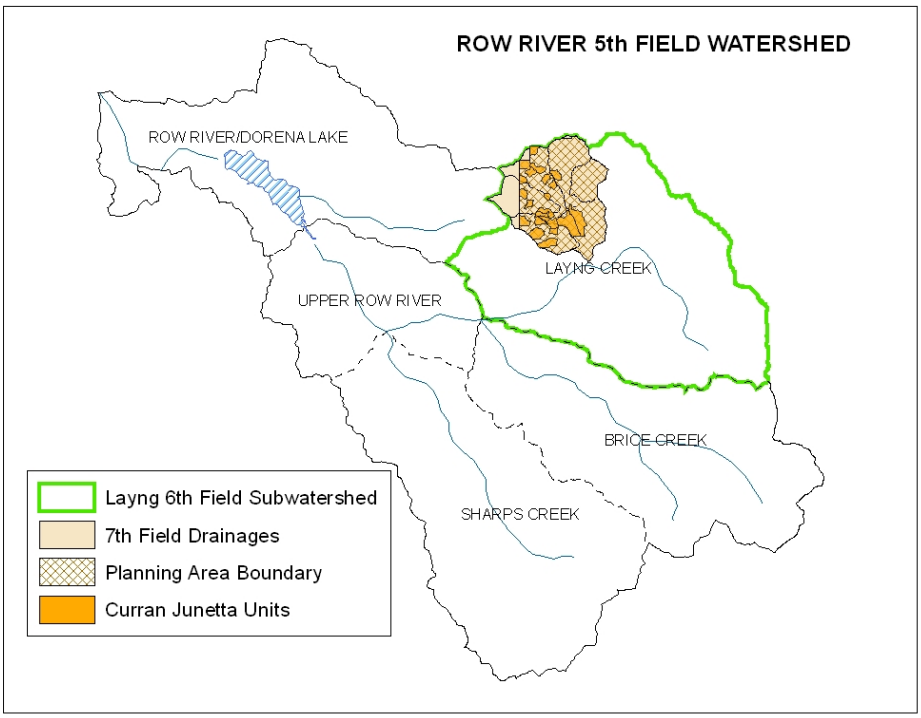

Figure 17. The five subwatersheds of the Row River Watershed

The compatibility with the objectives of the Aquatic Conservation Strategy is discussed in this chapter under the headings of Forest Vegetation and Unique Habitats in the Terrestrial Environment section of this Chapter. The results of watershed analysis are presented, a description of the existing condition of the important physical and biological components of the ACS are discussed, and conclusions are presented regarding how

48 A "watershed" is a subdivision of land that is based on hydrologic drainage and defined by a national hierarchical system, which delineates hydrologic drainage in nested multi-level subdivisions. The watershed level subdivides the "sub-basin" level (4th level). The 5th level watershed in this situation is Row River which is subdivided by five smaller subwatersheds (6th level). The subwatersheds are subdivided by drainages (7th level), which is the smallest hydrologic subdivision.

the alternatives move conditions toward desired conditions in terms of all nine ACS objectives which include:

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.

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.

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

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

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.

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.

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

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.

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

The Curran Junetta planning area is within the Layng Creek Subwatershed (42,195 acres). It consists of six 7th field drainages which encompass Junetta Creek and all its tributaries (Table 31). The drainages along the western boundary extend past the planning area and onto private land. The six drainages that encompass Junetta and Curran Creeks total 7,820 acres, of which 6,870 acres (88%) are in the planning area. The Layng Creek Subwatershed flows into the Row River Watershed which is approximately 178,774 acres. The land in the Curran Junetta planning area is predominantly Forest Service administered land; a small 240 acre private parcel is located near in the south end of the planning area.

Table 31. Summary of 7th Level Drainages

Drainage Name (7th level)	Area (acres)	Stream Density (mi/sq mi)	Resident Fish Bearing (miles)
Lower Junetta	1,465	5.5	2.2
Curran*	1,295	7.2	1.0
West Fork Junetta*	1,347	6.5	1.1
Middle Fork Junetta*	1,518	6.1	2.0
East Fork Junetta	885	5.0	0.5
Upper Junetta	1,410	5.4	1.9
Total for Curran and Junetta Drainages	**7,820**	**6.0**	**8.6**

*These drainages include private land located outside of the planning area boundary.

Approximately 14 miles downstream of the planning area, Dorena Dam (built in 1949) blocks all anadromous fish passage in the Upper Row River, including the Layng Creek Subwatershed. Resident cutthroat trout are found throughout the subwatershed and are managed by Oregon Department of Fish and Wildlife as a naturally producing wild population (Connolly, 1992).

There are two waterfalls (10 and 15 feet high) located near the mouth of Junetta Creek. Though these falls are natural barriers to resident fish in Layng Creek, the 1994 Stream Inventory found populations of cutthroat trout upstream from these barriers in all the main tributaries throughout the planning area (Table 31). Two species of sculpin were also observed in Junetta Creek and in the lower reach of the Middle Fork Junetta Creek. Spawning appears to be occurring throughout the fish bearing reaches, especially within the first mile of Junetta Creek and within the lower reaches of Curran and East Fork Junetta Creeks, where larger amounts of fry were observed. Adult trout ranged from 5-12 inches. Overall abundance of fish was considered low (USDA Umpqua NF, 1994).

There is no federally designated essential fish habitat, Federally listed endangered or threatened aquatic species, or State sensitive fish species within the planning area. Refer to the Wildlife section of this chapter for an analysis of non-fish aquatic State sensitive species.

BENEFICIAL USES OF WATER

To meet the Clean Water Act and standards and guidelines in the Umpqua National Forest Plan (watershed standard and guideline #1), the beneficial uses of water must be identified, and management activities planned, so they would not interfere with or be injurious to the beneficial uses of adjacent and downstream waters. The relevant beneficial uses of the Willamette River and its tributaries, including the Row River as determined by Oregon Department of Environmental Quality, are: 1) public and private domestic water supply; 2) industrial water supply; 3) irrigation; 4) livestock watering; 5) resident fish and aquatic life; 6) wildlife and hunting; 7) fishing; 8) water contact recreation; and, 9) aesthetic quality (ODEQ, 2003).

WATER QUALITY

Relevant Standards and Guidelines

The relevant standard and guidelines from the Umpqua Land Resource Management Plan (LRMP) related to water quality include:

Water quality/riparian area standard and guideline #1: All effective shading vegetation would be maintained on perennial streams unless a site-specific assessment shows that shade removal would not result in water temperature increase or degrade aquatic habitat.

Water quality/riparian area standard and guideline #5: Streams would be designated for protection on timber sale maps.

Water quality/riparian area standard and guideline #12: The application best management practices (BMPs) for the protection of water quality and beneficial uses (e.g.; fish habitat or potable water) would be monitored where ground disturbing activities occur.

Watershed cumulative effects and water quality standard and guideline #1: The beneficial uses of water must be identified and management activities planned so they would not interfere with or be injurious to the beneficial uses of adjacent and downstream waters.

Watershed cumulative effects and water quality standard and guideline #2: Beneficial uses of water and aquatic habitats would not be degraded by turbidity, sediment, or scoured stream channels caused by timber harvest, road construction, and related activities.

Watershed Analysis (WA) Recommendations

The 1995 Layng Creek WA and the Layng Creek WA Iteration 1.1 (USDA Umpqua NF, 2005) recommended restorative thinning in riparian reserves. The 2005 WA provided specific treatment and buffer recommendations based on the Northwest Forest Plan Temperature (TMDL) Implementation Strategies (USDA/USDI, 2005) which balances thinning and retention of primary shade so as to not affect stream temperature. The Riparian Reserve section of this Chapter lists these specific WA recommendations.

Existing Conditions

The Oregon Department of Environmental Quality (DEQ) has identified water quality limited streams throughout the Sate of Oregon, including the Row River Watershed (Table 32). Layng Creek is currently listed on DEQ's 303(d) List for exceeding the stream temperature criteria (ODEQ, 2007). The temperature exceedance relevant to this project occurs during the summer months when salmonid fish are rearing. The temperature listing includes both Layng Creek (mouth to 14.4 miles upstream) and the Row River (at the confluence of Layng and Brice creeks downstream to Dorena Lake). The supporting data for the Layng Creek listing originated from Umpqua National Forest monitoring at a site above Prather Creek, which is downstream of the planning area. At this site, the seven day average of daily maximum temperatures exceeded the temperature standard (64.4°F) during several summers from 1991-1994. The Cottage

Grove Ranger District continues to collect stream temperature data at this site and other locations in the Layng Creek subwatershed. Recent temperature data continues to exceed the State temperature criterion.

In the 1970's, turbidity in the Layng Creek subwatershed was recognized as a concern. The finer texture soil found in the Layng Creek earthflow terrain contributed to stream turbidity from both natural and anthropogenic disturbances. At that time, the City of Cottage Grove used a simple infiltration and chlorination system to treat Layng Creek water for domestic water use that did not meet state drinking water standards for turbidity (USDA Umpqua NF 1995). In response, the Forest Service initiated a turbidity monitoring program (annual turbidity-flow index) in 1976 and reduced annual timber harvest.

Since the 1970's, many chronic turbidity sources have been identified and mitigation measures taken with improving results. The turbidity monitoring results have showed a 75% decrease for typical winter flows without flooding conditions over the first eight years (1976-1984). Since then, the annual turbidity-flow index has shown little change since 1985, stabilizing with at least half of the turbidity levels observed in the 1970's. These results are discussed in the watershed analysis (USDA Umpqua NF 1995) and the annual forest monitoring reports (USDA Umpqua NF 2006a). Turbidity remains a key parameter of concern as identified in the Layng Creek Watershed Analysis, which recognized the City of Cottage Grove domestic water intake about one mile downstream of the planning area.

The only additional water quality parameter that is included in DEQ's 303(d) List and downstream (14 stream miles) of the planning area is mercury in Dorena Lake. A mercury study of Dorena Lake (Hygelund, 2001) found that the mercury contamination is from the Bohemia Mining District in the headwaters of Brice Creek. According to this study, mercury was historically used in the processing of gold and silver ore. This type of ore processing did not occur in the Layng Creek subwatershed, so this water quality listing is not linked to Layng Creek subwatershed and was not evaluated.

Table 32. Water Quality Listings in the Row River Watershed.

Waterbody Name	River Mile	Parameter	Season	List Date
Row River	0 to 7.4	Temperature	Summer	1998/2004
Dorena Lake	7.4 to 11.3*	Mercury	Year Around	1998/2004
Row River	11.3 to 20.8*	Temperature	Summer	2002/2004
Sharps Creek	0 to 15.2	Temperature	Summer	1998/2004
Martin Creek	0 to 3.4	Temperature	Summer	1998
Brice Creek	0 to 15.5	Temperature	Summer	1998/2004
Layng Creek	0 to 14.4*	Temperature	Summer	1998/2004

* Sections of water bodies downstream of the planning area.

The desired condition is the maintenance of water quality in keeping with ACS objective 4, while moving stem exclusion forest stands toward the desired range of natural variability.

Direct and Indirect Effects

Direct effects in the context of water quality are those that would occur in planning area streams. Direct effects are triggered immediately as a result of the Curran Junetta alternatives. Indirect effects are those that could occur later in time or downstream of the action at the drainage or larger scale.

Alternative One would result in no direct or indirect effects to water temperature or turbidity. Since no riparian trees would be cut along any perennial streams that could affect stream temperature and no ground disturbing activities would occur that would cause sediment delivery and elevate stream turbidity, such direct or indirect effects would not be expected.

Alternatives Two and Three would not have a direct or indirect effect on stream temperatures. The action alternatives would thin within riparian reserves, but effective shade along perennial streams would be retained. Water quality standard and guideline #1 and recommendations in the watershed analyses would be met. Streams within and adjacent to thinning units would be identified with applicable protection meeting water quality standard and guideline #5.

The Layng Creek Municipal Watershed Plan (LRMP Appendix G-6) includes a guideline to limit the amount of newly disturbed acres to 350 acres per year. This guideline was developed to protect water quality and avoid turbidity increases especially at the municipal water intake. Disturbed area levels include, in part, clearcut acres or thinned acres with overstory canopies of 50% or less. Under both action alternatives, the 474 acres of heavier thinning would bring the canopy closure below 50% (ranging from 35-47%, with an average of 40%), while the 762 acres of moderate thinning would maintain canopy closures closer to 50% (ranging from 38-54%, with an average of 45%). The proposed project-level Forest Plan amendment included in Chapter One would double the disturbed area level based on the fact that the majority of the acres of the proposed thinning would bring the canopy closure only slightly below 50%, and that all such acres would be associated with second-growth thinning instead of old-growth even-aged harvest. In addition, with an expected canopy growth rate of 2% per year (Chan, et al. 2006), most stands would be at or above 50% within five years.

Under this disturbed area guideline, the Municipal Watershed Plan estimated an average removal of 55,000 board feet of timber per acre. The heaviest thinning prescriptions in the Curran Junetta units would remove about 19,800 board feet per acre under partial harvest conditions, which is less than half of what was assumed in the Plan. The level of disturbance based on timber volume would be less than half of what was originally identified in this guideline. Therefore, the risk to water quality from harvest would be within the original guidelines allowed.

Under Alternatives Two and Three, both the road construction/reconstruction and the connected actions related to roads, along with yarding through some riparian areas, would potentially cause direct and indirect turbidity effects. The connected actions would include two fish passage culvert upgrades (1751 road at Curran and Middle Fork Junetta Creeks) and nine culvert removals on the roads proposed for inactivation. The direct effects would be site-specific and occur at the time of disturbance. The indirect effects would be short-term (up to one season for erosion control measures to become effective) both at the disturbance site and downstream within the drainage. The spatial extent of the indirect effects would be within the immediate drainage (e.g. Junetta drainage) and not be detectable downstream of the planning area in Layng Creek. The limited spatial extend would be either the result of the distance from disturbance to

Layng Creek or the limited amount of tributary flow to influence the downstream water quality.

Through project design features that include timing of disturbance and location, best management practices (discussed in Chapter Two), and only thinning second-growth size trees, the potential of the ground disturbance to influence sediment delivery and elevate stream turbidity would be mitigated, lessening the magnitude of effects on the beneficial uses. Therefore, Alternatives Two and Three would not be directly injurious to the beneficial uses at the site scale or indirectly downstream.

The work on five fire sumps under the action alternatives would involve two fish bearing streams (one each in Junetta and Curran Creeks). Two other sites are both located approximately 0.5 miles above fish bearing reaches in Currran and West Fork Junetta Creeks. The fifth site is high up the drainage, well above any fish bearing reaches. These actions would result in temporary direct turbidity effects during the in-stream excavation of filled-in gravels. The direct turbidity effects would dissipate quickly when the action stops and are not expected to extend more than tens of feet beyond the sump. Therefore, no indirect turbidity effect is expected. The sediments removed from the stream would either be end hauled or placed in a stable area. This would prevent heavy rains from eroding the sediment pile back into the stream channel.

The placement of approximately 40 pieces of large wood in Junetta Creek would also occur under the action alternatives. This action would likely cause some temporary direct turbidity effects only during the actual placement of large wood, and potential indirect turbidity effects from site specific bank erosion, if winter flow is redirected into the bank. Potential bank erosion would likely occur during storm runoff and not be continuous. Since turbidity/sediment levels are usually higher during storm runoff than other times of the year, it would be difficult to discern any turbidity increases associated with new bank erosion from background levels, especially downstream from the project. The recovery of bank erosion sites would likely occur by the fifth year after wood placement. Therefore, any short-term turbidity/sediment indirect effects would not be expected to extend more than 100's of feet over four years. This connected action would have the beneficial effects of local stream cooling where large wood would provide new shade and pools. New gravel accumulations would also create cooler intergravel stream flow.

Equipment would be used in Junetta Creek to place large wood. With equipment operating in the stream and working near the stream during yarding, there would be a risk of spilling diesel or other petroleum products (e.g. oil or hydraulic fluid). Best management practices that address equipment inspection and spill prevention would be used as described in Chapter Two. These potential pollutants would be kept from entering Junetta Creek during servicing or refueling by staying at least 100 feet from the stream. An Oil and Hazardous Substance Spill Contingency Plan[49] and Spill Prevention Control and Countermeasures (SPCC) Plan[50] would be required including the necessary equipment on site during operation.

A best management practices (BMPs) checklist applicable to the disturbances and for the protection of water quality and beneficial uses would be used. The purpose of the checklist is to identify roles and responsibilities for tracking BMPs through time to insure that these measures would be included in the various contracts and implemented on the

49 This is an action plan that would be implemented in the event of a hazardous substance spill.

50 This document requires appropriate measures to prevent oil products from entering the navigable waters of the United States.

ground. The development and subsequent use of the BMP checklist meets water quality standard and guideline #12.

The fuels treatments for Alternatives Two and Three that would have the most potential to affect water quality are underburning and machine pile burning. The burning of concentrated fuels tends to disturb the soil's duff layer, exposing soil to erosion. The mitigation measure of underburning during moist conditions to retain effective ground cover reduces the risk of killing overstory trees or impacting water quality.

Cumulative Effects

Past harvesting of perennial stream shade occurred up until about the mid 1980's in the subwatershed. This loss of stream shade contributed to elevated stream temperatures in planning area streams. However, all areas harvested prior to the mid 1980's would now be considered recovered (Holaday, 1992) and are currently provide stream shade.

Alternative One would result in no direct or indirect effects to water temperature or turbidity that would incrementally add to possible downstream heating or stream turbidity due to past, present or reasonable foreseeable future disturbance. Therefore, Alternative One would not have a cumulative temperature or turbidity effect.

Alternatives Two and Three would protect the effective shade along perennial streams to avoid stream temperature increases. Both actions alternatives would cause direct or indirect turbidity effects. However, the spatial and temporal extent and magnitude of these effects would not incrementally add to past, present, or reasonably foreseeable effects. Beneficial uses of water and aquatic habitats would not be degraded by turbidity, sediment, or scoured stream channels caused by timber harvest, road construction, and related activities. Watershed cumulative effects and water quality standard and guideline # 2 would be met. Therefore, no cumulative temperature or turbidity effect would result from these action alternatives.

Aquatic Conservation Strategy

As disclosed above in this water quality section, no prolonged or adverse impacts to water quality or the associated beneficial uses of water are expected from any of the proposed activities in any of the action alternatives including those actions occurring in the riparian reserve land allocation. As such, the long-term trend of improving water quality in the watershed would not be setback; water quality in Layng Creek and planning area streams would continue to support healthy riparian, aquatic and wetland ecosystems consistent with ACS objective 4. Since the action alternatives apply all relevant standards and guidelines, and since they were developed to restore riparian ecosystem health at the stream reach and landscape scale, they are also in keeping with the overarching intent of the Aquatic Conservation Strategy (USDA/USDI, 1994).

HERBICIDE USE AND WATER QUALITY

Relevant Standards and Guidelines

Relative standard and guideline from the Northwest Forest Plan include:

- RA-3 Herbicides, insecticides, and other toxicants and chemicals shall be applied only in a manner that avoids impacts that retard or prevent attainment of the Aquatic Conservation Strategy Objectives.

Relevant standard and guidelines from the Umpqua Land Resource Management Plan (LRMP), Appendix G (Layng Creek Municipal Watershed Management Plan) include:

- Maintain timely communication with City of Cottage Grove as to proposed activities. All proposed activities involving chemicals shall be acceptable to the City of Cottage Grove.

Standard Objectives from the Pacific Northwest Region, Preventing and Managing Invasive Plants Final Environmental Impact Statement (USDA Forest Service, 2005) include:

- Standard 18: Use only adjuvants (e.g. surfactants, dyes) and inert ingredients reviewed in Forest Service hazard and risk assessment documents such as SERA, 1997; Bakke, 2002.

- Standard 19: To minimize or eliminate direct or indirect negative effects to non-target plants, terrestrial animals, water quality and aquatic biota (including amphibians) from the application of herbicide, use site-specific soil characteristics, proximity to surface water and local water table depth to determine herbicide formulation, size of buffers needed, if any, and application method and timing. Consider herbicides registered for aquatic use where herbicide is likely to be delivered to surface waters.

Existing Conditions

Both action alternatives propose to use the herbicide glyphosate to eradicate false brome. Treatment would occur continuously along the first seven miles of the 1721 road and in a scattering of individual areas further up on the 1721 road and other individual sites not adjacent to the road, where there are known populations of false brome. For complete project details refer to the Connected Action and Management Requirements discussion in Chapter Two.

This herbicide project is located within and beyond the Curran Junetta planning area boundary. In addition to Curran and Junetta Creeks, other tributaries that cross the 1721 road in the areas of implementation flow into Prather and Layng Creeks. The City of Cottage Grove currently has municipal intakes on both Prather and Layng Creeks.

Implementation Along First Seven Miles of Rd. 1721

Implementation would occur during the dry summer months. The application along the 1721 road crosses perennial streams ten times. The stream crossings are located between 880 feet to 5,000 feet upstream from the fish bearing reaches of Curran Creek. Most of the crossings are greater than 4,000 feet above fish bearing reaches. The

section of the road that would be sprayed also crosses 15 intermittent streams that are expected to be dry during implementation. However, if water is flowing they would be treated as perennial stream channels, and require a 25 foot buffer.

Implementation at Scattered Sites

No perennial streams are located near any of the individual scattered treatment sites (along the upper 1721 road or in the areas not adjacent to the road). A few of these sites are near intermittent streams. Water is not expected to be flowing during project implementation. However if water is present perennial streams mitigation measures would apply.

Direct Effects

Direct effects in the context of herbicide application are those that would occur in streams within and adjacent to the planning area that cross the 1721 road within the zone of application. Direct effects are triggered immediately as a result of the Curran Junetta alternatives.

Under Alternative One, herbicides would not be applied to the watershed. Consequently there would be no effects to aquatic resources.

Herbicides can enter stream channels and impact municipal water sources or aquatic species. Direct impacts can occur from drift during spray application, as a result of soil erosion and runoff, or by directly applying the herbicide to stream courses. The discussion below demonstrates how mitigation measures would minimize the potential for the herbicide to enter and impact water quality.

Glyphosate is highly soluble in water, and is rapidly absorbed by soil particles. Heavy rains immediately after the application of glyphosate can result in runoff to stream channels. A 25 foot no spray buffer would be required along perennial stream channels. Application would occur during the dry summer months when road ditches are dry and chances of heavy rains are extremely low. Application would not occur if rain was forecast to occur within the next 36 hours. If standing water is found within road ditches, those areas would be treated as a perennial stream and have a 25 foot no spray buffer.

Berg (2004) reviewed a variety of herbicide projects and indicated that glyphosate was not detected in streams with adequate buffers. Berg suggests that effective buffers can vary in size. Stream type, the presence of sensitive species and herbicide toxicity should all be considered when determining buffer width. All streams that are directly associated with the herbicide project are small, non-fish bearing tributaries. The closest fish bearing reach is 880 feet downstream from one stream crossing. Most are greater than 4,000 feet away from fish bearing streams.

There are no threatened, endangered or sensitive fish species within the Layng Creek watershed (refer to the Wildlife section for other species associated with aquatic habitat). In addition, SERA (2003) cited a 1993 document from the U.S. Environmental Protection Agency, Office of Pesticide Programs that classified technical grade glyphosate as non-toxic to practically non-toxic to freshwater fish. It is the surfactant used with glyphosate that determines the toxicity levels. The surfactant proposed for this project is derived from vegetable oils and is considered to be inert (see Connected Action and Management Requirements discussion in Chapter Two). This is consistent with the

Standard Objective #18 from the Pacific Northwest Region, Preventing and Managing Invasive Plants Final Environmental Impact Statement (USDA Forest Service, 2005).

SERA (2003), suggests that at five miles per hour (mph), a typical backpack spray would drift less than 23 feet. Herbicide spraying would only occur with winds five mph or less. This mitigation would reduce the concern of drift entering the stream channel to non-detectable levels.

The 25 foot buffer proposed for this ground based spray project is consistent with similar projects that Berg (2005) reviewed. Given the characteristics of these streams the 25 foot buffer is adequate to protect water quality.

Herbicides would not be sprayed directly onto any surface water. Accidental spills are highly unlikely to enter surface water. Mitigation measures would reduce the potential for spills to occur, and if an accident were to occur the magnitude and intensity of impacts would be minimized. An Herbicide Transportation, Handling and Emergency Spill Response Plan would be a project requirement. This plan would address spill prevention and containment.

Dry roadside ditches and intermittent streams would not be buffered. Once heavy winter rains begin surface water would flow over these areas. Berg (2005) cited a study conducted in Oregon where herbicides were sprayed the end of September along a road. There were no buffers along the drainage ditch or in a stream that crossed the area. Monitoring occurred from the end of October through early January. Results from the study found no glyphosate detectable in the ditch or stream samples.

Application of herbicide would occur during the dry summer months. The rains typically begin mid October. There is a high likelihood that glyphosate would degrade prior to the rains. However, if it were to be detectable, levels are expected to be low, resulting in minimal impact to aquatic resources.

Given these mitigation measures, herbicide treatment is unlikely to affect water resources. Substantial adverse effects on beneficial uses of water are unlikely.

Indirect Effects

Indirect effects are those that could occur later in time or downstream of the action at the drainage or larger scale.

No measurable detection of herbicide or effects to water quality is expected at the City of Cottage Grove's municipal water intake. Since there are no expected adverse direct effects, there would be no downstream or larger scale measurable indirect effects.

Cumulative Effects

Treating noxious weeds with glyphosate is unlikely to have an effect to water resources. A threshold of concern would not be approached and therefore there would be no contribution to substantial cumulative effects. No adverse cumulative effects are expected from implementation of this project under the action alternatives.

STREAM FLOWS

Relevant Standards and Guidelines

The relevant standard and guidelines from the Umpqua Land and Resource Management Plan (LRMP) related to streamflow include:

Watershed cumulative effects and water quality, standard and guideline #2: Beneficial uses of water and aquatic habitats would not be degraded by turbidity, sediment, or scoured stream channels caused by timber harvest, road construction, and related activities.

Watershed cumulative effects and water quality, standard and guideline #4: Beneficial uses of water and aquatic habitat (water quality) would not be degraded by increased peak flows caused by canopy removal from timber harvest, road construction, and related activities.

Existing Conditions

The streamflow regime of the Curran Junetta Planning Area is influenced by Western Cascades geology. The Western Cascades streamflow regime responds rapidly during winter runoff events. This regime has large annual flow fluctuations with large differences between summer low flow and winter high flow. In general, the streamflow record from the gauging station on the Row River downstream of the planning area (about ten stream miles) reveals that winter flow for the upper area of the Row River Watershed responds quickly to storm precipitation with rapid runoff, in sharp contrast to summer flows that are very low.

The planning area is mostly within the transient snow zone (2,000 to 5,000 feet in elevation) where winter peak flows are an important fluvial process. In this zone, warm rain can follow a colder snow storm causing rapid snowmelt. In the Upper Willamette sub-basin, 88 percent of floods with a return period of greater than six years were associated with rain-on-snow events (Harr 1979, Christner 1981). Sizeable canopy openings can result in greater snow accumulation and more rapid snowmelt compared to locations lacking large canopy openings.

The forest canopy has a major influence on snow accumulation, distribution, and melting rates. The Umpqua Forest Plan requires an analysis of forest canopy conditions (standard and guideline #4, listed above). The hydrologic recovery procedure (HRP) was used to estimate the hydrologic recovery of the forest canopy at the drainage, subwatershed, and watershed scales. An area is considered fully recovered when the canopy closure is 70% and the average tree diameter is eight inches (USDA, Umpqua NF, 1990b). The hydrologic recovery level represents an area compilation of forest canopy re-development following disturbance. It also represents the potential influence on the streamflow and stream channel effects from floods. A hydrologic recovery of 75% or greater would maintain current peak flows and avoid an adverse change to physical channel condition and associated factors such as water quality and fish habitat. Statistically discernible increases in peak flows have occurred when greater than 25% of smaller drainages have been harvested (loss of canopy) and included roads; that is, the hydrologic recovery was less than 75% (Jones and Grant, 1996; Thomas and Megahan, 1998). Conditions below the 75% hydrologic recovery value (i.e.; lower levels of

hydrologic recovery) need further evaluation for potential peak flow cumulative effects from rapid snowmelt during rain-on-snow storms (following standard and guideline #4).

The combined Curran and Junetta drainages make up the planning area, and have a hydrologic recovery percentage of 85%. This calculation included the recent private clearcut at the southern end of the planning area and the private land within the drainages west of the planning area boundary.

Indirect Effects and Cumulative Effects

Peak flows represent an indirect effect rather than a direct small-scale effect. The Forest Plan (USDA, Umpqua NF, 1990a) identified an analysis area of at least 1,000 acres to evaluate potential peak flow response. As such, only downstream indirect effects and cumulative effects are discussed for the peak flow analysis.

Alternative One would not reduce canopy cover; therefore, no change in hydrologic recovery would occur that would potentially increase peak flow.

The overall hydrologic recovery analysis of snow accumulation and melt utilized recent research that was done on the Umpqua and Gifford Pinchot National Forests. This research indicated that a shelterwood canopy can allow about 60% greater snowpack runoff than mature forest (Storck et al. 1999) at the site scale. Therefore, the analysis for the action alternatives assumed a combined average of 43% canopy recovery condition for proposed thinning units and no recovery for canopy gaps. These conservative assumptions allowed for a margin of safety in the analysis that addresses scale and treatment differences between the original study and this project.

Under Alternatives Two and Three, the proposed silvicultural treatments would decrease the HRP to 75%, just above the level of concern. In addition, the remaining leave trees in the thinned areas would break up the flow of warm wind across the snow pack and substantially mitigate the rapid melt process of rain-on-snow events.

Alternatives Two and Three would not reduce canopy closure to a level that would cause an indirect peak flow response at the drainage scale or that would be detectable at the subwatershed or watershed scales. No cumulative peak flow effect is expected under the action alternatives because no indirect peak flow effect would occur that could be incrementally added to past, present, or reasonably foreseeable future activities to cause a cumulative peak flow increase.

Aquatic Conservation Strategy

As disclosed above in this stream flow section, no impacts to flow regimes or the associated beneficial uses of water are expected from any of the proposed activities in any of the action alternatives including those actions occurring in riparian reserves land such as restorative thinning, underburning, and planting. As such, the timing, magnitude, and duration of peak, high, and low flows are protected under all action alternatives, consistent with ACS objective 6. Since the action alternatives apply all relevant standards and guidelines, and since they were developed to restore riparian ecosystem health at the stream reach and landscape scale, they are also in keeping with the overarching intent of the Aquatic Conservation Strategy (USDA/USDI, 1994).

RIPARIAN RESERVES

The riparian reserve land allocation was established in the Northwest Forest Plan as part of the Aquatic Conservation Strategy (USDA/USDI, 1994). This riparian reserve analysis is based on the guidance in the Northwest Forest Plan which, in general, is defined for this analysis as one site potential tree height on non-fish bearing streams (either perennial or intermittent) and two site potential tree heights on fish bearing streams. No changes to these guidelines were made with either the 1995 Layng Creek Watershed Analysis or its 2005 iteration. A site potential tree height is the average maximum height of the tallest dominant trees, at 200 years or older, for a given area. The height of site potential trees in Layng Creek as described in the 1995 WA is 200 feet.

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems. This strategy is based, in part, on natural disturbance processes. Proposed riparian actions are assessed in relation to the watershed's existing condition and any short or long-term effects to such conditions.

Relevant Standards and Guidelines

The standards and guidelines for riparian reserves specifically related to the Curran Junetta alternatives include:

TM-1 (c). Prohibit timber harvest except where silvicultural practices are applied to control stocking and to acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

FM-1. Design fuel treatment to meet Aquatic Conservation Strategy objectives and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression could be damaging to long-term ecosystem function.

FM-4. Design prescribed burning and prescriptions to contribute to attainment of Aquatic Conservation Strategy objectives.

1995 Layng Creek Watershed Analysis Recommendations

- To meet Aquatic Conservation Strategy (ACS) objectives, riparian silviculture techniques such as thinning and release can be used to accelerate development of old growth characteristics in conifer and hardwood stands and within Riparian Reserves.
- Manage plantations that encroach on riparian reserves for maximum conversion to late-seral, old-growth conditions (LSOG). Manage for LSOG type diversity. Leave all non-conifer species and all western redcedar.

2005 Layng Creek Watershed Analysis Iteration

•Along perennial streams, apply silvicultural treatments such as thinning, activity fuel treatments, or prescribed underburns outside the primary shade zone[51] when it is determined that such activities can benefit effective shade and other riparian functions over the long term and meet Aquatic Conservation Strategy objectives. Apply no treatments buffers based on the 2005 Northwest Forest Plan Temperature TMDL Implementation Strategy (USDA/USDI 2005).

• Along intermittent streams, apply variable-width, no treatment buffers as needed to provide slope stability and lower sediment delivery associated with certain types of yarding. The size of no-treatment buffers would be prescribed based on site-specific conditions such as soil conditions and channel incision, and in the context of the proposed silvicultural prescription and logging system. On intermittent channels lacking substantial incision or other constraining characteristics, vegetation manipulation and fuel reduction are recommended throughout riparian reserves in order to maximize restorative treatments in the riparian area.

RIPARIAN FOREST CONDITIONS

Existing and Desired Condition

In Layng Creek, about 64% of the federally managed riparian reserves have been either previously clearcut, burned in fires, or occupied by permanent roads, leaving about 36% of this land allocation in late-seral conditions (USDA, Umpqua NF, 1995). A majority of Layng Creek's riparian reserves (62%) are considered mid-successional, and in the stem-exclusion stage of development.

In the planning area there are 3,077 acres of riparian reserve. Of this, 1,041 acres (34%) is late-successional while 2,036 acres (66%) have been previously clearcut. Most of the previously clearcut riparian reserve in the planning area are now Douglas-fir plantations in the stem exclusion stage. Most of the stem exclusion stands in Layng Creek are very dense and lack diversity due to the selection of Douglas-fir over other species during planting and precommercial thinning. If left untreated, many stands are on a track to develop as closed, homogeneous stands that do not represent desired conditions for either the matrix or riparian reserve land allocations (USDA Umpqua NF, 2005).

Roads in riparian areas have the potential to limit shade and reduce the deposition of large wood and debris to streams and riparian areas. At the scale of Layng Creek, there are about 539 acres of roads in the riparian reserves, equating to 2.8% of the land allocation (USDA Umpqua NF, 1995). In the planning area there are approximately

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51 The primary shade zone is an area along a perennial stream that provides shade between 10:00 AM and 2:00 PM. Though the primary shade zone can be substantially affected by stream orientation (the south bank of an east-west flowing stream is more critical than the north bank), the following table is useful in helping define the primary shade zone based solely on tree height and slope (USDI/USDA 2005):

Height Of Tree	%Hill Slope <30	%Hill Slope 30 to 60	%Hill Slope >60 .
Trees < 20 feet	12' buffer	14' buffer	15' buffer
Trees 21 to 60 feet	28' buffer	33' buffer	55' buffer
Trees 61 to 100 feet	50' buffer	50' buffer	60' buffer

13.6 miles of road within riparian reserves, with a density of 2.6 miles of road per square mile.

Table 33 displays the percent of riparian reserve trees in late-successional (see Forest Vegetation section) condition and the road density within the riparian reserves of each drainage in the planning area. The Lower Junetta and Middle Fork Junetta drainages have the highest impact from roads. This is primarily due to the 1751 and 1751-422 roads, which are located adjacent to the stream channels and within the riparian reserve. The Lower Junetta drainage also has a nominal late- successional component in riparian reserves. Conversely, the Hardesty Ecosystem Mangement Area (MA 14) and the Mt. June Semi-Primitive Unroaded Recreation Area (MA 1), which are located in Upper Junetta and East Fork Junetta drainages, have had limited road construction and timber management. This has resulted in a higher late-successional riparian component and a low amount of roads within the riparian reserves of these drainages.

Table 33. Late- Successional and Road Densities in Riparian Reserves.

Drainage Name (7th level)	% Riparian Reserve>80 years old	Road Density within Riparian Reserve (mi/sq mi)
Lower Junetta	4.3%	4.4
Curran*	20.5%	2.9
West Fork Junetta*	17.8%	1.6
Middle Fork Junetta*	17.6%	3.4
East Fork Junetta	81%	0.7
Upper Junetta	63.8%	1.6
Total	**29.7%**	**2.6**

*These drainages include private land located outside

The desired condition for second-growth riparian reserves is a decrease in riparian area occupied by permanent roads, increased species and structural diversity, and lower risk of stand replacement fire in keeping with ACS objectives 2, 3, 8, and 9.

Proposed Riparian Forest Treatments

The action alternatives would each thin a total of 438 riparian reserve acres, with only a small differences between the action alternatives with respect to logging systems (Table 34).

Table 34. Summary of thinning, fuel treatment, and logging systems in riparian reserves.

Actions	Alternative One	Alternative Two	*Alternative Three*
Thinning			
Riparian reserve in harvest units	N/A	705 acres	*705 acres*
Commercial Thinning	0	438 acres	*438 acres*
Fuel treatments			
Underburn	0	138 acres	*138 acres*
Machine pile	0	59 acres	*59 acres*
Hand pile and burn 100' in from private land	0	3 acres	*3 acres*
Hand pile and burn 100' in from 1721 and 1751 roads	0	26 acres	*26 acres*
Total treatment acres		226 acres	*226 acres*
No treatment	0	212 acres	*212 acres*
Logging Systems			
Skyline	0	333.5 acres	*293.5 acres*
Helicopter	0	45 acres	*85 acres*
Ground Based	*0*	*59 acres*	*59 acres*

The riparian reserve thinning prescriptions would be the same as in the adjacent matrix land, which involves low thinning (where the smaller trees are harvested) combined with gap creation as detailed in Tables 1 and 3 in Chapter Two. There would be some ¼ to ½ acre gaps created in the riparian reserve, although they would be placed no closer than 50 feet slope distance from stream channels. All perennial streams would receive at least a 50-60 foot no cut buffer, while the stable intermittent channels within proposed harvest units would be thinned up to the edge of the stream, without buffers. A little over a third of the riparian reserve acreage within unit boundaries (267acres) would function as no-cut buffers, while two-thirds of the riparian reserves would be thinned. The proposed thinning prescriptions in the matrix and riparian reserve land allocations were based on landscape scale disturbance and successional development processes as described and recommended in the 2005 Layng Creek WA iteration 1.1.

No new permanent roads would be located within riparian reserves (Table 35). However, some existing roads that are not currently part of the transportation system would be reconstructed and placed into the status of a system road. Approximately 1.6 acres of these roads are located within riparian reserves. Two of these roads currently have old log stream crossings which would be upgraded to culverts. These roads would be inactivated following sale activities. The action alternatives do not differ in regards to roads within riparian reserves. All roads identified in the Curran Junetta Roads Analysis as potential segments for inactivation and decommissioning are included in both action alternatives.

Table 35. Summary of road actions within riparian reserves.

	Alternative One	Alternatives Two and Three
New permanent roads (acres)	0	0 acres
Existing non-system road created into a system road and inactivated	0	1.6 acres
New temporary roads* (acres)	0	1.0 acres (obliterated following use)
Inactivation of existing roads	0	1.8 acres
Decommission existing roads	0	1.4 acres
Change from existing condition	*0*	*-1.4 acres of permanent road in riparian reserve removed*

*Temporary roads are not factored into the calculation of change from existing condition because all temporary roads would be obliterated immediately following the logging.

Direct Effects

The direct effects to riparian reserve forest conditions are defined as those occurring within the confines of the riparian reserve over the course of one to two decades following implementation.

Alternative One has no ground disturbing activities in riparian reserves. No temporary roads would be built that would adversely affect riparian site productivity or habitat quality.

Under both action alternatives, the construction of temporary roads within riparian reserves would result in short-term impacts to riparian forest conditions by disturbing soil and vegetation. This would result in losses of habitat and site productivity at the immediate site of the road prisms. The duration of these impacts is expected to be less than a decade because these roads would be subsoiled following use. The subsoiled temporary roads would be planted with big game forage, and the skid roads would have harvest slash or some other suitable organic material pulled back across the subsoiled surface (see Soil and Site Productivity and Botany-Revegetation mitigation measures in Chapter Two). These mitigation measures would reduce impacts.

Compared to Alternative One, the thinning on 438 Riparian Reserve acres and the fuel treatments on 226 acres under both action alternatives would reduce the existing 65-75% canopy closure to 35-54%, allowing more light penetration and resulting in warmer and dryer riparian forest conditions. The thinning under both action alternatives would also reduce the rate of litter input to streams and the riparian forest floor, which represents important nutrient cycling and food bases of aquatic and terrestrial organisms. This effect would likely reduce local populations of dependant organisms. These canopy-related effects would begin to subside in about a decade in the

moderately thinned areas, and in about two decades in the more heavily thinned riparian reserves as the canopies of the residual leave trees gradually fill-in.

The above effects from thinning and underburning would occur on a small scale in terms of the riparian reserve network that exists in the Curran and Junetta drainages. Of the 3,077 acres of riparian reserve in the planning area, only 14% would be thinned with the action alternatives and less than 5% would be underburned. Moreover, all perennial streams and 45% of the 1,873 feet of intermittent channels would have no cut buffers which would help provide a cooler, dense forest paralleling those stream channels.

The logging itself would also result in effects to riparian reserve conditions under both action alternatives. The ground based loader harvest systems would exert the most direct impact to riparian reserves due to soil disturbance compared to skyline and helicopter logging. Approximately 59 acres of riparian reserve would be ground based logged (Table 34). The actual amount of soil disturbance expected with the ground-based logging is estimated to be about 10% (5.9 acres). However, this estimate is high since no skid trails are expected to cross stream channels and roughly 70% of all skid roads would be on pre-existing skid roads. In addition, all skid roads would be rehabilitated after logging activities are completed.

Machine pile and handpile burning would also result in direct effects to riparian reserves in terms of site productivity and bare soil exposure. Since machine piles typically cover up to 5% of a treatment area, the 59 acres of machine piling and burning under Alternatives Two and Three could result in hot burns on an estimated three acres. Likewise, the handpile burning prescribed over 29 acres would result in about 3% of the treatment area (approx. one acre) affected by hot burns where site productivity would be negatively affected.

A mitigation measure incorporated into the action alternatives would require that underburning occur during moist conditions where large down wood and duff are less likely to be completely consumed. This measure is expected to lessen impacts and meet standard and guideline FM-1. Standard and guideline FM-4 would also be met with the action alternatives since prescribed burning in riparian reserves would reduce activity fuels to reasonable levels and create adequate planting sites in openings. These activities would contribute to meeting the desired riparian forest conditions of improved diversity.

Under Alternative One, no soil disturbance from logging or pile burning would occur, thus no bare soil would be exposed and no productivity losses would occur in riparian reserves.

In summary, though some direct adverse effects to riparian forest conditions would or could take place under the action alternatives, the magnitude of these effects at the site-scale and the scale of the planning area are not considered substantial, because neither the extent nor the intensity of these impacts is substantial.

Indirect Effects

The indirect effects to riparian reserve forests are defined for this analysis as those that would occur within the riparian reserves of the Curran Junetta harvest units over the long-term (greater than two decade).

None of the alternatives construct new permanent roads within riparian reserves.

Thinning under the action alternatives would reduce snag and down wood recruitment rates compared to Alternative One by removing trees that would otherwise die from suppression mortality. The loss of suppression mortality associated with the thinning in riparian reserves would affect trees ranging in size from seven inches up to trees greater than 18 inches in some riparian stands. Since suppression mortality typically kills smaller, suppressed trees rather than the larger dominate trees, the majority of the recruitment loss associated with the action alternatives would be from smaller-sized trees (Figure 14). Without a second commercial thinning, snag recruitment in riparian areas would approach pre-treatment levels in about three decades (Figure 15).

The large wood recruitment loss to stream channels would be largely mitigated by the 50-60 foot no-cut buffers since most of the wood that naturally recruits to streams comes from within the first 65 feet of the stream (Murphy and Koski, 1989; McDade et. al 1990). The effects of this snag and down wood recruitment loss include the loss of habitat for aquatic and terrestrial species that depend on these habitat structures. Though habitat quality and quantity would be diminished, the magnitude of the thinning and gap creation effects in terms of riparian species populations declines are not expected because only 14% of the planning area's riparian reserves would be affected.

The action alternatives would result in long-term beneficial effects to riparian forest structure and composition; development of late-successional conditions would occur sooner than in Alternative One. As such, under the action alternatives, standard and guideline TM-1 (c) would be met. The silvicultural practices applied to control stocking in the riparian reserve contribute to meeting the objectives for desired vegetation characteristics as outlined in the Aquatic Conservation Strategy.

The created canopy gaps would approximate a moderate severity fire, which was the process that historically created gaps and triggered the initiation and development of understory layers (Zenner, 2005). Establishment of shade-tolerant conifers is an essential step in development of the multilayered characteristics of old-growth (Franklin et al. 2002). The prescribed tree planting in the half-acre gaps would accelerate this process. Depending on the stand and treatment type, commercial thinning would eventually meet the desired conditions of riparian stands attaining at least eight trees per acre greater than 31 inches DBH within three to four decades. The beneficial effects would gradually improve habitat connectivity for riparian dependant species that rely on late-successional forest conditions. Again, the magnitude of the beneficial effects from the action alternatives are slight, since only 14% of the riparian reserve land allocation in the planning area would experience the benefits; the rate at which these effects would accrue over time is gradual. Alternative One would not attain these conditions throughout the modeled time frame of 100 years, and would not achieve the desired conditions of increased species and structural diversity or the acceleration of late-successional stand characteristics for riparian reserves, within the next several decades.

The removal of permanent roads within riparian reserves associated with road decommissioning under the action alternatives would achieve the desired condition of fewer overall acres of permanent road occupying the riparian reserve land allocation. Alternatives Two and Three would result in more of a net decrease of permanent roads in the reserves (due to decommissioning the 1751-422 Road). Alternative One would result in no beneficial long-term effects from road decommissioning in the riparian reserve land allocation.

At the scale of the Layng Creek riparian reserve network and the fifth level Row River watershed, all the above indirect effects of habitat changes in the riparian reserves

would not be measurable. Since the indirect effects exhibit a very low magnitude at the scale of the planning area, they would be substantially diluted at these larger scales.

STREAM CHANNELS

Streams in the planning area are primarily affected by roads that cross them or that exist near them, and by the condition of the adjacent forest that provides critical large wood input. Past management practices that removed large down wood from the stream channel also impacted the stream channels by reducing channel complexity and limiting aquatic habitat.

Riparian Reserve Road Standards and Guidelines from the Northwest Forest Plan

RF-2a. For each existing or planned road, meet aquatic conservation strategy (ACS) objectives by minimizing road and landing locations in riparian reserves.

RF-2e. For each existing or planned road, meet ACS objectives by minimizing disruption of natural hydrologic flow paths, including diversion of stream flow and interception of surface and subsurface flow.

RF-3. Determine the influence of each road on the ACS objectives through watershed analysis.

RF-3a. Meet ACS objectives by reconstructing roads and associated drainage features that pose a substantial risk.

RF-3c. Meet ACS objectives by closing and stabilizing, or obliterating and stabilizing, roads based on the ongoing and potential effects considering short-term and long-term transportation needs.

Instream Standards and Guidelines from the Northwest Forest Plan

RA-4. Locate water drafting sites to minimize adverse effects on stream channel stability, sedimentation, and in-stream flows needed to maintain riparian resources, channel conditions, and fish habitat.

FW-1. Design and implement fish habitat restoration and enhancement activities in a manner that contributes to attainment of the ACS objectives.

Watershed Analysis Recommendations from the 1995 Layng Creek WA

- ✓ Instream structure work is recommended for Junetta Creek to create spawning habitat, cover, and adult pool habitat.
- ✓ Storm-proof roads with cross ditches and outslope roads where maintenance levels are expected to be low.
- ✓ Consider decommissioning roads in areas where densities are high and roads are not necessary for management activities.
- ✓ Update the Access and Travel Management (ATM) Plan to incorporate ROD and ACS objectives.

- ✓ Replace culverts that would not accommodate a 100-year flood event.
- ✓ Replace culverts creating migration barriers across fishbearing streams.

Existing and Desired Conditions

Within the Layng Creek subwatershed, the streams with higher levels of late-successional forest in riparian areas have higher levels of instream wood and better fish habitat (USDA Umpqua NF, 1995). Stream habitat within the planning area are often lacking in large woody debris and pool habitat. This is of particular concern in lower Junetta Creek. Amounts of large woody debris and a more complex aquatic habitat improves in reaches with mature riparian trees and minimum to no roads, such as East Fork and Upper Junetta Creeks.

Bridges cross the main stem of Junetta Creek, allowing resident fish passage. However, two culverts on the 1751 road, that cross near the mouths of Curran and West Fork Junetta Creeks, are considered migration barriers and are creating aquatic connectivity problems. For resident trout, such artificial barriers can potentially lead to the loss of subpopulations over time as disturbance either reduces or extricates fish in upstream areas; these areas can then no longer be repopulated from down stream (USDA, Umpqua NF, 2001). These culverts limit upstream movement (one mile of Curran Creek and 1.2 miles of West Fork Junetta Creek) to presently occupied, suitable habitat.

Road densities are highest in the riparian reserves within Lower Junetta, Middle Fork Junetta and Curran Creek drainages (Table 32). Junetta and Middle Fork Junetta Creeks both have roads parallel to the stream channel and within the riparian reserve. Runoff from roads can be a source of fine sedimentation to stream channels. This is particularly of concern for valley bottoms (like the ones parallel to the stream channels) and the mid-sloped roads that cross several stream channels.

Roads also pose risks to the aquatic ecosystem by producing sediment to streams when culvert hydraulic capacity is exceeded. Culvert failure often results in a washout of the crossing; fill is eroded or the flow diverts down the road's ditch. During the development of the Curran Junetta Roads Analysis, 110 stream crossings were inventoried in order to prioritize high-risk sites for failure and address standard and guideline RF-2e. The Roads Analysis satisfied standard and guideline RF-3 by assessing the influence of each road on the Aquatic Conservation Strategy objectives. In addition, the Curran Junetta Roads Analysis identified several road segments for reconstruction, inactivation and decommissioning to help further ACS objectives and meet standard and guideline RF-3c.

Desired conditions for stream channels in the planning area include: 1) an immediate increase of large wood (moving toward 80 pieces per mile) as described in the WA (USDA, Umpqua NF 1995); 2) improved habitat connectivity for upstream movement of aquatic organisms; and, 3) decreased risk of stream crossing failures during storms.

Desired conditions for stream channels in the planning area include: 1) decreased risk of road-related stream diversion and stream crossing failure, in keeping with ACS objective 5 that addresses the sediment regime; 2) improved habitat connectivity for upstream movement of aquatic organisms in keeping with ACS objective 3 that addresses connectivity within watersheds; and 3) improved levels of large instream wood in keeping with ACS objective 2 that addresses stream bed and bank conditions.

Roads Analysis Recommendations

A project-level roads analysis was accomplished to meet standard and guidelines RF-3a and RF-3c. The specific recommendations in the roads analysis are listed under the vehicular access section in this Chapter.

Proposed Road Treatments

The road treatments that cross streams are similar in both action alternatives. There are no new stream crossings. The proposed inactivation of roads would remove several stream crossings while other crossings would be upgraded (Table 36).

Table 36. Number of stream crossings upgraded or removed.

	Alternative One	Alternatives Two and Three
Number of stream crossings upgraded	0	9 crossings upgraded (5 on system roads, 2 on non-system existing roads*, 2 migration barrier upgrades)
Number of new stream crossings	0	0
Number of existing stream crossings removed through road inactivation	0	13 crossings removed
Net change from existing condition	*0*	*-13 stream crossings removed*

*the non-system roads would be changed to system roads. Pipes would be removed when roads are inactivated after sale activities

All the temporary roads constructed to gain access for logging would be obliterated following use. The stream crossings removed are on roads proposed for inactivation, which includes the removal of culverts and blocking the road entry points to eliminate the possibility of unauthorized use.

The high priority stream crossings recommended in the Curran Junetta Roads Analysis for reconstruction are included in both action alternatives. Five sites that were identified in the roads analysis are proposed for treatment under the action alternatives (Table 37). These upgrades meet standard and guideline RF-3a.

Table 37. High priority stream crossings identified during roads analysis to be upgraded.

Road Number	Mile Post	Proposed Modification	Estimated Sediment Delivery
1721-000	2.49	24 inch pipe plugged. A small stream is diverted and flows through a rotten log beneath the road surface. Currently a void exists beneath the road that would most likely not hold up during log haul. Recommend removal of the rotten log and fill in with adequate material and re-channel water to the existing culvert once culvert is cleaned out. However, if pipe is in poor condition it would be replaced with another 24 inch pipe.	50-100 CY
1721-000	8.53	24 inch pipe that is damaged on both ends with a moderate plug potential. Recommend repairing the damaged ends along with catch basin and pipe cleanout	100-500 CY
1721-000	9.89	24 inch overflow pipe that has scour at outlet flowing onto the fill. Recommend approximately 25 yards of rip rap placed on the fill slope to armor the area.	50-100 CY
1721-000	12.75	15 inch pipe is undersized. Recommend replacing the pipe with a 24 inch pipe and a 10 foot splash apron with two yards of rip rap.	50-100 CY
1721-000	13.50	15 inch pipe in good condition exists at this site. A small tree is blocking the outlet and needs to be cut. A 5 foot splash apron with 3/5 yards of riprap is needed at the outlet	50-100 CY
Total			**300-900**

Proposed Stream Treatments

Two culverts on the 1751 Road are migration barriers for resident cutthroat trout. One is located near the mouth of Curran Creek and the other is near the mouth of West Fork Junetta Creek. Both action alternatives propose to replace these culverts with squashed pipes designed for fish passage. These fish passage projects (Figure 6) would implement WA recommendations listed above and would meet standard and guideline FW-1. Most of the work to replace these stream crossings would occur within the confines of the existing road prism; however some equipment access into the streams may be necessary.

Watershed Analysis recommendations would be implemented under both action alternatives by installing instream structures into Junetta Creek (Figure 6). This project would place large wood into the stream channel that would help provide hiding cover, scour pool habitat, help retain spawning gravels and improve overall channel complexity. The NEPA analysis for the Lower Brice Instream Project identified several blown down trees along roads. Not all these trees were used for that project. The trees that weren't used can be cable yarded to the road and hauled to Junetta Creek. In addition, guyline trees used to harvest units in Curran Junetta may also be used. Structures would consist of one to five logs. An estimated 40 logs would be used. These structures would be placed into Junetta Creek using a cable yarder off the 1751 road.

The sites for wood placement would be areas where large wood should have accumulated naturally, but has been removed through past management practices. About one mile of stream would receive treatment, satisfying standard and guideline FW-1.

Several mitigation measures are included as part of these instream proposals (as detailed in the fisheries mitigation measures of Chapter Two) to reduce or minimize the risk of water contamination and turbidity, and to lessen risk to fish and other aquatic life when equipment and workers are working in and near the channel.

Direct Effects

The direct effects to stream channels are defined as short-term effects at the immediate location of instream project areas over a period of up to five years. This is based on observations of the recovery time for in-channel and bank disturbances associated with road reconstruction, inactivation and various stream restoration projects.

The direct effects to stream channels from road reconstruction would be increased sediment input caused by exposure of soil throughout the area where upgrading and removal of stream crossings is done. Channel banks and beds would also be highly modified during these activities by the equipment working on banks and within channels that would excavate native materials and backfill around upgraded culverts. The extent of stream channel adversely affected would average about 45 feet for each stream crossing. Both action alternatives have similar effects (Table 38).

Table 38. Stream channel disturbance by Alternative.

	Alternative One	Alternatives Two and Three
Stream crossing removal with road inactivation	0	13 removals 585 lineal feet 130 CY sediment
Stream crossings replacement	0	9 replacements 405 lineal feet 90 CY sediment
Totals	0	22 sites 990 lineal feet 220 CY sediment

The instream changes in these areas are likely to impact resident aquatic organisms, potentially killing or harming aquatic life. There is a potential to harm fish with the work at the two fish passage upgrades. No other culverts are located directly in fish bearing reaches. These adverse biological effects would last the several days to weeks that people and machinery are operating in the channel.

The amount of sedimentation potentially delivered with each instream construction site is estimated to be about ten cubic yards over a two-year period. This level of sedimentation from 22 dispersed instream construction sites (Table 38), associated with both action alternatives, is minimal with respect to the overall sediment regime of the planning area. Moreover, the erosion control measures and best management practices listed in the roads section of Chapter Two would effectively reduce both the extent and duration of the work-site sedimentation.

Under Alternative One, no direct effects to stream channels or aquatic organisms would occur since no new roads would be built across streams and no existing stream crossings would be decommissioned.

Indirect Effects

The indirect effects to stream channels are defined as the long-term effects of the instream work that would last longer than five years, plus any downstream effects occurring in Layng Creek below the mouth of Junetta Creek or further downstream.

Overall, the action alternatives would both result in long-term beneficial effects to stream channel connectivity as a result of the road inactivation, culvert upgrades and the road reconstruction compared to Alternative One, where no such work would occur. In total, both action alternatives would result in a net decrease of 13 stream crossings in vicinity streams (Table 38), which would reduce the long-term risk of stream crossing failure at five of the stream crossings identified in Table 36.

The 13 stream crossings removed under the action alternatives are associated with roads that would be inactivated until future needs (10-15 years). Removal of these culverts would eliminate the potential for culvert failure and associated sedimentation that may occur during the time these roads are not needed. These 13 stream crossing removals would result in overall improved aquatic connectivity to non-fish species that inhabit these smaller tributary streams. Improved connectivity equates to unabated movement of organisms up and downstream, and the free flow of water, sediment, and wood downstream, in a natural condition, compared to these same sites under Alternative One.

Under the action alternatives, the reduced risk of culvert failure at the five high priority stream crossings would also substantially reduce the long-term potential for sediment delivery to streams. In contrast, Alternative One would perpetuate the long-term risk of sedimentation associated with these five sites, which is estimated to potentially produce somewhere between 300 and 900 cubic yards (Table 37) if they failed during a winter storm event.

Recent instream wood additions to Brice Creek on the Cottage Grove Ranger District would result in long-term beneficial effects to aquatic habitats and organisms since large wood additions have shown positive effects. On the North Umpqua Ranger District over the last 20 years, these beneficial effects have been evident in tributaries of Steamboat Creek. This connected instream work under both action alternatives helps attain the desired condition of providing an immediate increase of large wood to planning area streams reaches. Alternative One would not achieve that desired condition.

Finally, the fish passage work in Curran and Middle Fork Junetta Creeks proposed under both action alternatives would allow the free upstream movement of resident cutthroat trout for a total of 2.2 miles. The long-term beneficial effects to aquatic organisms associated with improved connectivity would provide the potential for isolated upstream subpopulations to re-connect with downstream subpopulations over time. With a lack of action under Alternative One, upstream fish passage in these streams would continue to be blocked and the desired condition of improved habitat connectivity for upstream movement of aquatic organisms would not be attained.

Riparian and Stream Channel Cumulative Effects

The potential of the Curran Junetta action alternatives to result in either adverse or beneficial cumulative effects to riparian forest and riparian stream conditions is addressed at the scale of the Curran and Junetta Creeks. Since the direct and indirect effects to riparian forests and stream channels are of low magnitude, (as detailed above), it is reasonable to assume that these effects would only overlap with the effects of other past, present, and foreseeable future activities at the planning area scale.

Substantial impacts to streams and riparian forests have resulted from past road building and timber harvest in this planning area. The past harvest of 2,036 acres, or 66% of riparian reserve acres, continues to affect riparian processes since the amount of stem exclusion forest is outside the natural range of variability. The existing 39.2 miles of road in the planning area, equating to 3.9 miles per square miles of land, continues to profoundly affect local streams at stream crossings, and to more broadly affect the overall stream system's connectivity, given the hundreds of stream crossings that exist. Other than routine road maintenance, noxious weed control, and public and administrative road use, presently no management activities (i.e. timber sales) are occurring that would overlap with this project (Tables 6 and 7), and no reasonably foreseeable activities would overlap with this project that would impact riparian conditions (Table 8).

The adverse direct effects of the action alternatives to riparian conditions discussed above would have some temporal overlap with the recent 212 acre clearcut on the private land at the southern end of the planning area. Past clearcuts on federally administered lands occurred at least two decades ago, and are no longer exhibiting these effects. The adverse effects of the action alternatives to riparian forest conditions, such as lower snag and down wood recruitment levels and riparian habitat removal from new permanent roads, overlaps with past harvest effects and is expected to incrementally add to past effects resulting in an adverse cumulative effect. However, snags and down would levels would remain within the DecAID 30% tolerance level, which is the minimum level suggested for management of coarse wood related species. (Figures 15 and 16).

The adverse direct effects of the road actions to stream conditions such as sediment delivery and direct channel habitat impacts from culvert upgrade and removal would temporally overlap the impacts of the existing road network in planning area streams. The adverse effects of sediment delivery would incrementally add to past road effects, resulting in a cumulative effect. However, the longer-term beneficial effects of the action alternatives on stream channels, including the stream crossing removals and fish passage work, would help off-set the cumulative effects of the action alternatives.

In total (Table 39), the adverse cumulative effects associated with the action alternatives are outweighed by the longer-term beneficial effects. Thus, the accelerated attainment of desired riparian forest conditions and the removal of stream connectivity barriers outweigh the adverse effects because the longer-term beneficial effects result in greater net benefits.

Table 39. Summary of riparian reserve actions and effects.

Riparian Actions	Riparian Change	Primary Effect (Beneficial and/or Adverse)	Duration	Amounts by Alternative	
				1	2 & 3
Thinning with canopy gaps	Lower tree density & less crown closure	Beneficial--improved species and structural diversity/late-successional characteristics Adverse--dryer microclimate, less litter to streams/forest floor	30+ years 10-20 years	0 ac	438 ac
	Change in snag and down wood recruitment process	Adverse--loss of suppression mortality in smaller-sized trees Beneficial--accelerated growth of larger leave trees	30 years up to 60 years		
Road actions	Stream crossings removed with road inactivation	Adverse--increased sediment delivery at the site, & immediately downstream	2 to 3 years	0	13 sites, 130 CY sediment
	Stream crossing upgrades	Beneficial—lower risk of stream diversion and/or washout	25 years	0 sites, Higher risk 300-900 CY sediment	9 sites, Lower risk
Instream Restor-ation	Large wood addition	Beneficial--habitat for aquatic species and connectivity for terrestrial species Adverse--harm to organisms from equipment	20-40 years 1 week	0	~40 pieces lg. wood
	Fish passage instream modifications	Beneficial--upstream access Adverse--harm to organisms from equipment	25 years 1 week to 1 month	0 0	2.2 mile 2 sites
Creation and treatment	Activity fuel created, not treated	Adverse--increased fire risk	10 years	0	212 ac

Riparian Actions	Riparian Change	Primary Effect (Beneficial and/or Adverse)	Duration	Amounts by Alternative	
				1	2 & 3
of activity fuel	Underburning	Beneficial--reintroduction of excluded process	20 years	0	138 ac
	Machine Pile	Adverse--soil disturbance, loss of site productivity, risk of weed infestations	5-20 years	0	59 ac

Aquatic Conservation Strategy

The riparian reserves included in this project have regenerated under dense conditions that do not reflect the historic disturbance regime. The proposed thinning and fuels treatments in the reserves under the action alternatives would implement Watershed Analysis recommendations (USDA, Umpqua NF, 2005) to use thinning and prescribed fire to manage plantation tree densities in both matrix and riparian reserve land allocations. The actions within riparian reserves under Alternatives Two and Three are in compliance with Northwest Forest Plan riparian reserve standard and guideline TM-1c which calls for the application of silvicultural practices that meet desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

As disclosed above under the Riparian Reserve discussion, the action alternatives would restore species composition and structural diversity of plant communities, and would also supply sufficient coarse woody debris in riparian areas. As such they are consistent with ACS objective #8. The restorative riparian thinning would also be consistent with ACS objective #9, because the thinning would provide long-term habitat for riparian dependant species of plants and animals. By restoring more open stands like those that historically developed following disturbance, the stem exclusion stands would be less prone to stand-replacement fire and more likely to develop habitat characteristics needed by riparian dependant species. Finally, at the broader scale, the riparian forest restoration under the action alternatives advances the role of riparian reserves in providing connectivity within and between watersheds, consistent with ACS objective #2. By maximizing the amount of riparian treatment in unnaturally dense stands, the stands would advance more rapidly to maturity, and would move the riparian network toward the natural range of variability of more late-successional habitat.

As disclosed above under the Stream Channel discussion, the instream restorative work (stream crossing upgrades, stream crossing migration barrier modifications, and instream wood additions) is consistent with ACS objective #3 of restoring the physical integrity of stream shorelines, banks and bottom configurations, and ACS objective #2 of restoring unobstructed routes for aquatic species movement. The non-restorative instream road work (re-use of existing stream crossings and reconstruction of abandoned stream crossings) follows riparian reserve standards and guidelines for roads. Though small scale adverse effects are expected under the action alternatives, the broader long-term objective of moving riparian and upland stands toward the natural range of variability addresses the overarching intent of the Aquatic Conservation Strategy.

Alternative One would not pro-actively implement any of the objectives of the Aquatic Conservation Strategy.

Erosion and Sedimentation

Erosion and sedimentation are geomorphic processes that shape the physical appearance of the landscape and strongly influence aquatic ecosystems. The range of natural variability for sediment delivery to streams and wetlands within the planning area is considered to be very large because erosion processes are influenced by infrequent natural disturbance events such as floods and wildfire. Sedimentation[52] rates to streams are typically inconsequential on a year to year basis but can spike several orders of magnitude during large storm events. Land management has the potential to accelerate erosion rates and the volume of sediment entering streams and wetlands.

Within the planning area sediment enters the aquatic environment through mass wasting, fluvial erosion, and surface erosion. Mass wasting, which includes landslides and soil creep, involves the downslope transport of rock and soil aggregates under the dominant influence of gravity. Surface erosion pertains to detachment and transport of individual soil and rock particles through the turbulent action of moving water. Surface erosion generally results when the vegetative cover is removed and mineral soil becomes exposed. Fluvial erosion is the erosion of stream banks and stream beds from the forces of water.

MASS WASTING

Mass wasting is the dominant mechanism of sediment production within temperate rain forests of the Pacific Northwest (Naimen, et al., 1990), which includes the Layng Creek watershed. The potential mass wasting processes within the planning area include rapid-shallow landslides such as debris avalanches and in-channel debris flows, and slow-moving deeper-seated forms of mass-movement that include rotational slumps, earth flows, and soil creep. Topography has a strong influence on the form of a landslide.

Relevant Standards and Guidelines

LRMP soil standard and guideline 5 (IV-68). Prepare a risk and hazard analysis when the potential exists for triggering slope mass-movements as a result of proposed land management activities. Alternative prescriptions or mitigation measures are required when management activities might substantially increase the potential risk or hazard of accelerating landslide activity and when that landslide activity may result in damage to aquatic resources. Each unit was visited by a soil scientist and evaluated for mass movement potential. A summary of findings is discussed in the effects analysis.

RF-2e. For each existing or planned road, meet Aquatic Conservation Strategy (ACS) objectives by minimizing disruption of natural hydrologic flow paths, including diversion of stream flow and interception of surface and subsurface flow (USDA/USDI, 1994).

RF-3a. Meet ACS objectives by reconstructing roads and associated drainage features that pose a substantial risk (USDA/USDI, 1994).

52 Sedimentation pertains to the deposition or settling of rock and soil materials in an aquatic environment.

RF-4, Existing stream crossings determined to pose a substantial risk to riparian conditions would be improved to accommodate at least a 100-year flood. Crossings would be maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure (USDA/USDI, 1994).

Existing and Desired Conditions

Earth flow terrain is gently-sloping and weakly-dissected terrain, where soils are finely textured, fairly deep, and poorly drained (Swanson and Swanston, 1976). Earth flow terrain within the planning area is largely dormant (inactive) in the present day climatic regime. Past clearcutting has not reactivated movement of the dormant earth flow features in the planning area, but the network of old skid roads tended to redirect runoff, which caused development of localized gullies and landslides.

Approximately 90 acres of earthflow terrain has been identified as sensitive to soil disturbance. These are areas with seasonally saturated soils, ponded water, or where shallow piping occurs. Figure 18 displays these Conditionally Unsuitable areas in Units 9, 11, 17, 18 and 19. These areas would be thinned, and protection measures, such as no ground based logging, would apply.

Rapid-shallow landslides typically occur on steep, well-dissected slopes where soils are coarse-textured and relatively thin, and develop during high intensity or prolonged rainfall events. The primary factor affecting shallow rapid slides between 1950 and 1970 was attributed to side cast fills and soil displacement from road building. Approximately five acres of shallow rapid slide potential was identified in units 17 and 21; currently unstable and unsuitable, this area is excluded from timber harvest during this entry.

Stream crossings represent potentially critical sites for mass wasting when culverts are undersized to pass large flows or become plugged by some combination of sediment and wood debris. Under these circumstances, water can divert down the road where it might exit the road in a steep area causing a rapid-shallow landslide. A total of 110 stream crossings were inventoried to assess the potential risk for sediment delivery to streams should a site failure occur by overtopping (washout) or diversion. Five existing steam crossings were identified within the planning area as high risk for sediment delivery. Table 37 discusses the restoration proposals for these culverts. Reconstruction of these sites would reduce the risk of stream sedimentation at unstable sites to help further ACS objectives and meet S&G RF-3c.

Improperly functioning (plugged) cross drains or an insufficient number of cross drains are a chief cause of road fill failures (USDA, Forest Service, 1999). When road fills become saturated and fail, rapid-shallow landslides can occur. Several past road fill failures are on roads 1721, 1721-411, 1721-440, 1721-503, 1721-610, and 1758-411. These road fill failures triggered rapid-shallow landslides into Junetta and Curran Creeks. Road reconstruction and maintenance would improve drainage on all roads that were identified in the Curran Junetta Roads Analysis.

The desired condition is improved road drainage and stream crossings with less risk of mass wasting triggered by roads, and to meet ACS objectives through improved road drainage and stream crossings that results in less risk of mass wasting, and is in keeping with ACS objective #5 of restoring the sediment regime.

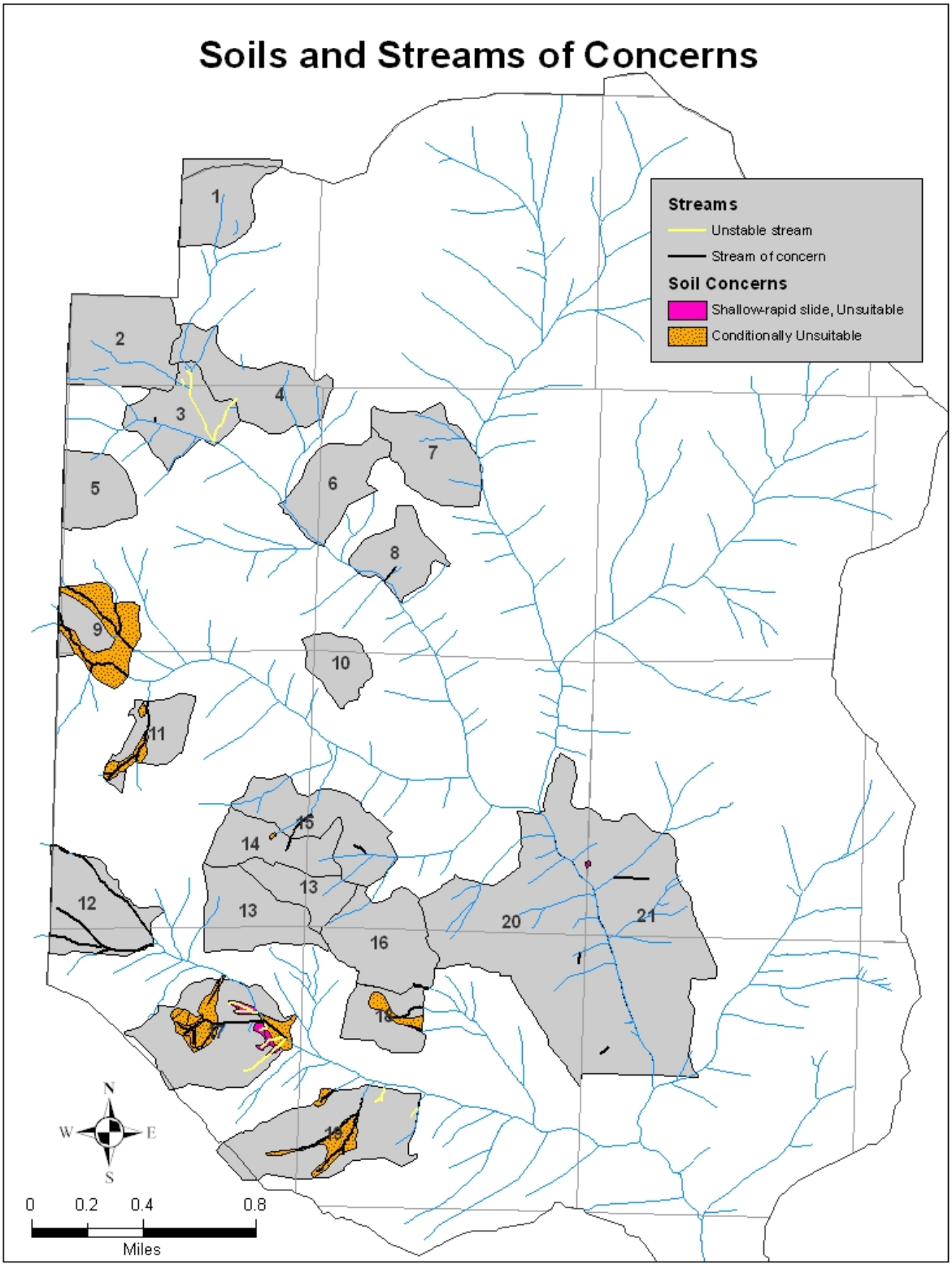

Figure 18. Soils and Streams of Concern in the Curran Junetta planning area.

Direct and Indirect Effects

Direct effects would occur as an immediate result of the proposed road work; such work can result in immediate changes to slope stability due to changes in water routing. Indirect effects are defined as those that occur over a longer time period as a result of longer-term changes to slope stability caused by chronic road problems, thinning, and potential future fires.

The action alternatives are not expected to result in any adverse short-term direct effects or longer-term indirect effects to the aquatic environment as a result of mass wasting. Shallow rapid slides and conditionally unsuitable lands within the planning area have been mapped (Figure 18). The shallow rapid slides were removed from the timber harvest base. Restrictions within Conditionally Unsuitable areas, such as no ground-based logging or created gaps, would maintain slope stability. The risk of activating any new mass movement in the earthflow terrain as a result of the thinning and logging under the action alternatives have been diminished. Moreover, since all the units now proposed for thinning have been previously clearcut and broadcast burned, and since these past intensive treatments did not activate the dormant earth flow features, it is very unlikely that the less-intensive thinning would either. For these reasons, the thinning in earth flow terrain under the action alternatives is not expected to trigger any new mass movement within the units or in downslope locations.

Under the action alternatives, an increased risk of partial stand-replacement fire would last for at least 15 years due to areas of untreated activity fuel. However, since the planning area is not at high risk for lightning caused fires or in a high recreation use area, the probability of a full stand replacement fire occurring as a result of untreated activity fuels is low. Therefore, the level of tree root mortality (and loss of slope stability) due to wildfire is considered inconsequential. The likelihood of additional mass wasting taking place in the planning area as a result of some future severe wildfire event is considered negligible. Alternative One would not increase the short-term fire hazard because no new fuel would be created.

The 0.24 miles of new permanent road construction under alternative Two would occur on a ridge top with no stream crossings. The road would be primarily outsloped53 so that water is immediately dispersed rather than concentrated in ditches. The risk of mass wasting from this road is minimal.

The modification of the five high priority stream crossings (Table 36) along with road reconstruction would result in beneficial effects to the aquatic environment. Such modifications to the existing road network would decrease the risk of mass wasting and would meet the desired condition of less road-related mass wasting. The duration of these beneficial effects are expected to last for up to 20 years assuming some level of road maintenance would occur. Though the extent of these beneficial effects is limited due to the small amount of road actually treated, the magnitude of the beneficial effects is actually considered substantial. This is because the five sites to be treated have a high chance of failure with substantial sediment delivery potential to planning area streams.

Alternative One would not result in any beneficial effects of reducing the existing mass wasting potential of high priority stream crossings.

6 Outsloped roads are constructed without ditchlines so water drains across the sloped surface of the road and off the road rather than running down a ditchline.

Cumulative effects

Since there are no adverse direct or indirect effects of increased mass wasting under the action alternatives, there would be no chance of these alternatives resulting in any adverse cumulative effects to the aquatic environment.

SURFACE EROSION

Surface erosion occurs when mineral soil is exposed to the erosive forces of water, wind and gravity. This occurs in forest environments when the protective surface layer of duff and other materials such as wood and rock is removed or displaced and exposes mineral soil to erosive forces. Activities such as dragging trees across the ground during yarding, burning activity-created fuels, road building, reconstruction, or decommissioning, and timber haul on existing dirt or gravel roads, can all result in sedimentation of the aquatic environment.

Relevant Standards and Guidelines

The relevant standards and guidelines related to surface erosion are found in the Umpqua NF Land and Resource Management Plan (USDA, Umpqua NF, 1990a).

Soil standard and guidelines #2 and #3 requires a minimum amount of effective ground cover (EGC) in order to meet acceptable levels of surface soil loss resulting from gravity, water, or wind action and to maintain soil productivity. Acceptable levels of ground cover must exist within the first year following the end of a ground disturbing activity. The action alternatives would maintain 85% effective ground cover in riparian reserves, along drainage ways, in areas mapped as conditionally unsuitable, and on steep slopes greater than 65%. In all other disturbance areas a minimum of 65% effective ground cover would be maintained. This minimum effective ground cover requirement is included as a mitigation measure for the action alternatives as listed in Chapter Two. If adequate ground cover is not present, certified weed free mulch or hydromulch would be applied as needed.

Soil standard and guideline #11 requires monitoring during and immediately following the implementation of prescribed burning to assess the adequacy of EGC during underburning with adjustments, as needed, in order to meet the requirements.

Soil standard and guideline #13 requires all areas of soil disturbance to have erosion control measures (teffective ground cover and erosion control structures) in place by the beginning of the rainy season. During the rainy season (November 1 - April 30), no more than ½ acre of exposed soil (S&G#13, LRMP pp. IV-71), including landings, skid trails, and temporary roads would exist at any time without erosion control that is effective in preventing sediment from reaching streams or any concentrated surface flow in excess of one cubic foot per second (cfs).

Soils standard and guideline #16 requires the identification of erosion control in existing developed areas where pre-existing surface erosion is on-going.

Existing and Desired Conditions

The proposed thinning units that are located on slopes less than 55% were originally clearcut using large dozers that displaced, compacted, and exposed the soil. Tractor yarding that occurred on slopes of 35 to 55% required cutting skid trails and roads into

the slope. When swales were crossed with tractors, subsurface flow was often intercepted and brought to the surface. New surface flow can result in the extension of new stream channels and the production of large quantities of surface erosion that can continue until eventually stabilized. In units 2, 3, 4, 14, 17, and 21 skid trails were placed across swales that contained buried streams where subsurface flow runs through natural piping in the soil. This caused the pipes to collapse, and brought the flow above ground, creating new surface flow, stream extension, and more surface erosion. For the most part, slopes and streams affected by these skid trails have had time to adjust and have stabilized. An exception is the old abandoned road network in the lower portion of unit 17, which has three abandoned stream crossings and some areas of unvegetated roads with ruts.

The units located on steeper terrain were originally clearcut using a high lead[54] logging system where entire log lengths were dragged either down or uphill without any part of the log suspended off the ground. High lead yarding often displaced large amounts of soil that ended up at the bottom of slopes and in streams, along with large amounts of large woody debris. This occurred in units 11, 17, 20, and 21, where the material later washed out in debris flows that plugged culverts and created roads failures. Most of the old surface erosion from the historic high lead logging has subsided with the recovery of ground cover and stream flow.

Existing roads are another source of surface erosion that leads to sedimentation of streams. Road inventories in the planning area revealed an overall low level of road prism erosion, mostly due to lack of broken down aggregate on most roads that traverse the planning area. The 1721-472 and 1721-941 roads were the only roads identified with erosion concerns. Regular road maintenance is critical to keeping the levels of road-related surface erosion in check.

Road maintenance has declined sharply in the last two decades because fewer timber sales have occurred to help accomplish road maintenance and since appropriated funds to do road maintenance have also declined. Annual road maintenance is limited to main use roads, which are part of the primary road system identified in the Forest's Access and Travel Management Plan (USDA, Umpqua NF 2003).

The desired condition is to reduce total compaction (legacy plus predicted) to no more than 20% of an area (LRMP S&G 1, pp. IV68), and to reduce long-term chronic surface erosion associated with system roads, legacy skid trails, and future wildfire in keeping with ACS objective #5, which calls for the restoration of sediment regimes.

Direct Effects

Direct effects are defined as the short-term effects of sedimentation that might occur within planning area streams as an immediate result of the proposed road work, timber haul, logging and treatment of activity fuels with fire.

Alternative One would result in no short-term impacts to the surface erosion processes because no ground-disturbing activities would occur.

Roads are a source of surface erosion that leads to sedimentation of streams. Grading and graveling dirt roads in the action alternatives would help to decrease erosion by

7 Highlead logging was used up until the mid-1970s. The system lacked a tall tower and typically lacked the ability to suspend any portion of the log off the ground. It has been replaced by skyline logging which typically gets one end of the log off the ground.

more effectively dispersing surface water before it becomes concentrated as runoff over road surfaces. The potential benefit from increased road maintenance in the project planning area would be similar between action alternatives, reducing the potential for sediment delivery over the next ten years from roads after the sale has closed and traffic is reduced. Most of the temporary road disturbance (70%) would occur on soil previously used by past entries and abandoned. Due to the location and the low number of stream crossings, sediment delivery from temporary roads would be minimal. Alternative Two would have new road construction (0.24 miles) and have less helicopter yarding. When considering winter haul as a factor, Alternative Two would have the potential risk for delivering slightly more sediment to streams than alternative Three. Implementing stream crossing improvements would have a net benefit of reducing the potential sediment delivery in all alternatives once the original soil disturbance has been revegetated.

Indirect Effects

Indirect effects are defined as the effects of delivery of sediment from surface erosion to streams within the planning area that can continue to contribute large spikes of fine sediment for several years or longer. Indirect effects are also defined as effects that could occur downstream in Layng Creek if a substantial storm event should occur immediately following the ground disturbance.

Based on the analysis described below in the cumulative effects section it is reasonable to assume that the projected amounts of sediment associated with Alternatives Two and Three are unlikely to result in an indirect adverse turbidity spike downstream of the planning area. This is because the amount of predicted surface erosion associated with the action alternatives is not expected to exceed the capacity of the local streams to properly store, route, and transport their burden of sediment. Based on sediment analysis and turbidity monitoring records between 1982 to the present, any spikes of sediment into the system would be expected to recover within one to two years.

Cumulative Effects

An analysis of soil erosion potential considers soil texture, slope steepness, changes in topography, precipitation, runoff potential and vegetation cover, and incorporates disturbances such as exposed, compacted, and severely burned soil. The cumulative potential for hill slope erosion and runoff from roads and harvest to deliver sediment to streams was evaluated using Disturbed WEPP (Eliot 2005), WEPP: Road (Elliot et al. 1999) and GIS modeling. Curran Junetta and Dinner (another recent timber sale analysis in the Layng Creek Subwatershed) were run through the model. Modeled sediment delivery is presented as a relative comparison, but the models tend to over-predict, thus delivery rates represent a worse case scenario.

The Dinner Timber Sale Environmental Assessment (USDA, Umpqua NF, 2006b) discusses these results in detail; that discussion is incorporated by reference here. In summary, the results from the sediment analysis indicate that Layng Creek was in a sediment laden state from the 1950s up until 1983. Turbidity in Layng Creek was recognized as a concern in the 1970s when the drinking water going to Cottage Grove did not meet State standards. In response, the Forest Service initiated a turbidity monitoring program in 1976, reduced the annual timber harvest in the Layng Creek Watershed, and implemented restoration projects to reduce surface erosion. A large

(several thousand cubic yard) failure occurred in Layng Creek at about 1976, while sediment from past harvest and road building practices was probably still moving through the system and Layng Creek was receiving heavy truck traffic. By 1982, the watershed appeared to have returned to a more resilient state; sediment delivery and increased turbidity quickly recovered. Sediment delivery potential estimated for a ten-year storm event in 1989, and a 100-year event in 1997, only resulted in minor measured turbidity spikes with recovery to pre-event levels by year two of each event. When considering past, present, and reasonably foreseeable future activities the cumulative effect of implementing either action alternative would result in lower sediment delivery potentials than occurred in 1989. Therefore it is reasonable to assume that no adverse cumulative effects from sediment delivery would occur to water quality or fisheries as a result of implementing Alternatives Two or Three.

FLUVIAL EROSION

Fluvial erosion is the erosion of stream banks and stream beds from the forces of water. Stream channels change both spatially and temporally under the fundamental influences of climate, geology, and topography. These factors help determine the stream flow and sediment regimes, as well as riparian vegetation which provides in-stream wood. Disturbances can affect stream channel form and the equilibrium between sediment input and output.

Relevant Standards and Guidelines

The relevant standard and guidelines from the LRMP related to fluvial erosion is watershed cumulative effects and water quality standard and guideline #2: Beneficial uses of water and aquatic habitats would not be degraded by scoured stream channels caused by timber harvest, road construction, and related activities.

Existing Condition

Vegetation along stream banks helps bind finely textured soil in place and provides physical resistance to fluvial erosion. Past logging practices within the planning area have sometimes affected stream channels. Clearcutting of riparian vegetation, especially along the near vertical banks of sensitive stream channels, have contributed to bank instability and resulted in sediment delivery. Past logging disturbances from yarding old-growth near and across sensitive channels, without suspension or mitigation measures, has also influenced potential delivery of sediment to these stream channels. The removal of large channel wood has changed channel stability and effected sediment storage, delivery, and routing.

Streams of concern have been identified in Figure 18. These streams of concern are often, but not exclusively, associated with earthflow terrain and have often been mapped along with the Conditionally Unsuitable areas. These channels frequently lack the complex geology structure in the form of various size substrates (cobbles and small to large-sized boulders) and are dependent on external input, specifically large wood recruitment, for channel complexity and stability. The erosional processes associated with these channels involve a high proportion of fine sediments that have little armoring of the bed and banks (USDA, Umpqua NF, 1995). As a result they often have little resistance to down-cutting and bank erosion during winter storm flow.

As displayed in Figure 18, a few streams in units 3, 4, 17 and 19 are of particular concern with banks that are actively unstable.

There are several examples, particularly in unit 17, where compaction and displacement from old skid roads have altered the local hydrology so that the subsurface flows are now intercepted and have created new stream channels.

Direct and Indirect Effects

Direct effects from fluvial erosion are described at the scale of stream segments within or adjacent to harvest units and that occur during the activity. Indirect effects occur after the activity at the disturbed stream segment, or downstream at the subwatershed or watershed scale, over two to three decades.

Alternative One would not change existing fluvial erosion processes that are currently occurring. Future recruitment of large instream wood that would stabilize and provide storage of channel sediment would be delayed because the overstocked riparian stand condition of dense, young trees would delay the development of large trees along channels.

None of the action alternatives would increase peak flows or accelerate sedimentation that could affect fluvial erosion. The riparian reserve thinning would improve overall health and vigor of the riparian leave trees, and would improve the potential future channel recruitment of large wood while reducing the long-term risk of wildfire impacts on the riparian reserves. Therefore, no direct or indirect effects associated with fluvial erosion in planning area streams would occur.

Cumulative Effects

Alternative One would not incrementally add to past, present, or reasonably foreseeable future activities to cause a cumulative fluvial erosion effect since no action would occur.

Since Alternatives Two and Three would not cause any direct or indirect fluvial erosion (as described above), they would not have any effects that could incrementally add to past, present, or reasonably foreseeable future activities at any of the analysis scales.

Aquatic Conservation Strategy

Large historic wildfires were the primary drivers of fluvial erosion when occasional stand replacement fires killed large areas of trees and caused peak flow increases. Since the advent of industrial forestry and fire suppression, clear-cuts and roads are the primary drivers of peak flow increases and associated impacts that cause fluvial erosion. Since the action alternatives apply all relevant standards and guidelines, and since they were developed to contribute to restoring the fifth level watershed over the long term (USDA, Umpqua NF, 1995), they are in keeping with the intent of the Aquatic Conservation Strategy.

The historic sediment regime was one of occasional, episodic sediment delivery following large scale fires. Wildfire occurred in particular drainages, followed by years of recovery with little to no disturbance (Reeves et al, 1995). Most of the sediment delivery came from mass wasting and fluvial erosion triggered by large post-fire rain storms, rather than from surface erosion. The sediment regime is now dominated by on-going,

chronic sediment delivery at lower levels, occurring most every winter, due to the road system. Fire suppression has temporarily curtailed the pre-management sediment regime of occasional, episodic sedimentation. Yet, as fire hazard builds due to the lack of natural fire and the preponderance of unnaturally dense plantations, more extreme sediment pulses are expected once wildfire escapes control efforts.

The Curran Junetta alternatives were purposefully designed to lessen the chance of large scale fire, which in turn helps restore the sediment regime. Moreover, the long-term benefits of the restorative road activities under the action alternatives outweigh the short-term impacts of road work needed to implement the thinning. As such, the action alternatives are consistent with ACS objective #5, which calls for the restoration of sediment regimes.

Alternative One would not proactively address the Aquatic Conservation Strategy.

Specifically Required and Other Disclosures

RECREATION

Existing and Desired Conditions

The Curran Junetta planning area is inventoried as "roaded modified" according to the Recreation Opportunity Spectrum[55] (ROS) inventory system. The area is characterized by predominantly natural appearing environments with evidence of the sights and sounds of people.

The Curran Junetta planning area is entirely within the Layng Creek subwatershed, which is managed as an "open" Municipal Watershed for the city of Cottage Grove. General recreation use is not encouraged above the water intake because of potential adverse effects on the quality of the water supply, and therefore there are no developed campgrounds or trails within the planning area. Day use activities such as driving, hiking, fishing, hunting, and gathering forest products are allowed; however, overnight camping and water based activities (swimming) are not permitted.

While recreation is not encouraged and certain activities are limited or prohibited by regulation in the Layng Creek subwatershed, there are a few individual dispersed camps within the Curran Junetta planning area. Most of these dispersed sites are typically located at the end of a spur road, or where old harvest landings have created a secluded flat area. These isolated dispersed spots are typically remote and infrequently used due to the prohibitions on overnight camping.

Relevant Standards and Guidelines

For Layng Creek, the Forest Plan lists the following Standards and Guidelines:

1. Overnight camping, swimming, and developed recreation sites would not be allowed.

55 Recreation Opportunity Spectrum (ROS) definition of Roaded Modified: An area characterized by a natural environment with much evidence of the works of humans. Such evidence usually dominates the natural environment.

2. Dispersed day use is permitted, but increased usage shall not be encouraged.
3. Control recreational vehicle use on roads during wet periods through a travel management plan. In the interim, wet-period travel would be restricted to paved or rocked roads.
4. ROS class for the Layng Creek municipal watershed is roaded modified, except for a portion of Hardesty Mountain, which is semi-primitive non-motorized.

All standards and guidelines for this area would continue to be met with this project.

Watershed Analysis Recommendations

The 1995 Layng Creek Watershed Analysis recognizes the Standards and Guidelines listed above and recommends continued management as an "open" Municipal Watershed for the city of Cottage Grove. No recommendations relevant to recreation were made in the 2005 Layng Creek WA iteration. Actions associated with Alternatives Two and Three would continue to implement the recommendations of not encouraging general recreation.

Direct and Indirect Effects

The type of recreational opportunities that exist within the Curran Junetta planning area would remain relatively static, with a continued trend of slight increases in the quantity of recreation use under Alternative One. The occurrence of illegal overnight camping at dispersed sites is also expected to increase due to an overall increase in the number of forest visitors seeking remoteness. Because no proposed activities would occur that would affect these illegal dispersed recreation sites, Alternative One would not directly or indirectly have an effect on forest visitors.

Commercial thinning of 1,236 acres under both action alternatives may have some short-term direct effects on recreation from noise disturbance during logging. This impact is expected to be minor and short-lived due to the limited amount of traffic and existing prohibition on camping.

Road construction activities would also have some seasonal indirect effect on recreation road use, however, these effects are also expected to be minor and short-lived due to the limited amount of recreation traffic and existing camping restrictions in the planning area. The increase of 0.24 miles of system road in Alternative Two and the increase of 3.42 miles of temporary roads in both Alternatives Two and Three may offer slightly more vehicular and foot access for hunting activities. However, the additional temporary roads are to be blocked for public use and would not increase vehicular access for recreation use.

The proposed actions in Alternatives Two and Three include 1.4 acres of active and passive road decommissioning and inactivation. These acres of existing non-system roads are closed to vehicular use due to maintenance standards and watershed limitations but provide for recreational foot access. Decommissioned roads would be more difficult to walk on, and would affect the ability of hunters to travel those short spur roads by foot. Decommissioning would directly lessen the total acres of non-system road by 1.4 miles. This impact is very small given the short segments that would be decommissioned.

Considering the above minimal effects, the implementation of Alternatives Two or Three would have no long-term or noteworthy direct or indirect effects on the recreation resource.

Cumulative Effects

The scale at which cumulative effects are analyzed is the planning area. There is currently no new recreation projects proposed within the planning area. Outside of the planning area at the subwatershed scale, improvements to existing developed recreation sites (Rujada Campground) are occurring to address the increase in recreating visitors. Trail improvements have been made to the Hardesty Way and Pinard Falls Trails, which would increase day-use hiking opportunities and therefore recreation use in the subwatershed, but not the planning area. However, because these activities would occur outside of the planning area, no cumulative effects to recreation would occur with implementation of any of the alternatives.

VISUALS

Existing and Desired Conditions

The Visual Management System is a tool used to recognize the scenic qualities of a specific area. It establishes criteria for identification and classification of, as well as visitor's concern for, scenic quality. Each visual quality objective (VQO[56]) represents the degree of alteration from the natural appearing environment. The Umpqua LRMP applies the Visual Management System Inventory (VMSI) as a minimum standard that projects should achieve when implemented. The visual resources can also be described by the USDA's National Forest Scenery Management System (SMS) (Agriculture Handbook Number 701). The Umpqua LRMP has not been amended to officially adopt this system. However, SMS terms are described in parenthesis where applicable, in order to provide information as to how the alternatives address visual resource protection.

Management of visual resources requires proposed activities to comply with the assigned objective; these objectives include retention (high scenic integrity), partial retention (moderate scenic integrity), modification (low scenic integrity), or maximum modification (very low scenic integrity).

Of the total acreage of the Curran Junetta Planning Area, 22% has the VQO of preservation, 6% retention, 6% partial retention, 57% modification, and 9% as maximum modification (Table 40). Approximately 200 acres of private land have been recently clear-cut harvested, thereby creating one large "created opening" encompassing 3% of the planning area. There are no "special features" identified in the LRMP that are located in the Curran Junetta Planning Area, and therefore there are no sensitive or substantial visual quality concerns.

56 The VQO inventory is divided into three components: the distance zone, the sensitivity level (constituent information), and the variety class (scenic attractiveness). The distance zones are described as FG-foreground, MG-middleground, and BG-background. The sensitivity level (1-highest, 2-average sensitivity, and 3-lowest) rates the concern for scenic quality. The visual inventory also describes the primary and sometimes the secondary place where a specific area can be viewed. This is usually from a prominent point of view or primary use area, or a particular road. Variety class relates to how distinct or common the visual resource is.

The VQO of preservation allows ecological changes only and management activities, except for very low visual impact recreation facilities, are prohibited. Retention objectives provide for management activities that are not visually evident. Management activities in partial retention must remain visually sub-ordinate by repeating form, line, color or texture common to the characteristic landscape. In areas with a VQO of modification, management activities may visually dominate the landscape; however, roads and visible remnants from logging such as slash and stumps, etc. should remain visually subordinate to the landscape. The maximum modification VQO allows management activities of vegetative and landform alternations to dominate the landscape.

Table 40. Acres of VQO and VQO Standards for Implementation.

Visual Quality Objective	Planning Area Acres	Percent of Planning Area	Distance Zone	Suggested Range of Opening Size	Maximum Percent of Created Opening at Any One Time
Preservation (East edge Unit 7)	1443	22%	Not Applicable	0	0
Retention (NE tip unit 1)	441	6%	Foreground 0-500' Foreground 500'>	0.25-1.25 1-5	5% 10%
Partial Retention (Units 1, 7 portions 21)	452	6%	Foreground 0-500' Foreground 500'>	0.5-1.5 1-8	10% 15%
Modification (Private. Land)	3768 120	55% 2%	Middleground/ Background	Site Specific Analysis	25% – Middleground 30% – Background
Maximum Modification (Private. Land)	526 120	7% 2%	All	Site Specific Analysis	33%
Totals	6870	100%	N/A	N/A	N/A

Relevant Standards and Guidelines

Visual Standards and Guidelines are listed in the Umpqua LRMP on pages IV-19 to IV-26 as well as the applicable Management Areas 1 and 14 on pages IV-107 and IV-140 respectively.

Specifically for this project, the Umpqua LRMP lists the following standards and guidelines:

- The maximum percentage of created openings at any one time is based on the VQO objective and distance zone, and is described in the above VQO table.

- A harvest unit is considered to be a created opening when the average stand height is less than 20 feet tall in fore- and middle ground distance zones, and is less than 4.5 feet tall in background distance zones.
- Activity slash within view sheds shall be treated commensurate with the VQO.

Direct and Indirect Effects

Approximately 200 acres, or less than 3% of the planning area, meets the Forest Plan definition of created openings. Alternative One would have no direct, indirect, or cumulative effects to the visual quality of the area because no openings would be created.

Under Alternatives Two and Three, all of the proposed harvest areas are commercial thin units with a total of 21 acres of numerous ¼ - ½ acres harvest gaps or created openings proposed. There are no clear-cut harvest units proposed. Since the proposed gaps or created openings are 0.5 acre or less in size they meet the Visual Quality Objectives and would remain visually unnoticeable from any sensitive viewing area. The creation of an additional 21 acres of created openings or gaps would increase the total created openings from 200 acres to 221 acres, a very slight increase to the 3% of the planning area, yet still below the recommended maximum allowed by the Forest Plan.

Both proposed action alternatives and the applicable prescriptions for each of the units meet the Forest Plan Visual Quality Objective Standards for Implementation as described in Table 40. If prescription changes in gap sizes are made, further Visual Resource evaluation would be required. There would be relatively no visible change to the landscape and therefore no direct or indirect effects on the visual resource. None of the connected actions would impact the visual resource. All Forest Plan Standards and Guidelines would be met with all alternatives.

Cumulative Effects

The scale at which effects are analyzed is the planning area. Since 1994, there have been approximately 200 acres of private lands (approximately 3%) of the planning area with regeneration harvest units that would be considered created openings in either middle or background distance zones. According to Forest Plan direction, neither action alternative would create any substantially visible change to the landscape. There would be no overlap in time or space with any past or reasonably foreseeable activity (commercial thinning only). Because there would be no visible change or overlap, there would be no cumulative effects on the visual resource with implementation of either action alternative.

HERITAGE RESOURCES

The affected environment for heritage resources falls within the areas of proposed ground disturbing activities (timber harvest, fuels treatment, road construction, reconstruction, and decommissioning, subsoiling, landing construction, etc.).

Forest Plan goals and objectives and Cultural Resource (Heritage) Standards and Guidelines are listed in Chapter IV, pages 28-30 of the Umpqua National Forest LRMP.

All applicable Standards and Guidelines have been met through the inventory and evaluation of any historic or prehistoric heritage resources.

A heritage resource inventory was conducted as part of the compliance process of section 106 of the National Historic Preservation Act of 1966. The Curran Junetta Timber Sale Project Reconnaissance Report has been completed and submitted to the State Historic Preservation Office (SHPO) as required; concurrence has been received. The Curran Junetta Timber Sale project meets the Stipulation III (B)1 Programmatic Agreement[57] (PA) for a "No Historic Properties Affected Determination."

One new prehistoric site and four new historic sites or artifacts related to logging in the 1950's were located during field surveys. The prehistoric site would be avoided with a minimum no-entry buffer of 100 feet. Historic artifacts were recorded, photographed, and removed for curation when deemed appropriate.

The potential exists for unidentified heritage resources in the Curran Junetta Project area, especially in areas where heavy shrub cover makes surveying difficult. Mitigation measures described in Chapter Two would protect undiscovered heritage resources, reducing the potential for effects to these resources. Overall, proposed ground disturbing activities would have little potential to affect heritage resources. Standard contract provisions would provide for protection of heritage resources discovered during project implementation.

The Umpqua National Forest sent a cover letter with the quarterly copies of the Schedule of Proposed Action (SOPA) to each of the Tribes. Each quarter, the cover letter highlights new projects that may be of interest to the Tribes; the Curran Junetta Timber Sale was identified as a new project when it was first initiated. The Confederated Tribes of the Grand Ronde, Confederated Tribes of the Siletz, and the Cow Creek Band of Umpqua Tribe of Indians were contacted by Debra Barner, Heritage Program Manager for the Forest. Other contacts in the form of phone calls, letters, and opportunities to participate in public tours and meetings at Tribal offices and elsewhere were also utilized to interact with the Tribes. No interest in this project was expressed by any of the tribes.

Under the treaties with the Tribes, no trust resources or reserved treaty rights are given for the lands managed by the Umpqua National Forest. Therefore, no effects to trust resources or reserved treaty rights would occur with any of the alternatives.

Direct, Indirect, and Cumulative Effects

Based on the results of the heritage surveys, review and avoidance mitigation of known heritage resources, mitigation for undiscovered sites, and consultation with tribes, there would be no direct, indirect, or cumulative effects on heritage resources as the result of implementing either of the proposed Curran Junetta Timber Sale project alternatives.

AIR QUALITY

The Fire Weather Regulated Use Map for the State Forester's Smoke Management Instructions identifies the Cottage Grove Ranger District as Cascade Range Zone 617.

57 The Stipulation III (B)1 Programmatic Agreement is between the Advisory Council on Historic Preservation (ACHP), Oregon State Historic Preservation Office, and the United States Forest Service, Region 6.

Curran Junetta is 20-21 miles from the Willamette Valley designated area and is within the Oakridge Special Protection Zone. This zone requires that from November 15th through February 15th the Forest Service checks the Oregon Smoke Management Advisory for special instructions for this area. These instructions may put further restrictions on burning done on the District during this time.

The closest Class I areas are Diamond Peak and Three Sisters Wilderness areas. The closest Class II areas are the Boulder Creek and Waldo Lake Wilderness areas. Burning would not impact these areas during the July 1 to September 15 restricted period. At the time of year burning would be conducted, smoke produced would not reach these areas; sufficient heat is needed to loft smoke to the heights necessary to carry the smoke those distances. That heat would not likely be produced, as a cooler burn would be required to protect residual trees and coarse woody debris (CWD).

Oakridge is the main population center that could be affected by the smoke from these stands. Burn planning would require favorable winds that would carry smoke away from the town. Based on past experience in this area, the smoke produced would likely disperse well before reaching populated areas.

Different treatment options cause different emission effects. Hand pile burning is usually done in the late fall to early spring months; consumption occurs mostly in the flaming phase and smoldering is minimal. Jackpot and underburning consume much of the fuels in the flaming stage of combustion, and can contribute to emissions in the smoldering phase if not mopped up afterward.

Utilizing burning techniques that minimize consumption in the smoldering phase of burning can directly influence emissions production. Early season (spring, early summer) burning can lessen emissions output by reducing primarily 0-3 inch fuels and leaving the majority of the duff and litter layer and larger woody material intact; these are the fuels that tend to generate the most emissions from the smoldering phase of combustion.

Through the plans and techniques described above, the health standards established by the Environmental Protection Agency (EPA) would likely be met. Prior to any burning, data is entered into a smoke management software program that can estimate emissions given certain weather, burn prescription and site parameters. This software is part of the Oregon Smoke Management Program, and is also used to record and document burn information for the State of Oregon.

Particulate Matter

The major pollutant of concern from smoke is fine particulate matter (Sandberg et al. 2002), which can travel great distances, reduce visibility, and absorb and transmit harmful gases. EPA standards have been established for two classes of airborne particulate matter – PM 10 and PM 2.5. PM 10 is particulate matter less than 10 microns in diameter while PM 2.5 is a subset that is less than 2.5 microns in diameter. Studies indicate that 90 percent of all smoke particles emitted during burning (both prescribed and wildland fire) are PM 10; of these, the majority are PM 2.5 (Hardy et. al. 1991). PM 2.5 causes the majority of air quality impacts. Human health studies on the effects of particulate matter indicate that fine particles are largely responsible for health effects (O'Neill et al. 1997).

Direct and Indirect Effects

Particulate matter emissions were estimated for the Curran Junetta Project using the Consume 3.0 model (Ottmar, et al 2006). In Table 43, the differences between PM 2.5 emissions from fuels treatments and emissions from wildfire are compared.

In comparing the direct effects of the alternatives, Table 43 shows that Alternative One results in no emissions produced (because no fuel treatment would occur), as compared to 368 tons of PM 2.5 for the action alternatives. The amounts of PM 2.5 displayed include all burning that would occur. Because not all units would be burned the same day and not all piles would be burned at the same time, the amount of emissions produced is not likely to affect population centers. This is because the emissions would last only a short time (the day of the burning) and would disperse rapidly, minimizing any direct effects to humans.

If a wildfire should occur in the future over the Curran Junetta Planning Area, the production of PM 2.5 emissions in treated stands would be less than what would be produced if no fuels treatment were to occur (Alternative One). In a severe wildfire in un harvested stands (Alternative One), emissions would be about 30 percent greater than those of treated stands, because more standing and surface fuels would be available. Table 43 illustrates the beneficial effect of thinning and slash treatment over no action in terms of total PM 2.5 produced.

Table 41. Total PM 2.5 Emissions in Tons by Alternative.

Fuels Treatment	Total PM2.5 Emissions From Fuels Treatment	Total PM2.5 Emissions with Future Wildfire
Alternative 1	0	1236
Alternatives 2 and 3	368	876

The effects of the emissions would cause temporary and short-term visibility impacts in the immediate project area during ignition and burning of activity-created fuels. The duration and extent of the effects would be affected by wind speed and direction. Weather systems can cause inversions that would affect dispersal of smoke down wind. The localized effects of burning in the project area would be short-term degradation of air quality from prescribed burning, primarily during the actual burning stage and during inversions. Smoke from prescribed burning may be visible to people driving through the area. The impacts to recreationists would likely be limited to the day of the burn, since camping is prohibited in the planning area. Burning piles in the fall would have minimal impacts to hunters or dispersed recreation users; this is due primarily to the favorable dispersal of smoke in the fall. Hunters in the area may be affected for a short period of time (the day of the burn), but would not experience adverse long-term impacts.

Very minor amounts of particulates would be generated by road work and road use during harvest activities. Dust abatement would be used on roads during dry periods to minimize this particulate source.

Cumulative Effects

The area encompassing the designated area of Cottage Grove is the scale at which cumulative effects are analyzed for air quality. There are no past projects that, when combined with any of the alternatives associated the Curran Junetta project, would

contribute to cumulative effects for PM 2.5 emissions. However, there are future projects that would produce emissions that affect air quality (Table 8). The Doris Timber Sale would treat (thin and slash treatment) an area similar in size (approximately 1,000 acres) to the Curran Junetta project.

It is reasonable to expect similar particulate emissions if the prescribed fuels treatment for the Doris or Dinner Timber Sales are similar to that proposed for this project. If fuels treatment occurs simultaneously on these two sales, there would be a potential cumulative effect of increased fine particulate matter in the Layng Creek sub-watershed. It is unlikely that these two projects would have slash treatment occurring at the same time. Burning in both planning areas in the same burn season would be more likely to occur on successive days. In either case, there would be limits set by Oregon Smoke Management as to how much could be burned in a given time period.

Burning conducted by other user groups or the public (firewood burning for heat or slash burning on other lands) may also occur at the same time that burning for the Curran Junetta project occurs. The Forest Service is required to file a burn plan with Oregon Department of Environmental Quality (ODEQ) and would comply with the strict standards for air quality. ODEQ would not allow burning when atmospheric conditions exist that may result in an inversion and, because they regulate most burning (state, private and federal) there it is unlikely that the effects from the Curran Junetta Project would add to the effects of other burning in the area. Therefore, there would be no cumulative effects to air quality.

NATIONAL FOREST MANAGEMENT ACT DETERMINATION OF SIGNIFICANCE

In terms of the proposed Forest Plan Amendment, the responsible official would make a Determination of Significance of Change to the Forest Plan in the Decision Notice/Finding of No Significant Impact. In order to make that determination, FSH 1909.12, Section 5.32, outlines the factors to be used to determine whether a proposed change to the LRMP is significant or not significant, based on National Forest Management Act requirements. A discussion of each of these four factors follows.

1. Timing. Determine whether the change is necessary during or after the plan period. In most cases, the later the change, the less likely it is to be significant for the forest plan. The proposed amendments are necessary now in order to efficiently thin the second growth stands in the Curran Junetta Planning Area. The LRMP was written in 1990 when the assumptions were that most harvest would be done through clearcutting of old-growth; this project focuses on thinning second growth stands and many of the protection measures outlined in Appendix G are not needed. Currently, the LRMP is 16 years old and is scheduled for revision in 2008. The plan is currently at the end of the planning cycle. Therefore, timing is not considered to be a significant factor related to the amendments.

2. Location and Size. Define the relationship of the affected area to the overall planning area. In most cases, the smaller the area affected by the change, the less likely it is to be a significant for the forest plan. The proposed amendments are specific to Layng Creek subwatershed, and apply only to the 6,870 acres in the planning area. Given the acreage of the Forest (about 1,000,000 acres), the proposal affects less than 1 percent of the land area. Therefore, the location and

size of the area involved in the proposed amendment are not considered to be significant.

3. Goals, Objectives, and Outputs. Determine whether the change would alter long-term levels of goods and services projected by the forest plan. The proposed amendments would not change existing goals or outputs as defined by the Forest Plan and would not result in changes in the level of goods and services currently being produced, which are consistent with levels projected by the LRMP. Therefore, the goals, objectives, and outputs are not considered to be a significant factor related to the proposed amendment.

4. Management Prescription. Determine whether the change in a management prescription is only for a specific situation or whether it would apply to future decisions throughout the planning area. The proposed amendments would eliminate or waive restrictions on certain yarding, road building, or logging practices within the Layng Creek municipal watershed for this project. These were the same amendments used for the Dinner, completed in 2006. In addition, a Forest Plan amendment for the Crawdog EA, completed in 2005, allowing thinning up to the boundary of the hardwoods, will be used. These combined amendments were site-specifically used for the Curran Junetta project. No permanent changes to the Standards and Guidelines or Management Prescriptions would occur. The Doris Timber Sale Project, planned for 2008 may also prescribe some of the same practices and require some of the same amendments. However, that project is in the very early stages of planning and it is not known whether or not some of the amendment language proposed for this project would be used. Therefore, the change in management prescription is for this specific situation and project, and is not considered to be a significant factor related to the proposed amendment.

UNIQUE HABITATS

Unique habitats are discussed in Chapter Three, under the terrestrial section. No further information would be added here.

WETLANDS AND FLOODPLAINS

Floodplains are associated with perennial streams and vary from only a few feet to much larger areas depending on the size of the stream and the topography of the streambanks and surrounding area. The action alternatives propose thinning and fuel treatments in several riparian areas (Table 34). The action alternatives would also reconstruct five rusted and damaged culverts located on existing stream crossings located on the 1721 road at mileposts 2.19, 8.53, 9.89, 12.75 and 13.50. The connected actions for both alternatives, which have definable floodplains, would include maintenance of five fire sumps and replacement of two migration barrier culverts located where Curran and West Fork Junetta streams cross the 1751 road. These actions would be improvements over the existing condition by reducing erosional risks. No new occupancy of project floodplains would occur; the culvert replacements and related road work would occur within the original locations.

No effects to floodplains associated with timber harvest under any action alternative would occur since perennial streams would all receive no-cut buffers. Slash burning may back into riparian areas in order to reduce fuel loads. No adverse direct, indirect, or cumulative effects to floodplains are expected to occur.

The environmental effects of road reconstruction and decommissioning within the floodplain are consistent with the Standards and Guidelines for the Umpqua National Forest LRMP have been evaluated and declared in the LRMP Final EIS (March 1990). Since the activities in this project follow those Standards and Guidelines, this activity would not be declared separately for this sale.

Small wetlands are dispersed throughout the planning area and located within most of the units. The average wetland size is about 0.33 acres. No thinning or yarding would occur in the wetlands as described in mitigation measures included in Chapter Two, and a 50 foot no-cut buffer would be site specifically applied. Underburning would not be initiated in wetlands, but would likely back into portions of some wetlands. The effects could be beneficial. This is because the species of plants found in this site are expected to thrive in the years following the underburn. Given the design features and mitigation incorporated into the action alternatives and the anticipated beneficial effects; no adverse direct, indirect, or cumulative effects to wetlands are anticipated under any of the Curran Junetta alternatives.

PRIME FARMLANDS, RANGELANDS, FORESTLANDS, AND PARKLANDS

No prime farmlands, rangelands, forestlands or parklands exist within the area; therefore; no direct, indirect or cumulative effects would occur.

POTENTIAL OR UNUSUAL EXPENDITURES OF ENERGY

The action alternatives would require expenditures of fuel for workers to access the project area, use power equipment and utilize the logging systems. In addition, jet fuel use for helicopter operations would also occur under Alternatives two and three; however, these alternatives would not result in any unusual expenditure of fuel. The no action alternative would require no expenditure of fuel. No other direct, indirect, or cumulative effects are expected to occur with any of the alternatives.

CONFLICTS WITH PLANS, POLICIES, OR OTHER JURISDICTIONS

The Hardesty Mountain Roadless area spans the boundaries of two National Forests: the Umpqua NF in Cottage Grove and the Willamette NF in Lowell (1990 LRMP FEIS Appendix C - 10). The inventoried roadless area for the Umpqua NF is designated as both management areas MA 1, Semi-Primitive Unroaded Recreation, and MA 14 Undeveloped Ecosystem. Both are in the northern-most reaches of the planning area. No Curran Junetta thinning units of 50 year old managed stands are proposed within MAs 1 or 14 or the Hardesty Mountain Roadless area within the Umpqua NF. There are no uninventoried roadless areas in the planning area; as such, there are no direct or indirect effects to these areas.

Implementation of any of the alternatives would not conflict with the plans or policies of other jurisdictions, including the Tribes. This project would not conflict with any other policies, regulations, or laws, including the Clean Water Act, Endangered Species Act, and the National Historic Preservation Act. Effects to air quality and compliance with the Clean Air Act are described in this chapter.

CONSUMERS, CIVIL RIGHTS, MINORITY GROUPS, AND WOMEN

Contracting procedures would ensure that projects made available to contractors through this project would be advertised and awarded in a manner that gives proper consideration to minority and women-owned business groups. Because of this

consideration, there would be no direct, indirect, or cumulative effects to consumers, civil rights, minority groups with implementation of any of the alternatives.

ENVIRONMENTAL JUSTICE

On February 11, 1994, President Clinton signed Executive Order 12898. This order directs Federal agencies to address environmental justice by identifying and disclosing the effects of the proposed activities on minority and low-income populations. The effects of the proposed alternatives on the economic conditions of the State and county are disclosed in the Economics section of this document.

According to statistical data for Lane County, 9.4% of the population is made up of minorities. Unemployment in the county is at about 6.6%, which is slightly higher than the State average of 5.6%. The Dorena and Dorena Lake areas, which lie about 12 air miles to the west/northwest, could see an increase in log truck traffic during logging operations. The city of Cottage Grove, which lies about 16 miles to the west/northwest, may also see an increase in business and an increase in traffic. However, none of these increases would be comparable to the logging seen in the area in the late 1980's. The area is not heavily used for recreation or other activities that may affect minority populations. Overall, none of the alternatives imposes any other additional hardships on minority or low-income communities; therefore, there would be no direct, indirect, or cumulative effects to environmental justice with any alternative.

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CHAPTER FOUR

CONSULTATION WITH OTHERS

PUBLIC INVOLVEMENT

Public involvement for the Curran Junetta Timber Sale began with a stewardship meeting in the spring of 2006. While collaboration was initially started for the Shrimp Stewardship project, input for potential restoration projects associated with the Curran Junetta planning area was solicited. Preliminary request for input occurred on March 2, 2006 at a public meeting held at the Cottage Grove Ranger District attended by nine people (see project files). Brainstorming for restoration projects for the Curran Junetta area generated 8 proposals. Some of the proposals that carried through to the proposed action were treatment of the noxious weed false brome, road maintenance and culvert replacement, and develop projects at the head of Junetta Creek. The next meeting was a field review of some of the proposals on March 24, 2006 attended by 8 interested people.

In January of 2007, a scoping notice and field trip announcement was sent to a mailing list of 61 people who might potentially be interested in the Curran Junetta project. The field trip was attended by eight interested persons. Four of these people also attended some of the stewardship meetings. Three emailed scoping comments and one mailed document was received by some of the people who attended the field trip. This project was first listed it the January 2007 Umpqua National Forest Quarterly Schedule of Proposed Actions (SOPA).

Concerns from the public ranged from existing snag and down woody protection, thinning to variable density, building too many roads, and encouraging use of stewardship contracting. Not all concerns can be addressed in developing a proposed action. The Forest Service listened to all input and addressed as many concerns as possible during development of the proposed action.

AGENCY CONSULTATION

The regulatory agencies (US Fish and Wildlife Service and NOAA Fisheries) charged with overseeing the Endangered Species Act, were consulted extensively throughout the planning process. Consultation with these agencies would be finalized before the Decision Notice is signed. Tribal consultation also occurred; no interest in this project was expressed by the Tribes.

INTERDISCIPLINARY TEAM

The following people are members of the Interdisciplinary Team (IDT) that participated in the preparation or review of all or part of this environmental assessment:

Laurie Bernstein	District Fisheries Biologist
Rob Cox	Wildlife Biologist
Leslie Elliott	Silviculturist
Paul Higgins	Timber Stand Improvement Specialist

Melissa Kirkland	District Botanist
Bev Reed	Writer/Editor
Eric Risdal	Fuels Planner
Suzanne Schindler	IDT Leader, District Silviculturist
Deb Schmidt	District Ranger
Pat Williams	Transportation and Logging Systems

In addition, the following people assisted in developing the proposal or in the editing and review of this document:

Debbie Anderson	Forest Environmental Coordinator
Dale Anderson	Timber Sale Administrator/Logging Systems
Ron Barber	District Fire Management Officer
Larry Broeker	Geologist
Stu Carlson	Timber Sale Administration
Scott Center	USFWS Biologist
Marty Cox	Biological Technician
Ray Davis	Wildlife Biologist
Barbara Fontaine	Fisheries Biologist
Richard Helliwell	Forest Botanist
Chris Kelly	Archeologist
Roy McNary	Geographic Information Systems Specialist
Steve Hofford	Hydrologist
Wes Messinger	Corps of Engineers Herbicide Consultant
Don Morrison	Silviculturist
Mike Olen	Biological Technician
Greg Orton	Soil Scientist
Cindy Pack	Heritage Resources/Recreation and Visuals
Sheryl Tooker-Dilley	Assistant District Fire Management Officer

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GLOSSARY OF TERMS

- Thinning is the harvest of a portion of the trees in a stand in order to release the remaining trees from competition to allow for improved growth and development of understory vegetation.
- Machine piling is done by a small excavator that picks up and piles slash in large piles, which are later burned during moist conditions.
- Hand pile burning is accomplished with hand crews where slash is piled in relatively small piles and burned under moist conditions.
- Lop and scatter is a fuel treatment where hand crews use chainsaws to cut and scatter activity fuel to a depth of 12 inches or less. Fuels closer to the ground wouldeither decay faster, or if burned, would produce lower flame lengths and make fires easier to control.
- Underburning is the burning of logging slash after a thinning where slash is burned in place rather than being redistributed by machines or hand crews.
- Loader logging uses one piece of equipment. A log loader works on a grid of straight skid roads to transport hand-felled trees to landings along roads within or outside of the unit. Slash is piled or hauled away and later burned.
- Cut-to-length logging uses two pieces of equipment, a processor which fells, limbs, and cuts trees into log lengths, and a forwarder to transport the logs out of the unit. Most of the work is done within the unit on the forwarding trails. Slash on the forwarding trails are crushed, and generally do not need further treatment.
- Skyline logging is generally accomplished on steeper ground where cables bring logs uphill to landings using a carriage/cable system attached to a tower to help suspend logs off the ground.
- Helicopter logging is accomplished where no immediate road access exists or where resource concerns override use of ground-based or skyline equipment. Helicopters fly logs to nearby road and landings.
- Cut-to-length/skyline swing logging is a combination of both skyline and cut-to-length logging together in one harvest unit. The logs accumulated from the cut-to-length system are piled such that they can be yarded to a landing using the skyline.
- System roads are those roads needed to provide long-term access for future stand management. Open system roads have different levels of maintenance, depending on whether they are managed for passenger vehicles or high clearance vehicles. Closed system roads (maintenance level one) are blocked with boulders, dirt berms or guard rails.
- Temporary roads are built only for a short-term use such as logging, and are not considered part of the long-term transportation system. They are obliterated following use.
- Road reconstruction activities are implemented on existing roads to reduce risk of resource damage and/or improve traffic safety. Treatments to address aquatic resources problems typically include the addition of cross drains (ditch-relief) culverts; drivable ‘rolling grades’ structures and out-sloping the road, if practical; increasing the capacity of the culvert to meet a 100-year storm event; reducing

plugging potential from excessive accumulation of sediment and woody debris (adding a side-tapered inlet or trash rack); eliminating diversion potential (constructing a 'drivable rolling grade', if road grade allows); reducing the size (height) of the fill where overtopping-type failure may occur; stabilizing or armoring fill slopes with riprap (rock blanket); dissipating stream outflow energy with riprap; dispersing water ('dewater') before reaching affected failure site (add cross drain on upgrade); and pull-back of the 'over-steepened' fill slopes.

- Temporary road obliteration is done after a newly created temporary road is used for logging purposes. The timber sale purchasers are required to obliterate the road under the timber sale contract. This involves subsoiling the road as appropriate, and pulling displaced soil and duff back over the road surface. Logging slash is also often pulled over the top of the road to provide additional ground cover and bare soil protection.
- Road inactivation includes reconstruction activities that reduce the risk of resource damage by preventing vehicle use of a road for an indefinite (temporary) period of time. An 'open road' may be closed as a result of inactivation, or a currently closed road may receive further treatment to reduce the risk of resource damage. The road remains on the Forest road system, though anticipated maintenance needs are minimal to none.
- Road decommissioning is intended to remove or substantially reduce the potential for resource damage attributed to the road, and results in the permanent closure of the road and its removal from the Forest system of maintained roads. Decommissioning implies that there is no reasonable expectation for use of the road in the foreseeable future, given presently available information and direction. Work typically includes removal of drainage structures (culverts) and reestablishing stream channel beds and banks, pullback of unstable road shoulders or landings, subsoiling the road surface, and various levels of revegetation.
- Passive road decommissioning is done to a road that presents little to no risk of resource damage that is being removed from the Forest system of maintained roads. Work typically involves minor work such as blocking or barricading the road, and in some cases constructing water bars or drain dips, and lopping and scattering woody debris onto the road surface.

Cryptogrammic crusts: They are important in the reduction of soil erosion, and facilitate vascular plant seedling establishment by improving water penetration and reducing runoff.

Succession: The process of development of vegetation involving changes of species and communities with time (Sugden 1984).