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Department of
Agriculture

Forest Service

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Environmental Assessment

Ball Park Thin Project

McKenzie River Ranger District
Willamette National Forest
Lane County, Oregon

Legal Locations: Within T14S, R5E, Sec. 24; T.14S, R.6E, Sec. 17-21, 28-30, 31-33; T.15S, R.6E, Sec. 3-6, 7-11, 14-18, 20-23; Willamette Meridian

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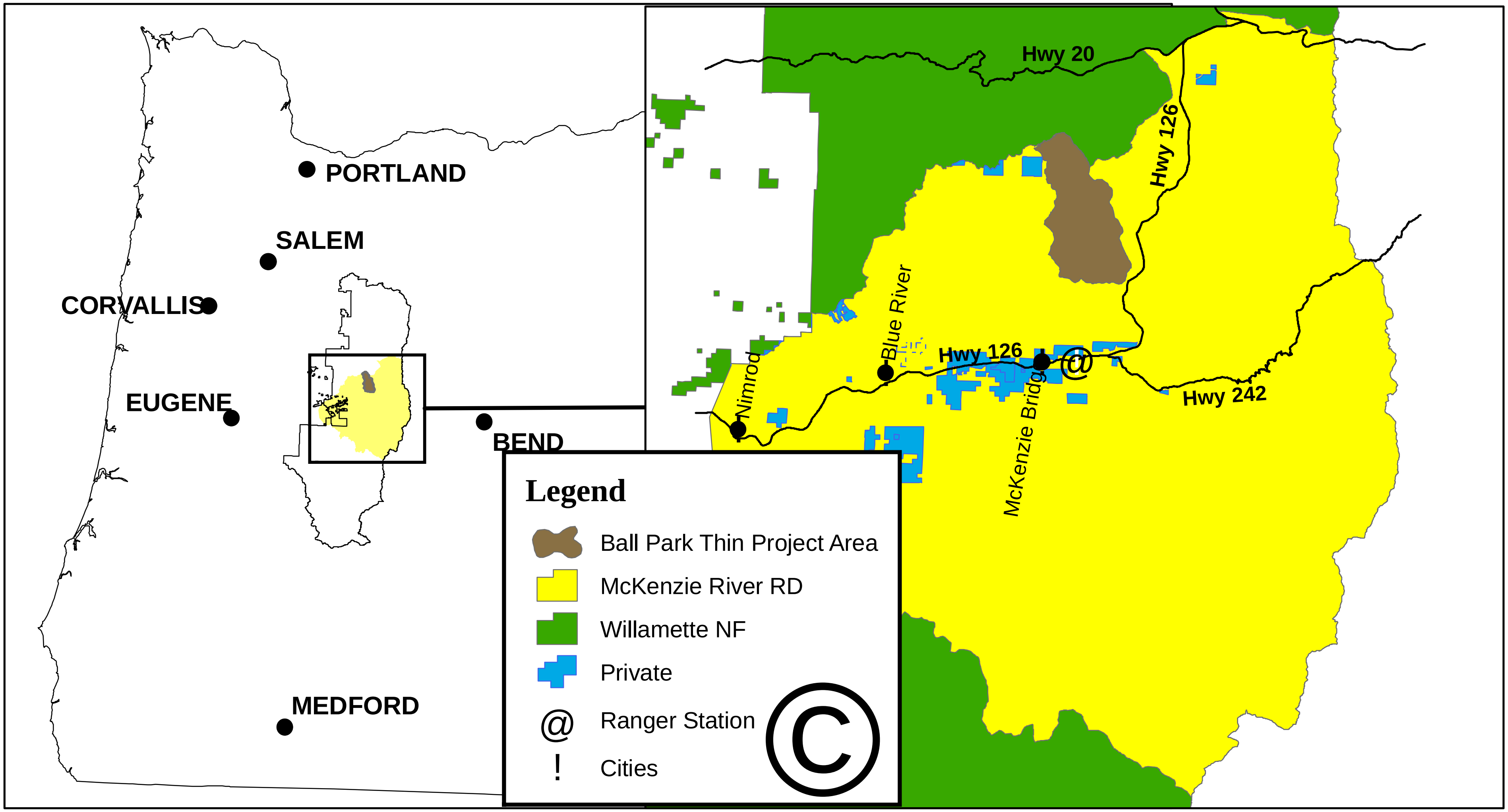

Figure 1. Ball Park Thin Project location map.

Table of Acronyms:

ACS	Aquatic Conservation Strategy
ARP	Aggregate Recovery Percentage
BGEA	Big Game Emphasis Area
CWPP	Community Wildfire Protection Plan
dbh	Diameter breast height
DN	Decision Notice
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
EWEB	Eugene Water And Electric Board
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FONSI	Finding of No Significant Impact
FPC	Federal Power Commission
FRCC	Fire Regime Condition Class
IDT	Inter-disciplinary Team
IRA	Inventoried Roadless Area
LFH	Listed Fish Habitat
MIS	Management Indicator Species
MRRD	McKenzie River Ranger District
MMBF	Million Board Feet
NEPA	National Environmental Policy Act
NFS	National Forest System
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
ODOT	Oregon Department of Transportation
OSHA	Occupational Safety and Health Administration
ODFW	Oregon Department of Fish and Wildlife
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SOPA	Schedule of Proposed Actions
TES	Threatened, Endangered, or Sensitive Species
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VQO	Visual Quality Objective
WA	Watershed Analysis
WFP	Willamette Forest Plan
WNF	Willamette National Forest

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Chapter 1. Purpose and Need for Action

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters and appendices:

- **Chapter 1-Purpose and Need for Action:** This section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. A section is included that details how the Forest Service informed the public of the proposal and how the public responded. This section also includes the relationship of the proposal to the 1990 Willamette Forest Plan, as amended.
- **Chapter 2 –Alternatives, Including the Proposed Action:** This section provides a more detailed description of the agency's proposed action as well as an alternative method for achieving the stated purpose. The alternative was developed based on significant issues raised by the public and other agencies. This discussion also includes a listing of mitigation measures and design features. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- **Chapter 3 -Environmental Consequences:** This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis discloses the effects on significant issues and the other issues addressed during scoping. Within each section, the affected environment is described first, followed by the effects from Alternative A – No Action, which provides a baseline for evaluation and comparison, Alternative B – Proposed Action, and Alternative C.
- **Chapter 4 - Consultation and Coordination:** This section provides a list of agencies, tribal governments, elected officials, and public consulted during the development of the environmental assessment. It also includes a list of IDT members who were involved in preparing this document.
- **Appendices:** The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including detailed analyses of project-area resources, may be found in the project planning record, or analysis file, located at the McKenzie River Ranger District Office in McKenzie Bridge, Oregon.

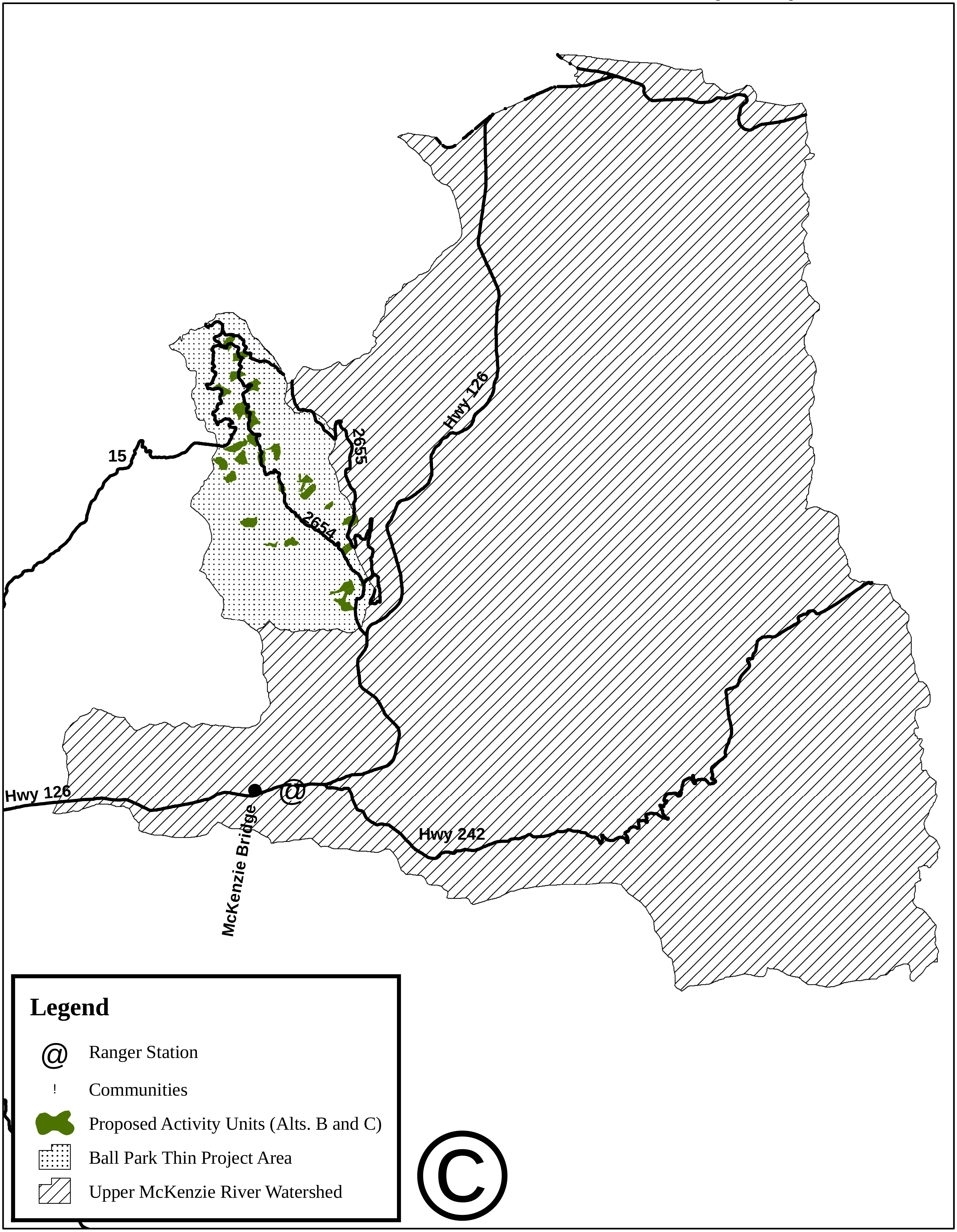


Figure 2. Upper McKenzie River/Deer Creek Watershed map.

Introduction

The Ball Park Thin Project area is within the Deer Creek Subwatershed (6th field) of the Upper McKenzie Watershed (5th field) on the McKenzie River Ranger District. The project area consists of 14,508 acres located northwest of the McKenzie River, east of the HJ Andrews Experimental Forest, and south of the District boundary that is adjacent to the Sweet Home District. Major drainages include Deer Creek, Budworm Creek, Fritz Creek, and Carpenter Creek.

Legal description of the project: T14S, R5E, Sec. 24; T.14S, R.6E, Sec. 17-21, 28-30, 31-33; T.15S, R.6E, Sec. 3-6, 7-11, 14-18, 20-23; Willamette Meridian; Lane and Linn Counties, Oregon.

Purpose and Need for Action

The purpose and need for this project is to improve stand conditions in terms of species composition, density, and structure over the long term in previously managed stands less than 80 years of age. The amended Willamette Forest Plan includes goals and objectives for managing stands with silvicultural techniques to maintain stand health and vigor and provide multiple use benefits, moving the project area toward the desired condition.

Actions Are Needed To ➔
• Restore structural diversity in stem exclusion stands to enhance wildlife habitat;
• Accelerate restoration of late-successional conditions for stands within Riparian Reserves;
• Protect and maintain aquatic resources;
• Restore degraded roads infrastructure;
• Restore meadows where fire was historically present;
• Reduce hazardous fuels and return the role of fire to the ecosystem as a natural disturbance process.
• Provide a sustainable supply of wood in support of the local and regional economy.

Restore Structural Diversity in Stem Exclusion Stands to Enhance Wildlife Habitat

Overstocked, dense, stem exclusion stands with little or no large dead wood structure is not providing quality wildlife habitat. A need exists to restore structural diversity through techniques such as variable density thinning with skips and gaps, underburning, and subsequent large snag/log creation. Thinning can improve diversity by helping develop shrub and vertical structure development (Curtis et al. 1998).

Accelerate Restoration of Late-Successional Conditions for Stands within Riparian Reserves

Riparian Reserves in existing plantations are currently characterized by dense, overstocked, stem exclusion conditions, and stand development toward late successional conditions has declined.

Riparian Reserves are intended to provide protection for riparian and aquatic habitat, and to provide late successional habitat and connectivity within the landscape. Silvicultural treatments such as thinning and prescribed fire are needed to eliminate stagnation and restore structural diversity in these riparian reserves. Thinning can accelerate development of large trees and multi-storied stands, leading to more complex and valuable habitats and sources of large wood to streams. Curtis et al. (1998), mentions how thinning can "produce larger, more valuable, and visually more attractive trees at any given age".

Protect and Maintain Aquatic Resources

The Ball Park Thin Project is located in Landscape Block 2A as identified in the Upper McKenzie Watershed Analysis (Willamette N.F., 1995). Recommendations from the watershed analysis for the protection and enhancement of aquatic resources include: maintenance of roads that are in poor condition, elimination of un-needed roads, restoration of large wood in deficient stream reaches, and protection and restoration of effective shade. Inclusion of opportunities to implement as many of these recommendations as possible are needed to move this portion of the watershed towards the desired condition.

Restore Degraded Roads Infrastructure

The forest roads in this planning area have a wide range of conditions and maintenance needs. The current road system was built to access timber and other forest resources. Timber sale revenues paid for the majority of past construction and road maintenance. However, timber harvest has declined under the Northwest Forest Plan. This change in forest management has reduced the operating budget and the ability to maintain the road system. Maintenance of degraded roads in the project area is needed to access areas for management with minimum impact to other resources.

Restore Meadows Where Fire was Historically Present

Many meadows depend on fire to keep encroaching trees and shrubs out of the opening. Over the past century fire return intervals have changed, resulting in the loss or reduction of many meadows to encroaching trees and shrubs. These meadows were historically burned by lightning or other indigenous methods. Improving the use of fire in these fire created meadows is needed to restore the structure and habitat of the area, which will in turn create more diversity across our forested landscapes.

Reduce hazardous fuels and return the role of fire to the ecosystem as a natural disturbance process

Fire has and will continue to play an active and vital role in our forest ecology. Treatments in this project would help to return the ecological role of fire disturbance. Historically, across the Willamette National Forest, fire created mosaic patterns within the vegetation as it occurred at different times in the year or locations which affected the intensity and severity of the fire. Fires were often caused by lightning, and there are references and stories of Indigenous people using fire for managing resources, the land, and travel routes (Teensma 1987, Kay 2007). Fire affects forest ecology in multiple ways through such items as: distribution of fungus, changes in understory vegetation and distribution of canopy cover, and diversifying areas for wildlife. Fire suppression over the past century makes managing hazardous fuels a priority in order to reduce potential of large, high severity wildfires and move the ecosystem closer to the natural disturbance process.

Provide a Sustainable Supply of Wood In Support of the Local and Regional Economy

There is a need to manage the project area to provide multiple-use benefits, as described in the Willamette National Forest Land and Resource Management Plan, which includes an expected output of timber products at the optimum level to meet the long-term sustained-yield capacity. The Willamette Forest Plan describes the goal to meet timber outputs at IV-227, and sets forth Standards and Guidelines for harvest scheduling at FW-176 and 177.

The Northwest Forest Plan Final Supplemental Environmental Impact Statement (USDA Forest Service and USDI Bureau of Land Management. 1994) Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Related Species within the Range of the Northern Spotted Owl (USDA Forest Service and USDI Bureau of Land Management. 1994a) amended the Willamette Forest Plan. It recognizes that "the need for forest products from forest ecosystems is the need for a sustainable supply of timber and other forest products that will help maintain the stability of local and regional economies on a predictable and long-term basis" (page 1-4).

Proposed Action

The McKenzie River Ranger District proposes to conduct activities on 1,156 acres of the Ball Park Project Area. The proposed activity acres include timber harvest (915), natural fuels underburns (49), and rock quarry/borrow pit use (5). The timber harvest would yield a gross estimate of 12.3 million board feet (MMBF) of wood products. This proposal, represented in Alternative B in this EA, would include canopy thinning on 664 acres, group selection on 129 acres, and riparian thinning on 122 acres. The timber sales from this proposal would likely be sold over a three year time span, beginning in fiscal year 2009.

The proposal also includes the activities listed below, which are described in detail in Chapter 2:

Proposed Action Activities
• **Yarding Systems:** Ground-based yarding systems would be used on approximately 606 acres and skyline yarding would occur on 459 acres.
• **Post-harvest Planting:** In group selects created from root rot pockets, follow-up planting with species that are non-susceptible to the species of root disease may occur to augment natural regeneration. In random group selects (gaps), stocking will be evaluated two years post harvest to evaluate needs. If a planting need is determined, underrepresented species will be planted to augment natural regeneration.
• **Subsoiling:** Soil would be ripped to promote regeneration and provide a suitable environment for future growth. Subsoiling is used to offset compaction from equipment where the harvest

prescription resulted in little to no residual stand and no further silvicultural treatments will be necessary for 40 or more years. Group selects will potentially have subsoiling needs if ground based operations create compaction within the unit or landings.
• **Road Closures and Decommissioning**: Activities are proposed to decommission Forest roads in the project area to return roads to reduce erosion potential and reduce disturbance to wildlife. Decommissioning roads is planned for 0.53 miles of currently closed roads, and would include activities that result in the stabilization and restoration to a more natural state.
• **Road Maintenance:** Roads used for timber haul that do not currently meet Forest standards for safety and haul suitability would receive road maintenance prior to use. Appropriate road maintenance would be performed on approximately 43.9 miles of Forest roads during operations and upon completion of sale activities. Part of the road maintenance activities would be the replacement of approximately 95 culverts and approximately 9 new culverts being installed in the project area. Proposed road maintenance activities would occur prior to timber harvest.
• **Temporary Road Construction:** The proposed action requires the connected action of constructing less than 3.0 miles of temporary roads to access proposed timber harvest units in the Ball Park Thin Project Area. Decommissioning of temporary roads in the project area would occur upon completion of sale activities.
• **Rock Quarry Development:** The proposed action requires the connected action of using existing nearby rock pits to supply crushed rock and rip rap for maintaining roads accessing the Ball Park Thin Project area. It is estimated that less than 4,000 cubic yards of crushed rock and riprap would be needed. No new development of any of the listed sources is required.
• **Fuels Treatments:** Logging slash would be reduced through underburning, burning landing piles, hand piles, and machine piles after harvest. Firewood cutting may be used as well. These treatments would reduce slash fuels created by timber harvesting. Underburning would also reintroduce the disturbance process of fire to the landscape within harvest units. Slash fuels may be pre-bunched in units where ground and skyline operations occur. Logging slash fuels treatments would occur within 5 years of timber harvest.
• **Natural Fuels Underburn:** (underburning without harvest) will occur which will reintroduce fire disturbance to the landscape.

Decision Framework

The Responsible Official for this proposal is the McKenzie River District Ranger. Given the purpose and need stated above, the Responsible Official reviews the proposed action and the other alternative actions in order to make the following determinations:

- The proposed actions as analyzed, comply with the applicable standards and guidelines found in the Willamette Forest Plan and all laws governing Forest Service actions.
- Sufficient site-specific environmental analysis has been completed.
- The proposed action meets the purpose and need for action.

With these assurances the Responsible Official must decide:

- Whether or not to select the Proposed Action or one of the alternatives, which includes the No-Action Alternative; and what, if any, additional actions should be required.
- Whether the selected alternative is consistent with the Willamette Land and Resource Management Plan (1990), or if the Forest Plan shall be amended in this action.

Tiering and Incorporating by Reference

In order to eliminate repetition and focus on site-specific analysis, this EA is tiered to the following documents as permitted by 40 CFR 1502.20:

- The Willamette National Forest Land and Resource Management Plan (Forest Plan) FEIS and Record of Decision (ROD) dated July 31, 1990, as well as all subsequent NEPA analysis for amendments. This includes the April 1994, Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Spotted Owl, or Northwest Forest Plan (USDA Forest Service and USDI Bureau of Land Management. 1994a), and the accompanying Land and Resource Management Plan, as amended. The Forest Plan guides all natural resource management activities and establishes management standards and guidelines for the Willamette National Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management.
- This EA tiers to a recent broader scale analysis for invasive plants (the Pacific Northwest Region Final Environmental Impact Statement for the Invasive Plant Program, 2005, hereby referred to as the R6 2005 FEIS) (USDA Forest Service. 2005). The R6 2005 FEIS culminated in a Record of Decision (R6 2005 ROD) that amended the Willamette National Forest Plan by adding management direction relative to invasive plants. This project is intended to comply with the new management direction. Proposed actions would also incorporate measures contained in the December 1988, Record of Decision and FEIS for Managing Competing and Unwanted Vegetation, and the requirements of the Mediated Agreement, signed May 24, 1989 by USFS, NCAP, OFS, et al.
- The Upper McKenzie Watershed Analysis (1995) is incorporated by reference. This document provides the Responsible Official with comprehensive information upon which to base land management decisions and establishes a consistent, watershed level context to project level analysis. The watershed analysis provides descriptions of reference, historic, and existing conditions of important physical, biological, and social components of the fifth field watershed. The study analyzed activities and processes that cumulatively altered the Upper McKenzie landscape over time. It recommends watershed management activities based upon landscape and ecological objectives. The watershed analysis is used to characterize elements of the watershed, provides background information for the cumulative effects analyses, and provides recommendations for management activities that move the systems toward management objectives.

- The Willamette National Forest Road Analysis Report (2003) is incorporated by reference. The Forest Road Analysis provides the responsible official with information needed to identify and manage a minimum road system. This is a road system that is safe, responsive to public needs and desires, is affordable, and efficient. The system also needs to have minimal adverse effects on ecological processes, ecological health, diversity, and be in balance with available funding for needed management actions. The District Roads Analysis evaluated each individual road segment on the District with criteria relating to terrestrial, aquatic, administrative, and public use factors. Transportation system decisions were made based on the rating system and road closure recommendations.

The Forest Plan

The Willamette Forest Plan, as amended, provides resource management goals and gives direction to apply a range of harvest methods to timber stands. Chapters II and III from the FEIS discuss silvicultural activities expected to occur on suitable lands on the Forest. Appendix F from the FEIS further documents the rationale used to determine the appropriate harvest systems to be used in managing coniferous forests on the Willamette National Forest.

Table 1 displays Management Area acres as designated in the amended Willamette Forest Plan (WFP) for the project area. The table also includes the overlying land allocations from the 1994 Northwest Forest Plan. Five of the six Northwest Forest Plan (NWFP) allocations are present and consist of Adaptive Management Area, Administratively Withdrawn, Late-Successional Reserves, Matrix, and Riparian Reserves. However, because Riparian Reserves overlap with other land allocations, they are not represented in the table. The intent is to accurately display WFP Management Area acres. Riparian Reserves within harvest units are displayed in Chapter 3, in the Water Quality/Aquatic Resources section. Management areas corresponding to both the WFP and the NWFP within the Ball Park Thin project area are displayed in Figures 3 and 4. All proposed activity units are located in the Adaptive Management Area NWFP land allocation. The objective of the Adaptive Management Area is to develop, demonstrate, implement, and monitor the effects of activities prescribed within the treatment areas.

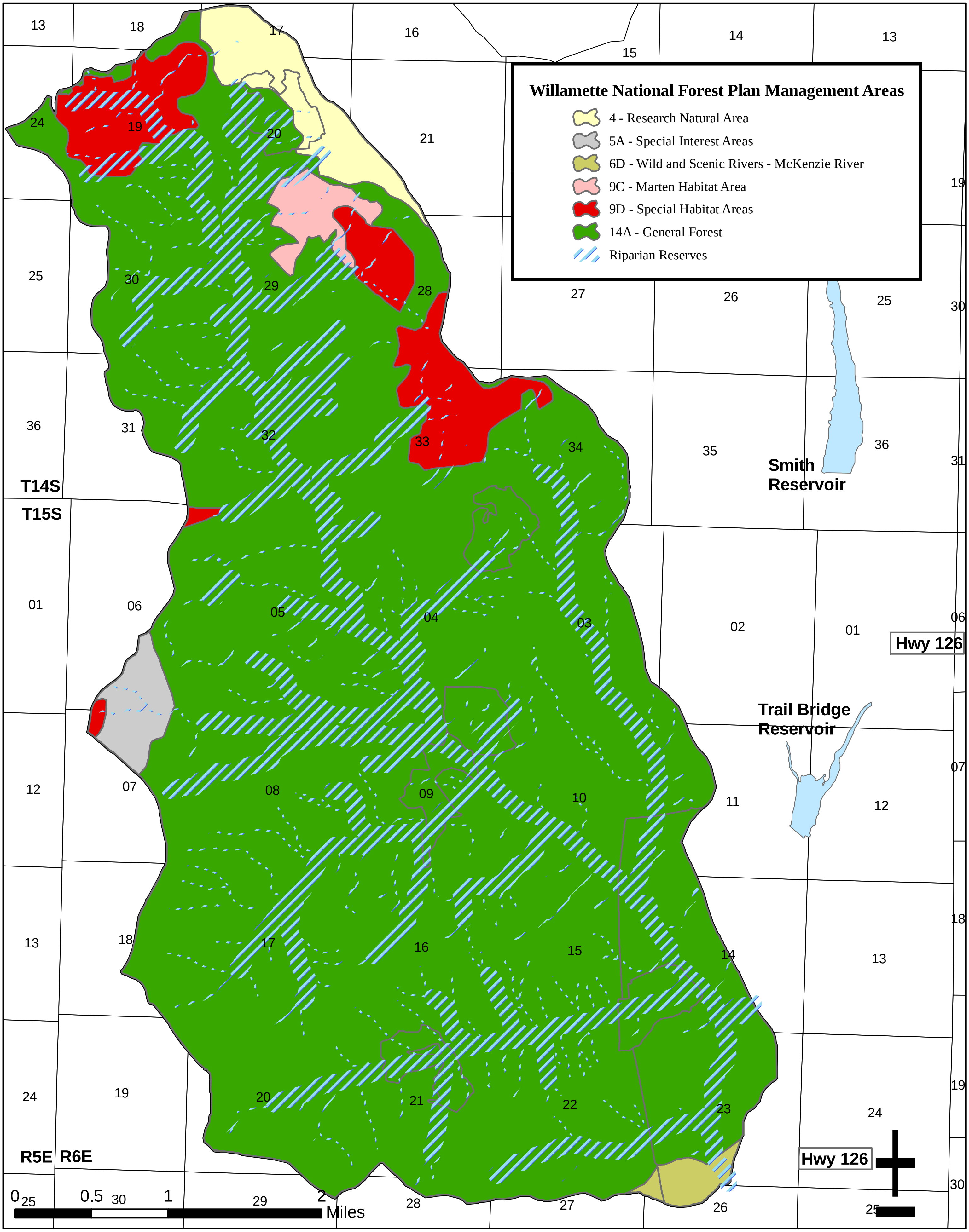


Figure 3. Willamette National Forest Plan Management Areas in the Ball Park Thin Project Area.

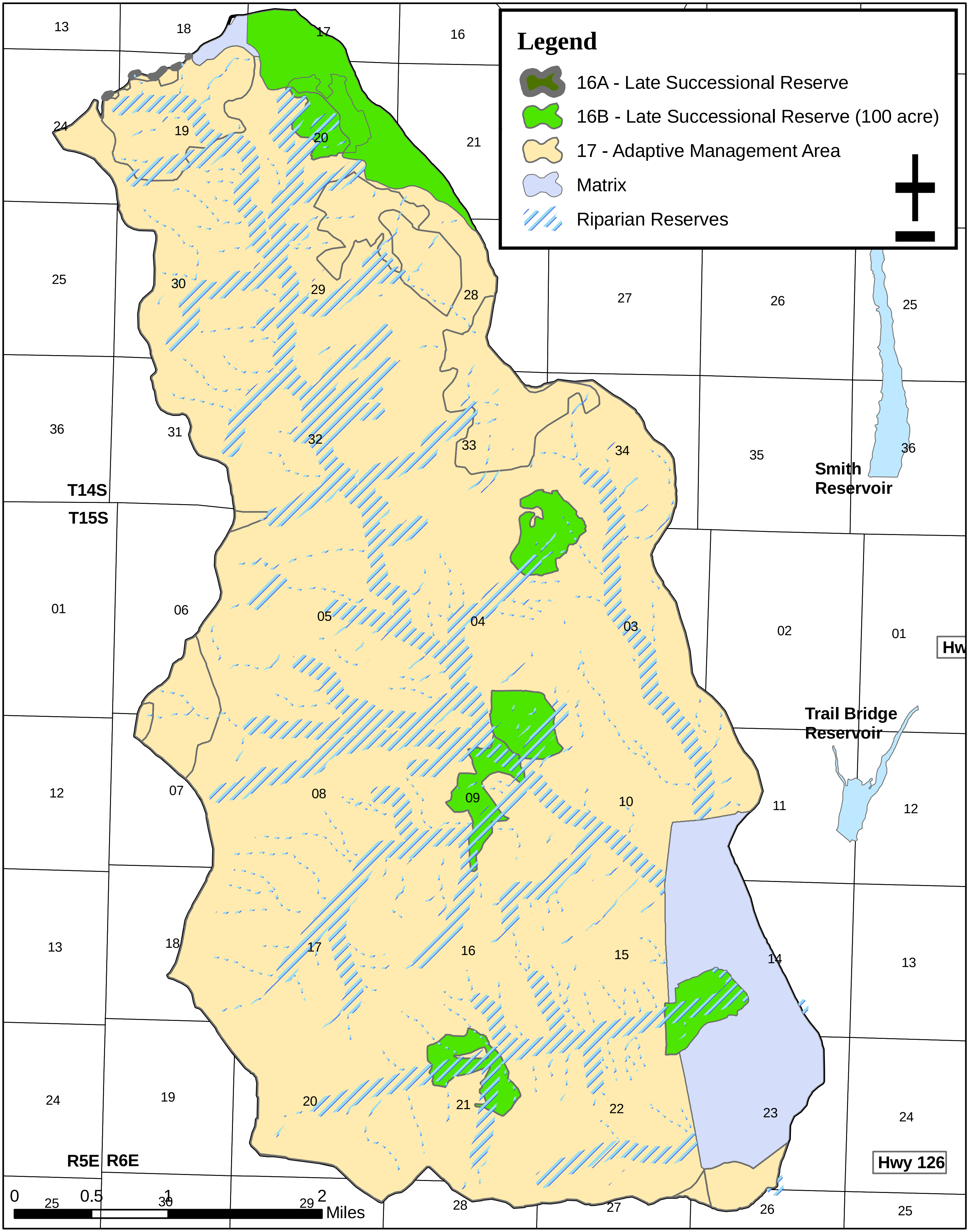


Figure 4. Northwest Forest Plan Management Areas in the Ball Park Thin Project Area.

Table 1. Management Areas within the Project Area.

Willamette Forest Plan Management Areas	Northwest Forest Plan Land Allocations	Total Acres	Acres in Activity Units
4 - Research Natural Area	*Administratively Withdrawn*	297	----
4 - Research Natural Area	*Late Successional Reserves*	54	---
5a – Carpenter Mt. SIA	*Late Successional Reserves*	168	---
6d – McKenzie River Wild and Scenic (Rec)	*Congressional Withdrawn*	78	---
6d – McKenzie River Wild and Scenic (Rec)	*Adaptive Management Area*	13	---
9c – Wildlife Habitat-Marten	*Adaptive Management Area*	154	---
9d – Wildlife Habitat-Special Areas	*Adaptive Management Area*	793	---
14a – General Forest	*Matrix*	905	172
14a – General Forest	*Late Successional Reserves*	591	---
14a – General Forest	*Adaptive Management Area*	11,455	984
Total Acres		**14,508**	**1,156**

The following briefly discusses the goals of the Forest Plan Management Areas within which harvest units or other management actions are included in action alternatives. See Chapter 2, Tables 2, and 4, for prescriptions by alternative.

MA-14a, General Forest – Matrix

Activity units partially or entirely within MA-14a:

The primary goal of this management area is to produce an optimum and sustainable yield of timber based on the growth potential of the land that is compatible with multiple use objectives and meets environmental requirements for soil, water, and wildlife habitat quality. In addition, this area can provide many opportunities for public use and enjoyment.

This allocation is distributed over the Ball Park Thin Project area. All temporary roads will be built in MA-14a. Restoration projects in MA-14a include road maintenance required to access harvest units, road closures, and decommissioning (2654-795, 2654-812).

MA-15, Riparian Reserves

Timber harvest units which include riparian reserves are listed in Chapter 2, Table 2.

Riparian Reserves are one of the designated management areas identified in the Northwest Forest Plan. The primary goal for lands located in this management area is to maintain the ecological function of rivers, streams, wetlands, and lakes within the landscape.

Riparian Reserves include at least the water body, inner gorges, all riparian vegetation, 100-year floodplain, landslides, and landslide-prone areas. Reserve widths are based on either a multiple of the site-potential tree or a prescribed slope distance, whichever is greater. Reserve widths may be adjusted based on watershed analysis to meet Aquatic Conservation Strategy (ACS) objectives. The ACS was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems on public lands by maintaining and restoring ecosystem health at watershed and landscape scales. The intent is to protect habitat for fish and other riparian-dependent species and to restore currently degraded habitats.

All action alternatives have management activities that occur in Riparian Reserves that are designed to be consistent with ACS objectives. Activities include: thinning, fuels treatments, natural fuels underburns and road restoration projects.

Public, Tribal, and Agency Involvement

Scoping is the process for determining issues relating to a proposed action and includes review of written comments, distribution of information about the project, interdisciplinary Team (IDT) meetings, and local news releases.

Scoping began on the Ball Park Thin Project under the current proposed action on May 24, 2007. The McKenzie River Ranger District sent a public scoping letter with preliminary information about this EA to a project mailing list of 43 interested individuals, agencies, tribal governments, and elected representatives. The scoping letter described the proposed action, a purpose and need for action, a brief summary of preliminary issues, and alternative actions. The Ball Park Thin Project has been listed in the Forest Focus – the quarterly schedule of proposed actions (SOPA) for the Willamette National Forest, since February 23, 2007.

Issues

Issues are points of concern about environmental effects that may occur as a result of implementing the proposed action. They are generated by the public, other agencies, organizations, and Forest Service resource specialists and are in response to the proposed action.

Significant issues describe a dispute or present an unresolved conflict associated with potential environmental effects of the proposed action. Significant issues are used to formulate alternatives, prescribe mitigation measures, and focus the analysis of environmental effects. Significant issues are also determined based on the potential extent of their geographic distribution, duration of their effects, or intensity of interest or resource conflict, if not mitigated or otherwise addressed. The significant issues for this project were identified by the ID Team and approved by the Responsible Official.

Significant issues are tracked through Issue Identification (Chapter 1), Alternative Development and Description (Chapter 2), and Environmental Consequences (Chapter 3). Measurement criteria have been identified for the significant issues and are used to compare alternatives. These criteria are shown in comparison in Table 11 at the end of Chapter 2.

In addition to the significant issues, other issues or non-significant issues were raised by the public or Forest Service resource specialists. These issues were determined to be non-significant because they were; 1) outside the scope of the proposed action, 2) already decided by law or regulation, Forest Plan, or other higher level decision, 3) irrelevant to the decision to be made, or 4) conjectural and not supported by scientific or factual evidence. These issues are less focused on the elements of the purpose and need for action and did not influence the formulation of alternatives. Several of the non-significant issues are also included in the environmental effects analysis (Chapter 3) because of regulatory or policy direction.

Significant Issues

Issue 1. Water Quality/Aquatic Resources

Past management activities have resulted in impacts to the riparian and aquatic resources of the analysis area. Proposed management activities such as timber harvest, prescribed fire, and road construction can adversely affect water quality, and aquatic and riparian habitat. The most common impacts include: reduction of large wood available for input to streams, removal of shading vegetation, and increases in sedimentation. These effects can result in simplification or elimination of fish and other aquatic habitat, and degradation of water quality with respect to elevated stream temperatures and increases in sediment delivered to streams. However, these same proposed management activities can positively affect these resources by creating stand conditions that favor the development of future large wood and other late-successional stand characteristics, as well as providing opportunities to restore degraded conditions that are the result of past activities in the watershed.

Beneficial uses that are dependent on the quality of the water in the McKenzie River in the project area include spawning and early rearing habitat for spring Chinook salmon, rearing and foraging habitat for sub-adult and adult bull trout (both listed as Threatened species and protected under the Endangered Species Act), and use as public drinking water for the City of Eugene at the Hayden Bridge intake downstream of the project area. Tributaries to the McKenzie River in the project area provide habitat for additional aquatic organisms, including cutthroat and rainbow trout, bull trout and spring Chinook salmon; all considered Management Indicator Species in evaluating project effects to animals and their habitat.

The effects of this project on water quality, aquatic and riparian habitat are evaluated by the following criteria:

Issue #1 Water Quality/Aquatics—Indicators		
#	**Indicator**	**Measurement**
1	*Changes in available stream shade and potential to increase stream water temperatures*	Projected increase in stream water temperature above current condition (Degrees Celsius)
2	*Changes in risk of altered peak flows.*	Expressed by the Aggregate Recovery Percentage

Issue #1 Water Quality/Aquatics—Indicators		
#	Indicator	Measurement
3	*Estimated project effect on short-and-long term transport of sediment from project area roads*	Cubic yards of sediment yield originating from roads during and after the project
4	*The amount of riparian area receiving treatment, and the effects of the treatment on riparian stand composition*	Acres and % of riparian thinned

Issue 2. Distribution and Amount of Diverse Early Seral Habitat for Wildlife

Diverse early seral habitat can be described as the forbs or small shrubs known to occur in early seral stages that occur after some sort of disturbance or natural meadow. This habitat type includes the structural diversity of dead wood, including various sizes and decay classes of snags and logs. Abundant flowering forbs and hardwoods are valuable components of wildlife habitat diversity. Changes in forest management on federal lands within the past 25 years have significantly decreased early seral openings. While early seral habitat is still plentiful on private lands adjacent to the Willamette National Forest, many of the species dependent on this type of habitat require the diverse species and structural diversity that intensively managed plantations on private land do not provide. A total of 156 wildlife species have been documented to depend on early seral habitat and the contribution to biological diversity it provides (O'Neil et.al 2001). This includes 10 species of amphibians, 88 species of birds, 42 species of mammals, and 16 species of reptiles.

Effects of the alternatives on diverse early seral habitat are evaluated by the following criteria:

Issue #2 Diverse Early Seral Habitat —Indicators		
#	Indicator	Measurement
1	*The amount of diverse early seral habitat created*	Acres of diverse early seral habitat created with gaps and remaining overstory canopy closure after treatments

Non-Significant Issues

These *other issues* were addressed in project development. The issue statements below are followed by reasons why they were not considered significant to the development of alternatives and not always fully analyzed in the following chapters. However, they may serve as important tools that are used to qualitatively evaluate differences between alternatives.

Soil Productivity/Slope Stability

Soil compaction and displacement can occur during timber harvest and road construction activities, which could adversely affect the re-establishment of vegetation and the hydrologic capacity of the soils. Road construction and timber harvest can reduce slope stability on potentially unstable slopes.

Since the potential effects identified with this issue would be effectively mitigated by measures designed to comply with the Willamette Forest Plan, this issue was not considered significant for designing alternatives to meet the purpose and need for action. All action alternatives meet or exceed standards and guidelines for soil protection from the Willamette Forest Plan, through incorporation of Best Management Practices for the protection of soil resources.

Variable Density Thinning

Scoping comments were received that urge use of variable density thinning in managed stands for this proposal. Variable density thinning would begin development of late-seral stand characteristics over time.

This issue was not considered significant because silviculture prescriptions and marking guidelines include variations in average residual tree spacing of between 17 and 35 feet. The average spacing along with openings caused by natural disturbances, such as, insects and diseases, as well as, windthrow along with untreated reserves will result in a stand with variability in continuity and density, similar to that suggested by the commenters (see Silvicultural Descriptions, page 54). Commercial thinning prescriptions would result in much the same variation in stand density after treatment as suggested by the commenters (see Silvicultural Descriptions).

Sensitive or Other Terrestrial Species of Concern

Activities that remove or degrade forest habitats might affect a variety of species. Activities that create noise above ambient levels may also impact a variety of wildlife species.

This issue was not considered significant because all actions that remove or degrade forest habitat would be required to follow conservation and protection guidelines provided by the Willamette Forest Plan to avoid adverse affects on listed species. Activities that generate noise above ambient levels near nest sites of Sensitive or other wildlife species of concern would be seasonally restricted. Design and mitigation measures address this issue in Chapter 2. The effects of the proposed action and other alternatives on Sensitive and other wildlife species of concern are addressed in Chapter 3.

Migratory Land Birds

This project could affect Migratory Land Birds and their habitat, which varies broadly for this large group of species. Required protection for these species is outlined in the Migratory Bird Treaty Act.

This issue was not considered significant because the proposed silvicultural treatments promote understory shrub development, tree species diversity, deciduous trees, and growth of larger trees. As a result, snags and downed logs are maintained and created, as well as the creation of gaps, which generally improve avian biodiversity in the stand. The effects of the proposed action and other alternatives on migratory land birds are addressed in Chapter 3.

Management Indicator Species (MIS)

Proposed actions could affect Management Indicator Species located within the project area as listed and described in the Willamette Forest Plan. The Forest MIS species list includes the northern spotted owl, pileated woodpecker, marten, Roosevelt elk, black-tailed deer, cavity excavators, bald eagle, peregrine falcon, sea-run spring Chinook salmon, river-dwelling bull trout, and resident fish species like rainbow trout, and cutthroat trout. Through Region-wide coordination each Forest identified the minimum habitat distribution and habitat characteristics needed to satisfy the life history needs of MIS. Management recommendations to ensure the viability of Management Indicator Species were incorporated into all action alternatives analyzed in the 1990 Willamette Forest Plan FEIS.

This issue was not considered significant because project action alternatives would meet the Willamette Forest Plan applicable Standards and Guidelines. The action alternatives are also designed to protect MIS species. Effects of the action alternatives on MIS are addressed in Chapter 3.

Fire and Fuels

Proposed actions may increase or reduce the severity of the effects from wildfires that could occur within the project area. Reducing continuity of vegetation through thinning and slash from harvest activities changes the potential for wildfire spread rate, intensity and mortality. Leaving activity created slash untreated would increase the effects of wildfire. Prescribed fire underburns and fuels treatments will reduce activity slash or naturally occurring fuels across the landscape, thus lessening the impact and severity of future wildfires in the project area. The methods of fuel treatments, the time of year prescribed fire is applied, and the frequency of prescribed fire treatments can change and reduce the amount and arrangement of fuel over the landscape. Additionally, returning the natural process of fire to the ecosystem creates variability in the effects from future wildfires. Air quality may also be affected during prescribed burning, given the close proximity of the Class I Airsheds (Mt. Washington and Three Sisters Wilderness) and the Designated Area of Willamette Valley (Leaburg).

This issue was not considered significant because design measures and accepted procedures for fuels treatments and air quality standards would follow the Willamette Forest Plan Standards and Guidelines addressed in Chapter 3.

Invasive Plants

Proposed actions may introduce or spread invasive and non-native plants. Off-road vehicle/equipment use, ground disturbance, and created openings in the forest canopy resulting from any action alternative, can provide an opportunity for invasive plants to establish and out-compete the desirable native vegetation.

Among the documented invasive plants in the Deer Creek watershed, four are “new invaders” which are weeds limited in distribution with the possibility of eradication based on knowledge of their location. These weeds are capable of broad ecological tolerance, prolific growth, and abundant seed production. Spotted knapweed (*Centaurea maculosa*) and false brome (*Brachypodium sylvaticum*) spread easily by vehicular traffic and have quickly become established along forest roads found in the project area.

This issue was not considered significant because prevention measures, such as washing of equipment, re-vegetation using local native species, and minimizing creation of open, disturbed areas adjacent to existing weeds would be used for all action alternatives. These measures would prevent population expansion and minimize establishment of any invaders. (See Mitigation Measures and Design Measures detailed in Chapter 2.)

Roads and Access

Management decisions could increase or decrease the roaded condition of the landscape, potentially affecting slope stability, water quality, and recreational access. Many of the roads within the project area are below current maintenance standards and are not drivable. This project would provide opportunities to improve current conditions on the 43.9 miles of road needed for rock and timber haul. Existing roads that pose potential adverse effects to riparian resources would require improvements to comply with existing Best Management Practices.

This issue was not considered significant because all action alternatives perform maintenance on roads where the need is identified, and improvements will comply with existing Best Management Practices. The effects of the action alternatives on roads and access are discussed in Chapter 3.

Recreation

Timber harvest and associated activities within and adjacent to proposed harvest units could affect dispersed recreation activities. There are no developed recreation sites within the project area. Mitigation measures listed in Chapter 2 would include signing at high traffic areas to ensure public safety and preventing binder checkpoints at parking areas or other public use locations.

This issue was not considered significant because the number of affected recreationists would be small, the impacts would be short-term, and mitigation measures would provide for public safety. The proposed action is also designed to be consistent with Willamette Forest Plan standards and guidelines for recreation management. Effects of the action alternatives on recreation are discussed in Chapter 3.

Scenic Quality

Proposed actions include timber harvest that may affect visual quality in the project area by creating openings from timber harvest. Commercial thinning harvest may also alter form and texture. The Visual Quality Objective for the project area where management activities are proposed is maximum modification.

This issue was not considered significant because the proposed action is designed to be consistent with Willamette Forest Plan visual quality standards and guidelines. Effects of the action alternative on scenic quality are discussed in Chapter 3.

Social/Economics

Timber volume generated from the proposed harvest units vary with different silviculture prescriptions. Alternatives actions may have different effects on the local and regional economies regarding job creation for neighboring communities when one considers the volume per acre of timber products for this proposal, and potential fluctuations in selling values when timber sales are implemented (starting in fiscal year 2009).

This issue was not considered significant for designing alternatives to meet the purpose and need because all action alternatives provide similar positive economic benefits to the economy in providing jobs and contributing timber products to local markets. All action alternatives are economically viable. See Chapter 3 for a discussion of this issue.

Heritage Resources

The project area has some known cultural resource sites and contains high probability areas for additional, undiscovered sites. Timber harvest and other ground-disturbing actions could potentially affect heritage resources.

This issue was not considered significant because Federal laws and regulations require that cultural resources be protected either through avoidance or data recovery. Cultural resource surveys of the proposed project area have been completed. All known NRHP eligible or potentially eligible sites in the Ball Park Thin Project area would be buffered and excluded from resource management activities.

Carmen-Smith Hydroelectric Project

The Eugene Water and Electric Board (EWEB) operates transmission lines associated with its Carmen-Smith Hydroelectric Project within this planning area. In 1958, EWEB applied for and was granted a 50-year license for the construction, operation, and maintenance of the project by the Federal Power Commission (FPC), with an effective date of December 1, 1958. Since EWEB's Original License was issued for a period of 50 years, the utility is currently seeking a New License from the Federal Energy Regulatory Commission, or FERC, the successor to the FPC. The New License is scheduled to be issued on December 1, 2009. All parties to the re-licensing effort are currently participating in settlement negotiations regarding potential license terms and conditions. FERC is currently collecting information as it prepares to conduct an Environmental Analysis of the utility's proposal and would subsequently issue a New License with its Articles based on that analysis and the result of settlement negotiations.

At this time there are no proposals or decisions associated with this project which can be reliably or accurately analyzed in order to assess future effects that may contribute cumulative effects within the context of this EA. Therefore, this issue was not considered significant to development of project alternatives. Ongoing regular maintenance activities would continue into the future for the hydropower project. Comments were received from EWEB managers during public scoping (Appendix H). The Smith-Carmen Hydroelectric project and facilities were considered in alternative development, and in the inclusion of mitigation and design measures, as discussed in Chapter 2.

Chapter 2. Alternatives, Including the Proposed Action

This chapter describes and compares the alternatives considered for the Ball Park Thin Project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare alternatives is based upon the design of the alternative (i.e., helicopter logging versus the use of skid trails) and some of the information is based upon the environmental effects of implementing each alternative (i.e., the amount of erosion or amount of spotted owl habitat altered).

Alternatives Considered – Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). The following Alternative design features were eliminated from detailed analysis for the reasons stated.

Alternative Excluding Silvicultural Treatments in Riparian Reserves
In response to initial public scoping comments that expressed concern about management activity in Riparian Reserves, an alternative that excluded silvicultural treatment within Riparian Reserves was evaluated. The District Ranger chose not to develop this alternative, and eliminated it from detailed study because it fails to meet the purpose and need to accelerate restoration of late-successional conditions for stands within Riparian Reserves.

Actions Considered – Eliminated from Action Alternatives

The following design features were incorporated into each of the action alternatives. These design features were based on public comment on the proposed action and new information concerning the project area.

Dropped Units for Economic Consideration
Initial public scoping indicated concerns that timber harvest proposals be economically feasible and that expensive methods be minimized. Consequently, Units 90, 100, 180, 250, 260, 300, 320, 340, and 350, which were originally considered for commercial thinning in the proposed action were dropped. This was the result of initial analysis that showed the current size of trees and volume per acre did not support the cost of logging in today's market.
Burning of Bunchgrass Mountain Meadow
The original proposed action included a 42 acre prescribed meadow burn. This restoration broadcast burn was intended to reduce encroaching conifers and encourage the growth of grasses and forbs.

Meadow researchers and resource specialists visited the Bunchgrass Mountain meadow in June 2007 to discuss the ecology and maintenance of this meadow. As a result of this review, a recommendation was made not to apply any burning treatments at this time because fire was not determined to be the single and primary process in the creation or maintenance of this particular meadow. Consequently, the proposed action to burn the area was not considered to be appropriate for this decision, and was dropped from the project.
EWEB Re-licensing
Unit 380, which is located adjacent to the EWEB transmission line along Deer Creek, was included in the original proposal for commercial thinning. However, EWEB and other parties to settlement negotiations for FERC re-licensing of these facilities are in the process of evaluating alternative designs and/or locations for the transmission line in this area. Since the outcome of these negotiations has not yet been determined, and could impact management design for Unit 380, management action in the unit was not considered to be appropriate for decision at this time. Consequently, Unit 380 was dropped from the proposed action.

Alternatives Considered in Detail

Alternative A – the No Action Alternative

Alternative A assesses the current management situation of the affected environment and serves as a baseline to compare and describe the differences in effects between taking no action and implementing action alternatives to meet project objectives. Existing site specific management plans and standards and guidelines would continue to be the basis for management of the project area. Only those management activities planned and implemented under previous decisions would continue in the project area.

The existing network of roads would remain unchanged. Normal scheduled road maintenance, such as brushing, culvert cleaning (not new or replacement), and surface blading would continue in accordance with annual maintenance plans. Control of invasive plants would continue as currently programmed and funded.

Alternative A (No Action) as it Responds to the Significant Issues:

Water Quality/Aquatic Resources

Alternative A proposes no activities that would create new risks to soil and water resources. However, the alternative allows existing road related problems including erosion from roads currently in poor condition resulting in continued annual road related sediment production of an estimated 183 cu yd/year. Alternative A would also allow dense, stagnant riparian stand conditions to persist in stands where prior regeneration harvest occurred, resulting in delayed development of late successional habitat and sources of large wood.

Distribution and Amount of Diverse Early-Seral Habitat for Wildlife
Alternative A proposes no activities that would change current declining trends of early seral wildlife habitat in the project area.

Alternative B – The Proposed Action

Alternative B would respond to the purpose and need by implementing timber harvest on 915 acres for a gross estimate of 12.3 million board feet (MMBF) of Forest products. This alternative is consistent with management direction set forth in the Willamette National Forest Plan and the Northwest Forest Plan direction for Adaptive Management Areas. Figure 5 display the activity units in the project area. Table 7 presents the types of treatment for each unit in this alternative

Vegetation

Harvest treatments include 122 acres of riparian thin, 664 acres of thinning to 40% canopy closure, and 129 acres group selects of approximately one acre each scattered through all units except 50, 130, 140, 160, 190, 200, 210, 230, 280, 330, and 360. Group selection (gaps) would be cut to help enhance the development of early seral habitat by creating openings in the stands. There would be 129 one-acre gaps within the project area. Stand conditions and silvicultural prescriptions for the units in this alternative can be found on pages 56-61. Alternative B would implement harvest using approximately 606 acres of ground based yarding and 459 acres using skyline yarding systems.

Table 2. Alternative B Treatment Plan

Type of Treatment		# of Acres
Timber Harvest	Thinning to 40% canopy closure	664
	Riparian Thinning	122
	1-acre Gap Creation	129
	Total Harvest	*915*
Prescribed Burning	Under or pile burns	1,065
	Underburn Buffer	42
	Natural fuels underburn	49
	Total Burning	*1,156*

Alternative B would provide for underrepresented species, for example Sugar Pine and Western redcedar. Though rare in the project area, Sugar Pine, a relatively shade intolerant species, has been shown to increase seed-to-seedling success from a ratio of (1:244 to 1:483) to (1:70) with disturbance under the seed trees (Fowells, 1956).

Natural fuels underburning will occur within two units on approximately 49 acres with three acres of reserves within the units. Burning will help to reduce stand competition by removing smaller trees more susceptible to fire kill while promoting understory shrubs and herbs.

Table 3. Alternative B Harvest Units.

Unit	Acres	Harvest Prescription* (Acres)	Logging Systems (acres)	Feet of Temp-Roads	Acers of Gaps	Fuels Treat-ment ++	Residual Trees per acre**	Gross Estimated Timber Volume (MBF / CCF)	
10	42	CT-15, RT-11, GS-6, NT-10	Skyline: 30 Ground: 12	500	6	UB	93	540	1,038

Unit	Acres	Harvest Prescription* (Acres)	Logging Systems (acres)	Feet of Temp-Roads	Acres of Gaps	Fuels Treat-ment++	Residual Trees per acre**	Gross Estimated Timber Volume (MBF / CCF)	
20	42	CT-21, RT-4, GS-9, NT-8	Skyline: 42	1,050	9	BB	109	217	417
30	52	CT-20, RT-12, GS-8, NT-12	Skyline: 52	450	8	HP	106	376	723
40	40	CT-22, RT-6, GS-4, NT-8	Skyline: 40		4	UB	85	288	554
50	6	CT-5, NT-1	Ground: 6		0	GP	109	85	163
60	52	CT-17, RT-17, GS-7, NT-11	Ground: 52		7	UB	88	1,171	2,252
70	39	CT-17, RT-9, GS-8, NT-5	Skyline: 26 Ground: 13	600	8	GP/HP	122	989	1,902
80	34	CT-22, RT-4, GS-5, NT-4	Ground: 34	450	5	GP	117	694	1,335
110	44	CT-12, RT-13, GS-5, NT-14	Skyline: 44		5	UB*/HP	106	361	694
120	57	CT-35, RT-9, GS-6, NT-7	Ground: 57	144	6	UB*/GP/HP	106	334	642
130	18	CT-18, NT-1	Ground: 18			GP/HP	99	245	471
140	29	CT-29	Skyline: 5 Ground: 24	300		GP/HP	109	449	863
150	44	CT-30, RT-5, GS-6, NT-3	Skyline: 8 Ground: 36	1,300	6	GP/HP	122	825	1,587
160	46	CT-42, NT-4	Skyline: 10 Ground: 36			GP/HP	109	546	1,050
170	47	CT-26, RT-1, GS-11, NT-9	Skyline: 10 Ground: 37	2,000	11	UB*/GP/HP	121	370	712
190	39	CT-39	Skyline: 19 Ground: 20	2,000		GP/HP	99	257	494
200	5	CT-5	Ground: 5			GP	90	41	79
210	10	CT-9, NT-1	Ground: 10	200		GP	99	73	140
220	24	CT-17, RT-2, GS-3, NT-2	Ground: 24		3	UB*/GP	80	498	958
230	11	CT-11	Ground: 11	300		GP	121	197	379
240	43	CT-24, RT-1, GS-10, 8	Ground: 43	1,000	10	GP	143	322	619
270	14	CT-11, GS-2, NT-1	Ground: 14		2	GP	99	167	321
280	9	RT-5, NT-4	Skyline: 9			UB*/HP	134	54	104
290	51	CT-31, RT-2, GS-12, NT-6	Ground: 51	1,500	12	UB*/GP/HP	109	906	1,742
310	52	CT-35, RT-1, GS-7, NT-9	Skyline: 25 Ground: 27	900	7	UB*/GP/HP	110	250	481

Unit	Acres	Harvest Prescription* (Acres)	Logging Systems (acres)	Feet of Temp-Roads	Acres of Gaps	Fuels Treat-ment++	Residual Trees per acre**	Gross Estimated Timber Volume (MBF / CCF)	
330	18	CT-17, NT-1	Skyline: 18			UB*/HP	108	265	510
360	19	CT-10, RT-6, NT-3	Skyline: 3 Ground: 16			GP/HP	112	380	731
370	48	CT-33, GS-8, NT-7	Skyline: 10 Ground: 38	500	8	HP	90	952	495
390	82	CT-71, RT-3, GS-3, NT-5	Skyline: 60 Ground: 22	500	3	UB*/HP	106	555	1,067
400	48	CT-20, RT-12, GS-9, NT-7	Skyline: 48		9	UB	96	892	1,715
1000	2					UB-buf			
1001	16					UB-buf			
1002	7					UB-buf			
1003	17					UB-buf			
2001	34					NFUB			
2002	15					NFUB			
Total	1,156	1065 ***		13,694	129			12,347	24,238

* **CT** = Canopy thin; **RT** = Riparian Thin; **GS** = Group Select; **NT** = No Treatment Riparian Reserve.

** Trees per acres (TPA) of trees 7+ inches diameter breast height. For units with multiple presctiptions (i.e. CT and RT), an average TPA (not including GS) of the prescriptions assigned to that unit is given. TPA is calculated based on average stand residual spacing.

*** Total acreage of a stands that have commercial harvest. This number includes NT areas of a stand.

++ **UB** = underburn; **UB*** = possible underburn trees <15"; **HP** = Hand piling within unit and/or along roads ~100ft; **GP** = grapple pile throughout unit <30% slopes; **UB*/GP/HP** = follow-up fuels treatment based on post harvest conditions; **NF UB** = Natural Fuel underburn, **UB--Buf** = Buffer unit around NF UB

Activities Common to Alternatives B and C

Treatments and actions to address significant issues that are common to both action alternatives (B and C) are presented below. Activities that differentiate the alternatives are presented in a separate section for each alternative.

Treatments Common to Alternatives B and C:

Fuels Treatment

The proposed fire/fuels treatments for Alternative B are shown in Table 2. The treatments are based on the type of stand, age and size of trees (dbh), topography, and location. All fuel treatments may cause tree mortality and result in additional large snag creation, which is an important component of wildlife habitat.

Tree mortality in underburning units is expected and desired to be between the ranges of 5 to 20%. Useable snags would occur if trees are lightly burned such that the bark is charred. In pile burn units tree mortality of the trees larger than 14" dbh is desirable to create future snag habitat. A high level of tree mortality is not expected within pile burn units. Some piles should be created adjacent to large trees such that they would be killed, but not fully consumed.

Table 4. Fuels Treatment and Fuel Loading Following Timber Harvest Proposed for Each Unit.
([1]fuel loading is in tons per acre)

Unit	Acres	Treatment	Fuel Loading[1] 0-3"	Unit	Acres	Treatment	Fuel Loading* 0-3"
10	42	UB	13.6	220	24	UB*/GP	15.1
20	42	BB	12.6	230	11	GP	15.4
30	52	HP	11.9	240	43	GP	11.6
40	40	UB	10.1	270	14	GP	11.8
50	6	GP	20.8	280	9	UB*/HP	26.1
60	52	UB	17.1	290	51	UB*/GP/HP	13
70	39	GP/HP	27	310	52	UB*/GP/HP	8.6
80	34	GP	18.2	330	18	UB*/HP	15.3
110	44	UB*/HP	12.9	360	19	GP/HP	21.3
120	57	UB*/GP/HP	14.9	370	48	HP	19.1
130	18	GP/HP	13.5	390	82	UB*/HP	9.5
140	29	GP/HP	13.6	400	48	UB	14.8
150	44	GP/HP	15.6	1000	2	UB-buffer	4
160	46	GP/HP	13.8	1001	16	UB-buffer	4
170	47	UB*/GP/HP	9.7	1002	7	UB-buffer	4
190	39	GP/HP	9.9	1003	17	UB-buffer	4
200	5	GP	11	2001	34	NFUB	4
210	10	GP	11.5	2002	15	NFUB	4

NFUB -- Natural Fuels Underburn in Units 2001 and 2002
No commercial harvest but fuels and vegetation will be treated through an underburn with expected mortality to range from 5 to 20%. Hazardous fuels will be reduced to S&G. Mop up will follow directly after ignition.
UB – Underburn in activity slash units
Post harvest fuels will be underburned. Treatment will be done in spring-like conditions when 1000 hour fuels and duff are still moist, mortality of residual trees will be ≤10% because majority of the trees will be >15" dbh. Hazardous fuels will be reduced to S&G levels. Mop-up follows directly after the unit is ignited.
UB-buffers – Buffers next to Units 1000, 1001, 1002, and 1003
These units are attached to units 270, 330, 240, and 210, respectively. The UB-buffer units are to

provide a different method of holding fire within the UB unit. Due to safety concerns and ecological constraints, the UB-buffer units will reduce the need for handline and also create safer implementation for firefighters during the UB.
UB* - Underburn *
Following the harvest the stand will be evaluated again to measure the residual tree dbh. If the majority of trees are 14” dbh they will be more resistant to a light/moderate underburn and the mortality of ≤10% can be maintained. If a unit has the majority of trees 12” dbh, mortality in an underburn may be difficult to hold at 10% or less due to the thin bark of the smaller trees.
GP – Grapple pile
Within units or in parts of units that are logged with ground equipment, create and cover piles post harvest and then burn the piles in the winter to reduce hazardous fuels to S&G.
HP – Hand pile
Within the unit where concentrations of slash exist or along the road to reinforce the road as a safer fire break and cover post harvest and then burn piles in winter to reduce hazardous fuels to meet S&G.
GS – Group selection with broadcast burning
One acre (Alt. B) to three acre (Alt. C) acre gaps will be created during the timber harvest. Units 10, 20, 40, 60, and 400 will be underburned and gaps will be burned at the same time. Units 110, 120, 170, 220, 280, 290, 310, 330, and 390 may be underburn, if the dbh does not allow then only the gaps will be broadcast burned. If the GS is <5 acres per unit, the GS will not be broadcast burned. Other units with GP or HP treatments may be broadcast burned within the group selection.

All units with harvest activities would have landing piles burned following harvest. Units with hand piling treatments would be focused along the roadsides within 100 feet into the unit or areas of concentrations within the unit. Hand piling would make roads more effective as fuel breaks for wildfire suppression. Alternative biomass utilization would occur if a market exists for wood fiber or firewood. Burning to treat logging slash would take place during the spring season, or when weather and fuels are in spring-like conditions. Spring-like conditions are defined as:

Spring-like conditions are defined as:
Fuels ≥3” in diameter (1,000 hour fuels) have fuel moistures of 25% or greater,
Soil moistures and duff moistures are damp, at levels where duff consumption could be limited to 30-40% across the unit,
Overstory tree mortality ranges from 5 to 20%.

Roads

For Alternative B, approximately 37.4 miles of existing forest roads would be maintained to allow access to harvest areas for timber haul and to reduce adverse impacts to resources. Another 6.5 miles of road would receive spot rocking and other road maintenance to support rock haul, for a total of 43.9 miles of road maintenance. Road maintenance activities would include felling danger trees, clearing and grubbing, replacing drainage structures, removing slides, repairing holes in the roadbed, reconstructing ditches, and placement of aggregate surfacing. There would be approximately 95 replacement culverts with nine new culverts would be installed as part of road maintenance activities.

Table 5. Roads Plan

All Action Alternatives – Roads Plan	
Maintain existing system roads	43.9 miles
Decommissioning of currently closed roads	0.53 miles
Constructing temporary spur roads (to be closed after use)	Less than 3.0 miles

Table 4 has a list of the approximate stream crossing culvert replacements. The stream crossing culvert replacement projects would occur on existing roads designated for haul in this project. All stream-crossing improvements would accommodate 100-year flood events.

Table 6. Approximate Stream Crossing Culvert Replacement.

Road Number	MP	Existing Culvert Diameter Inches	Streamflow[1] Class
1500	0.16	18	DR
	0.36	18	DR
	0.72	18	DR
	1.38	30	I
	1.44	N/A	DR
	1.47	36	P
	1.55	18	DR
	1.62	18	I
	1.67	18	DR
	1.68	30	I
	1.81	N/A	DR
	2.30	18	I
	2.37	18	DR
	2.83	30	I
	3.25	18	DR
	3.27	18	DR
	3.32	18	I
	3.37	18	DR
	3.42	18	I
	3.80	18	DR
	4.15	18	I
	4.19	18	DR
	4.65	18	I
	4.86	18	P
	5.01	18	P
	5.10	18	DR
	5.25	18	I
1500-700	0.02	0.02	18
	0.07	0.07	N/A
	0.02	18	DR
1500-705	1.19	18	DR
1506	0.04	18	DR
	0.12	18	I
	0.26	18	I
	0.60	18	DR
	0.74	18	P
	1.22	18	DR
	1.26	Unknown	DR
2654	1.12	18	I
	1.36	18	DR
	1.62	18	DR
	1.72	18	DR
	1.78	18	DR
	1.89	18	I
	2.05	18	DR
	2.09	18	I
	2.19	18	DR
	2.41	18	DR
	2.46	18	DR
	2.66	18	I
	2.95	18	DR
	3.06	18	I
	3.25	18	P
	3.33	18	DR
	3.35	18	I
	3.38	18	P
	3.45	18	P
	3.60	18	DR
	3.79	18	P

Road Number	MP	Existing Culvert Diameter (Inches)	Streamflow[1] Class
2654	3.85	18	DR
	3.86	18	DR
	4.60	18	P
	5.08	18	I
	5.35	18	I
	6.66	16	I
	8.10	18	I
	8.38	18	DR
	8.92	18	DR
	8.94	18	DR
	9.14	18	DR
	9.33	24	I
	9.94	24	P
	9.99	18	DR
	10.19	18	I
2654-782	0.08	18	P
	0.11	18	DR
	0.35	24	DR
	0.64	42	I
	0.68	36	I
2654-792	0	N/A	DR
	0.03	N/A	DR
	0.18	N/A	DR
2654-796	0.4	24	P
2654-797	0.37	18	I
	0.66	18	DR
2655	0.42	18	DR
	0.77	36	P

Road Number	MP	Existing Culvert Diameter (Inches)	Streamflow[1] Class
2655	3.43	18	DR
	10.32	N/A	I
	10.57	18	I
	10.95	18	DR
	11.03	18	I
	11.54	16	DR
	11.62	16	I
2655-503	2.83	18	DR
2655-507	0.18	N/A	DR
	0.56	N/A	DR
2656	0.2	18	I
	0.26	18	I
	0.29	18	I
	0.43	18	DR
	0.47	18	DR
	0.54	18	DR
	0.93	30	I

Streamflow[1]: *I-Intermittent DR-Ditch relief P-Perennial*

No existing open roads would be closed. Approximately 0.53 miles of existing closed roads would be decommissioned (see Soils, Watershed, and Fisheries protection Mitigation #16 for description). The segments of these roads that will be decommissioned will not be needed for Ball Park unit access (Forest Roads 2654-795 northern part and 2654-812).Both action alternatives would also construct less than 3.0 miles of new temporary roads to allow access to harvest. Upon completion of sale activities, the temporary roads would be decommissioned.

Table 7. Roads Decommissioning for Alternative B.

Road Number	Existing Condition	Proposed Road Treatment	Description of Associated Treatment Activities	Miles Affected
2654-795	Open*	Decommission end of road only from point prior to Class 3 stream crossing	Remove culverts and fills, deep rip , and re-vegetate	0.33
2654-812	Open	Decommission	Remove culverts and fills, deep rip , and re-vegetate	0.2
Total				**0.53**

* Road is open from milepost 0.0 to 0.60. Decommissioned will occur from milepost 0.60 to the end of the road.

Post-Timber Sale Activities

Following is a description of actions that would also occur within the Ball Park project area. More detailed site-specific information about these activities is available at the McKenzie River Ranger District.

Pre-commercial Thinning (PCT) – Thirty-two units were analyzed for pre-commercial thinning for an estimated 475 acres. PCT involves selectively cutting excess trees in stands from 10 to 20 years old to reduce competition for sunlight, moisture, and soil nutrients. By reducing competition the remaining trees are healthier, increase growth, and are less vulnerable to wind and snow damage. PCT also decreases the vulnerability of attack from insects and diseases. A 10-foot no-cut buffer is required along class 4 streams and a 20’ foot no cut buffer is required along class 1-3 streams. Roadside buffers to provide hiding cover for wildlife may also be required as described in individual unit prescriptions. Slash pullback and scattering is required along all forest roads to provide a fuel break. See Appendix F for a list of stands where treatments may occur.

Conifer Pruning – Twelve units were analyzed for conifer pruning for an estimated 240 acres. Conifer pruning involves removing the lower limbs from 70 to 110 trees per acre. These trees are between 20 and 40 years old. The lower limbs are removed from the base of the tree up to ½ the height of the tree. By removing the lower branches sooner than they would naturally fall off, it can produce higher quality lumber by allowing clear wood to form sooner. Pruning may also reduce the incidence of foliage diseases, such as Swiss Needle Cast and White Pine Blister Rust, and increase fire resistance within the stand by removing “ladder fuels”. There are no known relevant resource impacts associated with pruning that would support or prohibit the activity in Riparian Reserves. From the viewpoint of managing for water quality and stream bank and channel stability, there would be no restriction on pruning in Riparian Reserves. Slash pullback and scattering is required along all forest roads to provide a fuel-break. See Appendix F for a list of stands where treatments may occur.

Alternatives B and C as it Responds to the Significant Issues:

Water Quality/Aquatic Resources

Both action alternatives include 19 specific Best Management Practices (BMPs) that provide for the protection of soil, water, and fisheries resources, as required project mitigation. In addition each action alternative must comply with all project design criteria contained in the fisheries consultation document located in Appendix B. The riparian reserve thinning strategy also provides for the retention of effective stream shading vegetation and adequate levels of large wood in Riparian Reserves that occur in proposed partial cutting units. Silvicultural and fuels treatments within Riparian Reserves are prescribed at distances sufficient to maintain or improve aquatic habitat condition.

Both action alternatives treat approximately 122 acres of riparian reserve with thinning and fuels treatment following harvest. These treatments are expected to create stand conditions that favor the accelerated development of future large wood for in stream habitat, and stand characteristics that provide successional habitat and connectivity. The action alternatives would provide greater immediate diversity of patches and openings compared to the no action alternative, and would create conditions that result in greater plant species richness in thinned portions of Riparian Reserves.

Both action alternatives improve stream crossings on roads 2654, 2654-796, and 2655, improve road conditions through road maintenance and reconstruction on 43.9 miles of road, and decommission 0.53 miles of unneeded roads. Consequently road generated sediment upon completion of the project will be reduced from the current level of an estimated 183 cu yd/year to approximately 159 cu yd/year.

Alternative B as it Responds to the Significant Issues:

Distribution and Amount of Diverse Early Seral Habitat for Wildlife

This alternative will create diverse early seral habitat through the creation of 129 one-acre gaps. Gap creation would temporarily increase the amount of flowering and palatable forbs and shrubs. 915 acres of thinning units will leave 40% average canopy closure on all stands. The canopies are expected to close back in to the current condition within 7-10 years. Some additional but very small openings would be created within the prescribed natural fuels underburn units (49 acres) through minor overstory tree mortality. The goal is to kill 10% of overstory trees with an acceptable range of 5-20%. Large down wood would be left within harvest units. Both measures to increase snag and large down wood habitat would improve diversity within the created early seral habitat. Commercial thinning and underburning would increase the use of young forests in the area for foraging and hiding cover.

Alternative C

Alternative C would implement timber harvest on 915 acres for a gross estimate of 13.1 million board feet (MMBF) of Forest products. This alternative is consistent with management direction set forth in the Willamette National Forest Plan and the Northwest Forest Plan direction for Adaptive Management Area. Figures 8 displays Alternative C activity units within the Ball Park Thin Project area. Table 9 presents the types of treatment that is different from Alternative B for each unit in this alternative.

Vegetation

Harvest treatments include approximately 122 acres of riparian thin, 642 acres of canopy thinning, and 151 acres of Group selection thinning within 30 harvest units. The group selection thinning would have a higher frequency of 1 - 3 acre gaps installed compared to Alternative B. A total of 151 acres of gaps would be created. In addition to harvest, the units include about 150 acres of untreated reserves. Gaps would be placed within all of the same units as Alternative B with additional gaps added to unit 210. Stand conditions and silvicultural prescriptions for the units in Alternative C can be found on pages 54-56. Alternative C would implement harvest using the same methods as Alternative B.

Table 8. Alternative C Treatment Plan.

Type of Treatment		# of Acres
Timber Harvest	Thinning to 40% canopy closure	425
	Thinning to 30% canopy closure	217
	Riparian Thinning	122
	1-3 acre Gap Creation	151
	Total Harvest	*915*
Prescribed Burning	Under or pile burns	1,065
	Underburn Buffer	42
	Natural fuels underburn	49
	Total Burning	*1,156*

Table 9. Alternative C Differences in Harvest Units.
All Units are the same as Alternative B except for the following (total is for whole Alternative):

Unit	Acres	Acers of Gaps	Harvest Prescrip-tion* (Acres)	Logging Systems (acres)	Temp-Roads (Feet)	Residual Trees per acre**	Gross Estimated Timber Volume (MBF / CCF)	
170	47	14	CT-23, RT-1, GS-14, NT-9	Skyline: 10, Ground: 37	2000	121	583	1,121
210	10	3	CT-6, GS-3, NT-1	Ground: 10	200	99	98	188
240	43	13	CT-21, RT-1, GS-13, 8	Ground: 43	1000	143	404	777
270	14	4	CT-9, GS-4, NT-1	Ground: 14		99	208	400
290	51	15	CT-28, RT-2, GS-15, NT-6	Ground: 51	1500	109	1,164	2,238
310	52	15	CT-27, RT-1, GS-15, NT-9	Skyline: 25, Ground: 27	900	110	417	802
All Other Units	939	87	----	----	8,270	----	10,259	20,233
Total Alt. C	**1,156**	**151**	**1065 *****		**13,870**		**13,133**	**25,759**

* **CT** = Canopy thin; **RT** = Riparian Thin; **GS** = Group Select; **NT** = No Treatment Riparian Reserve.

** Trees per acres (TPA) of trees 7+ inches diameter breast height. For units with multiple prescriptions (i.e. CT and RT), an average TPA (not including GS) of the prescriptions assigned to that unit is given. TPA is calculated based on average stand residual spacing.

*** Total acreage of a stands that have commercial harvest. This number includes NT areas of a stand.

Alternatives C as it Responds to the Significant Issues:

See "Activities Common to Alternatives B and C" above for activates on fuels and roads.

Water Quality/ Aquatic Resources

See "Alternatives B and C as it Responds to the Significant Issues" above for how alternative C respond to this significant issue.

Distribution and Amount of Diverse Early Seral Habitat for Wildlife

This alternative would create diverse early seral habitat by creating 151 acres of group selects (gaps). These gaps would be approximately 1-3 acres in size scattered through all units except 50, 130, 140, 160, 190, 200, 230, 280, 330, and 360. It would also include 915 total acres of thinning units. An average of 40% canopy closure would remain on 642 acres of the total acres. 30% canopy closure would be maintained on 217 acres of the total acres to better benefit early seral wildlife habitat. Six units shown below with 30% canopy closure thinning were selected based on locations in a high emphasis elk management area that is below the target forage value, as well as two units being excellent potential forage areas for elk and other early seral wildlife species. These six selected units show high understory vegetation suitable for forage development. Commercial thinning would increase the use of young forests in the area for foraging and hiding cover. The prescribed natural fuels underburn will also provide for some early seral habitat with the goal of killing 10% of overstory trees with an acceptable range of 5 to 20%. This may create some additional but very small openings and medium-sized snags. Commercial thinning and underburning would increase the use of young forests in the area for foraging and hiding cover.

Table 10. Ball Park Units Most Suitable for Wider Canopy Spacing (30%).

Unit number	Emphasis Area Rating	HEI Forage	Area to concentrate forage openings	Reasoning
170	Deer/County-M	0.48	Ground-based portion	Area used heavily by elk
210	Upper Westside McKenzie-H	0.42	Entire unit	High emphasis area low in forage
240	Deer/County-M and Upper Westside McKenzie-H	0.48 0.42	Entire unit	High emphasis area low in forage
270	Upper Westside McKenzie-H	0.42	Entire unit	High emphasis area low in forage
290	Upper Westside McKenzie-H	0.42	Center of unit, avoid western edge with steep riparian reserve	High emphasis area low in forage
310	Deer/County-M	0.48	Entire unit	Area used heavily by elk.

Note: The Deer/County Emphasis Areas is being evaluated as one unit, as well as the Upper Westside/Upper McKenzie Westside areas.

Disclaimer: All maps are approximate. Ground activities may vary slightly. Spatial information is based on the Willamette NF Geographic Information System (GIS).

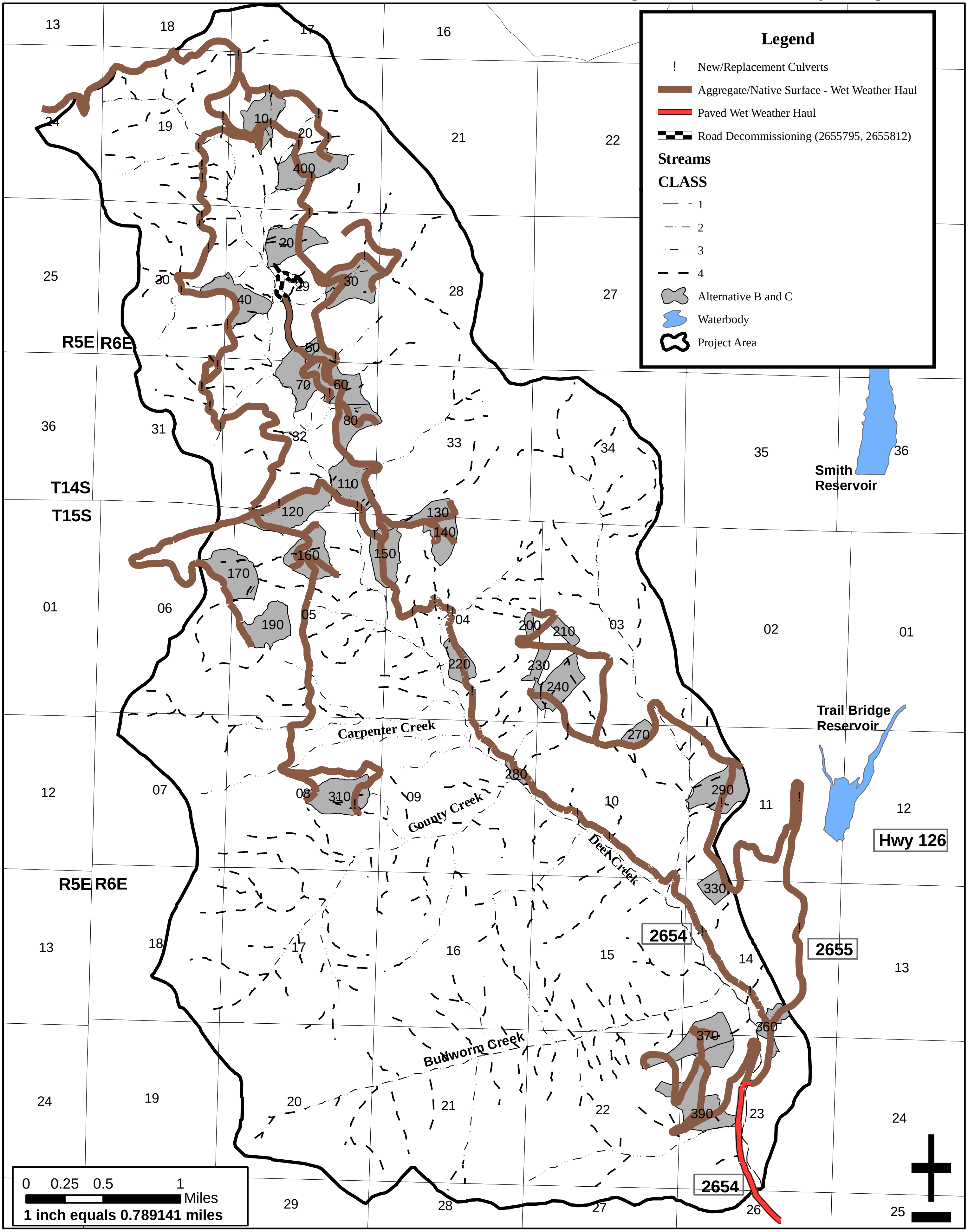


Figure 5 - Haul Route, Decommissioned Roads and New/Replacement Culvert Locations - Alternative B and C.

Ball Park Thin Unit #10 and #400

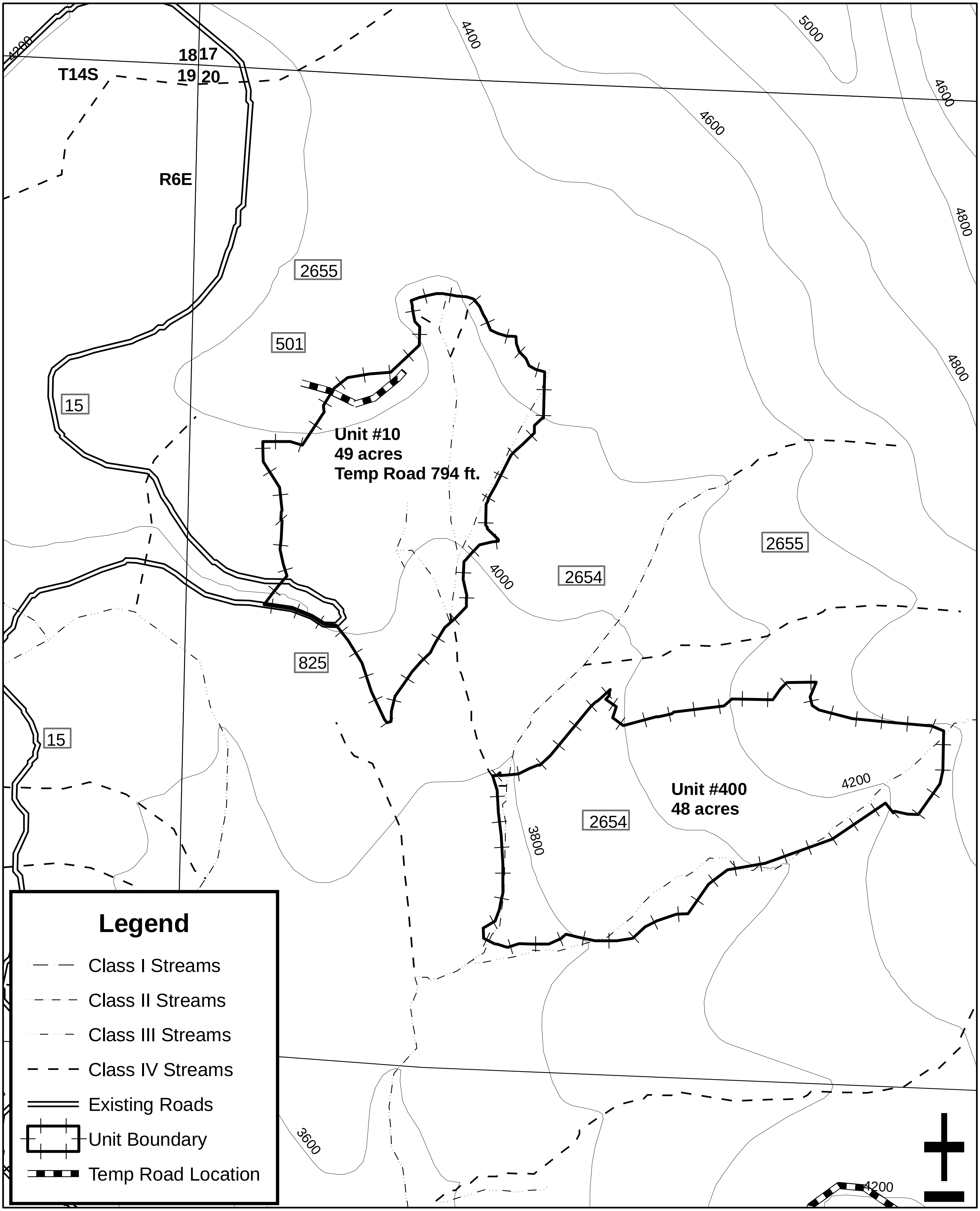


Figure 6 . Approximate Unit and Temporary Road Map - Unit 10 and 400 **1 inch equals 660 feet**

Ball Park Thin Unit #20 and #30

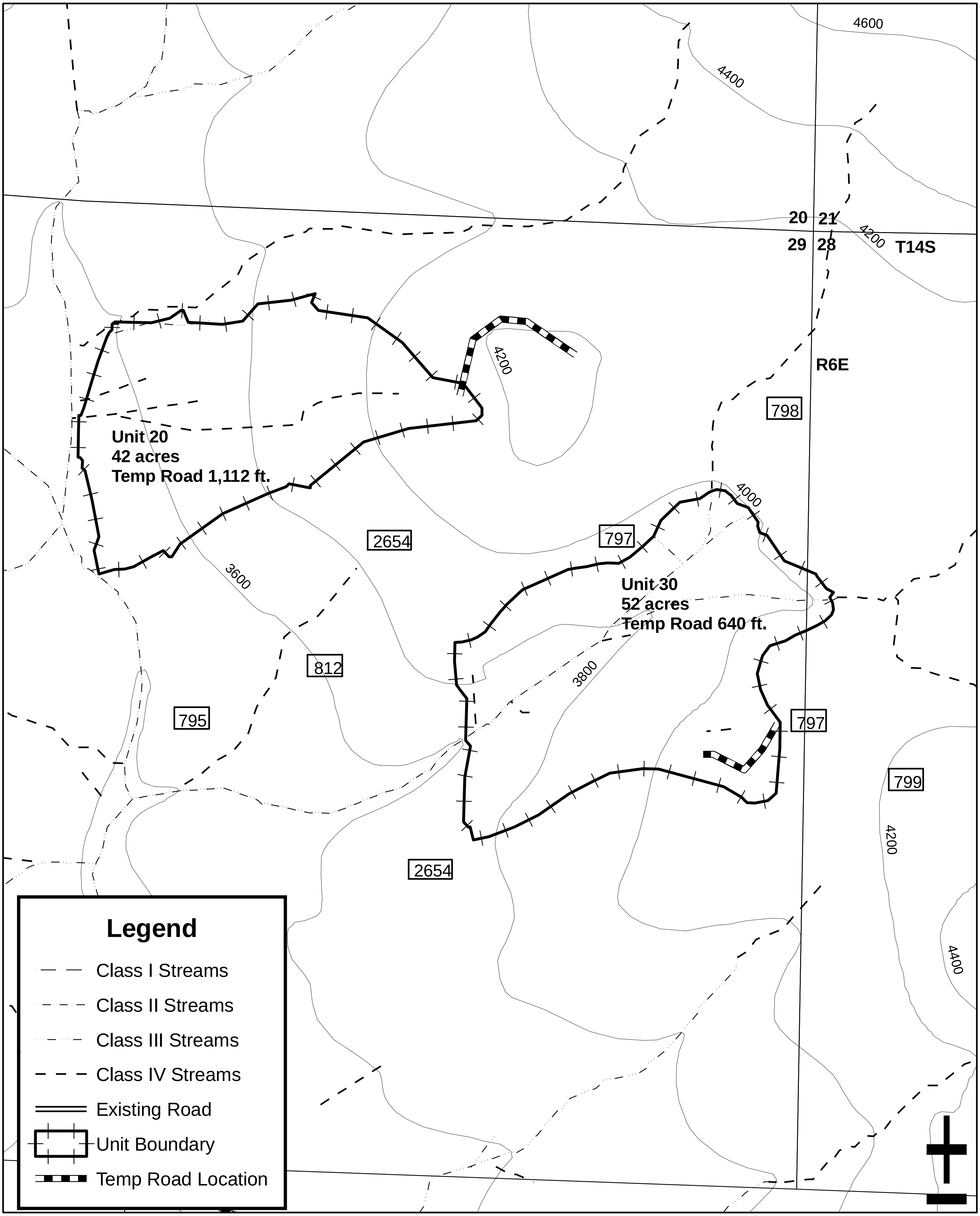


Figure 7. Approximate Unit and Temporary Roads Map - Unit 20 and 30 1 inch equals 660 feet

Ball Park Thin Unit #40

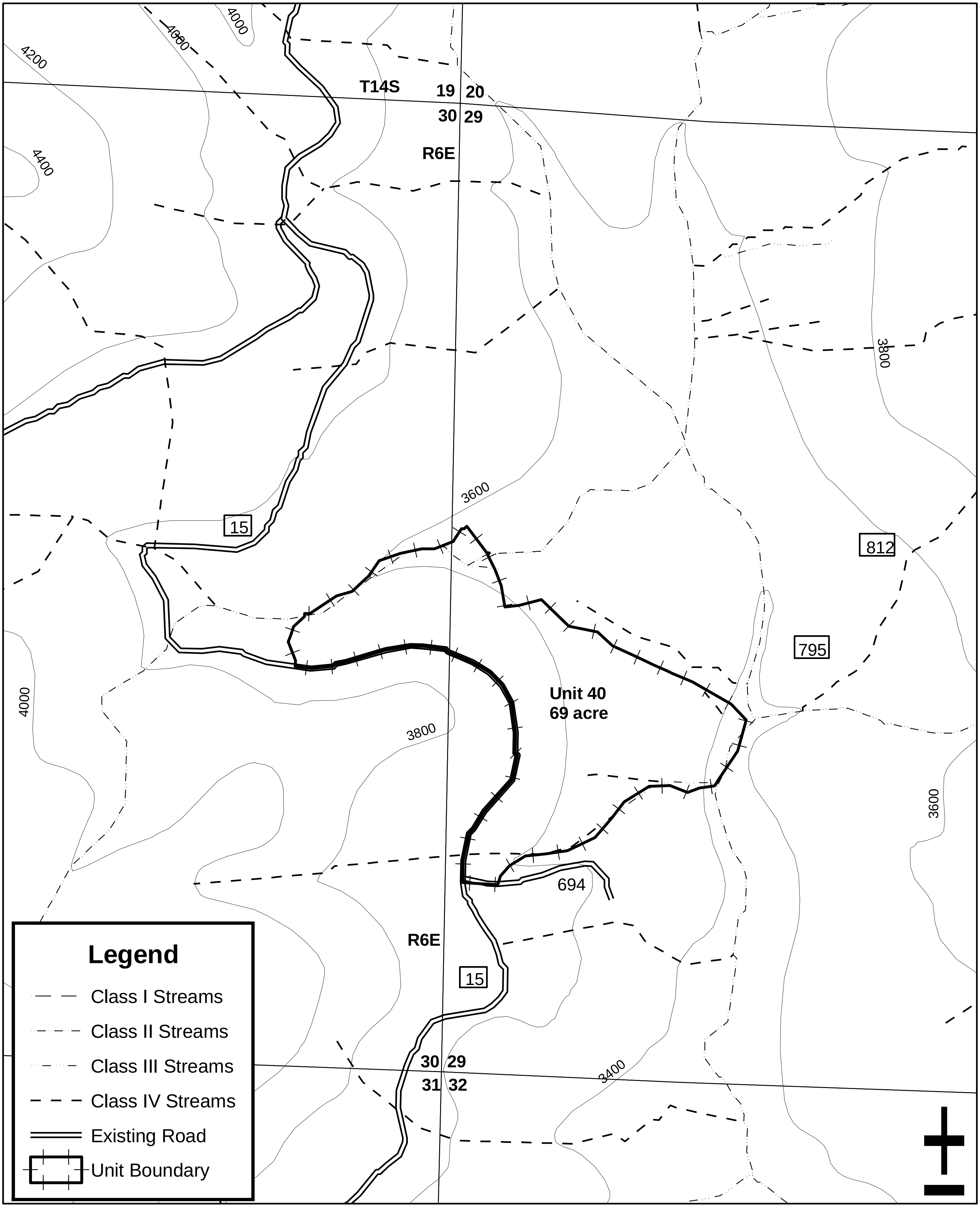


Figure 8. Approximate Unit Map. No Temp Road - Unit 40

1 inch equals 660 feet

Ball Park Thin Unit #50, #60, #70, and #80

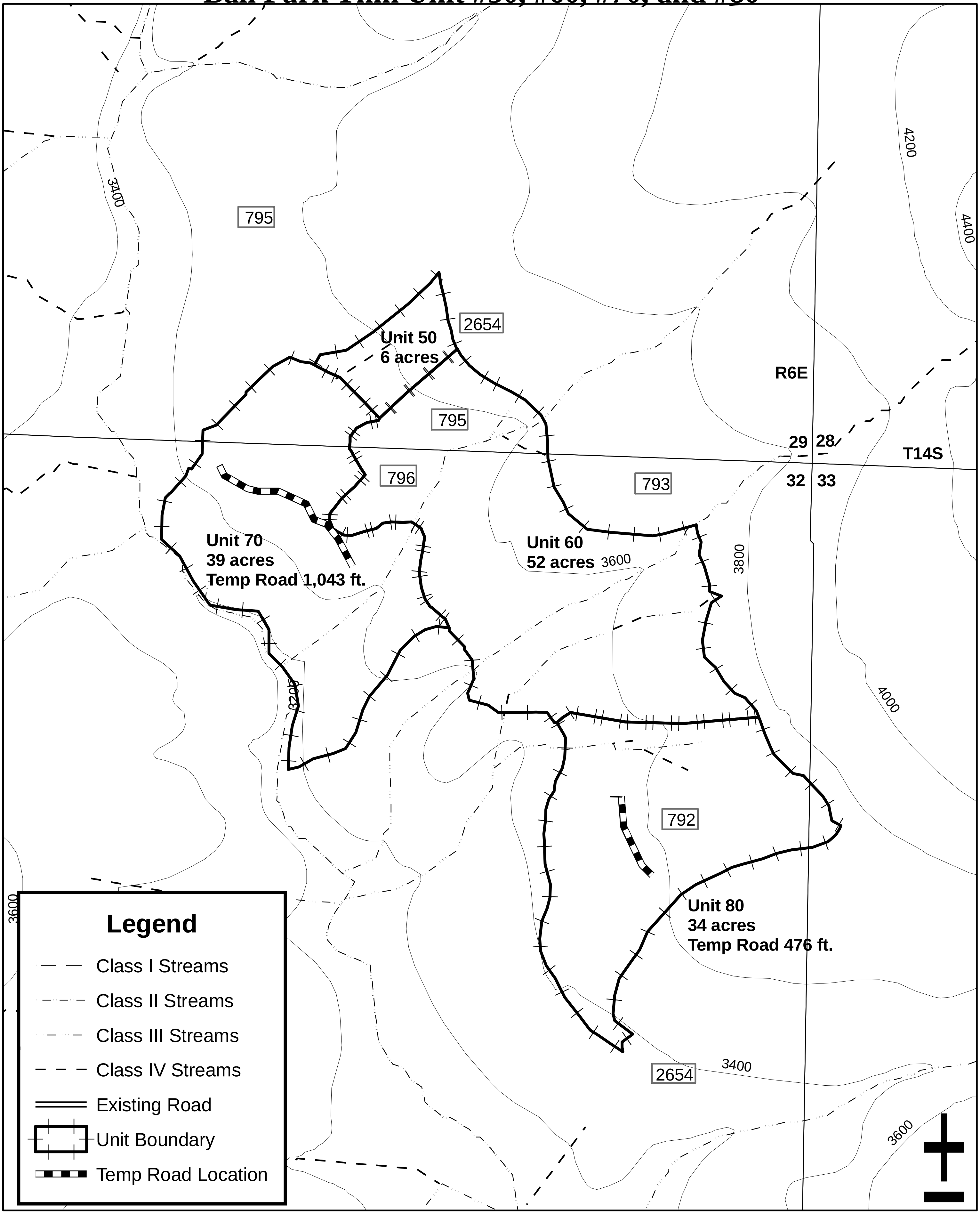


Figure 9. Approximate Unit and Temporary Road Map - Unit 50, 60, 70, and 80

1 inch equals 660 feet

Ball Park Thin Unit #110, #130, #140, and 150

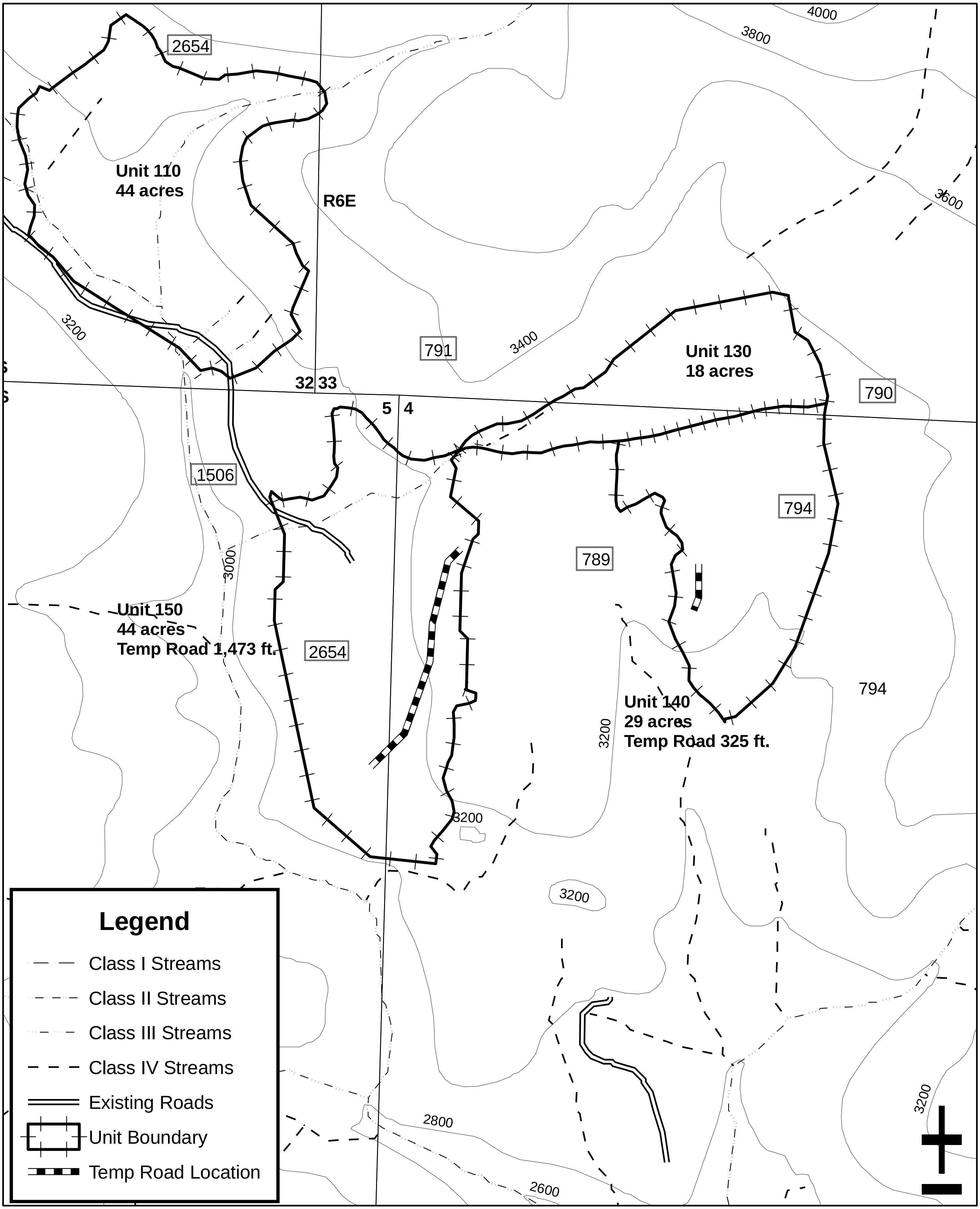


Figure 10. Approximate Unit and Temporary Road Map - Unit 110, 130, 140, and 150 **1 inch equals 660 feet**

Ball Park Thin Unit #120, #160, #170, and #190

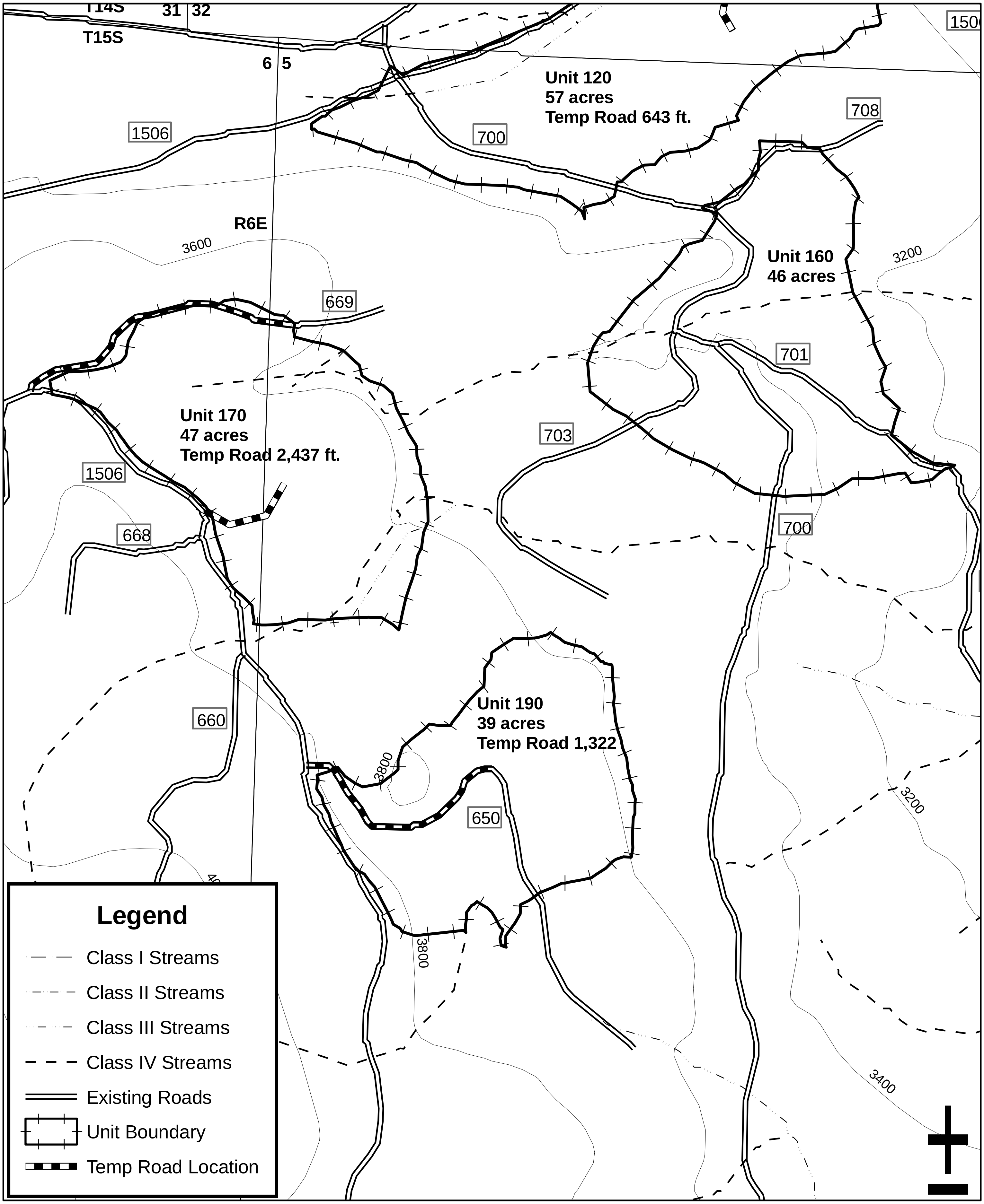


Figure 11. Approximate Unit and Temporary Road Map - 120, 160, 170, and 190

1 inch equals 660 feet

Ball Park Thin Unit #200, #210, #220, #230, and #240

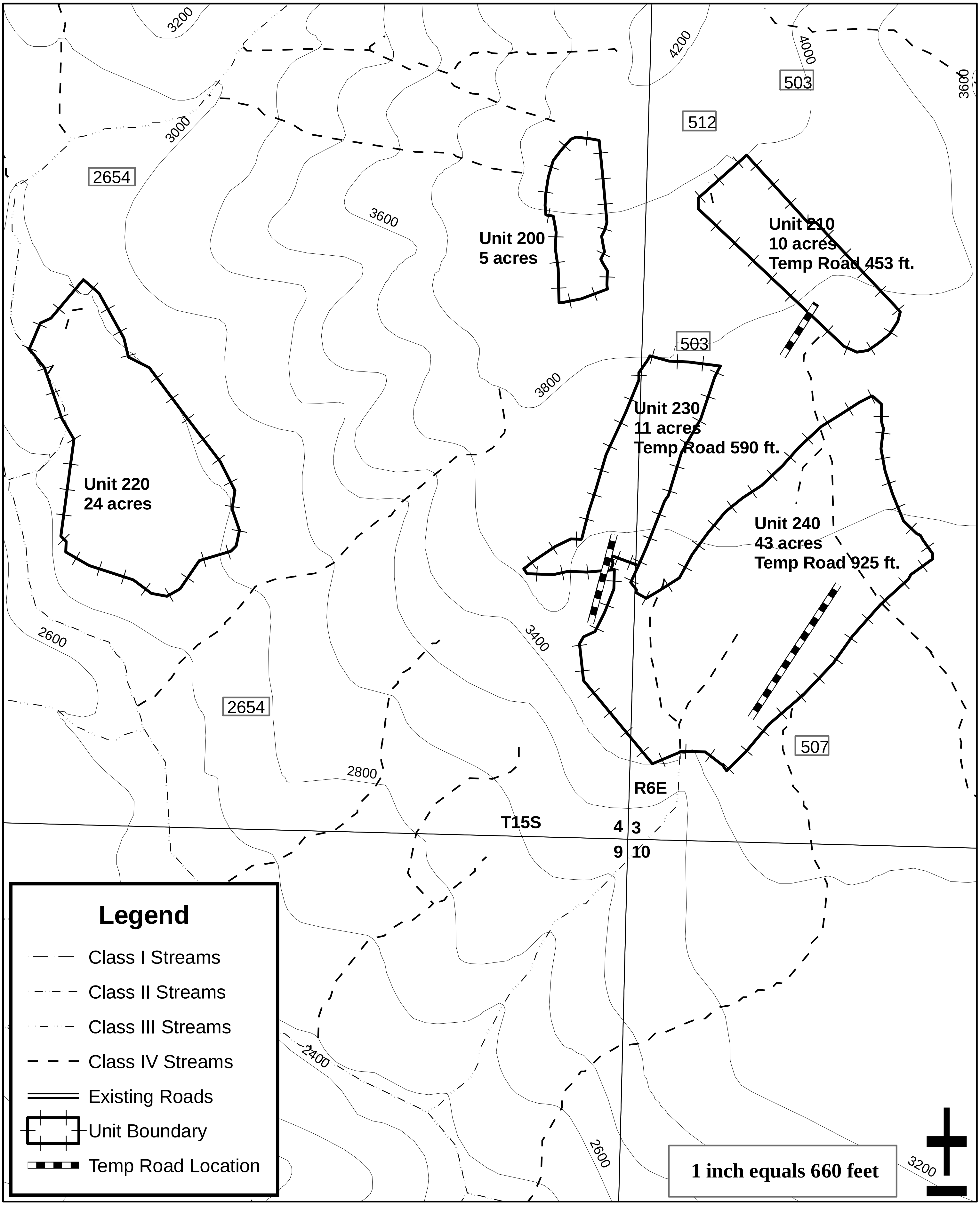


Figure 12. Approximate Unit and Temporary Road Map - Unit 200, 210, 220, 230, and 240

Ball Park Thin Unit #220 and #280

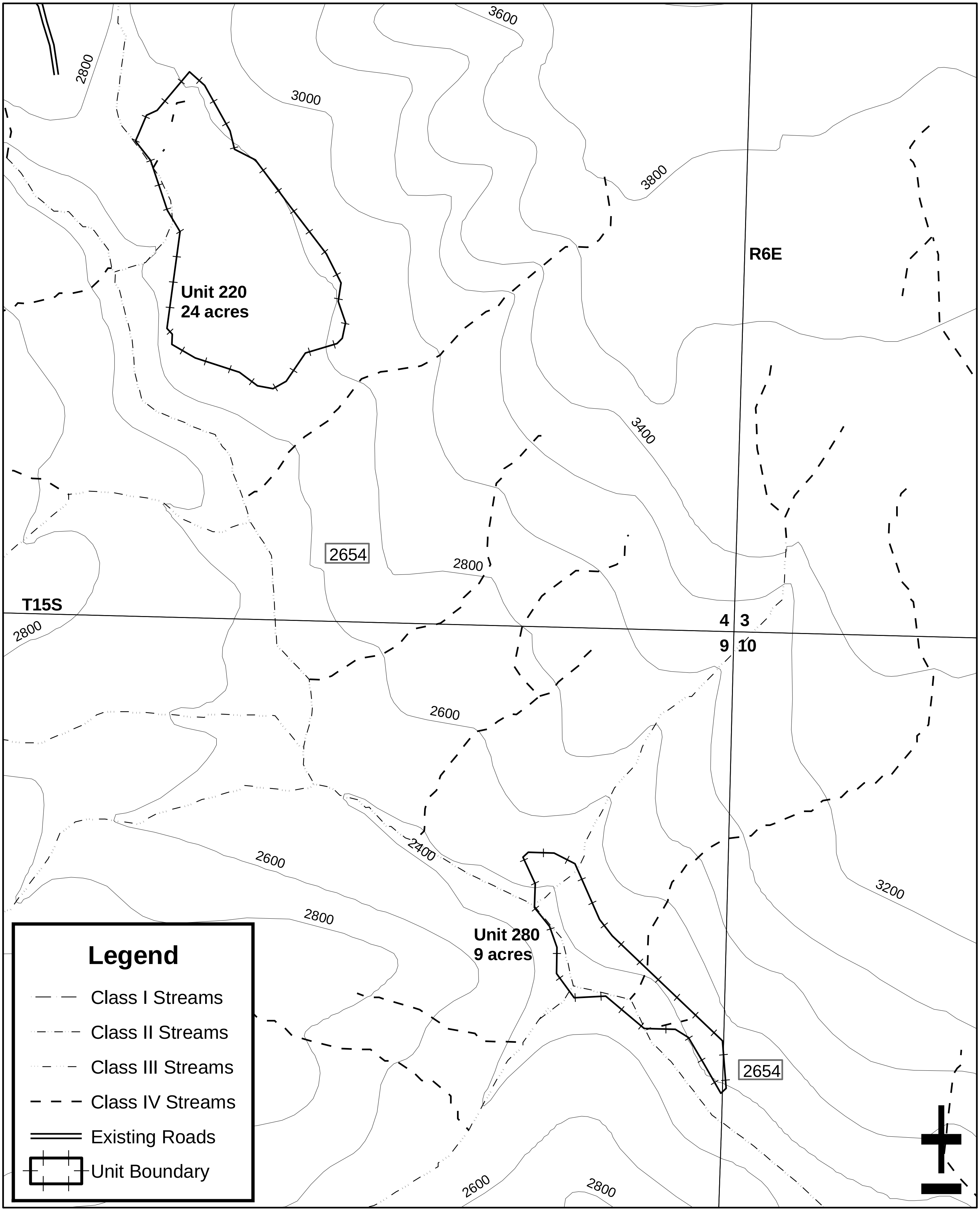


Figure 13 . Approximate Unit Map. No Temp Road - Unit 220 and 280 **1 inch equals 660 feet**

Ball Park Thin Unit #270 and #290

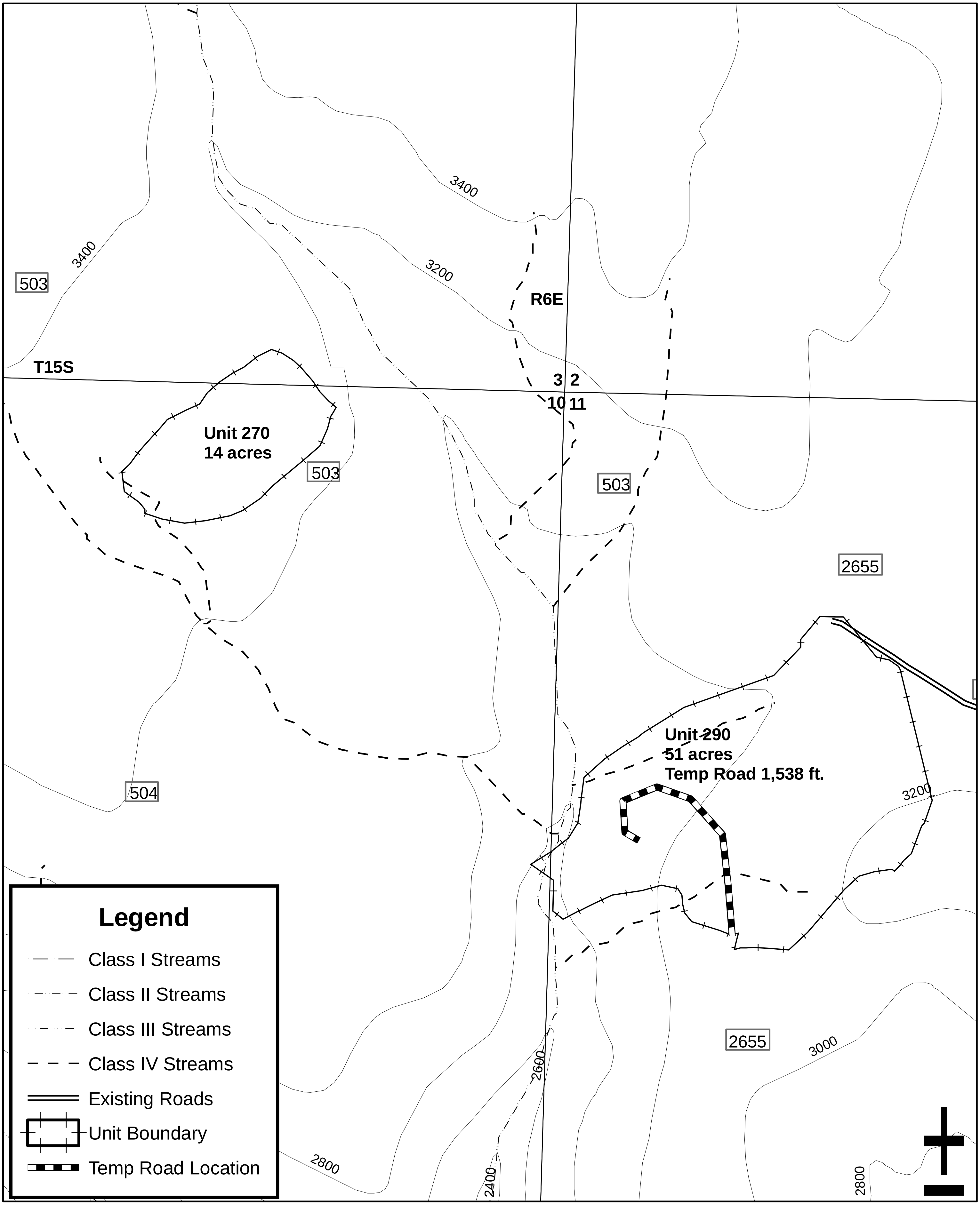


Figure 14. Approximate Unit and Temporary Road Map - Unit 270 and 290

1 inch equals 660 feet

Ball Park Thin Unit #310

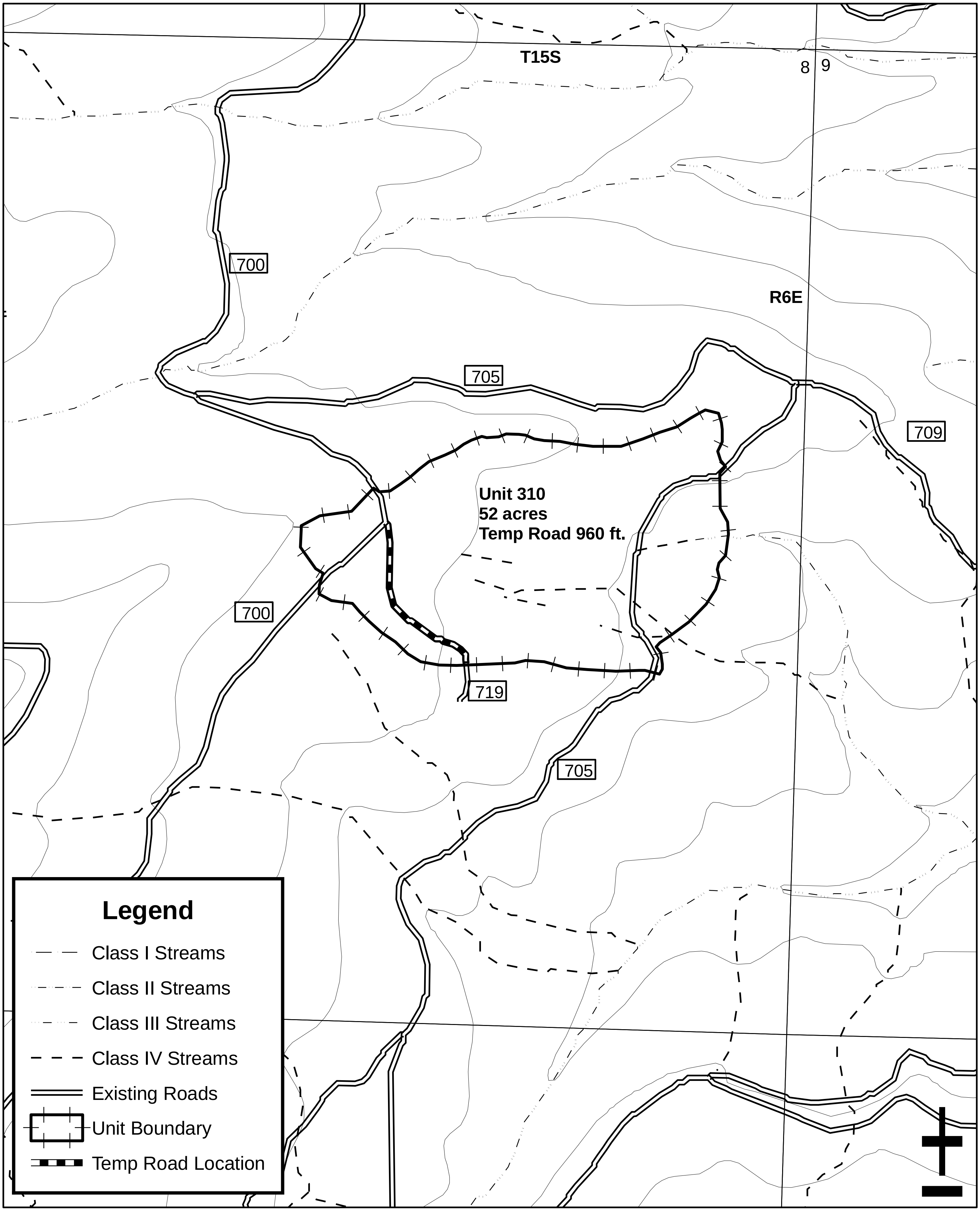


Figure 15. Approximate Unit and Temporary Road Map - Unit 310 **1 inch equals 660 feet**

Ball Park Thin Unit #330

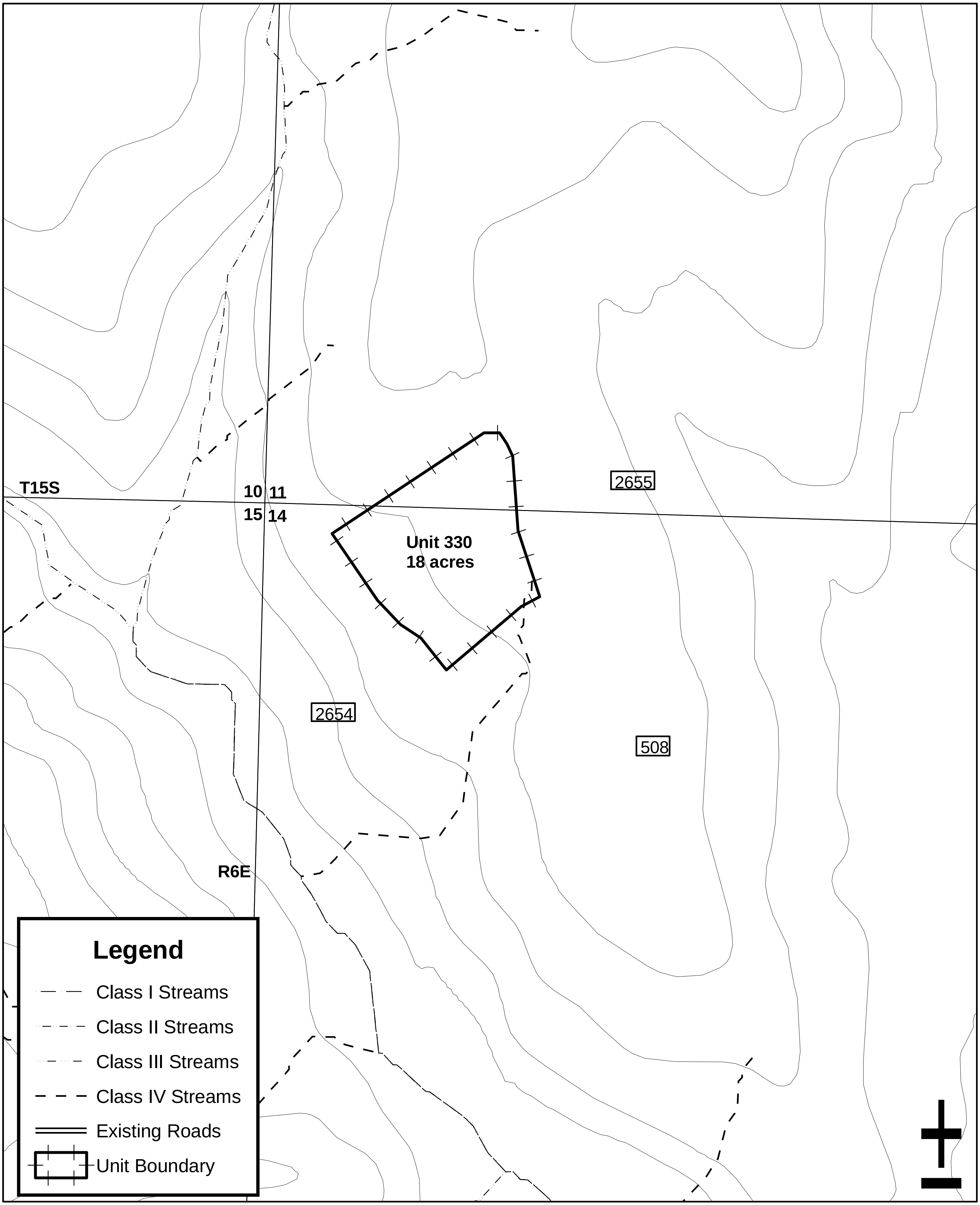


Figure 16. Approximate Unit Map. No Temp Roads - Unit 330 **1 inch equals 660 feet**

Ball Park Thin Unit #360, #370, and #390

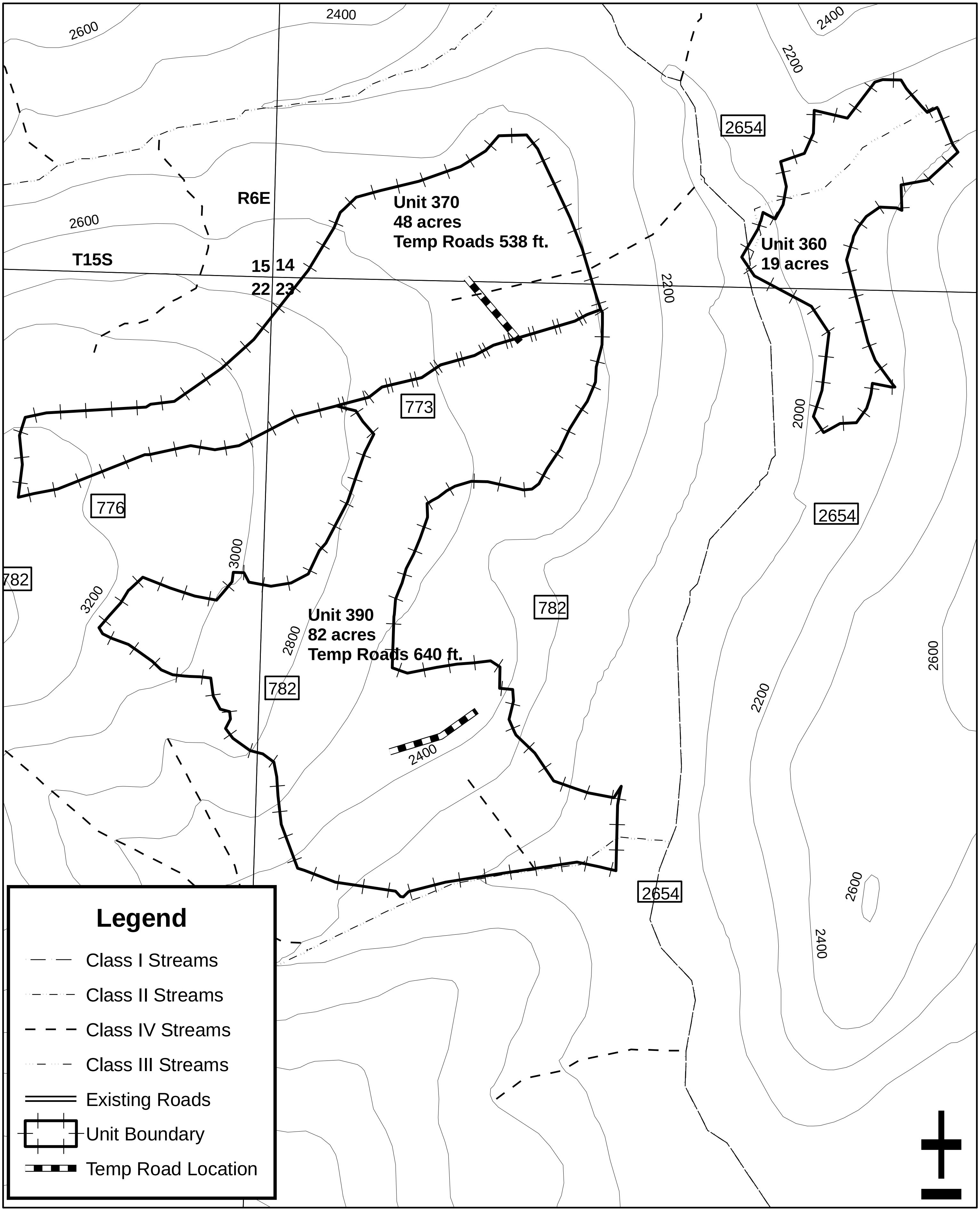


Figure 17. Approximate Unit and Temporary Road Map - Unit 360, 370, and 390 **1 inch equals 660 feet**

Mitigation and Design Measures Common to All Action Alternatives

Council of Environment Quality (CEQ) Regulations (§ 1508.20) defines Mitigation as:
Avoiding the impact altogether by not taking a certain action or certain parts of an action.
Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
Rectifying the impacts by repairing, rehabilitating, or restoring the affected environment.
Reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action.
Compensating for the impact by replacing or providing substitute resources or environments.

Design measures are also specifically described in this section are the controlling guidelines for the project as adopted by the responsible official in the Decision Notice. Mitigation measures and design measures would be implemented through project design and layout, contract specifications, contract administration, and following monitoring activities performed by Forest Service officers.

Silviculture

1. Plant as necessary to augment natural regeneration within gaps to ensure regional stocking levels are met. Plant with species that are not susceptible to the disease, when the gap is the result of root rot. Under-represented species should be planted to help increase diversity.

Soil, Watershed, and Fisheries Protection:

In addition to the following soil, water, and fisheries protection measures, all project design criteria documented in the Project Consistency Worksheet for the Not Likely to Adversely Affect Programmatic Consultation will be implemented. In the event of discrepancy between these items, the terms of the consultation document which is located in Appendix B of this document will apply.

1. Any project activity such as culvert replacement that must occur within fish-bearing and other perennial streams would comply with Oregon Department of Fish and Wildlife (ODFW) seasonal restrictions on in-stream work activities (July 1st – August 15th). Best Management Practices (BMP's), including placement of sediment barriers, provision of flow bypass, and other applicable measures, would be included in project design as necessary to control off-site movement of sediment.

2. Native surfaced roads would be restricted from hauling during the winter rainy season between October 16 and May 15. The objectives are to maintain water quality and fish habitat.

3. Construction or maintenance of roads would not be done when soils are saturated or run-off occurs, to minimize erosion and sedimentation. A stable fill would be constructed across all streams when crossed by new temporary roads.

4. All haul roads would be maintained in stable condition. Winter hauling may be allowable when the road surface is either covered with a relatively continuous snow pack or frozen, when run-off from the road is unlikely. Watering the road surface would be used if roads becomes excessively dusty during the summer.
5. Ground-based equipment used for yarding, processing, fuel treatment, or other project activities would operate only when soils are relatively dry following the rainy season in the spring through the summer, or during the winter months when there is a continuous snow pack of at least eighteen inches deep or when soils are frozen to a depth of six inches or greater. Operations would be suspended before rainfall or precipitation results in off site movement of muddy water into drainage courses.
6. Designated skid trails would be required in all ground-based yarding units except over snow yarding. Skid trails would be located outside drainages, seeps, springs and/or concave landforms, which could accumulate and transport overland flow and sediment. Existing skid trails that are outside drainages, seeps and springs that meet the needs of the yarding system should be used wherever possible. During over snow yarding, designation of skid trails is not required. This will disperse routes within ground-based units. A fisheries biologist, hydrologist and the timber sale administrator will discuss over snow yarding prior to implementation.
7. Sedimentation and water quality are criteria in determining if ground based equipment can be operated on short slopes >30%. Soil displacement, a key factor in productivity also has an increased probability on slopes >30% and should be identified as a factor to evaluate if ground-based logging equipment is allowed on steeper slopes. Ground-based equipment would be limited to slopes less than 30 percent for harvester/forwarder and conventional ground skidding operations. Short, isolated pitches up to 40 percent on otherwise suitable slopes may be approved after consultation with soil/watershed specialist determines that sediment transport to streams would not occur as a result. Adverse skidding conditions would be avoided through skid trail layout and use of alternative yarding systems.
8. Ground-based equipment used for yarding, processing, fuel treatment, or other project activities would not be permitted within 120 feet of the stream channel of Class 1, 2, and 3 (fish bearing and perennial non fish bearing streams) streams. Ground-based equipment would not be permitted within 50 feet of the stream channel in Class IV (seasonal, non-fish bearing) streams. In the remainder of the riparian reserve, ground-based equipment is permitted, but would be restricted to existing skid trails from previous entries. Alternative low disturbance ground-based equipment such as shovel yarding is also permitted in the remainder of the riparian reserve.
9. Regardless of unit harvest prescription, portions of harvest units that lie within Riparian Reserves would be managed to meet riparian objectives. Prescriptions elements designed to accomplish this are detailed on page 63.
10. Full suspension would be required when yarding over perennial stream channels. Where full suspension is not obtainable over intermittent streams, partial suspension would be required and

yarding would be limited to when the stream is dry. Bump logs to protect the stream channel would be utilized as appropriate

11. Where cable yarding requires corridors through a riparian reserve, corridors would be laid out to result in the least number of trees cut. Trees located within no-harvest buffers that must be cut to facilitate yarding corridors would be felled into the channel and left on site.
12. All skid trails and landings would be water-barred to provide adequate drainage. Water bars location should occur where local terrain facilitates effective drainage of the skid trail or landing. In general, water bars should be constructed every 100 feet on slopes less than 15 percent, and every 50 feet on slopes greater than 15 percent. Water bars should be keyed-in to the cut bank and have a clear outlet on the down hill side. Where available, slash should be placed on skid trails and landings.
13. Skid trails in thinning harvest units with ground-based yarding would be scarified to a depth of 3-6 inches.
14. Skid trails in the gaps and all landings would be sub-soiled to a depth of 18-22 inches.
15. Large areas of exposed soil, such as landings, skid trails, decommissioned roads, and cut and fill slopes associated with road construction or maintenance would be seeded with non-invasive cereal grains such as winter wheat, and native perennial species.
16. Temporary roads would be decommissioned after completion of activities. Decommissioning of roads may include: berming the entrance, removal of culverts, out-sloping the road surface, pulling back displaced material onto the road way, installation of water bars, removal of placed rock, and re-vegetation of the road prism.
17. In units containing stream channels, all existing large down wood would be retained within Riparian Reserves to maintain aquatic objectives.
18. Water sources used by project operations would be reconstructed or maintained as necessary to protect stream bank stability, riparian vegetation, and water quality.
19. Timber harvest and fuels treatments not associated with commercial harvest in Riparian Reserves would adhere to riparian reserve management measures listed below in Table 11.

Table 11. Riparian Reserve Management Measures (*: NH = No Harvest)

	Timber Harvest – Thinning and Group Selection (Includes activity fuel treatment)	**Prescribed Fire Treatment (No timber harvest treatment)**
Stands Adjacent to Listed Fish Habitat (Units: 360, 390)	Class 1 and 2.-. 100' NH and retain 50% Canopy Closure from 100' – 180 Class 3 - 60' NH and retain 50% Canopy Closure from 60' - 180' Class 4 - 60' NH Wetlands - 60' NH	Class 1 and 2 – 180' No Treatment Class 3 - 60' No Treatment Class 4 - 60' No Treatment Wetlands - 60' No Treatment
<u>Stands Within 1 Mile of Listed Fish Habitat</u> (Units: 290, 330, 370, 1001, 2001)	Class 1 and 2 - 60' NH and retain 50% Canopy Closure from 60' - 180' Class 3 - 60' NH and retain 50% Canopy Closure from 60' - 180' Class 4 - 60' NH Wetlands - 60' NH	Class 1 and 2 – 180' No Treatment Class 3 - 60' No Treatment Class 4 - 60' No Treatment Wetlands - 60' No Treatment
<u>Stands Greater Than 1 Mile from Listed Fish Habitat</u> (Units:10, 20, 30, 40, 50, 60, 70, 80, 110, 120, 130, 140, 150, 160, 170, 190, 200, 210, 220, 230, 240, 270, 280, 310, 400,.1000, 1002, 1003, 2002	Class 1 - 60' NH and retain 50% Canopy Closure from 60' - 180' Class 2 - 60' NH and retain 50% Canopy Closure from 60' - 180' Class 3 - 60' NH and retain 50% Canopy Closure from 60' - 180' Class 4 - 30' NH Wetlands - 60' NH	Class 1 – 60' No Treatment Class 2 – 60' No Treatment Class 3 - 60' No Treatment Class 4 - 60' No Treatment Wetlands - 60' No Treatment

The preceding list describes the Soil, water, and Fisheries mitigation measures that would be applied in the implementation of the proposed action Alternative B, or with the selection of Alternative C.

These measures, or equivalent effective measures, would be incorporated into individual unit prescriptions by resource specialists as needed to mitigate potential undesirable effects.

Recreation:

1. Post an advance notice of operations at the following locations:
   - Deer Creek bridge crossing of Forest Road 2654 at the entrance to the project area.
   - Junction of McKenzie River Trail and Forest Road 2654 (on the trail from both directions)
   - Deer Creek Hot Springs parking area
2. Reduce conflict by preventing log trucks to check binders at the Deer Creek Hot Springs parking area or other commonly used areas in the vicinity of the McKenzie River Trail crossing of Forest Road 2654.
3. Require slow speed (10 mph) for log trucks on the approach to Highway 126 in the vicinity of the hot springs and McKenzie River Trail crossing.

Wildlife:

1. Snags greater than 14” dbh would be retained when not a safety concern to support the prey base of northern spotted owl as well as primary and secondary cavity nesters and bats.
2. To secure a visual screen for Roosevelt elk, black-tailed deer, and other wildlife, a 50-foot no-harvest buffer would be left within harvest units 270 and 290 along Forest Service roads 2655-509 and 2655.
3. To reduce potential disturbance to any northern spotted owls or sensitive harlequin ducks in the area, seasonal restrictions for logging, burning and blasting would be imposed on disturbance activities in Table 12. Cutting of identified danger trees which are used for nesting habitat along the haul route will also occur outside the critical cavity nester breeding period from April 1-June 30. If possible, hazard tree cutting should be scheduled to occur after July 30 to consider late re-nesting birds. With the exception of the harlequin duck and cavity nester seasonal restriction, these may be lifted if surveys are conducted and non-nesting is verified for the year of operation.
4. Hazard trees that are felled within units would be left on site for large woody material and could be counted as decay class I and II.
5. A seasonal operating restriction is required for the Cascade Elk Rifle season, which is typically the third week of October. All public vehicle traffic would be restricted on closed roads beginning the Friday before this week through the end of the following Friday.
6. Avoid habitat disturbance within 30 feet of perennially wet areas. This measure ensures protection for the Crater Lake Tightcoil which may be present in the project area and applies to heavy equipment as well as prescribed burning.

Table 12. Seasonal Restrictions to Protect Northern Spotted Owl, Harlequin Ducks, and Cavity Nesters.

Unit/Area	Seasonal restriction for logging equipment or other heavy equipment	Seasonal restriction burning	Seasonal restriction on blasting
130 lower 150 feet near Hardy Creek	Yes, April 1-July 30 bottom 150 feet near Hardy Creek	Yes, April 1-July 30 bottom 150 feet near Hardy Creek	NA
280	No	Yes, March 1-July 15	NA
360 west of FS Road 2654	Yes, March 30-July 15	Yes, March 1-July 15	NA
370 east of FS Road 2654-773 and below 2654	Yes, March 1-July 15	Yes, March 1-July 15	NA
390 northeast of FS Road 2654 in the north part of the unit at the junction of the 2654-773	Yes, March 1-July 15	Yes, March 1-July 15	NA
Latiwi Rockpit	Yes, March 1-July 15	NA	Yes March 1-July 15
Dogwood Rockpit	No	NA	Yes, March 1-July 15
Boulder Rockpit	No	NA	Yes, March 1-July 15
Boulder Phase II Rockpit	No	NA	Yes, March 1-July 15
Haul Route Hazard Tree Falling	Yes, April 1-June 30	NA	NA

Sensitive Botanical Species:

1. A no-disturbance buffer would be placed around known occurrences of sensitive plant species. Sizes of buffers are listed in the Botanical BE in Appendix C. Broadcast burning would not be implemented within the no-disturbance buffer. Trees would be felled away from the no-disturbance buffer.

Special Habitat Areas:

1. A no-harvest buffer would be placed around special habitats listed in Table 29. Sizes of buffers are listed Appendix C. Trees would be felled away from the no-disturbance buffer.

Heritage Resources:

1. A 150 foot buffer and directional falling of trees away from the buffer will adequately protect site 06180400586 (TSO and Layout crew need to work with the Archaeologist to insure proper buffer width).

2. The District archaeologist will conduct post-harvest monitoring to document the condition of the above listed cultural site.

Other Design Measures

Wildlife:

1. Minimize damage to existing adjacent trees and vegetation when falling and yarding hazard trees along the haul-route, especially the large diameter trees and snags retained.
2. If Threatened, Endangered, or Sensitive (TES) wildlife species are found in future field work or during activities associated with this project, and potential for adverse effects exists, project modifications would be pursued and would be implemented. All contracts will include provisions to provide required protection measures in the event of TES species discovery.
3. The wildlife biologist shall be notified of any changes made to this project that would alter the need for seasonal restrictions, resulting in either waiving or applying additional restrictions. Examples include changes in locations where blasting is needed for rockpit development.
4. Implement planned road decommissioning as soon as possible after forest products removal operations are completed to benefit wildlife species needing seclusion.
5. Additional snag creation up to the recommended level of 3 snags over 14” dbh/acre may occur to provide habitat for cavity nesters as well as Pacific Fringe-tailed Bats. Snags created as a result of prescribed underburning or natural mortality would count towards this recommended level.
6. Large down woody material: A level of 240 lineal feet per acre of decay class I and II material greater than 18” diameter would be recommended to be retained within all harvest units. Full tree length down wood material is preferable to maximize wildlife habitat value; lengths less than 20 feet would not count towards the recommended total. Where the preferred size of material is not available, 240 lineal feet per acre of the largest diameter leave trees would recommended to be retained. Some of this material could be created over or directly adjacent to streams if possible. If post-harvest monitoring does not show large down woody material to be present at the recommended levels, falling may take place to create up to one half the amount. The assumption of additional large down wood be created by blow down within several years of the logging activity. The intent of this recommendation is to maintain currently existing levels, as well as the short-term future input that would be expected within these approximate 40 year old stands.

Invasive Plants Control:

1. All off-road equipment would be cleaned to remove all dirt and debris prior to entering National Forest System lands and when moving from infested to non-infested areas within the project area.
2. If area has invasive plants, equipment should work in non-infested areas first and then move to infested area (USFS would provide map).
3. Pre and post harvest survey and control of Invasive Plants would be applied to all harvest units and associated roads in the planning area.
4. Clean fill (soil or rock free of slash and debris) should be used for construction of temporary roads. Sources of rock and fill material needs to be free of Invasive Plants. Rock quarries that may be used would be surveyed for Invasive Plants prior to use. If Invasive Plants are found, they would be treated as necessary prior to use.
5. Disturbed areas (culverts, road shoulders, closed/obliterated roads, landings, skid trails) would be re-vegetated with weed-free native seed to compete with noxious weed seed. Weed-free mulch would be used if necessary.
6. Roads to be bermed or decommissioned would be treated for noxious and non-native weeds prior to blocking to harvest activities. All roads with disturbed soil would be planted with native plant material to prevent invasion by non-native species.
7. Bermed and decommissioned roads would be monitored for Invasive Plants for three years after the road treatment is completed. Identified weed populations would be treated.

Fuels Treatment:

1. In Riparian Reserves prescribed fire may be allowed to back through the buffer in order to reduce the amount of fireline constructed along the unit and riparian reserve boundaries.

Hydropower:

1. Prior to each period of operations, Eugene Water & Electric Board (EWEB) will be consulted to insure coordination between implementation of project activities and EWEB operations.

Heritage Resources:

1. All NRHP eligible sites and potentially eligible sites must be avoided during all project activities.
2. Changes to the current unit configurations and/or the addition of any new units, will require consultation with the District Archaeologist in order to protect known and unknown heritage resources.
3. Project activities planned outside of the area defined in the heritage resource inventory schema

must be coordinated with the district archaeologist prior to initiation. This includes the establishment of harvest landings, helicopter landings, guy-line equipment anchors, slash burning, removal of roadside danger trees, and ripping of temporary spur roads.

4. Although no other surface or subsurface evidence of cultural resources was found in the proposed project, there remains the possibility that buried prehistoric or historic cultural resources are present and could be uncovered during project activities. If cultural resources are encountered during the course of this project, earth-disturbing activities in the vicinity of the find must be suspended, in accordance with federal regulations, and the zone archaeologist notified to evaluate the discovery and recommend subsequent course of action.

Silviculture Prescriptions:

Table 13. Stand Treatment Prescriptions.

Stand Treatment (Reserve portions of units are not included in acreage)	% Maximum SDI*+	Post-Harvest % Canopy Closure+	Alt. A Acres	Alt. B Acres	Alt. C Acres
Canopy Thinning	19-35%	40-50%	----	664	----
Canopy Thinning	16-35%	33-50%	----	----	642
Riparian Thinning	26-36%	50-51%	----	122	122
Group Select	----	----	----	129	151
Natural Fuels Underburning++	----	----	----	49	49
Total Acreage	----	----	----	**964**	**964**

*SDI: Stand Density Index +Calculated on trees >= 7" dbh

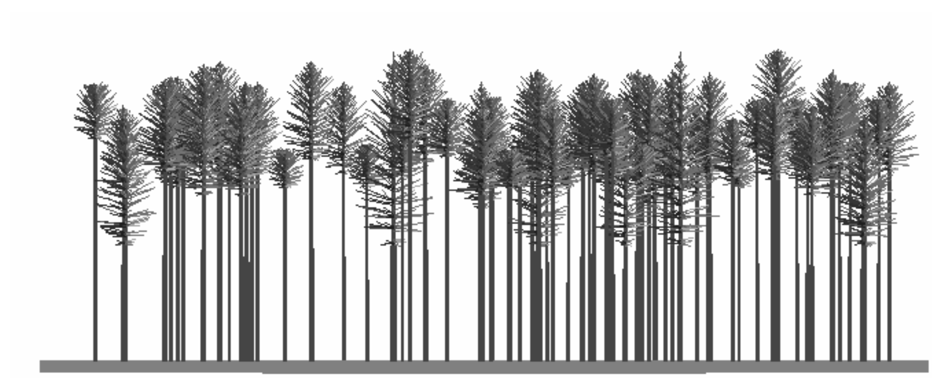
++ No significant change in SDI or canopy closure due to removal of ladder fuels and brush <7" dbh

Current Stand Conditions

Previously-managed Plantations

These stands range between 40-80 years old, and are the result of previous clear-cut harvesting. Stands in the 35-45 year age class are the most common age class in the project area. They are

Previously-Managed Plantations



predominantly comprised of Douglas-fir trees at moderate to high density stocking levels. Root rot exists in scattered areas and at low intensities. Units with a unit number less than 80 are previously managed plantations.

Silviculture Descriptions

Thinning

Intermediate cuttings of stands used for the reduction of stand density or management of species composition are called thinning. The main objective is increasing the overall growth potential of the residual trees, while removing trees that would ultimately die from suppression. Thinning can be applied to stands that exhibit a wide range of densities. A very light or salvage thinning confines removals to overtopped or suppressed trees where the canopy remains unbroken or only slightly broken. In contrast, a heavier thinning removes additional and higher crown classes opening the canopy to accelerate growth and crown expansion of the remaining trees. The remaining trees also develop into a healthier and more stable stand over time

In 2007 Davis et al. published an article that was based on an ongoing study called the “Young Stand Thinning and Diversity Study” with four study blocks located on the Willamette National Forest, two of which are on the McKenzie River District. The study results indicate that thinning “promotes growth of remaining overstory trees” and supports the establishment of “a prominent understory layer, thereby adding complexity to these young stands and perhaps accelerate the development of late-successional habitat”. In addition the study shows that thinning enhances the “development of understory shrubs and herbs associated with wildlife habitat.”

The Davis et al study shows that overstory cover closed in significantly in all thinning treatments within five years. The heaviest thin exhibited the greatest benefit in overstory treatment; while light thin was the least successful resulting in overstory conditions similar to untreated areas. The study recommends heavy thinning to “ensure canopy opening is maintained for several years” and leaving species other than Douglas-fir to prevent “initial simplification of canopy structure.” Heavy thinning was identified as effective in preventing the “homogeneous dominance of a few understory species” because the treatments ensured an uneven distribution of light. Diameter growth increased the most with heavy thins because it reduced densities and elevated resources available to residual trees.

Group Select

This prescription would provide for gaps in the stands to increase diversity and forage. . Alternative B has 129 acres of Group Selects identified in Table 6. Alternative C has 151 acres of Group Selects identified in Table 8. Group selects would be placed in units 10, 20, 30, 40, 60, 70, 80, 110, 120, 150, 170, 220, 240, 270, 290, 310, 370, 390, and 400 in both alternatives, in addition alternative C will also include unit 210. Group selects would be small holes approximately one acre in size in alternative B and one to three acres in alternative C. Group selects would be randomly placed, unless a root rot pocket is identified. See description of group select on page 58 for more information. Within the stand, another prescription would be applied to the area outside the group select. Large downed wood on the forest floor would be maintained or increased. Snags would be maintained on site, if not a hazard to logging operations.

Silviculture Prescriptions

Silvicultural treatments prescribed for the selected units include canopy thinning, riparian thinning, group selects, and fire hazard reduction. This combination of treatments are prescribed by the IDT in order to meet the various resources objectives derived from Forest Plan and project-level management direction, as well as the site specific conditions of the project area.

Stand Density Index. The stand treatments developed for the Ball Park Thin project units are based on the Stand Density Index (SDI), which is a relative measure of the stand's density with a maximum SDI that varies for each tree species. SDI is based on a percentage of $SDI^{max,}$ which is the maximum stem density a stand can support. At approximately 50% maximum SDI, maximum stand production occurs and individual tree vigor would begin to decline (Long, 1985). Thus, lower levels of SDI should be maintained in order to meet stand objectives, like growth for sustainable timber and mean tree growth for various wildlife habitat objectives.

Treatments would maintain or improve overall stand growth and vigor by reducing competition for limiting resources, like light, water, and soil nutrients. Thinning may increase individual tree stability making them more resistant to wind-throw as they mature. Trees may also be more resistant to insect infestations and disease. Understory shrubs and other vegetation would become established, or expand beyond areas where they currently exist into the openings created. Some natural regeneration of trees may also occur. Residual trees would respond over time with increased diameter growth and crown expansion. Consequently, another commercial thinning would likely be necessary in approximately 15 to 20 years when the maximum SDI levels again exceed 50%.

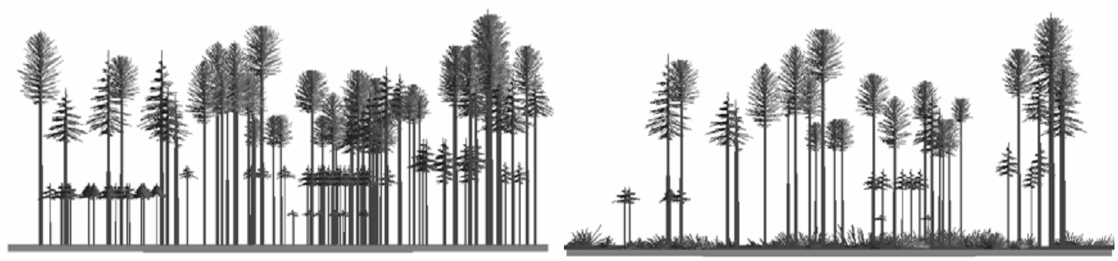
Activites associated with all Thinnings

Trees removed would primarily be the smaller diameter Douglas-fir trees in the stands. The goal is to increase growth and vigor of remaining trees, with emphasis placed on maintaining non-Douglas-fir species. This prescription would maintain or increase vegetative diversity and resistance to future insect infestations and disease. Thinning the younger stands would also increase individual tree stability making them more resistant to wind-throw as they mature. Decreasing the tree density would also reduce fire susceptibility. Large wood on the forest floor would be maintained or increased. Snags would be maintained on site if not a hazard to logging operations.

Canopy thinning

The canopy thinning prescription will enhance the stands by increasing health and vigor of the stands while also increasing lag time between re-entries. Alternative B has 664 acres of Canopy Thinning identified in Table 6 with thinning to be maintained at 19-35% SDI and 40-50% canopy closure. Alternative C has 642 acres of Canopy Thinning identified in Table 8 with thinning to be maintained at 16-35% SDI and 33-50% canopy closure.

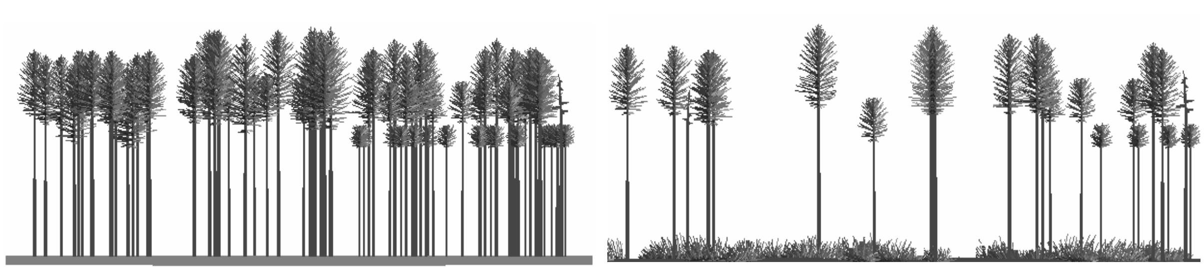
Canopy thin before treatment **Canopy thin after treatment**



Group Select

This prescription would provide for gaps in the stands to increase diversity and forage. Alternative B has 129 acres of Group Selects identified in Table 6. Alternative C has 151 acres of Group Selects identified in Table 8. Group selects would be placed in units 10, 20, 30, 40, 60, 70, 80, 110, 120, 150, 170, 220, 240, 270, 290, 310, 370, 390, and 400 in both alternatives, in addition alternative C will also include unit 210. Group selects would be small holes approximately one to three acres in size depending on the alternative. Group selects would be randomly placed, unless a root rot pocket is identified. See description of group select on page 58 for more information. Within the stand, another prescription (i.e. wildlife thin) would be applied to the area outside the group select. Large downed wood on the forest floor would be maintained or increased. Snags would be maintained on site, if not a hazard to logging operations.

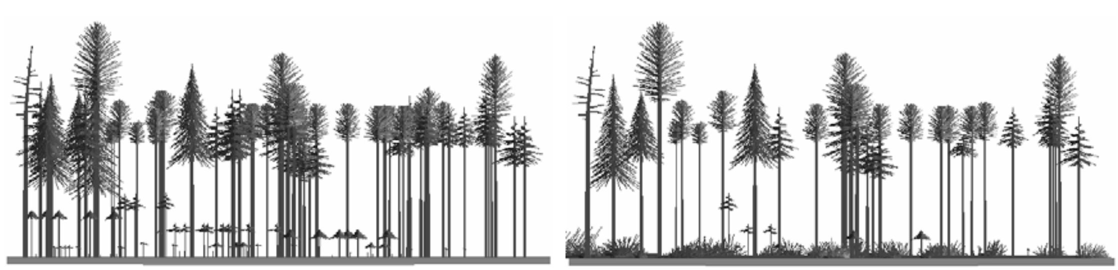
Stand before group selection **Stand after group selection**



Riparian Thinning

The riparian thinning prescription is proposed in riparian areas to maintain an average of 50% canopy cover. Alternative B and C have 122 acres of Riparian Thinning identified in Table 6 and 8. The

Riparian Thin before treatment **Riparian Thin after treatment**



stands would have a post-treatment SDI of 31-52% of SDI^{max}. The creation of large woody debris for in-stream process would be accelerated by riparian thinning, which provides more growing space for the residual stand creation. Hardwoods would also be left to add diversity within the riparian areas.

Comparison of Alternatives

This section provides a summary of actions and the connected actions described above for each alternative.

Table 14. Comparison of Alternatives by Activity.

Management Activity	Units of Measure	Alt. A No Action	Alt. B	Alt. C
Harvest Treatments				
Canopy thinning	Acres	0	664	642
Riparian Thinning	Acres	0	122	122
Group Select	Acres	0	129	151
Total Acres of Timber Harvest	Acres	0	915	915
Gross Estimates of Timber Output	(MBF/ CCF)	0/ 0	12,347/ 24,347	13,133/ 25,759
Treatments Not Associated with Harvest				
Natural Fuels Underburn	Acres	0	49	49
Logging System (total unit acres, including reserves)				
Ground-based	Acres	0	606	606
Skyline	Acres	0	459	459
Other				
Temp Roads	Feet	0	13,694	13,694
Present Net Value	Dollars	0	129,286	184,232

Comparison of Alternatives by Significant Issues

The following tables summarize the detailed analysis presented in Chapter 3 on the effects of the alternatives.

Table 15. Comparison of Alternatives by issue

Issue Measurement	Units of Measure	Alternative A (no action)	Alternative B	Alternative C
Issue #1:Water Quality/Aquatics Resources				
Indicator # 1: ***Increase in Stream Water Temperatures****	**Degrees Celsius**	0.8° to 2.3°	0.8° to 2.3°	0.8° to 2.3°
Indicator # 2: ***Changes in risk of altered peak flows***	**Aggregate Recovery Percentage (ARP)**	93.4%	92.8%	92.8%
Indicator #3: ***Sediment Yield After Project (Road Origin Sediment)***	**Sediment Cubic yards**	183	159	159
Indicator #4: ***The amount of riparian area receiving thinning treatment.***	**Acres treated/** **Percentage of Riparian in the project area**	0/ 0%	122/ 2.1%	122/ 2.1%
Issue #2: Diverse Early Seral Habitat				
Indicator #1: ***Amount of diverse early seral habitat created***	**Acres and Canopy Retention**	0	1 acre gaps 129 acres; 664 acres thinned at 40% canopy retention	1-3 acre gaps 151 acres; 217 acres thinned at 30% canopy retention; 425 acres thinned at 40% canopy retention

Chapter 3. Environmental Consequences

This section summarizes the physical, biological, social and economic environments of the affected project area. It has the potential changes to those environments due to implementation of the alternatives. This section also presents the scientific and analytical basis for comparison of alternatives presented in Chapter 2.

The cumulative effects discussed in this section include analysis that are primarily based on the aggregate effects of the past, present, and reasonably foreseeable future actions for the all of the actions listed in this document. Individual effects of past actions are not listed or analyzed, and are not necessary to describe the cumulative effects of this proposal or the alternatives. (CEQ Memorandum, Guidance on the Consideration of Past Actions in Cumulative Effects Analysis, June 24, 2005.)

Forest and Stand Structure

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Forest and Stand Structure includes the project activity units and the Deer Creek 6th Field sub-watershed, which is also the Ball Park Project area.

Affected Environment—Forest and Structure

The Ball Park Analysis Area (Figure 1) consists of 14,746 acres within the Deer Creek 6th field watershed located on the McKenzie River Ranger District. Timber harvesting has been a dominant disturbance on the forested landscape in the 20th century impacting approximately 7,254 acres (49%) of the Deer Creek watershed. Prescribed burning, wildfires, windthrow, and insect and disease have had much less effects during that time.

Based on acreage in the Willamette National Forest's VEGIS database, the following table provides a summary of timber harvest type by decade. Regeneration harvest activities include clearcutting and shelterwood. Treatments which were not identified as regeneration or commercial thinning were considered salvage.

Table 16. Historic Harvest in the Ball Park Thin Analysis Area.

Decade	Historic Management on Federal Land; Acres by Activity Category			
	Regeneration Harvest	*Commercial Thinning*	*Salvage*	*Pre-commercial Thinning*
Pre 1960	456	0	0	0
1960s	1,686	0	0	0
1970s	1,520	367	165	191
1980s	1,510	0	611	1,717
1990s	384	0	555	1,408
2000-Present	0	0	0	553
Total	5,556	367	1,331	3,869

Approximately 5,556 acres of the Deer Creek Watershed (38%) was modified with regeneration-type timber harvest, which is now in plantations 70 years old or less. Many of the existing plantations in the analysis area are now becoming ready for intermediate thinning treatments. Over the next decade younger plantations will continue to become both old enough and large enough for commercial thinning.

The project area consists of a mosaic of managed and natural forests with various stand ages and structures. Stands identified for harvest are previously managed stands consisting of plantations from even aged harvest. For the most part, the stands are entering stem exclusion (self-thinning) with reduced growth and limited regeneration. Canopy gaps in the canopy created from self-thinning or disturbance from wind-throw and root rot are promoting regeneration of conifer species in some areas. Regeneration is primarily of shade tolerant species both in the gaps and incidental trees within the stands.

Natural disturbance from windthrow and disease has also created low amounts of snags and moderate amounts of large down wood of various decay classes. Stands being proposed for thinning in the Ball Park Project do not contain remnant Douglas-fir trees that have survived past fires and other natural disturbances. The two natural fuels underburn stands do contain large remnant trees. Plantations being proposed for thinning generally contain a sparse understory. True firs (Noble and Silver fir) and western hemlock are regenerating in the upper elevations with primarily western hemlock in the lower elevations where regeneration is occurring.

The stands contain from 107 to 430 overstory trees per acre with average diameters of 13 inches dbh with a site tree potential estimated at 180 feet. Canopy closures of trees seven inches or larger diameter breast height average 67% within the planning area. Stands have scattered root rot pockets of armillaria root disease (*Armillaria ostoyae*) and laminated root rot (*Phellinus weirii*), both of which are common on the McKenzie River Ranger District. The diseases are often associated with insects such as bark beetles.

The Ball Park planning area stand exams were conducted in 2007. The data indicates that tree growth and vigor have been in decline over the years, and would continue to decline with future increases in stand size and stand density. For stands in the planning area the Stand Density Index (SDI) is relative to Douglas-fir, the major species in the stands. Douglas-fir has a maximum SDI of 595 before it reaches full site occupancy (Reineke, L.H. 1933). An SDI of 60% of the maximum SDI is often considered the lower limit of self thinning. To maximize overall growth a SDI up to 35% the maximum SDI is desired. The stands proposed for harvest average 55% maximum SDI with a range of 34-110%.

Environmental Consequences—Forest and Structure

For the following analysis of environmental consequences, the current condition of forest stands, including measures of SDI and stand development, was modeled using the Forest Vegetation Simulator (FVS) (USDA FS 2006 PNW model with Western Cascade variant).

Alternative A (No Action) — Direct, Indirect, and Cumulative Effects

No stand treatments would occur with implementation of Alternative A. Stands growth rates would continue to decline at current rates, and natural processes that affect tree vigor and cause changes in stand structure over time would continue. Tree mortality occurring within known root rot pockets would continue unabated. Populations of Douglas-fir beetle would increase and decline in response to pockets of root rot mortality.

Many stands are overstocked; site resources are being fully utilized and inter-tree competition is intense. Effects of overstocking include decreased growth, increased rates of mortality and high risk of insect attack. High rates of mortality would increase fuel loading; this combined with understory ladder fuels puts these stands at high risk for a stand replacement wildfire. These conditions are not sustainable over time. Decline in underrepresented species, like Sugar Pine (*Pinus lambertiana)* and Western redcedar (*Thuja plicata*), would continue.

Seral stage diversity within the stands would remain low. In the absence of treatments species tolerant to regenerating and growing under thick canopies would dominate the site over time. High stocking density and canopy closure would continue to restrict regeneration of Douglas-fir and Sugar Pine. The species composition in many stands would slowly shift from being dominated by species less tolerant of shade to more tolerant species like western hemlock. Early quality seral habitat for wildlife species from butterflies to Roosevelt elk would continue to be scarce in the planning area. Quality early seral habitat for wildlife species from butterflies to elk would continue to decline affecting their population. There is no ongoing or reasonably foreseeable timber harvests planned on Forest Service lands in the Ball Park Project area.

Alternatives B and C — Direct and Indirect Effects

Actions associated with All Thinning

Trees removed would primarily be the smaller diameter trees in the stands. The objective is to increase growth and vigor of remaining trees. Emphasis is on maintaining non-Douglas-fir species. This prescription would maintain or increase vegetative diversity and resistance to future insect infestations and disease. Reduced stand densities and greater diameter growth of residual trees would increase their stability making them more resistant to windthrow as they mature (Tappeiner, et al. p.213). The residual trees should also be less susceptible to fire and root diseases such as armillaria spp. and associated insects.

Thinning creates openings in the canopy allowing for the release of some existing understory trees and shrubs. The residual canopy closures would also provide opportunity for the establishment new vegetation and shade intolerant tree seedlings (Tappeiner, et al. p.230-231). These openings would, increase structural diversity and the future creation of large snags and down wood in treated stands.

Existing species composition, which is dominated by Douglas-fir, would result in a remaining overstory that is primarily Douglas-fir and respond to the reduced density with increased crown growth. Eventually the understory vegetation would be suppressed. As canopy closure and stand density increase over the next 12 to 15 years, an opportunity for subsequent thinning would emerge. A future thinning would maintain growth of residual trees and the growth and development of the stand.

Canopy thinning

Canopy thinning maintains or increases overall stand growth and vigor by reducing competition for limiting resources such as light, water, and soil nutrients. Reduced stand densities and competition allows the residual trees to maintain a higher growth rate than would occur with no thinning.

All units for both alternatives have Canopy thinning prescriptions. Areas within stands that are outside of Riparian Reserves, group selects, or other non-treated areas (botanical area, heritage area, etc.) will have the Canopy thin prescriptions applied.

Stands would be thinned to maintain an average canopy closure percentage that would be determined by the selected alternative (see chapter 2 for description). Post-treatment Stand Density Intensity (SDI) of 16-35% the SDI^{max} would be maintained. Sugar Pine natural regeneration will be promoted by the removal of non-Sugar Pine competition within a radius of 50 foot around Sugar Pine trees 24 inches and greater.

Riparian Thinning

Riparian thinning maintains or increases overall stand growth and vigor by reducing competition for limiting resources such as light, water, and soil nutrients. Reduced stand densities and competition allows the residual trees to maintain a higher growth rate than would occur with no thinning. The Riparian Thinning Rx would occur in the riparian area of units: 10, 20, 30, 40, 60, 70, 80, 110, 120, 130, 150, 170, 220, 240, 280, 290, 310, 360, 390, and 400 in both alternatives.

The stands would be thinned to maintain a combined average of at least 50% canopy closure within the secondary shade zones and a post-treatment SDI of 26--36% the SDI^{max}. Thinning will not occur within the primary shade zone.

Group Selection

The objective of group selections is to develop gaps of early seral forest by creating openings with minimal canopy cover. Shade intolerant species that need full sunlight for successful establishment and growth would be able to regenerate in openings created by group selection. Because of the small size of the group selections, there would be an edge effect (shade from residual trees around the edge of the group). Height growth would be higher towards the center of the groups, away from the edge and any leave tree or snags left in the group.

Groups would be randomly placed throughout the units with a minimum separation of one chain (66 foot) between groups. Groups would consist of approximate one-acre gaps with undulating edges to avoid circles or square edges in the stands. In areas where an insect or disease problem exists, like root rot disease, the group would be strategically placed on the root rot pocket. A minimum 50' area surrounding root rot pockets would be cleared, resulting in the group select. Openings created by the removal of root rot pockets would maintain a one acre size limit in Alt B, and three acre maximum in Alt C. In areas with large root rot pockets multiple groups will be utilized while maintaining the one chain separation. Within the groups, all but the four largest green trees per acre are to be removed. Any existing snags that are not a hazard to the logging operation and downed trees are to be left on site. Trees adjacent to the group would serve as a seed source, in addition to those left within the groups. Natural regeneration is unpredictable based on timing of cone crops and occupation of the site by competing vegetation. To ensure reforestation treatment success, post harvest treatments may be utilized. Edge effect and retention of overstory trees could inhibit growth in some seedlings by reducing light and moisture availability.

Underburning

Low to moderate intensity underburn would occur in some units following thinning. Desired silviculture objectives are to reduce the slash generated from the harvest activities and enable more shade intolerant species to further growth and regeneration. Thinning and underburning reduces competition, opens the canopy allowing for more sun and less fuels on the ground to enhance the growth and regeneration of species such as Douglas-fir. Please see Fire/Fuels Chapter 3.

Alternatives B and C —Cumulative Effects

Cumulative effects analysis is focused on the USDA Forest Service (FS) land within 14,746 acre Deer Creek 6th field watershed, the Ballpark Analysis Area. The entire analysis area is FS property Past management activities, including logging and fire suppression, have molded the analysis area. As displayed in Table 16, in the last 50+ years approximately 7,254 acres have been managed with regeneration, commercial thinning, or salvage logging and an additional 3,869 acres have been pre-commercially thinned. The 7,254 acres represents 49% of the entire watershed.

Both action alternatives propose 49 acres of natural fuels underburning in stands greater than 120 years old. The natural fuels underburning will increase acres of managed stands by less than 1% of the watershed acreage. As stated above, there would be a temporary increase in tree growth in the residual trees within treated units, which would also lead to development of a more diverse understory. The opening of the canopy and holes created with the group selects would increase the amount of wildlife forage and early seral forest stands on the landscape in varying amounts. Timber sale activities would reduce the number of natural snags that currently exist within the harvest units, but they would be replaced to some extent by burning induced tree mortality. There are no other foreseeable future projects that would add to the cumulative effects of past timber harvest and the proposed stand treatments.

Soil Productivity and Slope Stability

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Soil Productivity and Slope Stability includes the project activity units in the Ball Park Thin Project area.

Affected Environment—Soil Productivity and Slope Stability

Geology

This project area is located in the Deer Creek drainage in the McKenzie River basin. Deer Creek straddles the boundary between the older Western Cascades sequences of volcanic and volcaniclastic rocks more common to the north and west, and the younger High Cascade volcanic rocks to the east. Considered part of the Western Cascade physiographic region, the Deer Creek study area is composed primarily of basaltic andesite and andesite flows and flow breccias, lahars, and volcanic conglomerates. These rocks range in age from about 17 million years ago to about 10 million years old. Over lying this strata on most ridges are 4 to about 10 million year old olivine basalt, basaltic andesite and dacite lava flows. Some ridge capping flows of this time period are lithologically similar to flow rocks of the oldest flows of the High Cascade volcanic sequence, and some are more like flows that have been mapped as part of the Sardine Formation in the Western Cascade Province.

The surface expression of these rock formations has been extensively modified by erosion, especially from the Pleistocene through the Holocene with glacial activity. Glacial forms are common in the study area, and ice cap glaciers probably covered the High Cascade platform to the east several times during the Pleistocene. Valley glaciers likely traveled both down and up Deer Creek as it acted both as a valley glacier and as an outlet for excess ice accumulation to the east from the High Cascade platform. Small cirque basins, hanging valleys, and assorted morainal deposits all reside on the landscape, but some have been extensively altered by stream erosion and slope instability.

Soils

Locally, some of the bedrock materials tend to weather to form deep colluvial and residual soils that can give rise to unstable terrain with both rotational and translational failures. This complex geologic history has produced a myriad of diverse landforms and soils. The area consists of geomorphically complex terrain with a distinctive and diverse topographic expression. Landforms range from highly glaciated upland benches and flats with extensive ground moraine like Conroy Creek, to steep rocky canyons and crags, to the large scale stabilized slump/earth flow complexes and associated glacial deposits of Carpenter Creek, to the flat stable river terraces and outwash plains along the main stem of the McKenzie River at the confluence with Deer Creek.

Soils developed from both the volcanic and glacial deposits, even on the steeper side slopes, are usually stable and productive. The various soils associated with the numerous land types are generally well drained where permeability is rapid in the surface soil and moderately rapid in the subsoil. Because of high infiltration rates, overland flow is generally uncommon except during periods of high rainfall and snow melt. In the proposed units, side slopes range from near zero to about 30% on the gentler slopes to 40 to 80% on the steeper terrain. Offsite erosion is generally not a concern because of the vegetative ground cover, the high infiltration rates, and the gentle to moderate side slopes for many units

For the most part, the soils of the planning area are in good condition. Previous harvest activities did not result in excessive erosion, loss of effective ground cover, or slope instability that could have affected the long-term viability of the soils to support productive healthy forests. However, prior harvest with ground based equipment has resulted in residual soil compaction in many units. The adverse effects and extent of the compaction are within the Willamette National Forest Plan Standards and Guidelines (1990). A more detailed discussion can be found in the Soils Specialist Report in Appendix E.

Environmental Consequences—Soil Productivity and Slope Stability

Alternative A (No Action) — Direct, Indirect, and Cumulative Effects

Under this alternative, the soil resource in the near term of a few years would remain relatively unchanged. Stands would continue to develop. Intermediate and suppressed trees would slowly be removed from the stand through mortality and decay. In areas of heavy stocking, stands would stagnate. Overstocked stands would rapidly see density increase, growth slow, and mortality rise. Fuel accumulations would continue to increase. With bio-turbation and freeze/thaw, compaction would slowly be reduced. Short-term impacts from harvest, such as soil disturbance, dust, and slash accumulation, would not occur. There are no ongoing or reasonably foreseeable projects within the analysis area for soils productivity and slope stability.

Alternatives B and C — Direct and Indirect Effects

A field review of the project area was completed in 2007 by a Forest Geologist to verify the present SRI land type boundaries, determine the location of unsuited and unmanageable land types, and to evaluate potential soil impacts from management (see Appendix E).

The activity most likely to result in adverse effects on soil is yarding of timber with ground-based systems. Both action alternatives propose ground-based yarding on approximately 606 acres. Soil compaction, displacement, and reduced infiltration can occur during timber harvest and road construction activities, which could adversely affect the re-establishment of vegetation. However, best management practices to manage these impacts within acceptable levels have been included in each of these action alternatives. In addition, sub-soiling is proposed in ground based units to further reduce compaction levels. Mechanized fuel treatments on many of these acres are also proposed. Past experience with these treatments that typically result in single pass operations that operate on top of slash and on existing skid roads as much as possible is that they do not add substantially to soil impacts. This is supported by a recent study of similar mechanized fuel treatments that involve ground based vehicle mounted mastication equipment (Moghaddas and Stephens. 2008). Through the use of suspension and duff retention objectives, short-term impacts of these alternatives would remain within Forest Plan standards and guidelines. Substantial erosion is not likely based on the infiltrative capacity of the coarse textured soils and the implementation of required erosion management BMPs discussed in Chapter 2. Long-term adverse effects from the loss of productivity or instability would either be within established limits or are not anticipated.

In 2001, McKenzie River District personnel monitored the impacts resulting from the use of ground- based yarding systems in two partial cutting units similar to those proposed in the action alternatives, and on similar landtypes in the Thin Within Timber Sale monitoring, Willamette National Forest (USDA Forest Service, 2001). In both monitoring units, soil impacts were within the acceptable limit of 20% total detrimental condition as required by the Forest Plan. In one of the units, approximately 15% of the area was impacted, and in the other unit, approximately 8 % of the area was impacted. Compaction and displacement on these monitoring units were maintained within acceptable levels by using designated skid trails, placing slash on skid trails to buffer impacts, and operating machines on continuous snow pack. It is reasonable to anticipate similar results for the proposed treatment units in the Ball Park Thin Project.

Alternatives B and C — Cumulative Effects

Many of the previously managed stands that were harvested several decades ago were harvested with ground-based systems. Transects through these units indicate that existing compaction from skid roads and landings is approximately 2 to 17%. Bare soil areas no longer exist, although some evidence of disturbance is still evident. The Forest standard for disturbance and compaction is 20% of the unit area, including all roads and landings. Without the implementation of best management practices (BMPs), the potential exists for compaction from this entry to exceed those standards. To minimize the potential for cumulative adverse compaction, all skid road locations would be approved prior to use, and existing skid roads would be utilized as much as possible. After harvest, secondary skid roads would be scarified in order to avoid excessive root pruning. Primary skid roads and landings are proposed for sub-soiling to reduce compaction levels. Based on professional experience, it is estimated that upon completion of activities, compaction would remain at or below the existing levels. These results fall within the range permitted by Willamette National Forest standards and guidelines. There are no reasonably foreseeable future actions that would add additional soil impacts to the cumulative effects of past actions along with this proposed action.

Water Quality/Aquatic Resources (Significant Issue #1)

For each of the analysis items in this section, a discussion of the affected environment precedes the analysis of environmental consequences. The affected environment discussion provides a description of the existing condition, including important physical and biological components of the 6th field watershed in which the project occurs. It also identifies relevant information from applicable watershed analyses that was used to design and assess the project. The environmental consequences discussion describes the effects of the project on the existing condition.

Scale of Analysis

Unless otherwise noted, the geographic scale used to assess direct, indirect and cumulative effects for Water Quality/Aquatic resources includes the project activity units and the Deer Creek 6th Field sub-watershed, which is also the Ball Park Thin Project area.

Affected Environment—Stream Shade and Stream Temperature

Road construction and timber harvest began in the project area in the 1950s, peaking on National Forest System lands in the 1970s and 1980s. Much of this activity that occurred prior to implementation of the Willamette Forest Plan in July 1990, resulted in removal of riparian vegetation that provided shade for streams in the project area. The removal of shade likely resulted in elevated stream temperatures that appear to be represented in current temperature data.

Reaches of Deer Creek and it's tributaries, Budworm and County Creeks, have been identified as having impaired water quality within the Ball Park Thin Project area for temperatures in excess of water quality standards. (Oregon DEQ. 2004/2006. 303(d) List of Impaired Waters). Table 17 displays the listing information and applicable standards for each reach.

Table 17. Oregon 303(d) Listed Stream Reaches.

Stream Name	River Miles	Season	Standard (Degrees Celsius)	Beneficial Use
Budworm Creek	0 to 3.1	Year Around	12	Bull Trout Spawning and Rearing
County Creek	0 to 2.4	Year Around	12	Bull Trout Spawning and Rearing
Deer Creek	0 to 8.3	Summer	17.8	Salmonid Rearing
Deer Creek	0 to 2.6	Sept 1 – June 15	13	Salmon and Steelhead Spawning
Deer Creek	0 to 2.6	Year around	16	Core Cold Water Habitat

Actual fish distribution and habitat usage differ from the information presented above and are discussed in the Affected Environment Discussion for Aquatic Resources later in this chapter.

From June through September of 2004 through 2007, stream temperature data were collected at two locations in the project area to support project analysis. A summary of this data is provided below in Table 18 along with data from French Pete Creek, which is an unmanaged wilderness stream of similar size and basin characteristics to Deer Creek.

The existing conditions for stream temperatures in the Ball Park Thin project area appear to be slightly elevated above control conditions. Deer Creek above the EWEB power line is on average approximately 0.8 degrees C warmer than geologically and hydrologically similar control streams that have been predominantly un-impacted by land management activities. This is not a definitive difference based on only a few years of data, but one could speculate that the difference is attributable to past harvest that has reduced shade in these drainages.

Table 18. Average Stream Temperatures.

Stream Name	Average 7-day average of Maximum Temp. ° Celsius 2004 Data	Average 7-day average of Maximum Temp. ° Celsius 2005 Data	Average 7-day average of Maximum Temp. ° Celsius 2006 Data	Average 7-day average of Maximum Temp. ° Celsius 2007 Data	Range of Values	Average Value	Change from Control
French PeteCreek (Control)	16.7° C	15.6° C	16.7° C	16.4° C	1.1° C	16.4°C	NA
Deer Creek Above EWEB Power Line	17.6° C	16.7° C	17.4° C	17.2° C	0.9° C	17.2°C	0.8°C
Deer Creek Near Mouth	NA	19.0° C	NA	18.4° C	0.6° C	18.7°C	2.3°C

Deer Creek at its mouth is warmer by approximately 1.5 degrees C than the site above the power line, and by approximately 2.3 degrees C above the control. This would appear to be due to EWEB’s power line maintenance requirements that keep vegetation well trimmed. However, there is known geothermal influence in the area with Deer Creek hot springs located along the McKenzie River just downstream from Deer Creek. The observed difference is in all likelihood, the result of a combination of power line maintenance and geothermal influence with the exact contribution of each source unknown.

The range of maximum temperatures from one water year to the next did not substantially differ, nor did the annual timing of the maximum temperature, which occurred between July 15 and August 15 in all instances. This suggests that management has impacted only the increased value for maximum temperature and has not affected inter-annual variability or annual timing of peak temperatures.

Environmental Consequences—Stream Shade and Stream Temperature

Alternative A (No Action) — Direct, Indirect, and Cumulative Effects

Activities that affect stream-shading vegetation would not occur, and direct, indirect, or cumulative effects of this alternative on stream temperature are not anticipated. Water temperatures in streams in the project area would continue to recover toward more natural levels, as riparian vegetation that was disturbed or removed by management activities prior to implementation of the LRMP re-grows and re-establishes streamside shade.

Alternatives B and C — Direct, Indirect, and Cumulative Effects

For all action alternatives, treatments within riparian areas have been designed to fully comply with “Northwest Forest Plan Temperature TMDL Implementation Strategies – Evaluation of the adequacy of the Northwest Forest Plan Riparian Reserves to achieve and maintain stream temperature water quality standards” (USDA Forest Service and USDI Bureau of Land Management. 2005). This document was prepared in collaboration with Oregon Department of Environmental Quality and United States Environmental Protection Agency to provide documentation of Northwest Forest Plan compliance with the Clean Water Act with regard to state water quality standards for stream temperatures. As such, it redeems several of the Forest Service responsibilities identified in "Memorandum of Understanding between USDA Forest Service and Oregon Department of Environmental Quality To Meet State and Federal Water Quality Rules and Regulations" (USDA Forest Service and Oregon DEQ, 2002). The Implementation Strategy provides current scientific guidance for management of riparian vegetation to provide effective stream shade, including appropriate methods of managing stands for riparian objectives other than shade, such as production of large wood for future recruitment.

Trees within the stands proposed for treatment are currently 60 - 100 feet tall, and slopes typically fall within a 10% to 70% range. All fish bearing and perennial streams (Class 1 -3) are provided with a minimum of 60- feet of primary shade buffer to retain effective shade for stands of this height and these slopes. Intermittent (Class 4) streams are dry during the portion of the year that elevated temperatures and therefore are not a problem. However, bank stability trees and 30 to 60 foot no harvest buffers would be retained for other resource objectives, and would provide substantial shade regardless. For all classes of stream, an average of at least 50% crown closure would be retained within the entire remainder of the riparian reserve, including that portion which may provide secondary shading benefits.

Based on implementation of the design criteria outlined in the preceding discussion and field observations during project reconnaissance, no measurable direct, indirect, or incremental cumulative increases of stream temperature are anticipated within the project area, as a result of these alternatives. Consequently, as in the No Action Alternative, water temperatures in Deer Creek and other streams in the project area would continue to recover toward more natural levels, as riparian vegetation re-grows and re-establishes streamside shade. Incremental increases or a decrease in the rate of recovery as a result of implementation of either action alternative is not anticipated.

Alternatives B and C—Conclusions

Based on the previous discussion and field observations, no measurable direct, indirect, or incremental cumulative increases of stream temperature are anticipated within the project area as a result of any of these alternatives. The magnitude of cumulative increases resulting from past management activities were disclosed in the earlier Affected Environment discussion and there are no reasonably foreseeable actions that would not comply with TMDL requirements for the McKenzie Basin.

Affected Environment—Stream Flows/Disturbance History

Traditionally, projects involving timber harvest on the Willamette National Forest are analyzed for their cumulative impact on the quantity and timing of peak flows and water yields using an accounting methodology known as Aggregate Recovery Percentage or ARP, as specified by the Forest Plan. The ARP model compares the amount of an analysis area within the transient snow zone that is recovered against a threshold value (Midpoint) that was calibrated for the area during development of the Forest Plan. The midpoint values were developed based on the soil, geology, vegetation, climate, and stream channel conditions of each sub-watershed, and are intended to represent a minimum safe level of vegetative recovery in the sub-watersheds to prevent significant alteration of peak flow regimes as a result of management activities. Recovery generally occurs when stand diameters average 8" dbh and crown closures exceed 70%. The transient snow zone is generally considered to include those areas of the forest between the elevations of 1,500 and 4,000 feet respectively. The analysis is based on data extracted from the Forest's VEGIS database, which includes information about all past harvest activities in the sub-watershed. Currently, ARP levels in the Deer Creek Sub-watershed stand at 93.4%, which is far above the Forest Plan Midpoint of 75%.

Environmental Consequences—Streams Flow/Disturbance History

Alternative A (No Action)—Direct, Indirect and Cumulative Effects

Alternative A, No Action, would result in no changes to existing peak flows, having no direct, indirect, or cumulative effects on streams flow in the project area.

Alternatives B and C—Direct and Indirect Effects and Cumulative Effects

Table 19 summarizes levels of recovery immediately after implementation of the project for each of the alternatives. The incremental change associated with each alternative is determined by comparing these values with current condition values that were presented in the affected environment discussion.

Table 19. Recovery Levels Immediately after Project Implementation (2010).

Sub-watershed	Alternative A (No Action)	Alternative B	Alternative C	Midpoint ARP
Deer Creek	93.4%	92.8%	92.8%	75%

Examination of this information indicates that ARP levels are maintained well above recommended values by all alternatives in the affected sub-watershed, even immediately after implementation when the potential for impacts to vegetative recovery would be greatest. Therefore, no altered peak stream flow regimes are anticipated from implementation of the proposed actions.

There are no reasonably foreseeable future actions within the project area that would result in effects that differ from those already disclosed for each of the alternatives.

Affected Environment—Sedimentation and Roads

The geologic terrain and soils of the Ball Park Thin project area are not inherently prone to extensive erosion unless disturbed as discussed in the Soils Specialist Report in Appendix E. However, beginning in the 1950s road construction and timber harvest began in the project area, peaking on National Forest system lands in the 1970s. As discussed in the Soils Report, past timber harvest methods were employed that managed for minimal soil; disturbance. Road construction on the gentler portions of the project area and on the terraces mentioned in the Soils Report resulted in displacement, but little off site transport of sediment to streams, except at crossings.

But roads on the deeply dissected slopes between terraces, especially those roads constructed during the earlier part of the time period, employed construction methods such as cut and fill that resulted in relatively unstable facilities. These roads continued to produce sediment during storm events as unstable portions of road fills failed and resulted in debris torrents. Since implementation of the Forest Plan in 1990, road maintenance activities have worked to eliminate many of these unstable fill situations. Many were repaired to the higher standards after their initial failure. Even so, roads continue to be the largest source of human caused sedimentation in the project area, especially at stream crossings where road sediment can enter streams and undersized culverts can fail during flood events. Based on observations of existing road conditions during field reconnaissance for the project, sediment outputs from roads were estimated using the roads module of the Watershed Erosion Prediction Project (WEPP) model. The current sediment yield from roads is estimated at 247 cubic yards per year for the project area. The McKenzie River Sub-Basin, including the Ball Park Thin Project Area, provides municipal water to the City of Eugene by way of the Eugene Water and Electric Board's intake at Hayden Bridge, approximately 60 miles downstream from the project area. Sedimentation and associated turbidity are the most likely consequences of the Ball Park Thin project that could adversely affect municipal water quality.

Environmental Consequences—Sedimentation and Roads

Alternative A (No Action)—Direct, Indirect and Cumulative Effects

Alternative A, continues the current management situation regarding roads maintenance in the project area. This alternative would not change the potential for sediment delivery to streams from roads in the project area.

Alternatives B and C—Direct and Indirect Effects

Road work associated with the Ball Park Thin Project includes replacement of a number of culverts that are currently in poor repair or inadequately sized to pass "Q100 flows", or a flood that has a 1% probability of occurring in any given year. Replacement will require in-stream work in these locations. Work will be done during non-flow periods for intermittent streams, and engineering practices such as sediment barriers and flow bypass will minimize impacts on perennial streams. Flows in perennial streams are all expected to be less than 1.0 cubic feet per second when work occurs, based on personal observation during project reconnaissance. It is not possible to do this work without some sediment delivery, and accurate estimates are not predictable. Depending on weather behavior and other variable factors, sediment yields should fall between 0.5 and 2.0 cubic yards per installation based on professional experience. The culverts currently represent an elevated risk of fill failure because the culverts to be replaced are in poor condition or are undersized for Q100 flows. Discussion with engineering personnel indicated that the average fill volume is 250 cubic yards. This material is at risk of entering the streams and potentially generating debris torrents if the existing culvert fails. Table 20 provides a summary of these replacements and the potential amount of fill material that would have a reduced risk of entering streams, as well as estimates of the amount of sediment produced from the culvert replacements. The maximum estimate of sediment yields from the culvert replacements would be 81 cubic yards for Alternatives B and C. In comparison, the estimated volume of fill stabilized for Alternatives B and C are 11,750 cubic yards

Table 20. Approximate Culvert Replacements in Perennial and Intermittent Streams by Alternative.

	Stream Type	Number of Culverts Installed/Replaced/Removed	Cubic Yards of Fill Stabilized	Sediment Yields from Culvert Replacements (Cubic Yards)
Alternative A (No Action)	Intermittent	0	0	0
	Perennial	0	0	0
	Total	**0**	**0**	**0**
Alternative B and C	Intermittent	34	8,500	34 - 68
	Perennial	13	3,250	6.5 - 13
	Total	**47**	**11,750**	**40.5 - 81**

All of temporary roads (approximately 3 miles) that would be used in the action alternatives are situated on stable terrain, and all are situated where the potential for extension of drainage networks is negligible. Consequently minimal amounts of sediment are expected to reach stream channels as a result of this activity.

All action alternatives would implement the road management activities listed in the description of each action alternative, as detailed in Chapter 2. The following table provides additional information about road maintenance:

Table 21. Road Maintenance Summary.

	Alternative A	Alternative B	Alternative C
Miles	0	43.9	43.9
New/Replacement Relief Culverts not in Perennial or Intermittent streams	0	57	57

As a minimum, these activities would include maintenance of proper drainage through maintaining existing structures, installing water bars, or restoring natural drainage features. Also included would be the installation of new-ditch relief culverts and replacement of existing ditch-relief culverts that are currently in poor condition. These actions would reduce the likelihood of sediment leaving the road with runoff by reducing the average distance between drainage structures and consequently, the amount of water that each structure needs to handle. Less water translates to less sediment-carrying capacity

Alternatives B and C—Cumulative Effects

As was disclosed in the discussion of the affected environment, an analysis of estimated sediment outputs from roads in the project area was completed using the roads module of the Watershed Erosion Prediction Project (WEPP) model. The same analysis was conducted for the project area road system for each of the alternatives, incorporating all project related road maintenance and temporary construction activities, as well as product haul routes. Results were calculated to estimate sediment production rates during the implementation of the project as well as conditions following completion of the project. The results are summarized in the following table.

Table 22. Estimates of Sediment Production Rates.

	Alternative A (No Action)	Alternative B and C
Road Sediment Yield During Implementation (CuYd/Yr)	183	190
Road Sediment Yield after Implementation (CuYd/Yr)	183	159

Rates of road related sediment yield remain constant under the Alternative A (No Action), reflecting no specific changes in ongoing road treatments or conditions. For each of the action alternatives, annual sediment yield increases during the life of the project as a result of project activities. This represents an incremental increased contribution of sediment that cumulatively adds to sediment already produced under the existing road system. However, each of the action alternatives also shows a net incremental decrease in annual sediment yield after completion of the project. This reflects the lasting results of improvements made to the existing road system as part of the project, and represents an incremental reduction in the cumulative amount of road generated sediment.

Affected Environment—Riparian Habitat Improvement

Road construction and timber harvest began in the project area in the 1950s, peaking on National Forest system lands in the 1970s. Much of this activity that occurred prior to implementation of the Willamette Forest Plan in 1990 resulted in removal of riparian vegetation that provided large wood and shade to streams in the project area. The effects of these actions on stream shade and stream temperatures were included in analysis discussion. From these discussions, it is clear that the removal of wood resulted in reduced availability of large wood for in-stream and riparian habitat. The purpose of this analysis is to disclose some the effects of this project as well as other recent projects which begin to address the need to restore the large wood component to riparian stands.

Past management activities include logging, road construction, maintenance, fire suppression, and utility right-of-way construction. In the past 50 years approximately 7,254 acres have been managed with regeneration, commercial thinning, or salvage logging. Pre-commercial thinning of 3,869 acres has occurred within previously managed stands in more recent history. The 7,254 acres represents 49% of the entire 6th field sub-watershed (or the Ball Park Project Area). Road density within the sub-watershed is 3.1 miles/square mile. Total system road length within the sub-watershed is 70.9 miles.

The watershed is located in the Western Cascades geology. The landforms in this area are a product of alpine glaciation and subsequent valley filling processes such as glacial outwash and moraine deposits. The on-going fluvial processes have provided a mechanism for large mass wasting and erosion events involving side slope and toe slope deposits. Significant tributaries to Deer Creek include (from lower elevations, upstream) Budworm Creek, Fritz Creek, County Creek, Carpenter Creek, Conroy Creek, Brush Creek and Cadenza Creek. Between its confluence with the McKenzie River and Deer Creek Falls (a distance of about 4.9 miles) the channel is characterized by a moderately low gradient averaging 2.8%. Mainstem Deer Creek gradient changes in its upper reaches, typical of a large tributary draining western Cascades geology. Above Deer Creek Falls to its headwaters (a distance of about 5.3 miles) the channel steepens, averaging over 6% gradient. Erosion processes in Deer Creek are an important source of substrate in the upper McKenzie sub-basin, playing a vital role in fisheries habitat development and maintenance.

Essential aquatic habitat events such as landslides, torrent events and mass wasting, are completely natural. Over a large scale and long term development, these events periodically provide transport to side slopes and side slope tributaries leading into the main stem Deer Creek.

Environmental Consequences—Riparian Habitat Improvement

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

Direct and Indirect Effects

Tree mortality would be expected to increase and contribute to accelerated recruitment from riparian stands into stream channels. The aquatic benefit of small trees is limited due to their small diameter, namely through the reduced ability to store sediments and contribute to habitat development. The longevity of recruited small diameter trees is short-lived, as small diameters will break down through abrasion and decomposition more rapidly compared to significantly sized trees (>24 inch diameter). As compared to action alternatives, the no action alternative will provide a greater volume of in-stream wood in the short-term, but the wood will be of limited value to aquatic habitat quality and its presence will be of short duration. A continued suppression of diameter development of even-aged riparian reserve trees may be expected to exceed 40 years and delay the availability of significantly sized wood to channels.

Development of future sources of in-stream wood would depend on natural thinning events (stem mortality and disturbance) and to achieve stand diversity. Pulses of woody material recruitment in response to fire disturbance have occurred on this landscape for thousands of years. The composition of woody material pulses originating from a plantation, compared to a structurally diverse stand, is expectedly less stable and shorter lived in the channel.

Cumulative Effects

Alternative A will provide an accelerated rate of in-stream recruitment from 60-100 feet of perennial channels compared to action alternatives. This recruitment will be provided mostly by stem mortality from competition, disease, wind and snow downed trees. The rate of wood recruitment from 0-60 or 0-100 feet (depending upon thinning prescription) from perennial channels is expected to be at rates similar to action alternatives. Riparian stand composition will be expected to retain their uniform character. With continuing fire suppression in managed forest landscapes, the opportunity for fire disturbance to provide a process restoring diversity is limited. Desired stand diversity within 6th field Riparian Reserves is expected to occur at a delayed rate. A shortage of significant sized trees of value in-stream will continue into the foreseeable future.

Alternatives B and C—Direct and Indirect Effects

In Alternatives B and C, 122 acres of Riparian Reserves is proposed for thinning. Table 23 summarizes the percentage of riparian reserve area in the sub-watershed affected by thinning harvest.

Table 23. Percent of Sub-watershed Prescribed for Riparian Reserve Thinning

6th Field Deer Creek Sub-watershed Acres	Deer Creek Sub-watershed Acres of Riparian Reserve	Alt. B and C Riparian Reserve Acres Thinned	Alt. B or C Percent of Sub-watershed Riparian Reserve Thinned
14,746	5,696	122	2.1%

A desired benefit of thinning in Riparian Reserves is the influence on stand structure and the development of large diameter trees. The even-age character of the previously managed stands is expected to respond favorably to thinning in terms of growth rate. Thinned riparian reserve stands are expected to provide a greater degree of diversity of size in the long-term as compared to no thinning of reserves in the no action alternative.

Plantation thinned in the project area Riparian Reserves are expected to accelerate stream adjacent trees toward diameters considered better suited to provide stable in-stream large woody material. Within 40 years, adjacent trees to the stream in this project, will begin to approach the size considered "significant" (greater than or equal to 24 inches in diameter at breast height) to function as in-stream sediment storage elements and valuable in aquatic habitat development. The future rate of wood recruitment to channels following thinning will depend largely upon natural disturbance events such as wind-throws, snow-downs, mass failure/debris torrent, floods, and fires.

Portions of the riparian reserve that remain un-thinned are within 60-100 feet of perennial channels. Those portions of the reserve will remain unmodified by Alternative B and C. The exceptions are openings created by skyline corridors. Along skyline corridors some release of plantation trees would occur and be expected to accelerate tree growth. Trees yarded through skyline corridors will require full suspension over perennial waterways. Channels adjacent to skyline corridors will receive a management induced pulse of in-stream wood that will be left in place (Soil, Watershed, Fisheries Protection measure 11; Chapter 2).

Due to the area of riparian reserve treatment proposed, 2.1% of reserves in either action alternative, influence over the long term on stand structure and future large wood recruitment will be minor on the 6th field scale. Site specific benefits are expected to provide for a greater diversity of available aquatic habitat over the long term. Aquatic habitats currently characterized as simplified may be expected to improve in substrate storage and habitat complexity, improving their ability to meet aquatic life history needs at the site scale.

Alternatives B and C —Cumulative Effects

At the 6th field watershed scale, under Willamette and NW Forest Plan management direction, riparian areas in the sub-watershed are expected to contribute an increasing level of recruitment potential compared to current contribution. The quantity of significantly-sized large woody material (>24'' dbh) available to sub-watershed channels is expected to increase through time. In part, through accelerated riparian reserve treatments proposed in the Ball Park Thin project. Deficits of in-stream wood identified during surveys of channels in the project are expected to begin gaining in density. Combined with riparian reserve protections provided by the Forest Plan, and thinning treatments proposed with action alternatives, the composition of thinned Riparian Reserves is expected to look less uniform and contribute a higher quality habitat element. The Ball Park project riparian reserve thinning proposal will maintain existing hardwood elements within the reserve and maintain hardwood stand diversity and complexity.

A short-term reduction in current stem number available to channels adjacent to thinned reserves would occur with Alternative B and C. Riparian stand thinning within 60 to 100 feet of perennial channels (consisting of skyline corridors) is low in magnitude, and is expected to maintain aquatic habitat quality. The removal of thinned trees capable of contributing immediately to in-stream habitat (as influenced by action alternatives) is generally located between 60 and 100 feet distant from the channel. A similar rate of recruitment from among stands 0-60 feet or 0-100 feet from perennial channels is expected (compared to Alternative A).

Affected Environment—Aquatic Resources

The aquatic resources analysis examines project area habitat and fish species considered Management Indicator Species (native and anadromous fishes) in the Willamette Forest Plan. The scale of analysis for aquatic species examines the 6th field watershed, evaluated at this scale due to project footprint and potential effects of project activity downstream.

Management Indicator Species

Native rainbow trout (*Oncorhynchus mykiss*) are river dwelling in the main stem McKenzie River and larger tributaries including Deer Creek. Deer Creek is one of the largest upper McKenzie sub-basin tributaries, providing significant habitat for all life stages of Deer Creek resident rainbow trout. It also serves as spawning and rearing habitat for migratory McKenzie River trout, which are, trout that spend most of their adult life in the McKenzie River. The robustness of McKenzie River rainbow trout populations is believed diminished. The combination of habitat condition and ODFW stocking of non-native rainbow and introduced summer steelhead, is believed to suppress native rainbow trout abundance in the project area through habitat degradation and competition with non-native species.

Native cutthroat trout (*Oncorhynchus clarki clarki*) are the most widely distributed fish in the landform, ranging from headwater streams (Class 1 and 2 perennial and intermittent fish-bearing streams in the project area provide habitat for cutthroat trout) to the main stem of the McKenzie River. Previous timber management in riparian areas has affected aquatic habitat quality in tributaries by altering the quantity, size and supply of in-stream woody material, substrate storage and water temperature.

Listed Species Distribution and Habitat Requirements

Native spring Chinook salmon (*Oncorhynchus tshawytscha*) migrate, reproduces, and rear downstream of the project area, in the main stem of the McKenzie River. Historically, it is believed Chinook salmon utilized Deer Creek as spawning and rearing habitat. However, current salmon use of Deer Creek is believed limited due to higher stream temperatures. High summer stream temperatures and low flow conditions are believed to discourage juvenile Chinook use of lower Deer Creek during warmer months. Spring Chinook spawning migration would occur during the low flow/warm water periods (late August through September) in Deer Creek. Currently, flows are typically too low and warm to provide for the reproductive and rearing habitat needs of spring Chinook. The lower 2.6 miles of Deer Creek, downstream of Fritz Creek confluence, is designated as Critical Habitat for spring Chinook salmon. Elevated stream temperatures, beyond the life history needs of Chinook salmon, are believed to be the result of past timber management, presence and maintenance of roads in close proximity to lower Deer Creek, and maintenance of a power line corridor in lower Deer Creek by Eugene Water & Electric Board. Further description of spring Chinook salmon habitat requirements are located in the Ball Park Thin Aquatic Specialist Report.

Budworm and County Creeks are described as Bull Trout Spawning and Rearing streams in ODEQ 303d temperature listed waters (exceeding 12^{o} C 7-day maximum average). However, based upon geological and hydrological understanding of known bull trout spawning and rearing streams in the upper McKenzie River sub-basin (those tributaries present in High Cascades Geology), the Budworm and County Creek drainages do not naturally provide cold spring-fed conditions necessary for bull trout reproduction. Rather, both tributaries are typical of Western Cascades geology and warmer in stream temperature regime. Further descriptions of bull trout habitat requirements are located in the Ball Park Thin Aquatic Specialist Report.

Aquatic Habitat Quality

Deer Creek and tributary channel conditions reflect past timber management and high road density in their aquatic habitat condition. Low in-stream wood volumes, altered sediment storage capacity and aquatic habitat quality are less able to provide for the life history requirements of native aquatic organisms. The existing road system is routing soil to stream channels at higher than natural rate, the road system is in need of repair, upgrading, drainage improvement, closures and decommissioning where necessary to reduce fine sediment delivery rate.

Endangered Species Act Consultation – Fisheries

The scale of analysis to address the direct, indirect, and cumulative effects on aquatic resources examined the Deer Creek six-field watershed, evaluated at this scale due to the project footprint and potential effects of project activity downstream. The proposed action was evaluated for potential project effects on the Matrix of Indicators found within the *Biological Assessment for Fiscal Year 2007-2009 Low-Risk Thinning Timber Sales on the Mt. Hood and Willamette National Forest, and portions of the Eugene and Salem Bureau of Land Management*

Districts (Appendix B).

These indicators are Temperature, Sediment, Large Woody Material, Peak/Base Flows, Road Density, Disturbance History, and Riparian Reserves. Potential effects occur primarily as a result of timber harvest, road reconstruction, haul and fire treatments. Effects from the proposed action are expected to be negligible due to treatment scale, low severity and proximity of activity to stream channels (as direct and indirect effects).

The project is located in close proximity to Critical Habitat for spring Chinook salmon in lower Deer Creek and the McKenzie River. Assessment of project effects on population, habitat and non-habitat indicators were evaluated to determine project effects on listed species. Although some project activities will have localized and minor negative effects at the site scale, the effects to habitat occupied by spring Chinook salmon (including Critical Habitat for spring Chinook) and bull trout are considered to be either insignificant or discountable, primarily due to project design to minimize negative effects to aquatic species and their habitat. As effects were found to be either insignificant or discountable, the effects determination is described as Not Likely to Adversely Affect listed species; bull trout and spring Chinook salmon. The implementation of this project will not adversely modify habitat important to bull trout and spring Chinook, including habitat designated Critical Habitat for bull trout or spring Chinook salmon.

The ESA effects determination and rationale is described as Not Likely to Adversely Affect and has been found consistent with the *Biological Assessment for Fiscal Year 2007-2009 Low-Risk Thinning Timber Sales on the Mt. Hood and Willamette National Forest, and portions of the Eugene and Salem Bureau of Land Management Districts.* ESA informal consultation was completed with a signature of concurrence from USFWS (April 8, 2008) agreeing with the Forest Service determination that the proposed action was Not Likely to Adversely Affect bull trout, and it would have no adverse modification of Critical Habitat. ESA informal consultation was completed with a signature of concurrence from NMFS agreeing with the Forest Service determination that Ball Park Thin Project (Alternative B, proposed action) was Not Likely to Adversely Affect spring Chinook salmon (April 8, 2008). The quality of Critical Habitat important to listed aquatic species, including spring Chinook salmon and bull trout, is expected to be maintained with implementation of the proposed action or any action alternative.

Environmental Consequences—Aquatic Resources

Additional description of effects of the proposed action to aquatic resources is located in the Fisheries Programmatic Consultation (Appendix B).

Alternative A (No Action)—Direct and Indirect Effects

The no action alternative would leave roads untreated, yielding sediment similar to current levels. Project recommendations described would not be implemented. Landscape delivery of fine sediment, as modified by the road network, would remain largely as it is. The current fine sediment delivery rate as modified by the road network would remain within the range of conditions necessary to sustain native aquatic biota. Periodic stream crossing failures may occur at undersized and outdated culverts. Culvert failures may induce stresses on resident fish populations, but not at magnitudes that would be expected to extirpate management indicator species. The effect of no action upon MIS habitat use and distribution in tributaries to Deer Creek or the McKenzie River would be to yield fine sediments similar to current levels, with potential to produce sediment pulses associated with crossing failures. Ground disturbing activities associated with thinning operations, timber haul, temporary road construction, gravel removal and haul from pit locations, and fuels treatment would not occur.

Alternative A (No Action)—Cumulative Effects

Alternative A would be expected to function at or near the current level of fine sediment yield, temperature and flow regime, and serves as the baseline/existing condition for comparison to action alternatives. The current road density in the Deer Creek sub-watershed would remain near 3.1 miles per square mile. Road and culvert decommissioning along 0.53 mile of road within the riparian reserve would not occur.

The current fine sediment delivery rate as modified by the road network would remain within the range of conditions necessary to sustain native aquatic biota, but not optimally so. Periodic stream crossing failures may induce stresses on resident fish populations, but not at magnitudes that would be expected to extirpate management indicator species. The effect of no action upon listed species habitat use and distribution in the McKenzie River (with yield of fine sediments similar to current levels) has potential to produce sediment pulses associated with crossing failures. Degradation of habitat quality or loss of habitat use by listed/management indicator species would not be expected through selection of Alternative A, when combined with past, present or foreseeable actions.

Alternatives B and C—Direct and Indirect Effects

Habitat of importance to management indicator species could be subjected to short-term increases in turbidity if reconstruction activity were to occur in the immediate vicinity or during wet periods. However, distance of culvert replacements and seasonal restrictions are expected to maintain habitat conditions for aquatic species. Three culverts in close proximity (450 feet and 1,600 feet) to Listed Fish Habitat along Forest Road 2654 and 2655 have potential to yield approximately 1 cubic yard of fill into intermittent channels tributary to Deer Creek. The net effect of road reconstruction activity is to simultaneously reduce road origin fine sediment while replacing undersized and aged culverts. The use of best management practices and mitigation measures to trap fine sediments during culvert replacement is expected to minimize potential impacts to aquatic habitat and resources, with a negligible increase in sources of suspended sediment. A potential 1 cubic yard increase to the existing level of sedimentation in the sub-watershed (estimated annual sediment yield of 8,200 cubic yards) represents a 0.01 to 0.02% increase above current levels. The small potential increase delivered seasonally through intermittent channels would not present a perceptible increase in perennial channels lower in the sub-watershed. A slight potential increase in suspended sediment presents negligible risk to native aquatic biota. Localized increases in turbidity during and following the season of culvert replacement, is believed to remain within the habitat needs of aquatic MIS species. Decommissioning of road surfaces and culvert removal will similarly be required to meet seasonal restrictions, limiting the transmission of fine sediment. A post-project reduction of fine sediment yield following system road upgrades, estimated at 24 cubic yards per year, is expected to present a slight improvement in aquatic habitat quality.

Rock pit use will take place in existing pits located along forest roads. Current stock piles will be utilized with no enlargement or development of existing sites necessary. Approximately 4,000 cubic yards of material will be extracted to use for road reconstruction and maintenance activities. The nearest stream channels to existing pits are over 500 feet away. The potential to transmit fine sediment is minimal.

Road reconstruction and maintenance activities will occur during dry season and will be required to be maintained in stable condition during hauling (mitigations 3 and 4). Combined with improved and new ditch relief placements, the improved transportation system is expected to have negligible effect on aquatic habitat in the immediate vicinity of roads (from reconstruction and haul) and minimal effect on listed species habitat, most of which is 0.5 miles or greater from road locations. Short-term, localized increases in sources of fine sediment would not be discernable over background levels of sediment supply, particularly in perennial, fish-bearing channels located further from reconstruction and hauling activity.

Haul routes in close proximity to Deer Creek are largely paved (lower Forest Road 2654) or are aggregate roads that would be reconstructed to accommodate haul. Portions of the haul route in close proximity to the McKenzie River are paved (lower Forest Road 2654 and Hwy 126) and pose little potential to transmit significant quantities of fine sediment to the McKenzie River. An estimated increase of 7 cubic yards per year during seasons of haul would have negligible effect on aquatic organisms.

Wet season hauling will be allowed only on maintained aggregate or paved roads (mitigation measure 2 and 4) to protect water quality and fish habitat. When roads become excessively dusty, watering of roads is required. The effect to fish-bearing habitat and organisms is negligible and based upon observations during timber harvest operations in similar landforms on McKenzie River Ranger District.

Construction of approximately 3 miles of temporary road would occur only on stable landforms. Where stream crossings are necessary, clean stable fill material will be used. Seasons of temporary road construction are limited to dry season only, to limit potential to transmit fine sediment.

Logging and yarding systems are subject to a variety of restrictions. Soil, Watershed, and Fisheries Protection measures 5–17 are designed specifically to maintain water and habitat quality. The effect of minimizing skyline corridors and requiring riparian corridor trees to be left on site, is to ensure ground disturbance remains insignificant and stream bank stability is maintained. Alternative B and C will utilize 105 skyline corridors over perennial channels, and 31 corridors over intermittent channels.

Table 24. Skyline Corridors Through Stream Buffers and Proximity to Listed Fish Habitat

Unit	Acres by Yarding System		Skyline Corridors Across Streams			
			Perennial		Intermittent	
	Grd	Sky	Number of Crossings	Distance to LFH/CH (ft)	Number of Crossings	Distance to LFH/CH (ft)
10	12	30	17	33,800	3	33,800
20	0	42	0	N/A	3	29,800
30	0	52	34	29,500	4	29,500
40	0	40	2	27,200	2	27,200
50	6	0	0	N/A	0	N/A
60	52	0	0	N/A	0	N/A
70	13	26	5	23,200	0	N/A
80	34	0	0	N/A	0	N/A
110	0	44	23	18,900	3	18,900
120	57	0	0	N/A	0	N/A
130	18	0	0	N/A	0	N/A
140	24	5	0	N/A	0	N/A
150	36	8	4	18,100	0	N/A
160	36	10	0	N/A	4	18,400
170	37	10	5	19,900	7	19,900
190	20	19	0	N/A	0	N/A
200	5	0	0	N/A	0	N/A
210	10	0	0	N/A	0	N/A

Unit	Acres by Yarding System		Skyline Corridors Across Streams			
			Perennial		Intermittent	
	Grd	Sky	Number of Crossings	Distance to LFH/CH (ft)	Number of Crossings	Distance to LFH/CH (ft)
220	24	0	0	N/A	0	N/A
230	11	0	0	N/A	0	N/A
240	43	0	0	N/A	0	N/A
270	14	0	0	N/A	0	N/A
280	0	9	0	N/A	0	N/A
290	51	0	0	N/A	0	N/A
310	27	25	2	13,400	3	13,400
330	0	18	0	N/A	1	2,300
360	16	3	0	N/A	0	N/A
370	38	10	0	N/A	0	N/A
390	22	60	0	N/A	1	260
400	0	48	13	32,800	0	N/A
Total	**606**	**459**	**105**		**31**	

Removal of stream adjacent trees includes an increased risk of transporting fine sediments in channels immediate to the corridors. Short-term and local increase in turbidity is expected during the season of yarding. The magnitude of effect is expected to remain within the range of life history needs of aquatic management indicator species. The ability of channels to transport fine sediment to listed fish habitat is limited by proximity to LFH (ranging from 260 feet to 6.4 miles) and mitigations requiring full suspension and retention of corridor trees over channels. In intermittent channels, where full suspension is not possible, yarding is limited to when the stream is dry (mitigation measure 10). These measures are in place to maintain management indicator species habitat located downstream in the sub-watershed.

Fire treatment site conditions (when fuel moisture is sufficient to maintain duff and soil stability) will sufficiently protect aquatic resources in the project area. The potential to increase nutrient levels of phosphorous and nitrate to channels increases with use of fire. However the level of nutrient delivery would not exceed the range of conditions approached during historic fire disturbance. Aquatic species have adapted to a more frequent fire disturbance regime than is currently provided in a managed forest landscape. Removal of duff through burning and exposure of soil to mobilization with precipitation is of very low risk. The potential to adversely affect aquatic biota or habitat is negligible; due to the distance fire is utilized from the channel and low intensity of fire used in unit treatment.

Alternatives B and C—Cumulative Effects

The current road density in the sub-watershed will remain approximately 3.1 miles per square mile as no new system roads are added and a few are removed (0.53 miles) with the action alternatives.

Reconstruction of system roads in Alternative B and C is expected to withstand flood events through improved ditch relief drainage and up-sized stream culverts which may be expected to be more resistant to culvert related failure (compared to current condition). Both action alternatives would result in a slight increase in sediment input (up to an additional 7 cubic yards per year) in the sub-watershed in the short-term. A less than 4% increase would not be expected to adversely increment this indicator. The expected magnitude and duration of increase (the first fall storm following project activities) is of short duration and within the tolerance of native aquatic organisms to sustain or avoid sediment increase. The range of conditions necessary for aquatic resources in the project sub-watershed is maintained in the short-term, with localized increases perceptible at the site scale, and improved slightly in the long-term.

With the limited extent of disturbance within Riparian Reserves in close proximity to stream channels with the project, existing aquatic habitat conditions are expected to be maintained. As described in previous effects discussion, project effects on shade and water temperature, sedimentation, and stream flows are expected to be negligible at the sixth field watershed scale. Site-specific disturbance may be expected to be of short duration (approximately 3 years, during timber harvest and haul activity) and of insufficient magnitude to place native aquatic organisms at risk.

Following examination of the cumulative effects of past actions, the proposed project, and reasonably foreseeable actions in the analysis area, has determined that the additional management-induced effects from this project would not change the following:

1) The timing or magnitude of peak flow events (planning sub-drainage ARP remain above the Willamette Forest Plan recommended levels);
2) Instability of stream banks (recommended ARP midpoints are exceeded, and exclusion of bank destabilizing activity);
3) Adverse alteration of the supply of sediment to channels (fine sediment supply would be localized and of short duration);
4) Adverse alteration of sediment storage and structure in channels (channel conditions would be maintained with proposed action alternatives).

Blue River and Cougar Dam fragmentation of aquatic habitat in the McKenzie continues to be a major influence on the aquatic landscape and plays a crucial role in at-risk species viability. The Ball Park Thin Project would not incrementally contribute to increased fragmentation of habitat. Upstream passage measures at Cougar Dam are under NEPA evaluation (a trap-and-haul facility with evaluation by Army Corps of Engineers) and may be implemented following ACOE NEPA analysis. A favorable response by Management Indicator Species would be anticipated with reconnection of the South Fork McKenzie River to upstream reaches of the McKenzie River, primarily through population(s) access to historic refuge areas. Other projects are not foreseeable within the Ball Park Thin Project area that would add cumulatively to past and current actions. Habitat conditions necessary to aquatic MIS species (spring Chinook salmon, bull trout, rainbow trout, cutthroat trout) including ESA listed species (bull trout and spring Chinook) habitat in the upper McKenzie River are expected to be maintained within and downstream of the project area.

Distribution and Amount of Diverse Early Seral Habitat for Wildlife (Significant Issue #2)

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for diverse early seral habitat for wildlife was the Ball Park planning area, as well as the larger Upper McKenzie Watershed and the McKenzie Sub-basin. Effects to early seral habitat quality as it pertains to Roosevelt elk are discussed separately in this Chapter under Elk Habitat.

Affected Environment—Diverse Early Seral Habitat for Wildlife

Changes in forest management on federal lands within the past 25 years have resulted in significantly less acres in early seral openings. Early seral habitat is still plentiful on private lands adjacent to the Willamette National Forest. However the Willamette National Forest is lacking the quality early seral habitat resulting from natural disturbances such as wildfire and un-natural disturbances such as logging. Diverse early seral habitat has forbs and young shrub components that can be associated with disturbances. It also includes a variability of dead wood structure that is an important component of wildlife habitat. This includes snags and large down logs of various sizes, decay classes, and species. Flowering forbs and shrubs are abundant and provide forage and nectar. Although adjacent private lands consisting of managed plantations temporarily provide early seral habitat, they do not provide the quality nor the duration for longer term early seral habitat because they are being managed for intensive timber production instead of habitat. In addition, the current distribution of early seral habitat is unbalanced in terms of elevation and location. Near the Willamette National Forest, much of the early seral habitat occurs at the lower elevations interspersed and west of the forest boundary, on private land. In 1995 it was projected that creation of early seral habitat would decrease by 50% by 2005 (USDA Forest Service, 1995).

Diverse quality early seral habitat is of key importance to wildlife. This is supported by the Upper McKenzie Watershed Analysis done in 1995, which states that 14% of the wildlife species within this watershed depend on early seral habitat (USDA Forest Service, 1995). This does not take into account the 40% of wildlife species that are classified as generalists or the 5% of species that require edge habitat that use early seral habitat as well. The majority of the early seral species are birds, although several voles and reptiles also require this type of habitat. This habitat was historically produced primarily from fire disturbance. The size and composition of early seral habitat patches varies by vegetation series and topography. Over 40% of early seral species require snags or large down wood for breeding. Early logging from the 1940s through the 1960s usually left abundant amounts of large down wood but not many snags. Later logging practices from the 1960s to the 1980s transitioned to “sanitation” practices which resulted in clearcuts devoid of any large dead wood component. Currently available early seral habitat within the Ball Park project area is only partially effective at being quality diverse habitat. Early seral habitat is present in natural open meadows at the higher elevations of the planning area.

On a broader scale in Oregon and Washington, a total of 156 wildlife species have been documented to depend on early seral habitat (O’Neil et.al 2001). This includes 10 species of amphibians, 88 species of birds, 42 species of mammals, and 16 species of reptiles.

Table 25. Distribution of Seral Stages within Ball Park

Vegetation Stage	Stand age	Acres	% of Planning Area
Non-forested	NA	984	7
Early seral*	<40	3953	27
Mid seral	40-79	1704	12
Mature	80-199	1784	12
Older mature/old-growth	>200	6083	42
Total	>200	14,093	100

* Many of these acres do not consist of diverse quality early seral habitat.

An analysis of early seral habitat by vegetation series in the Upper McKenzie Watershed compared the amount present in the historic reference year 1900 with the year of analysis in 1995. The amount of early seral habitat on the landscape within the Upper McKenzie Watershed was greater in 1995 than in the historic reference year 1900. Only within the Douglas-fir vegetation series was the quantity of early seral habitat considerably lower in 1995 when compared to 1900 (USDA Forest Service 1995). The 2008, levels of early seral habitat across the landscape has dropped further from 1995 and currently represents 27% of the landscape (Table 25). This trend exists on federal lands throughout the Pacific Northwest.

The levels of early seral habitat for Pacific silver fir in 1900 and 1995 are shown in Figure 18 for the Upper McKenzie Watershed Analysis area. Although the figure displays conditions for the entire watershed, it also reflects the condition of the Ball Park Project area. Early seral stages include grass/forb, open sapling/pole, shelter-wood, and shrub conditions. Mid-1 seral includes closed sapling/pole. Mid-2 seral includes open small saw logs and closed small saw logs condition; Late seral includes large saw logs and old growth. The dark solid line in the figures 18-20 (all figures are found in the Upper McKenzie Watershed (USDA Forest Service, 1995)). represents a historical range of variability from 1600 to 1850.

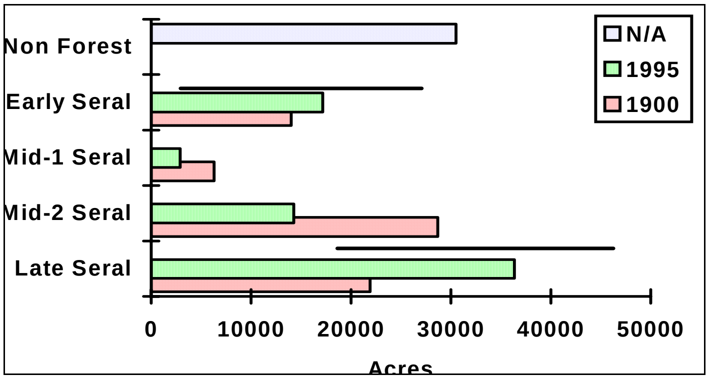


Figure 18. Acres of Pacific silver fir Seral Stages in 1900 and 1995

The vegetation distribution shows an increased level of late successional forest in 1995 compared to 1900 in western hemlock (Figure 19). The amount of early seral vegetation in 1995 was twice the level it was in 1900. In 1995, the level of early and late successional forest within the western hemlock vegetation series was within the historical range of variability.

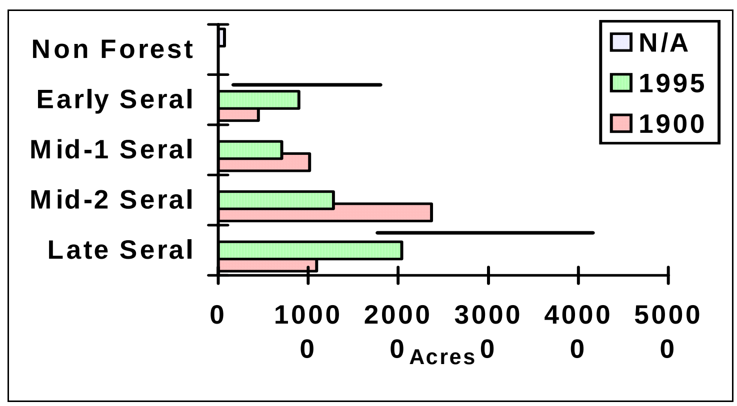
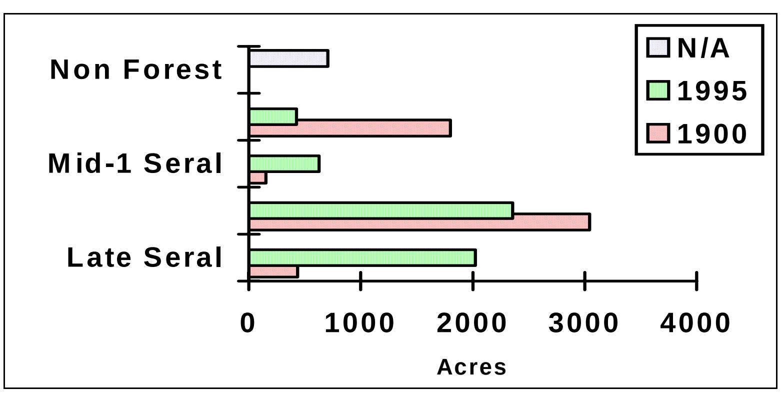


Figure 19. Acres of Hemlock Seral Stages in 1900 and 1995



The shift in dominance from mid to late seral in figure 20 corresponds to our era of fire suppression. Historic information on the composition and distribution of vegetation was not compiled specifically for Douglas-fir forests during the Regional Ecosystem Assessment Project (REAP 1993).

Figure 20. Acres of Douglas-fir Seral Stages in 1900 and 1995

Environmental Consequences— Diverse Early Seral Habitat for Wildlife

Alternative A (No Action)—Direct, Indirect, Cumulative Effects

Under this alternative, the current amount of diverse early seral habitat in the Ball Park project scale would not change in the near-term future. Natural tree mortality within Ball Park thinning units from root rot pockets or blowdown is not expected to be significant nor likely to produce many openings, resulting in no noticeable change in early seral habitat across the landscape. Risk of stand replacing wildfire on the landscape would not undergo stand stratification for another century or more. A stand replacing wildfire would provide many acres of diverse early seral habitat.

Alternative B—Direct and Indirect Effects

Diverse early seral habitat will be created by cutting 1-acre gaps that are distributed across the units in Alternative B. An average canopy closure of 40% will be left on all stands after thinning, post-harvest burning, and snag creation. Canopies are expected to close back in to the current condition within 7-10 years. Prescribed natural fire in two units, totaling 49 acres, may result in minor overstory tree mortality creating some additional small openings. Commercial thinning would provide temporary forage. Thinning would also increase use of the young forests and make them more suitable to a wider range of wildlife species, compared to the current dense closed canopy condition.

Some species strongly dependent on diverse early seral habitat are (Altman 1999):
• Western bluebird – near large snags >40 feet tall suitable for nesting.
• Rufous hummingbird – near nectar-producing plants and diverse vegetative structure, especially currant, penstemon, and paintbrush.
• Olive-sided flycatcher – near residual canopy trees and large snags.

Other species that would benefit from increased forage include Roosevelt elk, black-tailed deer, turkey vulture, sharp-shinned hawk, Cooper's hawk, California quail, long- and short-eared owls, Vaux's swift, Anna's hummingbird, rufous hummingbird, as well as the overall avian biodiversity (see Migratory Land Birds section).

Alternative C—Direct and Indirect Effects

Diverse early seral habitat would be created using 1 to 3 acre gaps within 151 acres out of the total of 915 acres of thinning units in Alternative C. An average of 30% canopy closure would be maintained on 217 acres with an average of 40% canopy closure remaining on 642 acres of the total acres. The 30% canopy closure would slightly improve early seral wildlife habitat conditions compared to Alternative B. The six units with 30% canopy closure were selected for heavier thinning based on locations in the high emphasis elk management areas, as well as one unit within a moderate elk emphasis area being an expected high quality forage area for elk. These six selected units show high understory vegetation suitability for forage development. The prescribed natural fire units and effects are the same as Alternative B.

Alternatives B and C—Cumulative Effects

The analysis area chosen for considering cumulative effects to diverse early seral habitat was the Ball Park Planning Area. Past management activities initially resulted in an abundance of early seral habitat with the many acres of regeneration harvesting that occurred (Figures 20-21). At the time clearcutting resulted in evenaged stands with no snag or large tree retention. Plantations established before the mid 1980s did not contain high levels of structural diversity resulting in a lack of quality early seral habiat. Large snags with remnant under and overstory were rarely retained. In some cases large down wood was left on site which is now in the more advanced decay classes of IV-V. Thinning these plantations now will provide some improvement in structural diversity. The more recent lack of regeneration harvest has allowed the plantations to grow into dense closed canopy stands with less open quality early seral habitat than in the more recent past. The overall impact of the proposed action is that dense closed canopy mid-seral forests would be thinned to a more open condition with small gaps that provide some early seral habitat. These more open habitat conditions are expected to last approximately 7-10 years, depending on the site and final canopy closure. At the present time, there are no foreseeable actions that would modify additional habitat in the Ball Park Planning Area.

Elk Habitat

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Elk Habitat includes the project activity units and five Emphasis Areas within which management activities would occur. These emphasis areas were used for the scope of analysis because of established ratings for elk habitat as described in the Willamette National Forest Plan Standards and Guidelines. These Emphasis Areas do not include private lands.

Affected Environment—Elk Habitat

Management objectives for deer and elk habitat apply to specific mapped “Emphasis Areas” within the Willamette National Forest. Each emphasis area has been assigned a rating of high, moderate, or low. Standards and Guidelines for management of these areas were developed in cooperation with the Oregon Department of Fish and Wildlife.

The Ball Park planning area includes portions of five designated emphasis areas: Latiwi, County, Upper Westside, Deer, and Belknap-Paradise Camp (See Figure 21). These areas are managed for elk habitat under guidance from the Willamette Forest Plan Standards and guidelines (FW-137) with the assumption that providing high quality elk habitat would adequately address the needs for black-tailed deer.

Elk Model for Ball Park Project Area

A Model to Evaluate Elk Habitat in Western Oregon (Wisdom 1986) is used to estimate habitat effectiveness (HE), which is defined as the proportion of achievement relative to an optimum condition. The management intent is to maintain effectiveness within a range of values with the optimum value being 1.0. HE incorporates and qualifies four key habitat attributes: size and spacing of forage (HEs), quality of forage (HEf), cover areas (HEc), and open road density through elk habitat (HEr). Each habitat variable is calculated individually and allows for a comparison by variable or as a whole (HEI). The elk model considers past and ongoing activities and results in an evaluation of the cumulative impacts on habitat from the past, present, and foreseeable future actions in the Emphasis areas.

Maintaining a balance between cover and forage areas is a key component of elk habitat management in the Wisdom model. Using tightly controlled experimental conditions, Cook et al.(1998) found that thermal cover did not enhance elk survival and production. They also found that thermal cover was not required by elk where food was not limiting, and could not compensate for inadequate forage conditions. Further research has shown that high summer and fall forage quality is critical to elk reproduction, survival, and population growth and stability (Cook et al. 2004). The increased importance of available forage abundance and quality, compared to thermal cover has also been supported by nutritional and physiological studies of black-tailed deer (Parker et al. 1999).

The Wisdom model was developed to evaluate landscape areas where quality forage areas were provided primarily by clear cutting and associated post-harvest burning and fertilization. With the dramatic decline in regeneration timber harvest under the Northwest Forest Plan, there has been a corresponding decline in high-quality elk forage habitat. This trend, coupled with recent studies, has increased the importance of providing foraging habitat for elk. A drawback of the Wisdom model is that forage is evaluated based on the *average value* of defined forage areas and does not consider the amount of forage provided. Areas that provide meaningful forage are not considered in the forage effectiveness calculations. For example, providing substantial acres of temporarily improved elk and deer forage conditions by commercial thinning may result in a lower forage score in the Wisdom model. Published research supports the idea that increasing the amount of available forage by commercial thinning should improve overall habitat conditions for elk and deer within the analysis area regardless of the average forage value derived from the Wisdom model.

Another example for which the model does not effectively show results due to the averaging nature of the values is for cover values. If thermal habitat is thinned and temporarily loses its' thermal value, the model increases the cover value because a greater amount of remaining cover may be optimal cover (compare Tables 26a and 26b below).

Table 26a. HEI Analysis for Elk Habitat in the Ball Park Project Area, 1995 and Alternative A.

Emphasis Area Name	Emphasis Rating	Results for Each Model Variable					
		Year	HEs	HEr	HEc	HEf	Overall HEI
Upper Westside McKenzie*	High	1995	0.82	0.49	0.47	0.42	0.53
		2008	0.71	**0.32**	0.64	**0.39**	**0.49**
Latiwi	Moderate	1995	0.83	0.38	0.40	0.52	0.51
		2008	0.79	**0.33**	0.58	0.55	0.54
County/Deer*	Moderate	1995	0.90	0.48	0.41	0.48	0.51
		2008	0.88	0.44	0.53	0.44	0.55
Belknap-Paradise Camp	Moderate	1995	0.52	0.54	0.45	0.45	0.48
		2008	0.82	0.54	0.65	0.45	0.60

*Upper Westside was analyzed with Upper Westside McKenzie which is not within the Ball Park Project Area. The County Emphasis Area was analyzed with the Deer Emphasis Area. Values shown in bold are below recommended minimum threshold levels in the Willamette NF Land Management Plan. Target Levels: **High Emphasis Area Individual Index**: >0.5 Overall index: >0.6 Moderate **Emphasis Area Individual Index**: >0.4 Overall Index: >0.5

Low Emphasis Area Individual Index: >0.2 Overall index: increase any variable <0.2Table 26a displays the condition of habitat values for patch size and spacing (HEs), open road density (HEr), cover quality (HEc), forage quality (HEf), and overall habitat quality (HEI) that existed for big game habitat when the Upper McKenzie Watershed Analysis was conducted in 1995 and also current conditions that existed in 2008.

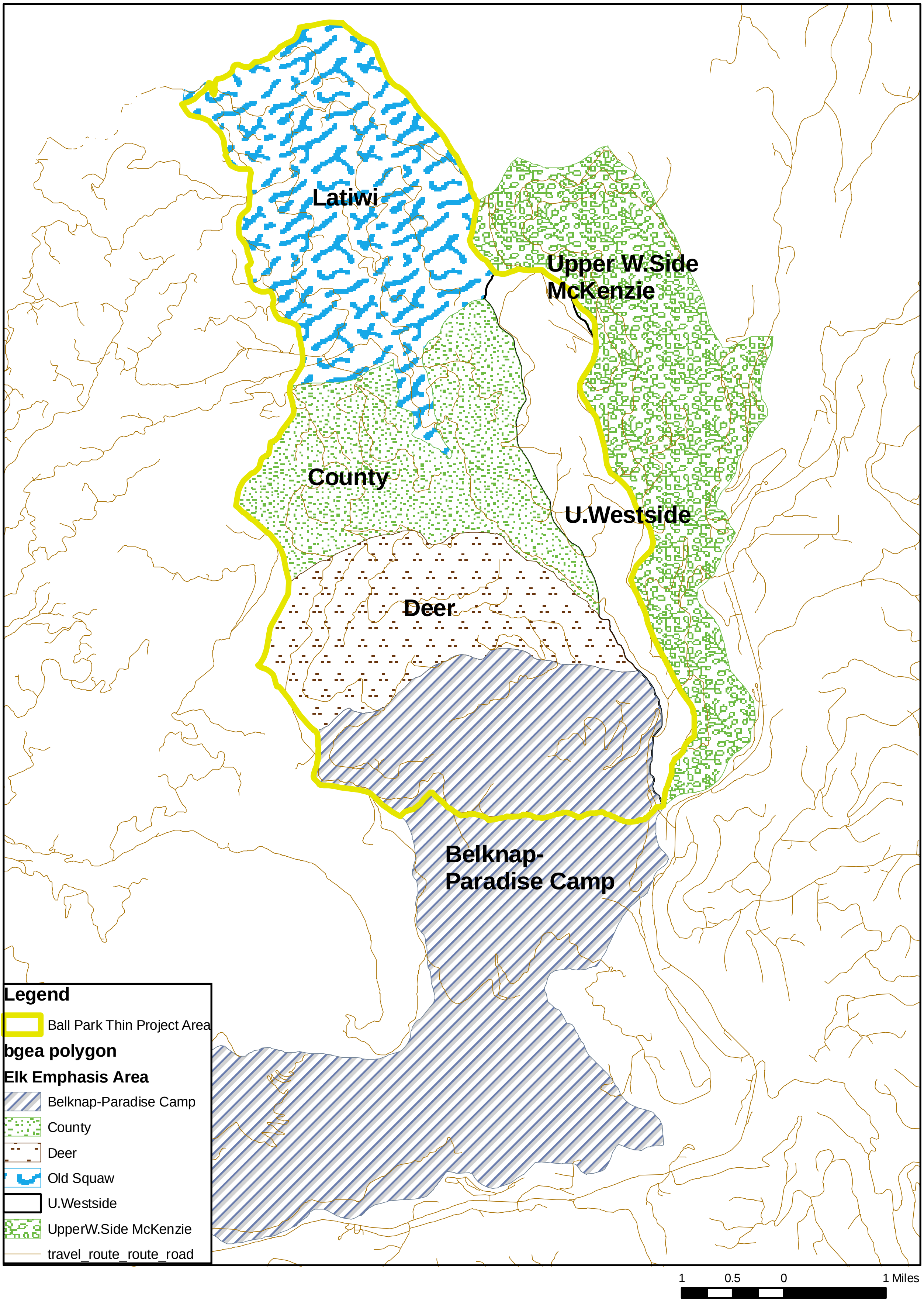
Table 26b. HEI Analysis for Elk Habitat in the Ball Park Project Area, Alternative B and C.
(In most cases values for Alternative C are the same and are only shown as a second value if different)

Emphasis Area Name	Emphasis Rating	Results for Each Model Variable				
		HEs	HEr	HEc	HEf	Overall HEI
Upper Westside/Upper Westside McKenzie*	High	0.74/0.73	0.32	0.65	0.37/0.40	0.48/ 0.49
Latiwi	Moderate	0.93	0.33	0.60	0.27	0.47
County/Deer*	Moderate	0.92	0.44	0.55	0.33/0.37	0.52/0.53
Belknap-Paradise Camp	Moderate	0.85	0.54	0.65	0.41	0.59

*Upper Westside was analyzed with Upper Westside McKenzie which is not within the Ball Park Project Area. The County Emphasis Area was analyzed with the Deer Emphasis Area.
Values shown in bold are below recommended minimum threshold levels in the Willamette NF Land Management Plan. Target Levels:
High Emphasis Area Individual Index: >0.5 Overall index: >0.6
Moderate Emphasis Area Individual Index: >0.4 Overall Index: >0.5
Low Emphasis Area Individual Index: >0.2 Overall index: increase any variable <0.2Forage, Hiding, Thermal,

Summary of Existing Elk Model Variables for the Ball Park Project Analysis Area
• **Size and Spacing of Forage**: The size and spacing habitat effectiveness rating (HEs) for forage and cover in all four elk emphasis areas is excellent. Management goals for size and spacing are currently being met.
• **Road Density:** Road densities in two areas are currently adequate with HEr values of County/Deer (0.44) and Belknap-Paradise Camp (0.54). Road densities in the Upper Westside (0.32) and Latiwi (0.33) areas are currently below Forest standards.
• **Cover:** The habitat effectiveness value for cover (HEc) in all four elk emphasis areas are excellent and meeting Forest Plan standards.
• **Forage:** Forage quality habitat effectiveness ratings (HEf) for Latiwi (0.55), County/Deer (0.44), and Belknap-Paradise Camp (0.45) areas are currently meeting Forest Plan standards. The Upper Westside (0.39) emphasis area is currently below Forest Plan standards.
• **Habitat Effectiveness Index (HEI):** The overall ratings of (HEI) indicate that three emphasis areas are currently above Forest plan standards: Latiwi (0.54), County/Deer (0.55), and Belknap-Paradise Camp (0.60). The overall HEI rating for Upper Westside (0.49) is currently below Forest Plan standards.

Figure 21. Elk Emphasis Areas in the Ball Park Thin Project Area.



Optimal Cover and Road Densities

Past harvest activities have shaped the landscape in terms of the types of elk habitat. Harvest treatments were primarily regeneration, which included clearcuts and shelterwoods. These harvested units once provided a wealth of quality forage for elk but have since grown into hiding and thermal cover. No specific data is available for the local elk/deer population within the five Emphasis Areas that this project overlaps. Current ODFW biological data are not sufficient to provide an accurate estimate of the black-tailed deer population in western Oregon (ODFW 2002). Recent ODFW elk population estimates show that the state management unit in vicinity of the project area (McKenzie) has elk herds with population numbers near their current management objectives (Bill Castillo pers com; ODFW 2005).

Environmental Consequences—Elk Habitat

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

Current trends of elk habitat development would continue to occur naturally over time with Alternative A. Existing elk foraging habitat within open plantations may continue growing denser into hiding cover and then to thermal cover. Some of the current foraging habitat areas are in higher elevation frost pockets that may be maintained in a long-term foraging habitat condition. Meadow habitats may undergo slight levels of tree encroachment. With Alternative A, the current elk effectiveness ratings would not change significantly within the next few decades.

In ten years, some forage availability would be expected to decrease in this area as current harvest openings grow into hiding cover. In the absence of additional harvest or wildfire, no new foraging areas would be created. The current optimal and thermal cover would not significantly change. In 50 years, approximately 30% of the existing thermal cover would shift into optimal cover. Road density and big game security would not change. Overall habitat quality may decrease from the loss of forage. No foreseeable timber or fuels management activities are scheduled to occur in the analysis area that could contribute to incremental cumulative effects on elk habitat.

Alternative B —Direct and Indirect Effects

The proposed thinning (915 acres) for the Ball Park Project would change the function of elk habitat from thermal cover to mostly lower quality thermal cover that contains small inclusions of forage areas. Opening of the canopy is expected to temporarily improve understory shrub and forb development by increasing sunlight within stands. Small one-acre gaps within thinning units would provide small forage openings (129 acres) scattered across the units. Forage quality would be highest within the gap centers to the north of the clearing where the most sunlight would encourage forb and shrub development. Gaps should try and be placed in southern facing aspects to increase sunlight within the openings. Forage quality along gap perimeters would be lower due to increased shade. Thermal habitat quality in these 40 year old plantations is currently moderately low due to the young age of the stands. After thinning to an average of 40% canopy closure thermal habitat quality would be low for several years, and is expected to fully recover when the canopy again closes in approximately 7-10 years. At this time, thermal habitat quality would be improved slightly compared to before thinning since trees would have been released growning taller and larger canopies. Additional understory development would also benefit thermal habitat quality.

Forage values with Alternative B show a reduction in all four emphasis areas. In reality, forage values would temporarily increase due to increased sunlight from canopy thinning, however the forage habitat in the thinning would be relatively short lived. Gap forage values may remain higher longer, depending on tree regeneration within created gaps.

Alternative C—Direct and Indirect Effects

With Alternative C, effects will be similar to Alternative B. The difference is in a higher acreage of forage gaps totaling 151 acres which will better benefit elk and other species that depend on early seral habitats. In addition, six units totaling 217 acres will have more intensive thinning treatments resulting in 30% average canopy retention. These units were selected based on the excellent potential they offer for improved understory forage development.

Elk Model results for Alternative C show a small improvement in forage values for both the Upper Westside and County/Deer emphasis areas compared to Alternative B (Table 26b). This slightly increases overall HEI scores by 0.01 for both the Upper Westside and County/Deer emphasis areas. In addition, the Size and Spacing variable in the Upper Westside emphasis area shows a decrease from 0.74 to 0.73. Other values within the elk model for Alternative C are identical to those for Alternative B.

Alternatives B and C—Direct and Indirect Effects

The proposed road decommissioning of 0.53 miles may benefit elk and other wildlife species susceptible to human disturbance by more permanently blocking off access. Both roads (2654-795 and 2654-812) are currently bermed and not driveable. Decommissioning will reduce or eliminate soil compaction to better allow establishment of herbaceous forage until trees colonize the former road surface. Potential disturbance to elk and other wildlife species in the Ball Park Project area would temporarily increase during implementation of this project due to additional miles of temporary roads and increased traffic to access thinning stands. However, all these temporary roads would be closed once the activaties are completed. The Elk Model road densities would not change.

The proposed prescribed burning of two stands totaling 49 acres would slightly reduce thermal cover quality for several years due to opening of the canopy and expected tree mortality. Burning may create small understory forage patches of high value to elk and other early seral wildlife species. This would slightly improve forage habitat quality in the County/Deer Emphasis Area.

Alternatives B and C—Cumulative Effects

Past management activities initially resulted in an abundance of forage habitat with the many acres of regeneration harvesting that occurred. The more recent lack of regeneration harvest has allowed these forests to grow into hiding and thermal cover to create the current condition represented by the no action alternative in Table 26a. The overall impact of the proposed action is that thermal cover in treated stands would be changed to lower quality thermal cover, hiding cover, or forage, which again according to Cook et al.(1998), thermal cover did not enhance elk survival or production. There are no foreseeable actions that would modify habitat in these Elk Emphasis Areas.

Alternatives B and C—Conclusions

Proposed activities would increase habitat quality for elk and deer in all five Emphasis Areas. Open road densities would not change in the long-term. Forage quality would noticeably increase on the 129 acres gaps in Alternative B and 151 acres gaps with 217 acres of 30% canopy retention thinning in Alternative C. Beneficial effects to elk and other early seral species' forage from thinning and prescribed burning are not expected to be reflected in individual or overall habitat effectiveness values in the elk model given that the majority of acres would remain in a thermal cover classification under both Alternatives B and C. A limited number of animals would benefit from the small-sized openings that would be created by the project, so there would be little potential for any noticeable population response as a result of the proposed actions. Project effects to elk and deer are essentially unquantifiable on an individual basis relative to the amount of habitat modified or disturbed against the amount available to these species on a daily basis in the affected Emphasis Areas. Direct and indirect effects are largely limited to potential temporary displacement of individuals during implementation of proposed activities. Short and long-term increases in forage habitat would be evident within the project area. In the context of the Emphasis Areas and adjacent 5th field watersheds, project effects would result in a minor contribution to cumulative effects that have already occurred from past management actions surrounding the project area. Given what is currently known about local deer and elk populations, the future viability of these species is assured as long as habitat restoration opportunities continue to be implemented – especially when conducted at an appropriate scale.

Threatened Northern Spotted Owl

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for threatened northern spotted owl was a 1.2 mile radius buffer around all project units that may alter habitat conditions for the spotted owl. The analysis area is within the H.J. Andrews northern spotted owl demographic study area where monitoring of owl populations has occurred since 1987 (Anthony et al. 2006). Occupancy modeling by USFWS predicted no new home ranges undetected by surveys, thus this effects analysis is based on actual survey data.

Affected Environment—Threatened Northern Spotted Owl

The northern spotted owl is considered a Management Indicator Species (MIS) for old growth habitat in the Willamette Forest Plan (USDA Forest Service 1990) and represents the 4% of wildlife species associated with late seral forests (USDA Forest Service, 1995). Past surveys for spotted owls have documented ten spotted owl activity centers within 1.2 miles of project units. All ten spotted owl activity centers have established, 100-acre late successional reserves. Effects not specifically discussed here pertaining to new threats to the spotted owl (USDI 2004, Anthony et al. 2004, Courtney et al. 2004) such as wildfire, west Nile virus, and barred owls are further discussed in the Biological Assessment in Appendix D.

Challenges to spotted owl conservation are wide ranged, which includes potential threats from wildfires, barred owl competition, great horned owl predation, West Nile Virus and sudden oak death. A detailed discussion of these potential threats can be found in the Biological Assessment in Appendix D. Disturbances on the landscape from wildfires and wind storms have affected spotted owl habitat. Loss and fragmentation of suitable spotted owl habitat and other interior forest species' habitat in this planning area have had detrimental effects on this species. Fragmented habitat increases flight distance and energy consumption for foraging, and increases habitat suitability for predatory and competitive owls such as great horned and barred owls. This fragmentation may increase spotted owl mortality, especially for juveniles.

The U.S. Fish and Wildlife Service has determined that reduction of suitable spotted owl habitat below 40% of the median home range (1,182 acres) has a notably higher likelihood of leading to disruption of essential breeding, feeding, and sheltering behaviors (USDI Fish and Wildlife Service, 1992). A 1.2-mile radius around the activity centers defines the median home range in the Oregon Cascades (Thomas et al. 1990). Eight of the ten known activity centers in the Ball Park Project area are currently above the 40% habitat threshold.

Suitable spotted owl habitat has been defined in various documents: The ISC Report, USFWS Critical Habitat Determination, Memorandum Decision and Injunction for Judge Dwyer's Decision, and the FSEIS on Management of the Northern Spotted Owl in the National Forests. General guidelines for suitable spotted owl habitat are forested stands of Douglas-fir, Western hemlock, Western redcedar, or Ponderosa pine older than 200 years and having a moderate to high canopy closure of 60-80%. An understory of multi-layered conifers and hardwoods open enough to still allow owls to fly within and beneath it. Moderate to high snag densities, and large logs are also found in typical spotted owl habitat. However, all of the above characteristics do not need to be present for spotted owls to make use of an area, and for habitat to be determined suitable.

Dispersal habitat typically does not contain large, old-growth nest trees, a multi-layered canopy, or many large snags and logs. The minimum canopy closure for dispersal habitat is 40%. Past logging activities in the Ball Park Project area have removed many acres of spotted owl habitat. Remaining suitable habitat in the project area is now fragmented, lowering the overall quality of habitat on the landscape.

Environmental Consequences—Threatened Northern Spotted Owl

The Ball Park Project would not downgrade or remove existing suitable spotted owl habitat, which consists of nesting, roosting, and foraging habitat. Acres that were consulted on in the BA to consider the effects of this project on the northern spotted owl were higher than those which are being proposed for treatment within this EA. After preparation of the BA in February 2008, additional acres were dropped from the Ball Park Thin project which decreases overall effects. Dispersal habitat would be modified with Alternatives B and C. Alternative C only would remove 217 acres of dispersal habitat. Within the analysis area, dispersal habitat is not limited within and between home ranges. The following definitions apply to these terms:

- **Downgraded:** to alter the functionality of spotted owl suitable habitat so that the habitat no longer supports nesting, roosting, and foraging behavior. This downgrading of habitat can result when the canopy and understory are thinned yet still retain a minimum of 40% average canopy closure.
- **Removed:** to alter suitable spotted owl habitat so that the habitat no longer supports nesting, roosting, and foraging behavior. In addition, to alter dispersal habitat so that canopy cover results in less than 40 percent and no longer functions as dispersal habitat.

Effects on habitat are in compliance with Standards and Guidelines from the Willamette National Forest Plan and U.S. Fish and Wildlife Service guidance. All sites at risk from noise disturbance would be protected with seasonal restrictions. None of the proposed project units are located in Critical Habitat or within Late Successional Reserves.

Informal consultation with the U.S. Fish & Wildlife Service for effects to the northern spotted owl was initiated with a Biological Assessment submitted on February 29, 2008 for potential effects to terrestrial species from four vegetation management projects on the Willamette National Forest. Ball Park was one of these projects. At issue in this consultation were the effects from four vegetation management projects on the Willamette National Forest (WNF) that may effect northern spotted owls and critical habitat. The Biological Assessment (Appendix D) contains an analysis of spotted owls including effects of project related activities. A letter of concurrence dated April 4, 2008 was received from the U.S. Fish and Wildlife Service that concurred with the Biological Assessment that the Ball Park project may affect, but is not likely to adversely affect spotted owls and spotted owl critical habitat (FWS *reference*: 13420-2007-I-0038).

Alternative A (No Action)—Direct, Indirect, Cumulative Effects

Under this alternative, no actions would be implemented that change spotted owl nesting, roosting or dispersal habitat. Forest stands in the area would continue to grow following natural successional pathways. Fragmented forest blocks would aggregate into contiguous forest over time. Trees within younger stands would thin out naturally over a span of several decades, and may reach low quality spotted owl foraging habitat suitability in approximately 50 or more years. Due to the previous clearcuts and relatively tight spacing in plantations, tree diameter growth would be slower than with thinnings. Self-thinning would take place over time mostly due to tree competition, some wind throw, and from root rot which currently exists in the area. Down wood would be provided as tree mortality occurs, which contributes to maintaining the spotted owl prey base.

The Sweet Home Ranger District which is located just north of the Ball Park project area is currently planning the Parks Smith timber sale. This project would remove additional dispersal habitat from spotted owl home ranges on the north end of the planning area and may be implemented during the same timeframe as the Ball Park project. Spotted owl dispersal habitat connectivity would remain adequate with implementation of this project because dispersal habitat functionality in thinned units would be maintained with a 40% canopy closure.

Alternatives B and C—Direct and Indirect Effects

This project proposes no habitat modification activities in Critical Habitat Units. Approximately one mile of road reconstruction (no habitat modification) may occur in CHU OR-16. Underburning with no other treatment is proposed on 49 acres of suitable spotted owl habitat within the Matrix and AMA land use allocations to reintroduce fire back into the ecosystem.

The introduction of prescribed fire into older, suitable spotted owl habitat may reduce the long-term risk of stand-replacing fires across the landscape. The 49 acres is not within any spotted owl core area, known or predictive site. Additionally these areas will be spring burned to retain large coarse woody debris. The proposed underburning is expected to open the forest canopy slightly which may encourage use of these stands by raptors that may compete with spotted owls. In the long term, when these stands undergo further structural development, they may become more suitable for spotted owls and their prey.

Three of the existing rock sources that would be used are within the disturbance/disruption distance of a known or predicted owl site and will have seasonal restrictions applied for blasting, as needed. No spotted owl habitat would be altered or removed. Subsurface blasting, rock crushing and use of heavy equipment for loading rock would occur. Since no habitat would be altered, use of these rock sources would have no effect on the habitat of spotted owls.

There are no proposed activities in spotted owl Critical Habitat Units other than minor road reconstruction for the haul route. Although hazard trees and brush will be removed, the functionality of the habitat will be maintained.

Alternative B—Direct and Indirect Effects

No suitable spotted owl habitat would be downgraded or removed.with the implementation of alternative B. In this alternative 915 acres of owl dispersal habitat would be thinned, without the use of helicopters. The functionality of the habitat will be maintained post treatment since the stands will retain a canopy cover of at least 40 percent, retention of large down wood and retention of hardwoods. These are all elements positively associated with dispersal habitat and spotted owl use. These stands contain few (if any) large snags at the present time. Some may be lost due to safety hazards at the time of logging, while others may be created as a result of post-harvest underburning. Canopy closures of the thinned stands are expected to close back in to current conditions within approximately 7-10 years (Chan et al. 2006)

Alternative C—Direct and Indirect Effects

No suitable spotted owl habitat would be downgraded or removed with the implementation of alternative C. 217 acres of dispersal habitat in 6 units would be thinned down to 30% canopy closure. None of these units are located in Critical Habitat. Canopy closure is expected to recover and exceed the 40% required threshold for dispersal habitat suitability within 7-10 years. An additional 698 acres would be thinned to an average of 40% canopy and maintain spotted owl dispersal habitat functionality.

Alternatives B and C—Cumulative Effects

The analysis area chosen for considering cumulative effects on spotted owls was a 1.2 mile radius buffer around all project units that may change habitat conditions for the spotted owl. Ten spotted owl home ranges overlap proposed project activity units. The changing trend in timber management occurring within the past decade, and projected for the future, should positively influence occupancy of suitable habitat for northern spotted owls as previously harvested stands within the Deer Creek and other adjacent watersheds redevelops. More emphasis is placed on recruitment of key structural components missing from harvested stands as well as retention of key structural components present in unharvested stands and restoration/maintenance of special habitats as key components of biodiversity at a landscape level.

The Biological Assessment found in Appendix D contains a detailed analysis of spotted owls. Past timber harvest resulted in the removal or fragmentation of many acres of suitable spotted owl habitat since the 1940s. At the present time, some of the previously managed stands are currently providing dispersal habitat conditions. Other stands are still too young with tree diameters that are too small to be considered dispersal habitat at this time, but they will grow into dispersal habitat over time.

Alternative B, the proposed action, would not remove suitable or dispersal spotted owl habitat. While canopies will be more open in the short-term. Long-term habitat conditions will improve with larger tree sizes and increased structural diversity. This is also the case for the two mature stands where fire is proposed as the only treatment. The projected overstory tree mortality of approximately 10% is expected to enhance structural habitat conditions within those stands for spotted owls and their prey. The USFWS has concluded that this proposed action, would not jeopardize the continued existence of the spotted owl.

One foreseeable future project is being planned in the 6th field watershed just north of the Ball Park project area. The Parks Smith Thinning Project is proposed on 1,291 acres in Matrix (918 acres dispersal habitat and 370 acres non-habitat) and Administratively Withdrawn Areas. Functionality of this habitat will be maintained because the post treatment stands are being planned to maintain a canopy of at least 40 percent, retention of snags (especially large diameter snags), retention of large down wood, and retention of hardwoods. These are all elements positively associated with dispersal habitat and spotted owl use. While the Parks Smith Thinning Project may be implemented during the same timeframe as Ball Park, it will also include seasonal operating restrictions to minimize effects to spotted owls during the critical breeding season. There is the potential that even with seasonal operating restrictions around nesting spotted owl pairs, owls present in this larger landscape area of both Ball Park and Parks Smith may be impacted by noise disturbance outside the nesting season on a larger scale. This could lead to increased energy needs and behavior modifications, temporarily affecting their fitness. In addition, thinning of stands in both projects combined may over the long-term benefit the structural development of spotted owl dispersal habitat on this landscape, while it may also temporarily increase habitat suitability for competitive raptors such as great horned or barred owls on a larger scale than if only one of these projects was being implemented throughout a longer timeframe.

Sensitive Species

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Threatened, Endangered, and Sensitive Species includes the project activity units and Forest Service lands within the Deer Creek 6th Field sub-watershed.

Affected Environment—Wildlife

Sensitive species have specific requirements under the Willamette National Forest Plan to maintain viability. Protection includes managing habitat to minimize impacts, as well as prohibition of noise disturbance during the breeding season.

Table 27 lists the sensitive wildlife species on the Willamette National Forest (USDA Forest Service, 2004) and whether there is potential habitat in the planning area. Additional detailed information about these species is in the Appendix D Biological Evaluation for Wildlife.

Environmental Consequences—Wildlife

Alternative A—Direct, Indirect, and Cumulative Effects

Under this alternative, no actions would be implemented to change sensitive species breeding, foraging or dispersal habitat. Forest stands in the area would continue to grow following natural successional pathways. Fragmented forest blocks would aggregate into contiguous forest over time. Trees within younger stands would thin out naturally over a span of several decades. Due to the previous clearcuts and relatively tight spacing in plantations, trees would grow slower in diameter than if thinning were to occur. Self-thinning would take place over time mostly due to tree competition, some wind throw, and root rot over time. Snags and large down wood would accumulate as tree mortality occurs. No foreseeable timber or fuels management activities are scheduled to occur in the analysis area that could contribute to incremental cumulative effects to sensitive wildlife species.

Alternatives B and C—Direct and Indirect Effects

Ball Park Alternatives B and C meet all applicable Standards and Guidelines from the Willamette National Forest Plan and the Northwest Forest Plan Standards and Guidelines. Under Alternatives B and C, changes in the amount or characteristics of required habitat for sensitive species that may occur in the area would be minimal, and therefore maintain persistent populations. Potential effects and impacts of action alternatives of the Ball Park Project on sensitive wildlife species can be found in the Biological Evaluations in Appendix D.

Alternatives B and C—Cumulative Effects

The wildlife species listed as MIS for the Willamette National Forest which are known or suspected to be present in the project area are discussed elsewhere in this EA. Cumulative effects on deer and elk are also discussed above. There would be minimal additional incremental effects from Alternatives B and C on sensitive species including their habitat within the project area, when considering the effects from all past actions. There is no foreseeable future habitat management actions planned within the Ball Park project area that would add to cumulative effects of the past or action alternatives.

Table 27. Potential for Occurrence of Sensitive Species in the Project Area

Species	Habitat Present in the Ball Park Project Area?
Amphibians and Reptiles	
Oregon Slender Salamander	Yes
Cascade Torrent Salamander	Yes
Foothill Yellow-legged Frog	No
Oregon Spotted Frog	No
Northwestern Pond Turtle	No
Birds	
Least Bittern	No
Bufflehead	No
Harlequin Duck	Yes
Northern Bald Eagle	No
American Peregrine Falcon	Yes
Yellow Rail	No
Black Swift	No
Tri-colored Blackbird	No
Mammals	
Baird's Shrew	Yes
Pacific Shrew	Yes
Wolverine	Yes
Pacific Fisher	Yes
Pacific Fringe-tailed Bat	Yes
Mollusks	
Crater Lake Tightcoil	Yes
Invertebrates	
Mardon skipper	Yes

Affected Environment— Sensitive, Rare, and Uncommon Plant Species

The Forest Service manual gives direction to ensure the viability of sensitive botanical species as well as preclude trends toward endangerment that would result in the need for Federal listing (Forest Service, 1991). There are no listed Threatened or Endangered plant species on the Willamette National Forest. Other rare plants, often not associated with older forests, are compiled on the Regional Forester's Sensitive Species List for the Willamette National Forest. These species and their habitats are often rare and limited in distribution.

During the early stages of project development, a pre-field review determined which sensitive species occur in the Ball Park Thin Project area. The pre-field review identified known populations of Thompson's mistmaiden (*Romanzoffia thompsonii)* along Forest road 2654. From there, intuitive-controlled field surveys conducted during June and July of 2007 investigated potential habitat of sensitive plants. Aside from the aforementioned sensitive plant, subsequent surveys identified an additional sensitive lichen species, and other unique special habitats in the project area. See Table 28.

Table 28. Sensitive Species in the Ball Park Thin Project Area

Proposed Units	Sensitive Species	Buffer
280	*Nephroma occultum*	180 ft.
370, 390	*Tetraplodon mnioides*	180 ft.
280	*Romanzoffia thompsonii*	360 ft.

Environmental Consequences—Sensitive, Rare, and Uncommon Plant Species

Alternative A— Direct and Indirect Effects

This alternative would have no direct or indirect effect on sensitive plants or rare botanical species. There would be no ground-disturbance or disturbance of the microclimate with this alternative.

Selecting Alternative A may have potential adverse effects on certain species of sensitive fungi. Without management action, downed wood accumulation would likely increase over time. Landscapes with heavy fuel loads are at greater risk of high-intensity, stand replacing fires. As a result, high intensity fire is more likely to sterilize the soil, thus destroying fungal spores and mycelium found in organic mater on the surface and uppermost soil horizons.

Alternatives B and C—Direct and Indirect Effects

No direct or indirect effects on sensitive plants or rare botanical species are expected with either action alternatives. All known sensitive plant occurrences have been mapped and would be protected with the *no-disturbance* buffers identified in Table 29 in order to maintain the viability of the populations. The buffers would maintain the microclimate for those species requiring cover or moisture retention and aid in protecting other species from physical damage during project implementation. This buffer applies to all harvest activities, ground disturbing activities, and fuels treatments.

Fungi are difficult to identify in the field, often requiring chemical and microscopic spore analysis. Apart from taxonomy, fungal relationships in ecosystems and seemingly sporadic fruiting from year to year add to the complexity of fully understanding these organisms. Direct effects to fungi (mycelial disruption) may result from either action alternative due to soil compaction, loss of host trees and underburing. Changes in microclimate from thinning would potentially have some indirect effect to unknown fungi species in the planning area.

Alternative C would have the greatest risks to unknown fungi species because it proposes more acreage in group selects then Alternative B. However, neither alternative proposes a level of thinning that would completely alter the forbs and shrub composition of the forest floor. Sunlight would be greatest in the group select units, but the change in temperature would decrease over time as the canopy begins to close.

There is moderate risk of direct and indirect effects to fungi with either alternative. It is not feasible to collect site-specific information on the cobweb-like filaments, found throughout the various soil horizons, which make up the fungi's mycelium. As such, it is not feasible to develop and implement mitigation measures to reduce impacts for most rare and uncommon fungi. In conclusion, since suitable habitat exists throughout the Ball Park Thin planning area for many rare or uncommon fungi, it is assumed that there would be some degree of impacts.

Canopy removal may have an effect on fungi that are sensitive to microclimatic change. Subsequent slash pile/fuels treatments have potential to affect some fungi species in the Ball Park Thin project area. Without knowing the presence or absence of these fungi, a reasonable assumption is that there may be some localized effects to them from timber felling, yarding and fuels treatments. However, these actions have a low risk of adverse effects to sensitive fungi and are not likely to cause a trend toward federal listing of a particular species. For further information on botanical resources, see the botanical resource report in Appendix C.

All Alternatives (A, B, and C) – Cumulative Effects

The analysis area for sensitive and rare botanical species cumulative effects is the Ball Park Thin Project area. There are no planned activities adjacent to the analysis area, therefore actions beyond this analysis area would have no effect on sensitive species, or other rare botanical species potentially located in the Ball Park Thin analysis area.

Implementation of the proposed action or any action alternatives would have no cumulative effect on sensitive plants in the project area because of the buffer and no-disturbance mitigation. Based on the analysis of this project there would be no incremental change to existing populations of sensitive species or other botanical species in the project area due to selecting any alternative detailed in the Ball Park Thin EA. Despite limitations in survey reliability, the risk of the proposed project activities endangering the viability of sensitive fungi species is low.

Affected Environment—Special Habitats

Special habitats are non-forested habitats that are limited in size and distribution across the landscape. It is important to consider the biological diversity and ecosystem function of these small, scattered habitats for a number of reasons. Special habitats often play important roles for not only full-time wildlife residents of the sites, but also for those who use them seasonally, or for only a portion of their life cycles. Numerous factors contribute to the creation or maintenance of special habitats. Among such factors, topography and hydrology often determine the microclimatic conditions at these sites.

Numerous special habitats were located in the Ball Park Thin project area during summer 2007 surveys. They range in size from 2 to 10 acres. The special habitats documented in the Ball Park Thin project area and the buffer sizes recommended in the Willamette National Forest Special Habitat Management Guide (J.Dimling and C. McCain, 1996) are presented in Table 29.

Table 29. Special Habitats in the Ball Park Thin Project Area

Proposed Units	Special Habitat	Buffer
390	Rock outcrop	180 ft.
380	Rock outcrop	180 ft.
130	Swamp	1 acre
140	Wet meadow	1 acre
150	Seep	1 acre
180	Rock outcrop	180 ft.
170	Wet meadow	1 acre
240	Rock outcrop	180 ft.

Environmental Consequences—Special Habitats

Alternative A—Direct, Indirect, and Cumulative Effects

Selecting the No-Action alternative would allow for the same level of special habitat management annually programmed. This alternative would have no adverse effect on special habitats.

All Alternatives – Cumultive Effects

The analysis area for special habitat cumulative effects is the Ball Park Thin Project area. This area was chosen because activities outside the analysis area would have no effect on special habitats located within the project analysis area.

Implementation of the proposed action or any action alternatives would have no cumulative effect on special habitats in the project area because of the buffer and no-disturbance mitigation. Based on the analysis of this project there will be no incremental change to existing populations of special habitats in the project area as a result of selecting any alternative detailed in the Ball Park Thin EA.

Alternatives B and C—Direct and Indirect Effects

The action alternatives would have no direct or indirect effects on special habitats. Special habitats would also be buffered from harvest and ground disturbing activities. These buffers would maintain the microclimate, hydrology, and prevent damage to the areas during project implementation. Without the buffer and no-disturbance mitigation, reduced cover could potentially decrease humidity and increase temperature earlier in the growing season, thus altering habitat viability.

Migratory Land Birds

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Migratory Land Birds includes the project activity units and the Deer Creek 6th Field sub-watershed, which is also the Ball Park Project area.

Affected Environment—Migratory Land Birds

Altman and Hagar (2007) identify 93 bird species in the Pacific Northwest that regularly breed in conifer forests less than 60 years of age. Over half of these species are experiencing population declines. Thinning generally does not change habitat conditions so dramatically that bird species can no longer use the stand, but often temporarily increases or decreases bird abundance depending on species. Altman and Hagar (2007) summarize studies showing 21 species of migratory birds whose range overlaps the project area increasing in abundance following forest thinning treatments. Seventeen migratory bird species did not change in abundance or had mixed responses in thinned forests, while 7 species generally decreased in abundance, at least temporarily, after thinning. Silvicultural treatments that promote understory shrub development, trees species diversity, deciduous trees, and the growth of larger trees; maintain snags and downed logs; and create gaps in the stand generally improve avian biodiversity. Thinning has not been shown to have long term effects on any sensitive bird species or species of special concern.

Environmental Consequences—Migratory Land Birds

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

Alternative A would not alter habitat conditions for migratory landbirds. Existing vegetation conditions would continue to follow natural successional pathways, and bird populations would respond accordingly. While no snag habitat used by certain species of migratory land birds would be lost due to roadside hazard tree removal, no snag habitat would be created within forest stands where it is currently at extremely low densities, or non-existent. Additional snag habitat would be created through natural mortality in forest stands which are currently at low densities. Alternative A would have no direct, indirect, or cumulative effects on habitat of migratory landbirds in the project area.

Alternatives B and C—Direct and Indirect Effects

Felling of trees within plantations or along roadsides associated with this project may unintentionally affect habitat for individual migratory birds, but is not expected to have a measurable effect on their overall habitat or populations because of the limited extent of habitat removal. Thinning in young stands and prescribed fire in mature stands may impact habitat for certain species such as Hutton's vireo, golden-crowned kinglet, hermit thrush, and Swainson's thrush by reducing suitable habitat. There would be areas of no harvest, such as buffers of special plant habitats or specific riparian areas, within some of the proposed stands providing potentially less impact.

Species that use early seral stages, such as the winter wren, American robin, and grouse, may benefit from thinning harvest treatments, especially the small gaps. Species which would increase in number as a result of thinning include Dark-eyed junco, Warbling vireo, American robin, Hairy woodpecker, Townsend's solitaire, Evening grosbeak, Western tanager, and Hammond's flycatcher (Hayes, J. et al. 2003).

Snag habitat which may be used by migratory land birds such as western bluebirds or swallows, would be lost due to roadside hazard tree removal under Alternatives B and C. However, snags would be created in some thinning units from the post-harvest burn, as well as throughout the 49 acres of natural fuels underburn. It may take approximately ten or more years before these created snags become functional, although increased insects on these dead trees may increase bird foraging habitat within only a few years.

Spring burning may impact nesting land bird species by leading to nest failure or individual mortality. Species most affected would be those birds which nest relatively low to the ground such as hummingbirds, flycatchers, warblers, sparrows, and thrushes. Most migratory land birds generally fledge in June or July, although this can be later when second nest attempts are made. Juveniles of some species may not be able to fly long distances until late summer, however, many species are independent much earlier and would be able to escape a fire and smoke situation that could harm them.

Alternative B and C would change migratory land bird habitat by thinning 915 acres of young forest plantations. No thinning in Alternative B would reduce final canopy closure to less than an average of 40%. Those species that would be less affected as a result of this thinning, compared to a more intensive canopy thinning, include Pacific-slope flycatcher, Hutton's vireo, and brown creeper (Hayes, J. et al. 2003). Alternative C would create slightly more gap habitat within stands (151 acres compared to 129 acres with Alternative B) which would benefit early seral land bird species. In addition, Alternative C would thin to 30% remaining canopy closure on 217 acres, also benefiting those species that prefer open stand conditions. Species that would respond negatively to Alternative C's six units of 30% canopy retention include Pacific-slope flycatcher, Hutton's vireo, and brown creeper (Hayes, J. et al. 2003). Habitat for these latter bird species would improve once canopies close back in 7-10 years from implementation.

Alternatives B and C—Cumulative Effects

Past management activities within the Ball Park Project area have resulted in changes to the seral stage composition across the landscape altering habitat conditions for land birds. Different species occupy different seral stage habitats and therefore the effects to habitat for each species depend on the specific type of change that occurred. Effects from the proposed thinning and underburning activities of the Ball Park Project would be an increase in acres of small openings created across the landscape, which may impact some landbird habitat by reducing suitable, dense nesting habitat in very young trees. The more open nature of the remaining young trees may make nests more available to landbird nest predators, i.e. Stellar's jays or common ravens. There are no other reasonably foreseeable future timber harvest or prescribed fire activities planned for the project area.

Snags and Down Wood

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Snags and Down Wood includes the project activity units and Deer Creek 6th Field sub-watershed, which is also the Ball Park Project area.

Affected Environment—Snags and Down Wood

The significance of the ecological role of dead wood, i.e. snags and large down wood in influencing ecosystem diversity and productivity is well addressed in the Willamette National Forest Land and Resource Management Plan (1990) and elsewhere (Brown et al. 2003). The importance of dead wood in coniferous forests of the Pacific Northwest is further emphasized by management Standards and Guidelines (S&G) under the Northwest Forest Plan ROD (1994, 2001), as well as elsewhere throughout published literature (Hagar et al. 1996, Hallett et al. 2001, Laudenslayer et al. 2002, Lewis 1998, Muir et al. 2002, Rose et al. 2001).

Under the Willamette Forest Plan as amended by the ROD, snag habitat shall be managed at levels capable of providing for at least 40% or greater potential populations of cavity-nesting species. Current science has not tested the validity of the potential population approach to species management, yet it remains the basis for Standard and Guidelines involving snag management. Strong support for identifying more appropriate amounts of snag and down wood habitat has resulted in the development of new approaches in addressing these habitat components. One such approach is DecAID - the decayed wood advisor for managing snags, partially dead trees, and down wood for biodiversity in forests of Washington and Oregon (Mellen et al. 2006). DecAID has been created as a tool to help managers evaluate how varying levels of dead wood provide habitat for different species, and is primarily designed to apply to salvage and green tree projects. A benefit of using DecAID during the planning process is that it determines if current dead wood levels are consistent with reference conditions. In addition, DecAID can be applied to identify dead wood management goals for projects that affect dead wood habitat throughout dominant habitat types. Snag and dead wood habitat levels were compared to DecAID recommendations and Forest Plan Standard and Guidelines based on population potential for this project.

Interpretation and/or application of advice obtained from DecAID for how the Ball Park Project may effect dead wood habitat is based on referencing information available in DecAID for the Westside Lowland Conifer-Hardwood habitat type in the Western Oregon Cascades with a Small/Medium Tree Vegetation Condition (WLCH_OCA_S). With the exception of the two proposed natural fire stands which are in the Large Tree condition, the remainder of the Ball Park Project stands proposed for commercial thinning is entirely within this habitat type. The Ball Park Project planning area is considered an appropriate sized area of similar habitat to consider when evaluating current and future levels of dead wood (Mellen et al. 2006).

Snags (Current Condition)

Estimates for current snag size and distribution are displayed in Table 30, and were made based on estimates from a combination of stand exam data, knowledge of previous snag creation activity, and field reconnaissance.
Two approaches were used to assess snag levels for the Ball Park project area:

- Quantitative evaluation of seral stage habitat
- DecAID tool

Seral stage habitat evaluation:

Natural forest stands in all seral stages will usually contain large downed wood on the forest floor and snags in the overstory. Many stands that are currently in the early and especially mid seral stages, logged prior to about 1987, do not contain snags and large down wood or only very limited amounts. After that time, snag habitat was sometimes retained and generally created at variable levels of 1-4 snags/acre.

The younger early seral stands (<25 years old) generally contain very little large down wood left after the logging operation. Some of the older early seral stands (26-40 years old) contain much higher levels of very large diameter down wood. This remnant down wood is relatively old, and mostly all in the higher decay classes 3-5 (Bartels et. al 1985).

Snag and down log information from CVS plots was summarized by vegetation series for natural stands in mature and old-growth stages for the Mid-Willamette LSR Assessment. The following table is extracted from additional information, and shows only big snags (>20", >16') and big logs (>21", >21'). The levels of snags and logs are highly variable among stands.

Table 30 is for Mature and Old Growth in the Willamette National Forest (USDA Willamette National Forest et. al 1998). Vegetation Series shown are those which occur in the Ball Park Planning Area. For more discussion on Snags, see Appendix D

Table 30. Big Snag and Log Ranges by Vegetation Series

Series	Big snags per acre	Big logs per acre
Pacific silver fir *Mature*	21 (14-29)	19 (5-13)
Old growth	32 (18-43)	12 (7-16)
Douglas-fir *Mature*	0 (0-5)	9 na
Old growth	21 (11-21)	13 (9-22)
Western hemlock *Mature*	11 (5-21)	11 (8-25)
Old growth	24 (13-42)	14 (9-21)
Numbers shown in parentheses show within stand variability.		

Aerial flight information for unmanaged stands was considered, but was not additive to the above discussed snag totals. Current levels of large tree mortality are not considered to be outside the levels of normally occurring insect and disease mortality. The forest insect and disease detection survey cannot measure older snags in the later decay classes and trees broken by wind, and may not accurately record snag recruitment in the understory due to suppression. Down wood recruitment also has not been recorded. Future areas of tree mortality due to damage from Balsam woody adelgid were also documented, but are not judged to be significantly outside the normal range of occurrence.

Table 31. Snag levels in the Ball Park Project Area.

Unmanaged Stands	Managed Stands
• Old Growth stands assumed to have 18 large snags/acre. • Mature stands assumed to contain 50% of old growth stands or 9 large snags/acre.	• In stands with snag creation: 621 wildlife trees created in 1982, 1983, 1986, 1994, and 2001. • Many managed stands had no snag creation. • Average for all managed stands combined: 0.4 snags/acre
• Aerial flights: 0.2/acre in all seral stages	

On a larger scale, dead tree patches have largely been missing in the western Oregon landscape due to fire suppression and post-fire salvaging, at least until the 1991 Warner Creek Fire on the Willamette National Forest, which was not salvaged. Additional large-scale snag habitat was created by the 2003 B&B Complex Fire, although most of this burned on the eastside Deschutes National Forest. Large landscape-scale snag patches, especially in high elevation wilderness, last only a few decades before forest succession reclaims them. About 30 percent of snags less than 40 inches dbh fall down within the first decade (Ohmann and Wadell 2002) and 50 percent of Douglas-fir less than 16 inches dbh fall within the first 15 years (Everett et al. 1999). Larger diameter trees usually remain standing for much longer periods.

In 2002, there were roughly 29 concentrations of large snag patches greater than 10 acres which are currently scattered across the landscape within the Oregon Western Cascade Province (Davis 2003). The average distance between snag patches is about 4.2 miles. This is the average, shortest distance from one cluster of patches to another. Considering this is the best, most concentrated snag habitat, with moderate and lower quality habitat in between, it is expected that this should allow for fairly good connectivity of high quality snag-dependent bird habitat.

<u>DecAID</u>:

Snag levels within the project area were compared against those listed in DecAID for Westside Lowland Conifer-Hardwood habitat type, in the Western Oregon Cascades, with a Small/Medium Tree Vegetation Condition (WLCH_OCA_S). Current snag levels throughout the planning area are above average values of the 50% tolerance range representative for snags in unharvested areas in this habitat type and condition.

Table 32. Current Condition (Alt. A) and Estimated levels of Snag Habitat in Comparison with DecAID

		DecAID	
Snag Size	**Current Snags per Acre***	Un-harvested inventory plots (un-thinned managed stands)	All inventory plots (previously thinned and un-thinned managed stands)
≥10” dbh	≥13 snags/acre	66th percentile	85th percentile
≥20” dbh	≥9.6 snags/acre	67th percentile	83rd percentile

* are in approximate numbers

The majority of large standing snags are Douglas-fir. The majority of smaller snags throughout the area is also Douglas-fir, and as a result of mortality from growth competition. Snag distribution across the project area can be considered patchy and variable, and would be affected equally under either Action Alternative.

Down wood estimates for current size and distribution were made based on reasoned estimates using inventory and stand exams from unthinned managed stands throughout the planning area. Tree mortality largely associated with self-thinning competition, cull logs from previous harvest activity, localized breakout from snow loading, and in one area wildfire has resulted in down wood levels as shown in Table 33.

Smaller logs are generally in decay class I and II, while larger logs are in decay class II and III. Many of the largest pieces of down wood (cull logs from initial harvest activity) exist in decay class III. Existing down wood occurs in patches rather than even distribution across the planning area.

Table 33. Current Condition (Alt. A) and Estimated levels of Down Wood in Comparison with DecAID

Down wood Size	Stand Type	Tons/Acre
≥6” diameter	Thinned managed stands	22.7
≥20” diameter		18.4
Down wood Size	**Stand Type**	**Tons/Acre**
≥6” diameter	Unthinned managed stands	38.1
≥20” diameter		24.8

In addition to dead wood levels associated with down logs, it is estimated that decaying wood habitat associated with stumps ≥20” diameter would cover less than 1% of areas treated under either Action Alternative. The amount is considered to be equal under either of these alternatives. Use of stumps throughout a range of decay classes has been documented for a wide variety of organisms (O’Neil et al. 2001, NatureServe 2006, Rose et al. 2001, Zabel and Anthony 2003). This type of dead wood provides a valuable, long-lasting habitat component that supplements the potential to maintain native biodiversity throughout the project area.

Down wood levels for this project were compared against those listed in DecAID for Westside Lowland Conifer-Hardwood habitat type, in the Western Oregon Cascades, with a Small/Medium Tree Vegetation Condition (WLCH_OCA_S). A review of DecAID data discloses current down wood levels throughout the planning area are above average values (within the 50% tolerance range) representative for dead wood in both harvested and unharvested areas within this habitat type and condition. How down wood levels in the Ball Park Project planning area compare to DecAID data is displayed in Table 34.

Table 34. Current Condition (Alt. A) and Estimated levels of Down Wood in Comparison with DecAID

	DecAID	
Down Wood Size	Unharvested inventory plots (unthinned managed stands)	All inventory plots (thinned and unthinned managed stands)
≥6” dbh	71st percentile	67th percentile
≥20” dbh	82nd percentile	78th percentile

Normal processes that influence these changes are highly variable in their ability to affect change (Rose et al. 2001). The natural fire interval for the Ball Park project area has been estimated at less than 50 years to 200 years with a mixed fire regime, depending on the area (Lantz, personal communication 2008). Insects and pathogens continually contribute to successional development; however, traditionally this occurs at a small scale relative to the overall landscape. The area is not prone to flooding or landslides which may also affect changes on a small scale. Windthrow is yet another normal process that has occurred, and would continue to occur unpredictably, to influence stand dynamics in this area on a small scale. Because the overall condition of the project area is largely influenced by previous management activities that have simplified stand and landscape structure and diversity, additional stand management may be seen as a method to assist in restoring some landscape conditions, such as stand dynamics associated with creating more normal levels of snags and down wood. Snag creation between

1988 through 2006 has already contributed 621 additional large snags to current stands less than 40 years old. Most of these snags were topped and should develop into useable snag habitat within ~5 years.

With current fire suppression efforts, not many wildfires can burn to create the diversity of snag and large down wood habitat on the landscape. A number of events throughout the watershed, as well as within the project area, have occurred to increase dead wood levels across the landscape. District fire records reveal that from 1970 to 2007, there has been 36 small wildfires averaging less than one acre each. These fires may have produced a small number of snags or down wood throughout the project area. Salvage is not known to have occurred associated with any of these fire events.

Reference information extrapolated from DecAID suggests current size, abundance, and distribution of snags and down wood exceeds average historic levels (50% tolerance) across the project area considering habitat type and vegetation condition. It should be noted that with respect to snags or down wood, the objective of the Ball Park Project is more directed at managing for an average historic dead wood habitat condition rather than focusing on specific dead wood requirements for individual wildlife species.

Environmental Consequences—Snags and Down Wood

Alternative A—Direct, Indirect, and Cumulative Effects

Alternative A does not propose management activities at this time and therefore would not alter snag and down wood densities. Existing vegetation conditions would continue to follow natural successional pathways, with snags and down wood responding accordingly. Snags and large down wood would continue to be created by the various natural mortality agents: insects and diseases, wildfire, windthrow, snowthrow, bear damage, as well as suppression mortality. Alternative A would have no direct, indirect, or cumulative effects on snag and down wood in the project area.

Alternatives B and C—Direct and Indirect Effects

<u>Commercial thinning</u>: Some loss of existing snag habitat would occur under either Action Alternative, due to safety issues. The highest loss of the largest snags, and currently injured trees which may become future snags, would occur as snags are felled along the Ball Park haul route for safety reasons. Most of these are concentrated at higher elevations (> 2500 feet). Current snag levels within Ball Park harvest units range from low to almost none, so loss within thinning units is judged to be minor. Snag loss would be greatest among sizes <10”dbh, intermediate for snags ≥10-20” dbh, and very low among snags ≥20”dbh. All felled snags would be left as down wood. Depending on decay class and burning conditions, some felled snags may be fully or partially consumed during subsequent fuels reduction of underburning. Some of the retained green trees may have defects that would provide future dead wood habitat.

<u>Post-harvest fuels treatments</u>: Underburning many of the thinned stands may produce additional snag habitat, but is not judged to provide much due to the moister spring-like conditions this type of burning would occur in. Tree mortality of up to 10% would be acceptable, but in the past, many underburns have not reached 10%. Underburning may reduce existing large down wood habitat in specific areas when logs are in the older decay classes III or IV. Stands that are not underburned would have pile burning treatments to reduce fine fuels. Existing large down wood would not be impacted because piles are not placed over large existing down wood of

any decay class. Pile burning treatments are unlikely to result in tree mortality. Any such mortality would add to an existing patchy distribution of snag habitat throughout the planning area.

Natural Fuels Underburn: Implementing a natural fuels underburn on two units may slightly increase snag habitat and is not expected to impact large down wood habitat. The fire prescription calls for 10% live tree mortality (with an acceptable range of 5-20%), which in a mature forest stand translates to approximately 8-10 snags/acre being created on the 49 acres where this treatment is prescribed.

Within stand variability throughout the planning area influences current snag distribution. This variability would also influence the location of replacement snags, which would be provided for in a patchy rather than even distribution across the area. This prescription is common to each Action Alternative and would assure compliance with Northwest Forest Plan guidance to maintain 40% of potential populations of cavity nesting species (USDA, USDI 1994 page C-42).

Based on current stand structure, composition, and habitat type there is generally sufficient site-specific potential to support application of the Northwest Forest Plan Standard and Guideline (ROD page C-40) to leave an average of 240 linear feet of logs per acre greater than or equal to 20 inches in diameter or material of the largest diameter class available across areas treated by the Ball Park Project under either Action Alternative.

Alternatives B and C—Cumulative Effects

The cumulative effects analysis area was the Ball Park project area. As mentioned above the project area is considered an appropriate sized area of similar habitat to consider when evaluating current and future levels of dead wood (Mellen et al. 2006). Approximately 38%, or 5,556 acres, of the Ball Park Project area has been managed by regeneration harvest.

Past management actions related to timber harvest activity are generally responsible for the current condition of dead wood habitat throughout the planning area. These actions have affected the overall amount and distribution of dead wood habitat by reducing the amount of old-growth habitat and increasing the amount of mid seral habitat. There are no foreseeable actions that would affect dead wood habitat in this area. Current science and the changing trend in timber management that has occurred within the past decade, and is projected for the future, should positively influence management of decaying wood as previously harvested stands redevelop, and more emphasis is placed on retention of key structural components in harvested stands.

Data analysis reveals the amount and distribution of snag and down wood habitat would essentially remain unchanged or experience a slight increase under either Action Alternative. Commercial thinning as proposed under either Action Alternative for the Ball Park Project is therefore likely to have little or no cumulative effect on dead wood habitat throughout the planning area. The action alternatives would allow trees to grow larger and faster, and to develop characteristics such as large limbs and crowns. The increased health and resistance of the thinned forest stands to future insect and disease outbreaks would make natural snag development less likely for the next 10-20 years; however some diseases would still occur such root rot. Whether or not the natural fuels underburn stands show increased or decreased snag development after the first round of tree mortality post-fire is unknown.

Dead wood habitat should exist in a sufficient amount and distribution to support the local wildlife community, including MIS such as pileated woodpecker, marten, and cavity nesters such that their ability to persist or become established would not be limited by this habitat component important to most members of the wildlife community in this area.

Alternatives B and C—Conclusions

Under either Action Alternative the Ball Park Project proposes commercial thinning in approximately 53% of mid-seral (stem exclusion) habitat throughout the planning area. This relates to approximately 6% of the entire planning area. There is essentially no difference between Action Alternatives and their effect on dead wood.

The silvicultural prescription calls for protection of existing snags and down logs. However, some amount of loss or disturbance of snags and down wood is inevitable as a result of safety and logging feasibility issues. Measures are identified to address this loss or disturbance. Effects analysis reveals that proposed activities in conjunction with mitigation measures would result in a stable or slight increase in dead wood levels associated with areas treated. Direct and indirect effects would be limited to an undetermined number of snags and logs that may be unavoidably affected or created within harvest units and the prescribed natural fire stands.

DecAID relies on data from unharvested plots to assist managers in setting objectives aimed at mimicking natural conditions. Considering current conditions of snag and down wood habitat along with the information presented above, it is expected that dead wood levels throughout the Ball Park planning area should remain above average in the natural range considered for similar habitat following thinning, subsequent fuels reduction, and prescribed natural fire.

On a smaller stand scale, dead wood levels would be on the low end of the natural range as shown in DecAID and the Willamette Province LSR Assessment. For this reason, snag creation at the level of three per acre at a minimum of 14” dbh is recommended as an enhancement to the project area throughout all units if monitoring following logging and fire activities shows the area to be deficient. Large down wood creation is recommended if monitoring following the activities shows levels to be below 240 linear feet/acre with a minimum dbh of 14”.

The Ball Park Project would maintain dead wood habitat throughout a managed forest that typifies the planning area at levels that would ensure its’ ongoing central role in the ecological processes affecting this type of forested habitat (Rose et al. 2001). The project would comply with S&Gs for snag and down wood management.

Management Indicator Species

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Management Indicator Species includes the project activity units and Forest Service land within the McKenzie Deer Creek 6th Field sub-watershed.

Affected Environment—Terrestrial Species

Management Indicator Species (MIS) were addressed in the Willamette Forest Plan. They include the spotted owl, pileated woodpecker, marten, elk, deer, cavity excavators, bald eagle, peregrine falcon, and fish. All of the management indicator species except the bald eagle may occur in the Ball Park Thin Project area.

Through Region-wide coordination, each Forest identified the minimum habitat distribution and habitat characteristics needed to satisfy the life history needs of MIS. Management recommendations to ensure their viability were incorporated into all WNF Plan Action Alternatives. Current conditions for the spotted owl and bald eagle are discussed in the Wildlife BE in Appendix C. Habitat for elk and deer is discussed in the Elk Habitat section in this chapter.

Environmental Consequences—Terrestrial Species

Alternative A (No Action)—Direct and Indirect Effects

Under Alternative A, no change to habitat of management indicator species would occur; forest stands would continue to develop following natural successional pathways and aquatic resources would remain similar to current conditions. Alternative A would be expected to meet applicable Standards and Guidelines from the Willamette Forest Plan. Alternative A would have no direct, indirect, or cumulative effects on habitat of management indicator species in the project area

Alternatives B and C—Direct and Indirect Effects

Ball Park Thin Alternatives B and C meet all applicable Standards and Guidelines from the Willamette Forest Plan. All alternatives of the Ball Park Thin Project would meet Northwest Forest Plan Standards and Guidelines, and therefore maintain persistent populations of spotted owls, pileated woodpeckers, and martens (USDA Forest Service, USDI Bureau of Land Management. 1994. Appendix J2). Under Alternatives B and C, changes in the amount or characteristics of required habitat for these species would be minimal.

Impacts of the Ball Park Thin Project alternatives on the spotted owl, bald eagle, peregrine falcon, and fish can be found in the Biological Evaluations in Appendices B and D. This project may affect, but is not likely to adversely affect, the northern spotted owl due removal of dispersal habitat and natural fuels underburning in suitable habitat in Alternatives B and C. The spotted owl is discussed further in the previous section. This project has no effects on bald eagles or peregrine falcons. Impacts of the Ball Park Thin Project on elk and deer are discussed in the Elk Habitat section.

While pileated woodpecker and marten may be displaced by harvest and burning activities in this area, populations throughout their range have not been identified as being in decline, as indicated by their absence from the Regional Forester's Sensitive Species List (USDA Forest Service. 2002).

Alternatives B and C—Cumulative Effects

Wildlife species listed as MIS for the Willamette National Forest and present in the project area, are discussed elsewhere in this EA. Cumulative effects on deer and elk are also discussed above.

Implementation of either action alternative would not result in significant, incremental negative effects on the remaining MIS species or their habitat within the project area (including pileated woodpeckers, pine marten and non-TES fish), when considering the effects from all past actions in the analysis area. There are no foreseeable future habitat management actions planned within the Ball Park Thin Project area that would add to cumulative effects of the past and currently proposed actions or action alternatives.

Affected Environment—Fisheries

Management indicator fish species found in this area were described previously in the Aquatic Resources discussion. The MIS fish species described are spring Chinook salmon, bull trout, rainbow trout, and cutthroat trout. Because the distribution and range of these MIS fish overlap and possess similar requirements in water and habitat quality, the analysis findings for spring Chinook salmon and bull trout (main stem McKenzie River), and cutthroat trout (small tributaries) were used to evaluate effects.

Environmental Consequences—Fisheries

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

Under Alternative A, no change to habitat of management indicator species would occur; forest stands would continue to develop following natural successional pathways and aquatic resources would remain similar to current conditions. Alternative A would be expected to meet applicable Standards and Guidelines from the Willamette Forest Plan. Alternative A would have no direct, indirect, or cumulative effects on habitat of management indicator species in the project area.

Alternatives B and C—Direct and Indirect Effects

Although some project activities will have localized and minor negative effects at the project scale, the effects to habitat occupied by native species considered Management Indicator Species are insignificant and are not expected to have an adverse effect on MIS. Due to project design and mitigation measures, the Ball Park Thin project may be expected to maintain MIS species and habitat in the short-term (during project implementation), and have a beneficial influence on MIS habitat in the long-term (5-50 years), following proposed road reconstruction and as thinned riparian reserve stands begin to contribute to in-stream habitat quality.

Project direct and indirect effects would not adversely affect fisheries MIS. Water and habitat quality would be maintained meeting the objectives of the Willamette National Forest LRMP and Aquatic Conservation Strategy of the Northwest Forest Plan.

Alternatives B and C—Cumulative Effects

A review of the analysis area for past action, the proposed action, and any foreseeable future actions was completed. Previous road construction and timber management has affected the condition of fish habitat in the analysis area as discussed in Water Quality/Aquatic Resources effects. The proposed action and the action alternatives would not incrementally contribute to loss of aquatic habitat (in action alternatives, primarily through proposed drainage improvements to the existing road network). Timber management activities and their proximity to waterways were designed to maintain existing water quality and minimize potential disturbance to native aquatic biota (as sources of sedimentation). Potential to increase stream temperature with the proposed action and action alternatives does not exist, due to protection of sources of shade to perennial waterways.

Following examination of the cumulative effects from past actions along with the proposed projects, the additional management-induced effects from this project would not change the following:

1. The timing or magnitude of peak flow events (planning sub-drainage ARP remain above the Willamette Forest Plan recommended levels);
2. Instability of stream banks [recommended ARP midpoints are exceeded, and exclusion of bank destabilizing activity);
3. Adverse alteration of the supply of sediment to channels (localized increases of short duration would not adversely modify project area sediment supply);
4. Adverse alteration of sediment storage and structure in channels (current channel conditions would be maintained with proposed action alternatives).

Upstream passage measures at Cougar Dam are under NEPA evaluation (a trap-and-haul facility with evaluation by Army Corps of Engineers) and may be implemented following ACOE NEPA analysis. A favorable response by MIS aquatic species would be anticipated with reconnection of the South Fork McKenzie River to project adjacent reaches of the McKenzie River, primarily through bull trout and spring Chinook salmon access to historic refuge areas.

No other foreseeable project planned in the Ball Park Thin Project area would add incrementally such that the proposed activities, in combination, would adversely alter aquatic habitat conditions. This assertion includes the cumulative impacts of past actions. The quality of Critical Habitat important to listed aquatic species (spring Chinook salmon and bull trout) is expected to be maintained with implementation of the proposed action (Alternative B) or other action alternatives (Alternative C). Similarly, the No Action Alternative would maintain habitat conditions currently available to aquatic MIS.

Fire and Fuels

Scale of Analysis

This report identifies direct, indirect effects within the proposed treatment areas of 1,156 acres. The cumulative effects analyzed the Ball Park Thin Project Area of 14,508 acres. The project lies within the Deer Creek Subwatershed (6th field) within the Upper McKenzie River Watershed (5th field). The Fire Regime Condition Class (FRCC) model was done at the 4th field. Specific field data within the Project Area was gathered as stated above. Models were used that included project data and data from large landscape level due to the character of fire as a disturbance and how it moves across the landscape. To identify specific effects of fuels treatments, models were zoomed into the area using field information and landscape level data.

Affected Environment—Fire Fuels

Fire has and will continue to play an active and vital role in our forest ecology. Treatments in this project would help to return the ecological role of fire disturbance. Historically, across the Willamette National Forest, fire created mosaic patterns within the vegetation. This is because fires occurred at different times in the year or locations, which affected the intensity and severity of the fire. Fires were often caused by lightning, and there are references and stories of Native Americans using fire for managing resources, the land, and travel routes (Teensma 1987, Kay 2007). Fire affects forest ecology in multiple ways, some examples of this are the distribution of fungi, changes in understory vegetation, distribution of canopy cover, and diversification of areas for wildlife. Improving the role of fire is needed to decrease the potential of large, high severity wildfires, and to move the ecosystem closer to the natural disturbance process. Teensma studied fire history in an area near Ball Park Thin Project Area. The mean fire return interval (MRFI) he analyzed ranged from <100 years to 166 years.

Kay (2007) notes that low intensity fire was regularly used by Native Americans across the Americas, as well as in the Willamette Valley. Archaeological data, ethnographic, and historical information confirm that Native American travel routes and communities are located in the area. Consequently, it is assumed that controlled fire would have been a tool commonly used before Anglo settlement in the area. Another line of evidence that suggests fire played an important role in developing the forests vegetation due to the presence of shade intolerant tree species at many of the lower elevations on the McKenzie River RD. Teensma's Dissertation (1987) shows how the natural fire rotation changed from times during Indigenous use, Anglo-settlement, and current fire suppression.

- 1772-1830 at 78 years
- 1851-1909 at 87 years
- 1910-1987 at 77 years

Fire Regimes

Fire Regimes describe the natural frequency fire occurs across the landscape pre-settlement and includes the historic aboriginal use (Agee 1993). Five Fire Regimes are used at the national level Fire Regime I, II, III, IV, and V (Hann et al. 2003). Within the Ball Park Thin Project Area the following Pacific Northwest Region 6 Fire Regimes have been classified:

Fire Regimes in the Ball Park Thin Project Area (See Figure 27)
• **Fire Regime I –** < 0-35 year fire return interval; low severity
• **Fire Regime IIIa –** < 50 year fire return interval; mixed severity
• **Fire Regime IIIb –** 50-100 year fire return interval; mixed severity
• **Fire Regime IIIc –** 100-200 year fire return interval; mixed severity
• **Fire Regime V –** 150+ year fire return interval; high severity

Fire Regimes use the description of mixed severity. This term on the Willamette NF explains the varying degrees of fire intensity that can occur given the topography, vegetation, and the ability of larger trees to withstand the intensity creating different levels of mortality. Mixed severity fires range from low intensity (low mortality) ground fires to higher severity fires where canopy fires kill most of the trees, thus mixed severity creates a mosaic of different mortality and seral stage classes across the landscape (Hann et al. 2004). For example a light intensity burn would not leave fire scars or cat-face on larger trees. Due to this light intensity fire understory vegetation would change, but evidence that a fire occurred would be difficult to find through tree scarring. No tree scarring does not discount that fire occurred across the landscape and played an important role ecologically (Kertis, 2008).

In addition to the frequency and severity, fire disturbance is categorized into Fire Regime Condition Class (FRCC). FRCC describes the degree of departure of current vegetation from the historic fire regime and helps to establish reference and evaluate risks to the ecosystem (Hann, et.al. 2001). FRCC 1, 2, and 3 rank the degree of departure:

Table 35. Fire Regime Condition Class (FRCC) Definitions

Condition Class	Departure of Fire Regime from Historic Range	Risk of Losing Key Ecosystem Components	Alteration of Vegetation Attributes form Historic Range
FRCC 1	Departure is not more than one return interval	Low	Functioning within the historic range
FRCC 2	Moderate change in size and intensity has resulted	Moderate	Moderately altered
FRCC 3	Dramatic changes in fire size has severity have resulted	Severe	Substantially

Figure 22. Fire Regime map

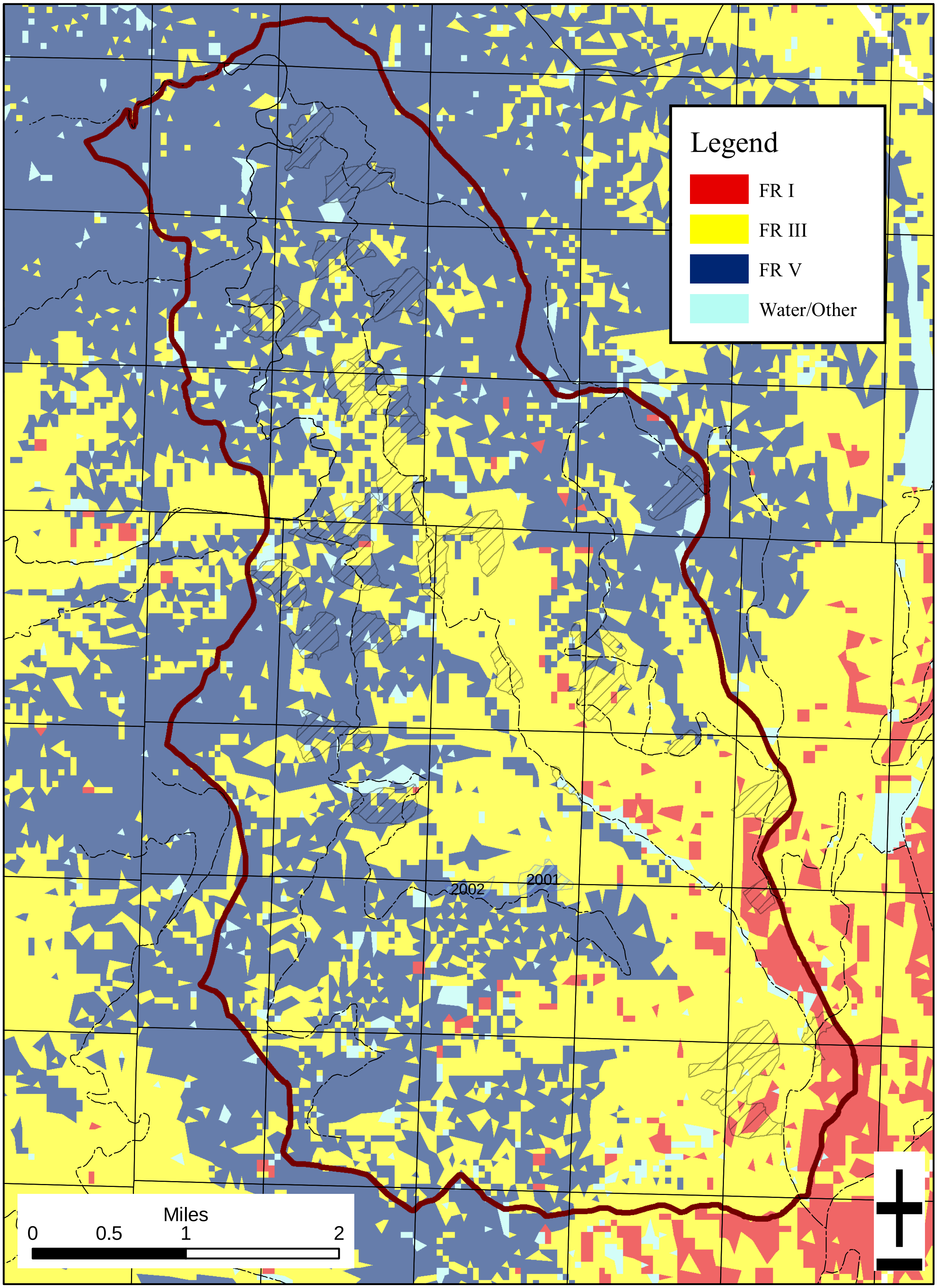


Figure 23. Fire Regime Condition Class Map

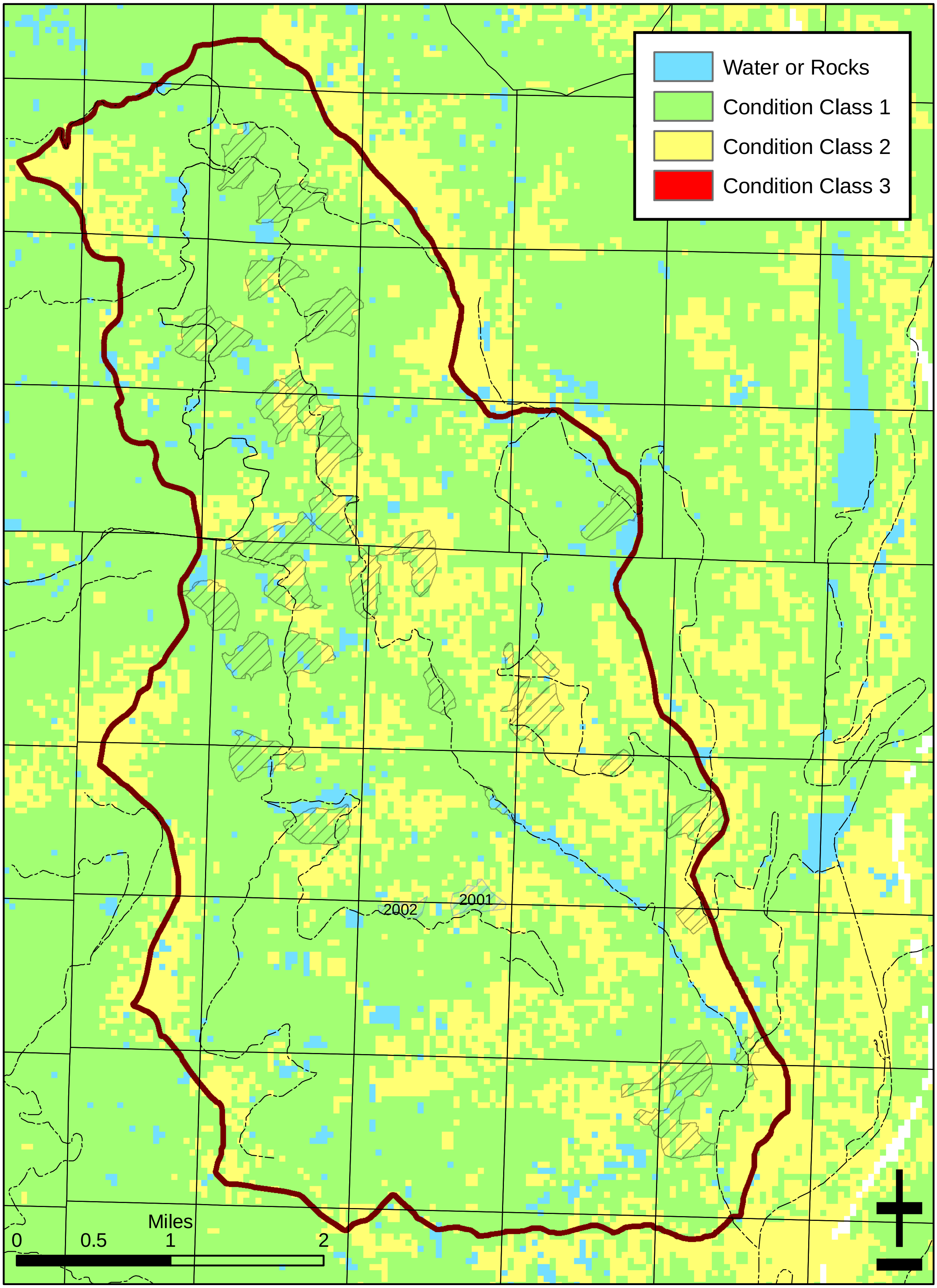
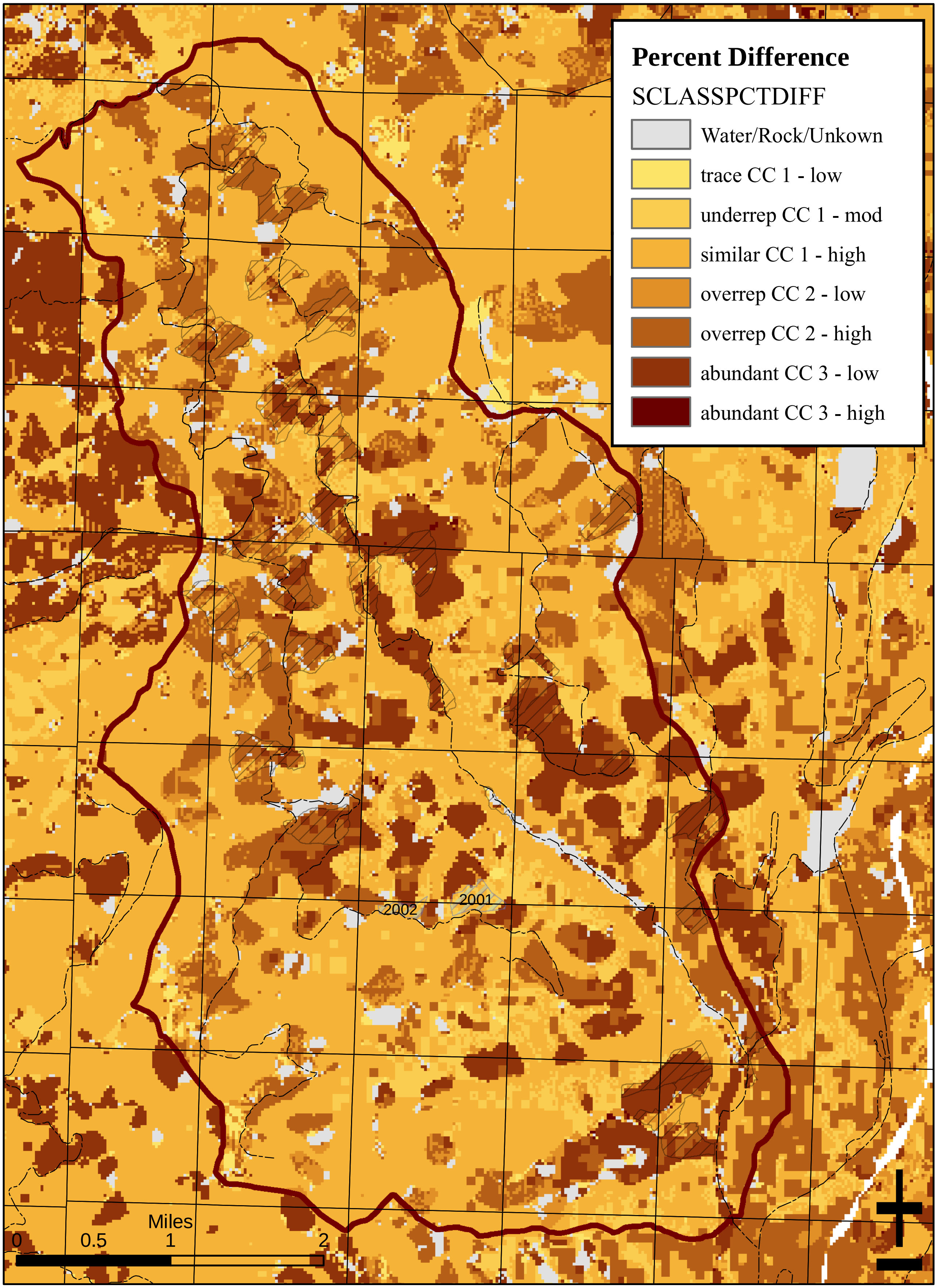


Figure. 24: Fire Regime Condition Class Map % Difference



As stated in documentation from the NW Oregon FRCC workgroup in 2004, FRCC evaluation is conducted by identifying the plant communities (biophysical settings, BpS) that would exist given the soils, climate, topography, and the natural disturbance regime. This is followed by identifying current vegetation in five seral stage categories (early, mid-closed, mid-open, late-open, late-closed). The stratum FRCC (4-6th field watershed) categorizes fire as a landscape level disturbance and is evaluated across an area it may naturally occur. Stand FRCC was evaluated at a field level using relationships between current and historical seral stages (Kertis et al. 2007 and Hann et al. 2004). Figures 23 and 24 show the difference of FRCC stratum and stand level. Figures 24 shows a greater amount of the area falls into FRCC 2 and FRCC 3. Much of the Ball Park area currently exists as seral stages: early, mid-closed, or late-closed with very few in the mid-open or late-open.

Given the difference in seral stages, from historic to current, the Ball Park Thin Project Area ranges through all three FRCC levels and on average concludes the area is moderately altered from the historical range of variability for fire interval. A moderate change in potential fire intensity and severity has resulted (Kertis et al. 2007 and Hann et al. 2001). Additionally, susceptibility to high severity of fire within the Ball Park Thin Project Area should be tempered with the current continuous horizontal and vertical fuel profile and the main highway travel route. These factors and fire suppression create more of a potential for unnatural, severe fire as well as hazards to public and fire fighters.

Fuel Profile

Fuel models describe the fuel profile in the Ball Park Thin Project Area. Fuel models are a quantitative way to describe surface fuel loading (amount of fuel in tons/acre), arrangement, structure, and calculate predicted fire behavior. The primary fuel that carries the fire is the general classification in fuel models, i.e. grass, brush, timber litter, or timber slash. Fuel loading and depth correlate to the fire intensity and rate of spread. Horizontal fuels refer to ground or surface fuels, while vertical fuels refer to standing trees and ladder fuels such as limbs on the bole of trees, crown base height (CBH), regeneration, and brush.

Fuel loading and fuel models are described below. Both are used to calculate and predict expected fire behavior. Fuel loading is measured using size of fuel that relates to time frames based on how the fuel responds to moisture (how long it takes to dry and become consumable) and are then quantified using tons/acre.

Measurements for fuel loading are:

- 0” – .24” diameter or 1 hour fuels
- .25” – .99” diameter or 10 hour fuels
- 1.0” – 2.99” diameter or 100 hour fuels
- ≥3.0” diameter or 1000 hour fuels

The Ball Park Thin Project Area is represented by the following fuel models (FM):

Ball Park Thin Project Area Fuel Models
• **FM 1**– Representative of grass meadows or openings. Fuel loading in the 0-3 inch diameter fuels is less than 1.5 tons/acre. Less than one-third of the area contains trees or shrubs. Fire spreads quickly in this fine fuel when it is cured or nearly cured. *Example – Bunchgrass Meadow*.
• **FM 5** – Representative of timber plantations and natural regeneration between two and 10 feet tall. *Ceanothus velutinus* is the common understory brush. Shrubs or grass in the understory can carry the fire. Fuel loading in the 0-3 inch diameter for live and dead fuel is less than 3.5 tons/acre. *Example – second growth units under 30 years old that have trees ≤35’ tall and a shrub component along the 2654 Road*.

• **FM 8** – Mature short-needle conifer stands with light fuel loading in the 0-3 inch diameter fuels. This profile can be found in stands that were or were not previously harvested. Fire spread is generally slow with low flame lengths. Heavy fuel concentrations (jackpots) can flare up. Fuel loading in the 0-3" diameter for live and dead fuel is less than 5 tons/acre. *Example – area along 2654 Road with few understory shrubs or regeneration..*
• **FM 10 –** Representative of mixed conifer stands with heavy concentrations of large down wood, > 9" diameter. Fuel loading in the 0-3 inch diameter for live and dead fuel is less than 12 tons/acre. Ground fire behavior is higher in intensity than fuel models 8 because of the heavier fuel loading and the ladder fuels. Torching of trees (fire in the crowns of trees) occurs more frequently. *Example – areas along the 2654 about 4 miles up the road on the east side of the road.*
Post harvest units are categorized as FM11 and 12
• **FM 11** – Light slash load resulting from light to moderate partial cuts or harvests which yard tops of trees attached to the last log. Fuel loading in the 0-3" diameter for live and dead fuel is <12 tons/acre. The continuity of the slash can increase fire behavior.
• **FM 12** – Moderate slash loads resulting from moderate or heavy partial cuts. Fuel loading in the 0-3" diameter for live and dead fuel is < 35.6 tons/acre. Fire behavior can be rapidly spreading, especially with red needles still on the branch wood.

Table 36. Existing Condition - Fuel Model within Ball ParkThin Project Area *

	FM 1	FM 5	FM 8	FM 10**
Acres within Ball Park Thin Project Area	476 Ac.	3,561 Ac.	4,530 Ac.	5,941 Ac.

**:Data derived from 2000 FSVeg.*

The term hazardous fuel is used in current publications, such as the National Fire Plan, and describes the current and potential hazardous fuels in the Ball Park Thin Project Area:

Current and Potential Hazardous Fuels
• fine fuels (1, 10, and portions of 100 hour) generated following timber harvest and in forested areas that have been excluded from disturbance processes
• vegetation structure with fine fuels on the ground, shrubs and small trees in the understory, lichen on larger trees, and tight canopy closure all contributing to rapid horizontal and vertical movement of fire;

Fire Behavior

The Ball Park Thin Project Area has a fire frequency of 1.7 fires every two years. This shows that fire continues to occur naturally in this area. Fire behavior is a result of the fuels, topography, and weather conditions. Fire behavior was modeled using BehavePlus3 with fuels and topography inputs that correspond to the Ball Park Thin Project Area and summer fire weather data representing the hot, dry fire weather (97^{th} percentile) similar to 2003 and 2006 is used to represent conditions where fires can escape initial attack, threaten resource, and have high severity/mortality. Areas with light fuel loading, such as FM 8, exhibit lower intensity fires with lower severity (low mortality of dominant vegetation). Fuel Model 10 exhibits high fire intensity and high severity including crown fire with mortality. Fuel Model 5 is also high fire severity and exhibits fast rates of spread. FM10 and 5 are difficult to contain because:

- flame lengths exceed the safety of hand tooled firefighters (flame lengths over 4 feet in height require mechanized equipment, air resources, or indirect attack);
- rates of spread over 6 chains/hour (1 chain = 66 feet) and this exceeds the ability of a 20 person crew.

Larger fuels, > 9” diameter, are not often considered the carrier of fire. Large 1000 hour fuel will create longer lasting intensity, higher flame lengths and enable crown and high severity fires to progress. Standard fire suppression operations would require mechanized suppression resources when flame lengths reach heights over four feet. Firefighters are not able to safely suppress fires directly if the flame lengths exceed four feet.

Environmental Consequences—Fire Fuels

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

In the Ball Park Thin Project Area the No Action Alternative would not support returning fire as a natural disturbance process to the ecosystem due to fire suppression responsibilities and life, property, and resource priorities. Through time, fuel loading would continue to increase and vegetation would continue through successional pathways. Stands would continue to grow increasing fuel loading on the ground and canopy closure thus escalating the potential wildfire behavior. In the absence of prescribed fire and treatments, ladder fuels and canopy closure would be high, thus providing propellants for severe, high intensity wildfires. FRCC would not be reduced or maintained at a FRCC1, again reducing the natural forest resiliency and changes to fire. No Action would not create the DFC, return fire as an ecosystem process, reduce firefighting risks, or be cost effective due to suppression of all wildland fires.

Alternatives B and C—Direct and Indirect Effects

Harvests increase fuel loading in a unit which increases the wildfire behavior potential. Hazardous fuels increase after harvest and can exist for up to 5 years because of the red needle slash and loftiness of the fuels. This slash has high ignition and spread potential. The hazard would be reduced with fuels treatments 1-2 years post harvest. Across the landscape the lack of variability in the horizontal and vertical fuel profile also increases the spread potential and intensity of wildfire. The proposed fire and fuels actions in Alternative B and C would change the fire and fuels environment by:

Actions to Change Fire and Fuels Environment
• Returning the natural disturbance process of fire with prescribed fire UB treatments; • Reducing hazardous fuels to S&G and create variations in the horizontal and vertical fuel profile; • Creating a mosaic and distribution of seral stages present in a mixed severity fire regime taking steps towards changing FRCC3 →FRCC2 → FRCC1; • Increasing fire tolerant, shade intolerant conifers and reducing shade tolerant conifers; • Creating safe and cost effective protection of life, structures, and resources through reducing the risk of potential high severity fires;

All prescribed fire underburns would create variability across the landscape and return a vital disturbance process to the ecosystem. The distribution of seral stages that determine the FRCC would not completely change the Ball Park Thin Project Area from a FRCC3 or FRCC2 to a FRCC1. However, the treatments would move towards reaching the FRCC1, displaying more variation of seral stages that occurred under historic fire events. Changes to seral class have occurred for over 100 years. Future treatments would need to take place in order to reach that goal and create mid open and late open seral stage distribution that is needed under a FRCC1.

The proposed timber harvests will create varying amounts of timber activity fuels (slash) in each unit (see Table 2 in Chapter 2). The increased fine fuel loading from timber harvest may reduce the success of initial attack suppression operations due to the faster rate of spread and the flame lengths >4 feet. Activity fuels treatments would reduce the amount of fuel created from the harvests to the S&G fuel loading of 7-11 tons/acre for 0-3" diameter fuel. Fuels treatments are proposed to be within 1-2 years after the harvest. The reduction in fuel loading would reduce the potential wildfire behavior.

Table 37 displays the changes in fire behavior within the unit of treatment for existing, post harvest, and post fuels treatment conditions. Fire behavior that exceeds 4 foot flame lengths requires machinery or aerial support to reduce the risks to tooled firefighters.

Table 37. Existing fire behavior

	Rate of spread (chains/hour)	Flame length (feet)	Crown fire with % mortality*	Spotting potential (miles)
FM5	117 ch/hr	13 feet	Active w/ 99% mort	Yes at 0.6 miles
FM10	38 ch/hr	11 feet	Active w/ 37% mort	Yes at 1.5 miles
FM12	37 ch/hr	13 feet	Active w/ 97% mort	Yes at 0.6 miles
Post Fuels Treatment	5 ch/hr	2 feet	Active w/ 12% mort	Yes at 0.6 miles

**:Crown fire activity is displayed as Active, which means that fire is present in both the surface fuels and canopy fuels.*
***:Post fuels treatment examines the fire behavior as FM8 because units would have lower fuel loading, higher CBH, and varying canopy density.*

Forest Plan Standards & Guidelines to be met in fuel treatment units:
• reducing fuel loading of 7-11 tons/acre for 0-3" diameter fuel;
• maintaining duff coverage of 85% or more;
• weight of equipment and machinery would be with in range;
• downed woody debri minimum of 240 linear feet of representative DBH;
• IDT decision to keep mortality at 10% or less.

The proposed treatment of Unit 2001 and 2002 would be a natural fuels underburn. This unit is along 1500-705 Road. A natural fuels underburn is completed without harvests being implemented. The UB would provide a reduction in fuel loading on the ground, reduce ladder fuels and vertical continuity, and create variations in the canopy closure through tree mortality. Mortality in these stands would be around 20% or less. The units would change from FM10 to a FM8 post UB. The fire behavior post burn aims to reduce the severity of wildfire behavior by reducing the spread potential of ground fire to crown fire, as well as reducing the severity of wildfire. Underburning is a preferred method of treatment not only to reduce hazardous fuels but to return fire to the ecosystem.

Underburns would take place during the spring or spring-like conditions where the soil and duff moisture are damp and fuel moisture in the large woody debris is high. These conditions slow or stop consumption which helps to retain sustainable levels of duff, soil coverage, and large woody debris often used by wildlife. Additionally, mortality of residual overstory trees can be controlled because of high live fuel moistures.

Underburns or broadcast burns may require handlines constructed around the perimeter. These are created prior to the burn and aid in containing the prescribed fire within the unit boundaries. Handlines are created by scraping fuel back to an 18” mineral soil line and scattering fuels that lie within 10 feet of the proposed line. If units are located on a steep slope waterbars are created within the fireline to reduce erosion.

On Units 270, 330, 240, 210 UB-buffers will be used if the unit is treated with an UB. This is to mitigate the need for handline along the unit boundary. Fire would not be able to move quickly or with much intensity in UB-buffers, the shaded and unharvested stand outside of the unit. The fire should not continue to move through the shaded area, thus a natural fire break or natural fire line is used instead of constructing handline. The UB-buffers are small and they fill in the distance from the harvest unit to the road. If fire does move up into the canopy in the shaded area, firefighters will aim to reduce the intensity in the unharvested stand.

Hand, grapple, and landing piles are covered with plastic following construction. This creates a drier pocket of fuel in the middle of the pile and enables them to be burned in the late fall or early winter when there is very low risk of the piles spreading into other fuels. Removing the plastic before burning is suggested in order to aid in reducing emissions from the plastic.

Alternatives B and C—Cumulative Effects

Cumulative effects are based on management activities that have or would occur in the Ball Park Thin Project Area. The area analyzed displays the direct and indirect effects of fire on the treated units which translate to the variation of fuel profiles over the sub-watershed landscape. Proposed fuel treatments, in concert with harvest activities, would help to diversify the fuel profile across the landscape. Future wildfire suppression actions will continue, however the proposed treatments aid in returning the natural disturbance to the landscape. Other future fire/fuels activities may be meadow burns. Bunchgrass Meadow was reviewed for prescribed fire due to the encroaching conifers and the potential loss of the open meadow in the future. Fire could be a proposal for meadow restoration in the next five years. This action would not create any negative effects as S&G would be maintained. No other foreseeable actions are planned within Ball Park Thin Project Area that would contribute incrementally to the cumulative effects from past or currently proposed activities. No adverse effects on the fuel profile or on fire behavior would result from the proposed fuel treatments.

Alternatives B and C—Conclusion

Alternatives B and C fuels treatments would be conducted following S&G. FRCC 3 and 2 would move closer to FRCC 1. And all prescribed fire UB treatments would reintroduce the disturbance process of fire to the ecosystem.

Air Quality

Scale of Analysis

The area defined for direct, indirect, and cumulative effects analysis is the treatment units in the Ball Park Thin Project area, as well as, the larger landscape where smoke emissions can travel.
These are the location of the Design Areas and the Class I Airsheds.

Affected Environment—Air Quality

The State of Oregon has been delegated authority for attainment standards set by the 1990 Clean Air Act and the 1977 Clean Air Act and its amendments. To regulate these standards, the state developed the Oregon Smoke Management Plan and the State Implementation Plan. These are guidelines and regulations for prescribed fire smoke emissions in Oregon. The Willamette National Forest has adopted this plan for emission control in Oregon (LRMP, 1990).

Designated Areas and Class I Airsheds are priority areas regulated in order to protect air quality. The Willamette Valley (at the eastern side, Leaburg), Oakridge, and Sisters are the closest Designated Areas to Ball Park Thin Project Area. Mt. Washington, Menagerie, and Three Sisters Wilderness are the closest Class I Airsheds to the Ball Park Thin Project Area (5, 9, and 10 miles respectively). Class I Airsheds are recommended to be protected from visibility impairment July 1 through September 15.

Environmental Consequences—Air Quality

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

If no management actions take place in the Ball Park Thin Project Area no air quality impacts would occur in a scheduled timeframe. However, the risk of wildfire would still exist. In the event of a wildfire, air quality impacts are considerably higher than prescribed fire. Smoke emissions are not short term and can often last for many weeks or months, as witnessed during the Puzzle Fire in 2006 and GW Fires in 2007. Smoke emissions from wildfire are more likely to heavily impact communities and contribute to harmful, concentrated levels of PM 2.5 and PM 10 micrometers. Particulate Matter (PM) is hazardous to our health because the particles are small enough to penetrate through our throat and nose and enter our lungs (http://www.epa.gov/particles/). These are usually from industries, automobiles and fire smoke. Table 37 displays that emissions are considerably higher than prescribed fire emissions, posing risk to community residents, forest users, and firefighters. Acreage used for the above wildfire calculation was 1,114 acres, the number of harvest and treated acres (excluding the underburn buffers) in Alternative B.

Alternatives B and C—Direct and Indirect Effects

Prescribed fire of activity fuels in the Ball Park Thin Project Area would comply with Oregon Smoke Management Plan regulations. Smoke emissions would be mitigated based on the timing of the burns, seasonality, forecasted transport wind direction, and weather. Regulations from the Oregon Smoke Management enforce specific days which are suitable to burn in relation to other land owners burning or weather forecasts. Prescribed fire would most likely be avoided between July 1 and September 15 in order to protect visibility standards for Class I Airsheds.

Recreationists and some local residents near Ball Park Thin Project Area may be temporarily impacted by smoke from the prescribed fire underburns or pile burning. In the Oregon Smoke Management Plan, non-harmful concentrations of drift smoke are considered nuisance smoke (Oregon SMP 1995). Mitigation measures, such as signing along the road or near the treatment area, would be taken in order to reduce the amount of nuisance smoke and notifications to the public would be made prior to burning.

Smoke emissions were predicted using the estimates from the debris prediction tables and FOFEM (First Order Fire Effects Model version 5.0). This model calculates particulate matter emitted based on the amount of fuel consumed. Fuel inputs were from the predicted post harvest data and based on a percentage of fuels that would most likely be consumed given the prescribed fire window. That is, weather and fuels dryness would be measured to achieve the objective of reducing the fuel profile across the unit. From past experience, fuels treatments often consume an average of 80% of the fine fuels (0-1 inch diameter), 60% of the 1-3 inch fuels and only about 20% of the 3-9 inch. LWD >9 inches is most often too wet to be consumed. FOFEM however consumes 100% of 1, 10, and 100 hour fuels in spring-like conditions. Table 38 summarizes particulate matter predicted for fuels treatment activities.

Table 38. Summary of particulate matter emissions for Ball Park Thin Project Area for all treatments

	Alternative A – Wildfire	Alternative B and C
PM 2.5 total	3122 tons/acre	704 tons
PM 10 total	3683 tons/acre	934 tons

It is important to note these emissions levels do not occur at one time. Additionally the model is assuming the ground fuels on the entire unit will be burned, but it is not likely due to GP and HP will not collect all the fuels and may not be through the entire units. Usually prescribed fires take place one unit at a time, and most likely one per day. For example, Unit 60 of 52 acres is predicted to have 17.1 tons/acre of 0-3” diameter fuel post-harvest. During the underburn, emissions are estimated at 11.4 tons/unit of PM2.5 and 13.1 tons/unit of PM10

Alternatives B and C—Cumulative Effects

No adverse effects on the air quality would result from the proposed fuel treatments. The area defined for cumulative effects is the Ball Park Thin Project Area, as well as the larger landscape where smoke emissions can travel. These are the locations of the Designated Areas and Class I Airsheds. Neither would be affected from the treatments. Smoke emissions would be short duration and mitigation measures would reduce the quantity of emissions during prescribed burns. Past management activities do not cumulatively add to air quality impacts from the proposed treatments. No other foreseeable management activities that would affect air quality are scheduled to occur in the Ball Park Thin Project Area.

Alternatives B and C—Concusion of effects

Smoke emissions from burns would be reduced and partly mitigated by conducting UB in spring-like conditions (as stated in the fuels treatment section). Pile burning will be done in the winter where fires will be highly unlikely to spread past the pile perimeter. All treatments should meet the S&G and Air Quality Regulations.

Invasive Plants

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for invasive plants includes the project activity units, associated and adjacent roads, and the Deer Creek Subwatershed (6th field) of the Upper McKenzie Watershed (5th field) on the McKenzie River Ranger District.

Affected Environment—Invasive Plants

The Willamette National Forest categorizes invasive plants into three groups, and control strategies will differ depending on species' classification.

Invasive Plant Groups	
1	**Potential invaders** are those species located in adjacent National Forest or other lands that have a high probability of being detected on the Forest in the foreseeable future (next 15 years) because potential habitat exists here.
2	**New invaders** are those weed species just entering the National Forest and whose populations are possible to eradicate.
3	**Established infestations** include weed species that are so widespread on the Forest they are not likely to eradicate. Some species, such as blackberry, can have both new invader populations that are less than 10 plants and are outliers as well as established infestations such as those that are found bordering streams at lower elevations.

Four species of new invasive plants are documented in the Ball Park Thin project area. Some species have greater potential to out-compete native plants and are more difficult to control than others, however, all of them are capable of adverse ecological impacts. The four new invasive species known to occur in the Ball Park Thin project area are listed below in Table 39:

Table 39. Invasive Plants in the Ball Park Thin Project Area

Invasive Species	Proposed Units	*Recommended treatments
False brome (*Brachypodium sylvaticum*)	360	Mechanical Chemical
Spotted knapweed (*Centaurea maculosa*)	30, 130, 140	Manual/Mechanical/Chemical
Dalmatian toadflax (*Linaria dalmatica*)	40	Manual/Mechanical/Chemical
Deptford pink (*Dianthus armeria.*)	360	Mechanical Chemical

* = in addition to Ch. 2 mitigation measures, design criteria, and BMPs
Manual=hand pulling/digging before seed production
Mechanical=mowing/cutting just after flowering has ended, but before seed matures
Chemical=use of one or more herbicides approved for application in the Willamette National Forest Integrated Weed Management EA (March 2007)

With the exception of false brome, the other new invader plants documented in the project area are considered shade-intolerant and generally confined to roadsides and open areas. One of many ecological advantages of invasive or non-native plants is the lack of native competition to keep populations balanced. More so, prolific propagation and the ability to disperse large amounts of seed is probably the greatest advantage invasive plants have in native ecosystems.

Proposed actions may introduce or spread invasive and non-native plants. In most cases, the risk of worsening the Forest invasive and non-native plant problem can be minimized through proper inventory and project design. Opportunity for invasive plants to establish and out-compete native vegetation may be caused by implementation equipment and/or disturbance from activities in both action alternatives.

Because the vast majority of the Forest’s invasive plant infestations occur along road shoulders, road maintenance represents a particular risk for inadvertently spreading weeds. Road maintenance activities across the Forest risk the spread of new invader species from one watershed to another. Activities such as grading, brushing, mowing, culvert upgrades, and ditch cleaning can contribute to the spread of invasive plants along road corridors by transporting seeds from infested sites to un-infested areas.

Environmental Consequences—Invasive Plants

Alternative A (No Action)—Direct and Indirect,

Selecting Alternative A would allow the same level of invasive plant control as currently programmed. New and potential invader plant populations documented in the Ball Park Thin project area would remain highest priority in receiving treatment and monitoring.

The No-Action alternative would not provide further opportunities to contain or control invasive plant populations. It would also not reduce the current rate of spread of these species within the project area.

Alternatives B and C—Direct and Indirect Effects

Alternatives B and C both would have similar direct impacts on invasive plants because both propose similar acres of harvest, fuel treatments, road maintenance, and road decommissioning. Additionally, both action alternatives propose the same acreage in terms of harvest systems. The ground disturbance caused from implementation may provide suitable conditions for invasive plants to establish or out-compete native vegetation. However, if one considers the potential ground disturbance resulting from harvest activities and an additional difference of 10% in canopy retention between the action alternatives, Alternative B poses the least risk of impacts to invasive plants.

Most of the invasive plant populations in the Ball Park Thin project area are established along roads and are mainly spread by vehicular traffic. False brome and Deptford pink occur on roads adjacent to units proposed for harvest, ground-based yarding, and under-burning fuels treatments. These populations should be treated prior to implementing any action alternative, subsequently treated and monitored for at least three years.

With mitigation measures identified in Chapter 2, selecting either of the alternatives would result in moderate risk of further spreading or introducing invasive plants. With mitigation measures, the proposed actions would have a low risk of spreading invasive plants onto adjacent properties by hauling across ownership boundaries.

All Alternatives– Cumulative Effects

The scale of analysis for cumulative effects is the Ball Park Thin project area This analysis addresses known distribution of invasive plants and likely travel routes for the proposed projects.

Management activities in the last 50 years include road construction, road maintenance, and timber harvest. Included in these activities are the Eugene Water and Electric Board (EWEB) power line corridor, as well as the vegetation management activities associated with it.

Even without past or present management actions, invasive plants would still be present from natural and biological vectors. Invasive plants are present on the properties of adjacent landowners and along the Highway

126 corridor. However, past harvest and road maintenance activities within the Ball Park Thin project area have provided additional opportunities for establishment and spread of invasive plants. Some management actions, such as harvest and yarding, result in short-term disturbance conducive for invasive plant establishment. The effects of these actions are greatest at the on-set of implementation and often decrease over time and with stand succession.

Other management activities like road construction or maintenance often result in longer-term effects to invasive plant infestations. This is because roads serve dual functions by acting as suitable ground for the establishment of invasive plants and by providing the plants access to a host of potential vectors.

Because of the design criteria and mitigation measures, the actions proposed in Alternatives B or C, along with past and reasonably foreseeable activities in the analysis area, are not expected to cumulatively add to a significant increase in invasive plants. The potential opportunities afforded by this project would provide additional resources to treat the new invader species in the Ball Park Thin project area. It would also assist in reaching the goal of control and eventual eradication of *new* invader plants. This would result in an overall net improvement of invasive plants in the Ball Park Thin project area.

Roads and Access

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Roads and Access includes the project activity units and the McKenzie Deer Creek 6th Field sub-watershed, which is also the Ball Park Thin Project area.

Affected Environment—Roads and Access

The project area includes approximately 77.9 miles of Forest roads. There are no State or Federal Highways, County roads, or private roads within the project area boundary on the McKenzie River Ranger District. The Forest road system consists of 6.1 miles of arterial road, 20.7 of collector road and 51.1 miles of local roads. There is 0.42 miles of unclassified road.

Past management activities in and near the Ball Park Thin Project area have provided the current network of Forest Roads, mainly from timber sales. The current system of roads provides sustainable access to the area for administration, protection, public recreation, and forest product utilization, consistent with the Willamette Forest Plan. This section incorporates by reference the Willamette National Forest Road Analysis Report (USDA Forest Service. 2003), which provides detailed information regarding the Forest roads, describing maintenance levels, maintenance costs, and management direction.

Existing Condition of the Road System

Road 1500 is the only road classified as an arterial within the planning area. Road 1500 is a single lane aggregate surfaced road within the planning area, although it is paved with asphalt surfacing on both the north and south ends. Road 1500 provides seasonal access between US Highway 20 on the north, and State Highway 126 to the south. Roads 2654 and 2655 provide the primary access to the central and eastern parts of the planning area..

There are 41.63 miles of Key Forest Roads identified in the Roads Analysis Report for this project area. These roads are the 15, 1500-700, 1500-705, 1500-720, 1506, 1509, 2654, 2655, 2655-503, and 2655-507. The

Roads Analysis Report identified a need for these roads for long-term management of the Forest, access to recreation opportunities, and private lands. They are the priority roads that are open to the public and maintained for vehicular traffic. These key roads provide the long-term transportation network necessary to meet forest management objectives. These Key Roads and numerous secondary roads are primarily surfaced with crushed rock.

There are currently 11.4 miles of forest road in the project area that are closed. The roads are closed by means of gates, berms or other physical barriers implemented through road management, or naturally by brush growth or blown down timber. 5.55 miles of road in the project area have been decommissioned.

The current road system allows the Forest Service administrative access to conduct a wide variety of forest management and fire protection activities in the area. Access is also provided for inspection and maintenance of the Eugene Water and Electric Board powerline facilities. The Forest roads provide access to the McKenzie River National Recreation Trail. Numerous dispersed campsites are accessible by roads in the project area. In addition, current roads provide the means to transport timber products from the National Forest. These roads also allow public use of firewood and special forest products.

The road system receives annual maintenance in accordance with established road management objectives. However, over the last decade, a limitation on road maintenance funds on the Forest has resulted in a backlog of maintenance work to reduce brush, clean out drainages, and repair road surfaces on many of the Key and secondary roads in the project area. There are drainage improvements which need to be implemented prior to commercial haul, in order to protect water quality. Many of the culverts on the roads are in poor condition and in need of replacement.

Environmental Consequences—Roads and Access

Alternative A (No Action)—Direct,Indirect, and Cumulative Effects

Alternative A would not change the use pattern of roads, or correct existing road erosion problems. Without timber harvest related road maintenance, the existing budgetary trend makes it unlikely that funding would be available to support adequate road maintenance, which could eventually result in unsafe traveling conditions for public and administrative traffic, as well increasing the possibility of resource damage. There is currently a backlog of road maintenance and some local roads are becoming impassible due to fallen trees or the growth of brush. Culverts that are not maintained because of impassible roads could plug and cause washouts. Current invasive plants rate of the spread could continue on roads not maintained.

Alternatives B and C—Direct and Indirect Effects

Road maintenance as identified in Chapter 2 would occur under all action alternatives, and would protect the road infrastructure, improve safety of the road, improve drainage, and reduce the spread of invasive plants. Action alternatives may cause a temporary increase in sedimentation while the work is being done, but in the long term, would decrease the volume and velocity of water that carries sediments into creeks. Newly graded or surfaced roads, improved drainage structures, and upgraded culverts could increase sediment production until road surfaces stabilize.

Maintenance activities could cause some short-term delays or detours for road users while roadwork is being performed. Road maintenance would protect the existing road infrastructure, improve safety of the road, decrease sedimentation, and reduce the spread of Invasive Plants. Brushing roads increases sight distance to increase visibility for safe driving. Blading, ditch maintenance, culvert replacement, surface rocking, and installing dips or waterbars corrects or improves water drainage. Removing ditch slough, or accumulated soil, to predetermined disposal locations would reduce the likelihood of spreading Invasive Plants. Designated water sources for filling water tankers for compaction and dust abatement operations are not expected to affect stream flows.

After the road decommissioning, the open road density within the project area would not be changed. The roads to be decommissioned are presently closed to traffic. The proposed road decommissioning would reduce existing road erosion problems, and reduce road maintenance costs. Roads treated by the project would be left in a condition to drain properly and protect water quality.

There would be fewer roads for public and administrative vehicle access for recreation, reforestation, fire and noxious weed control. It would cost more to suppress fires or treat weeds if vehicle access is prevented (walking in to the affected areas would be required). However, the cost of maintaining a road that has been effectively decommissioned and has self-maintaining water drainages is less costly than keeping it open.

Alternatives B and C—Cumulative Effects

The effect of past management actions have created a 77.9 mile Forest Service road system within the Ball Park Thin Project area that requires consistent road maintenance levels to provide adequate resource protection. Alternatives B and C would provide this necessary road maintenance on the haul routes. The incremental cumulative effect of all action alternatives would be to reduce the miles of road available for access within the project area by approximately 0.53 miles. Public access would be unchanged. There are no additional foreseeable future Forest Service management actions that would add to or subtract mileage from the current roaded condition of the project area.

Recreation

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Recreation resources includes the project activity units and the Deer Creek 6th field watershed, which is also the Ball Park Project area.

Affected Environment—Recreation

The project area offers no developed recreation activities and limited opportunities for dispersed recreation. A portion of the McKenzie Wild and Scenic River corridor is within the project area, however the river itself is outside of the project area. Adjacent to the project area is the West Cascades National Scenic Byway, which includes a portion of State Highway 126.

The forested slopes along the McKenzie River form an important scenic backdrop to the National Scenic Byway. The McKenzie River and its adjacent lands are a favorite location for fishing, hunting, hiking, biking, photography, picnicking, and boating. The McKenzie River National Recreation Trail is located adjacent to and southwest of the project area.

Developed recreation sites located nearby but outside of the project area include: Trail Bridge Campground, Ollalie Campground and Boat Launch, and Frissel Boat Launch. The project area receives light to moderate dispersed recreation use. Recreational activities include berry picking, viewing scenery, dispersed camping, picnicking, fishing, and hunting. Hunting is particularly heavy for deer and elk in the fall. There are no recreation residences or special use permits within the project area.

Recreation Opportunity Spectrum (ROS)

The Forest Service uses a land classification system to inventory and describe a range of recreation opportunities called the Recreational Opportunity Spectrum (ROS) from the Willamette Forest Plan FEIS, page III-93. This system seeks to identify recreation settings of varying characteristics that range from remote, undeveloped areas to easily accessed highly developed sites. Settings are described in the following five ROS Classes: Primitive, Semiprimitive Non-motorized, Semiprimitive Motorized, Roaded Natural, and Roaded Modified. Primitive falls on the most unmodified natural environment end of the spectrum and Roaded Modified falls on the most substantially modified end of the spectrum. Table 40 displays the ROS for those Management Areas within the project area.

Table 40. Recreation Opportunity Spectrum for the Project Area

Willamette Forest Plan Management Areas	ROS Class	Unit(s)
4 – Research Natural Area, 5a – Special Interest Area, 6d – McKenzie River W&S, 9c – Marten Habitat, 9d – Wildlife Habitat – Special Area	ROS – Roaded Natural	None.
14a – General Forest	ROS – Roaded Modified	All activity units are located within this ROS Class.

Recreational Driving

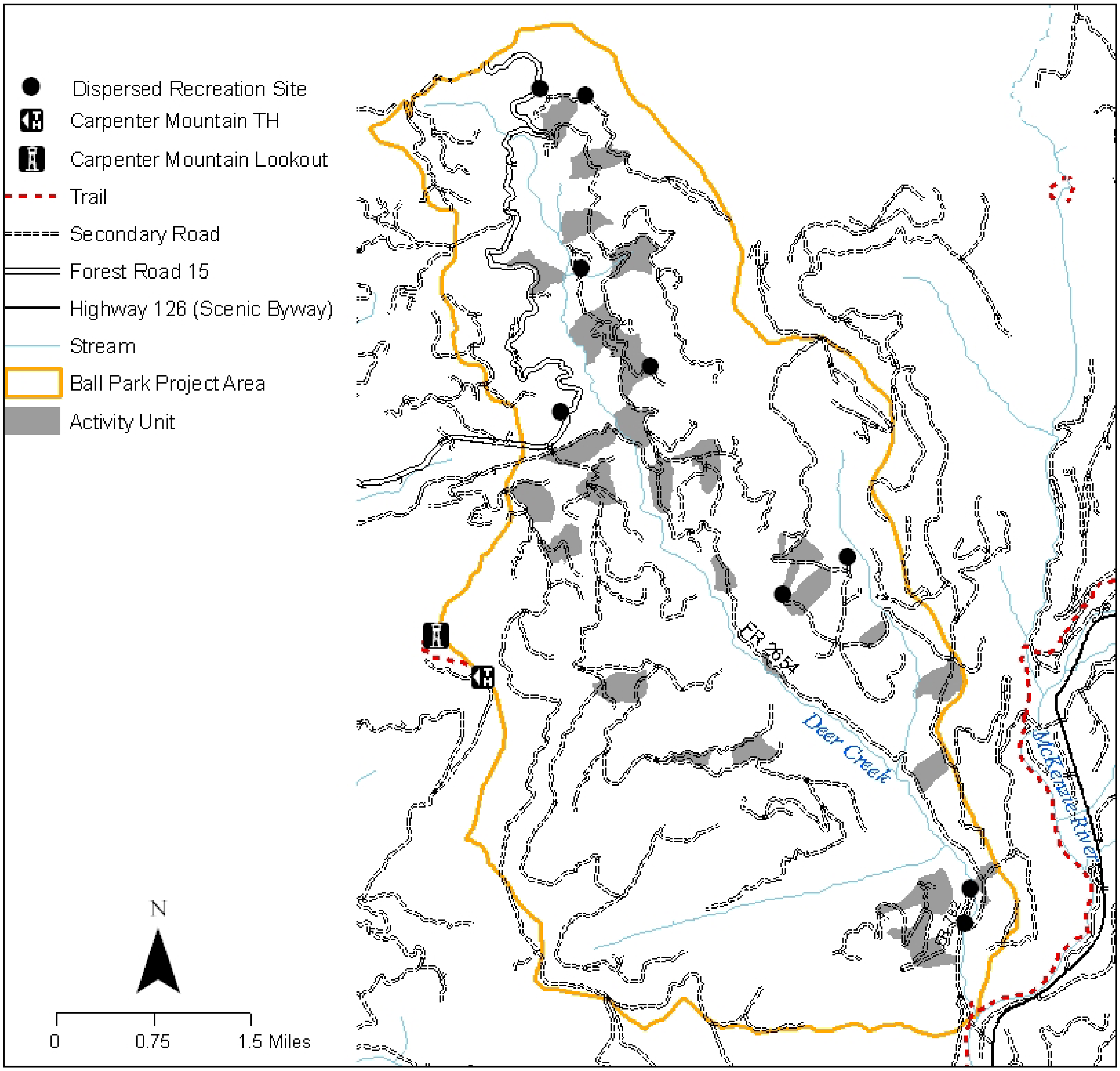
The most noticeable driving for pleasure (sightseeing) occurs along the West Cascades National Scenic Byway, a segment of which lies just outside the project area. It receives heavy traffic from motorcycles, RVs, logging trucks, passenger cars and pickups, as well as bicycles. Fewer vehicles travel the Forest roads within the project area with use decreasing in the winter months due to the snow levels. When the roads are accessible, use fluctuates from very light on most dead end roads to moderate use on secondary and collector roads. Within the project area, secondary and collector roads receive increased use during the hunting season.

Dispersed Camping

There are nine known dispersed sites within the project area. These sites are usually associated with favorite hunting areas and get-away-spots, and are often located near water or at the end of a dead end road. Figure 27 illustrates these dispersed sites in relation to activity units and the existing road system.

The lower stretch of Deer Creek, in particular, receives a moderate amount of use with dispersed sites along Forest Roads 782 and 2654. Steep slopes along Deer Creek make this stream generally inaccessible, except for this one mile stretch before the confluence with the McKenzie River. Just outside the project area near the confluence and along the McKenzie River National Recreation Trail, is Deer Creek Hot Springs. Also known as Bigelow Hot Springs, this one pool spring is situated in the bank of the McKenzie River offering visitors a primitive soaking experience. Optimum use time is during summer and fall seasons when the river level is lower.

Figure 25. Recreation features within and adjacent to project area.



Wolf Meadow is another popular dispersed area, located near the western edge of the project boundary. There was a Forest Service campground at this location that was decommissioned several years back. Camping still occurs in this now primitive, dispersed camping area.

Developed Sites

There are no developed recreation sites within the project area. There are dispersed sites that are utilized for day use and overnight use that are illustrated in Figure 27, above. Developed recreation sites located nearby but outside of the project area include: Trail Bridge Campground, Ollalie Campground and Boat Launch, and Frissel Boat Launch.

Trails

Approximately 1000 feet of the McKenzie River National Recreation Trail dips into the south end of the project area. As well, approximately 1000 feet of the Carpenter Mountain Trail that leads to the fire lookout traverses the ridge of the project area and circles inside the west end of the project boundary near the top of Carpenter Mountain. These are the only active system trails within the project area.

Environmental Consequences—Recreation

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

Recreation use of the National Forest in the project area would remain unchanged with the no action alternative. The recreating public would continue to use the project area for recreational purposes, and would continue current use of dispersed sites, trails, and roads. Alternative A does not manage forested stands within recreation areas and there are no ongoing or reasonably foreseeable projects in the area. Therefore, Alternative A would have no direct, indirect, or cumulative effects on recreation within the project area.

Alternatives B and C—Direct and Indirect Effects

Short terms effects of proposed timber harvesting, log truck hauling, and fuel treatments would include the following: localized road closures, and disruption to hunting, hiking, camping, and driving in some areas. The logging activity, hauling, and fuel treatments could cause noise and dust or smoke disturbance. The duration of these effects would only last for the duration of implementing the stand treatment. It is unlikely that all recreation use in the area would be affected at the same time.

Alternatives B and C—Cumulative Effects

Past activities in the Ball Park project area included timber harvest and road construction, creating a network of roads. These activities have opened vehicle access to Forest lands where dispersed recreation activities may occur. The incremental effects of all action alternatives would be to reduce approximately 0.53 miles of road, as discussed in Chapter 3, Roads and Access. Dispersed recreation activities nearby will be accessible after reduced access is implemented. There is no foreseeable future management action planned, which would add cumulative effects to the recreation uses condition in the project area.

Scenic Quality

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Scenic Quality includes the project activity units within Forest Plan Management Allocation 14a in the Deer Creek 6th field watershed, which is also the Ball Park project area.

Affected Environment—Scenic Quality

The landscape within and adjacent to the project area is generally characterized as being a Douglas-fir dominant forest. From the road and river corridors, views are made up of an even-aged or uniform appearing overstory of Douglas-fir trees, hemlock and hardwood understory tree species, and common shrubs such as rhododendron, vine maple, and Oregon grape. Past and present natural and human caused disturbances/modifications (including: fire, disease, timber harvest, fire suppression, and road development) are visible within and adjacent to the project area.

There are openings in the project area from past timber management activity (within last 60 years). Some older existing openings are visible in the scenic viewshed but these stands are considered vegetatively recovered, as defined by Willamette Forest Plan standards and guidelines. Some management created openings above the river are visible from State Highway 126.

Visual Quality Objectives (VQO)

The Forest Plan establishes Visual Quality Objective (VQO) categories to describe degrees of acceptable alteration of the natural landscape when considering timber stand management (Forest Plan FEIS, page III-112). Objectives range from allowing ecological change only to allowing for human activity to dominate the characteristic landscape. The five VQO categories are: Preservation, Retention, Partial Retention, Modification, and Maximum Modification. Following is a description of each category:

Visual Quality Objectives
Preservation: Provides for ecological change only.
Retention: In general, human activities are not evident to the casual forest visitor.
Partial Retention: In general, human activities may be evident but must remain subordinate to the characteristic landscape.
Modification: Human activities may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture, and appear as natural occurrence when viewed in foreground or middleground.
Maximum Modification: Human activity may dominate the characteristic landscape but should not appear as a natural occurrence when viewed as background.

Table 41. Visual Quality Objective categories for the management areas that contain activity units.

Willamette Forest Plan Management Areas	VQO category	Unit
14a - General Forest	VQO – Maximum Modification	All activity units are located within this MA

Upper McKenzie River Wild and Scenic River and West Cascades National Scenic Byway

The McKenzie River Wild and Scenic Corridor and the West Cascades National Scenic Byway are both visually sensitive areas that require consideration during land management planning. The McKenzie River was designated in 1992 based on a set of outstandingly remarkable values, including scenery. In 2000, the West Cascades Oregon Scenic Byway was federally designated as a National Scenic Byway by the Federal Highway Administration and extends approximately 220 miles from Estacada to Westfir, Oregon. The West Cascades National Scenic Byway traverses the western edge of the Cascade Mountains and a segment of the route includes Highway 126 from its junction with Highway 20 south to Forest Road 19.

Approximately 85 acres of the river corridor falls within the project area and has a VQO of retention and partial retention. Approximately 3,300 acres of the scenic byway viewshed overlaps the southern portion of the project area and a small piece along the western edge. VQO for this area is primarily maximum modification, with a small portion retention/partial retention where it overlaps the river corridor.

Environmental Consequences—Scenic Quality

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

Scenic quality along the West Cascades National Scenic Byway and Upper McKenzie River Wild and Scenic River Corridor would remain unchanged. The No Action Alternative would not harvest timber stands in any visual management areas in the Ball Park planning area, and there are no ongoing or reasonably foreseeable projects in the area. All visually sensitive Management Areas remain consistent with Forest Plan standards and guidelines, and VQOs are met. Alternative A would have no direct, indirect, or cumulative effects on scenic quality in the project area

Alternatives B and C—Direct and Indirect Effects

Short term effects to visual quality for the Ball Park project area would be limited to exposed stumps from harvested trees, less dense forested stands (increasing depth of view), slash or underburned areas, and possibly dust from transporting forest products from the forest on unpaved forest roads. Long term effects would include fewer exposed stumps due to vegetation recovery (3-6 years and after), and larger diameters and larger crowns of residual trees due to increased growing space. Intermediate harvest treatments, including fuels treatment, are expected to accelerate stand development toward a more natural range of conditions and scenic diversity in the project area. Units within the scenic byway viewshed (360, 370, and 390) will meet VQO standards and guidelines. The prescriptions for these units will result in a more open forest canopy and scenic byway motorists may glimpse small openings. However, more visually interesting structure, depth of view, and mix of vegetative species are likely long term effects of proposed vegetation entry.

Alternatives B and C—Cumulative Effects

Considering that Alternatives B and C would include thinning of a small portion (less than 1%) of the scenic byway viewshed, there would be no adverse effect on the scenic quality. Short term acceptable effects from the thinning are recognized.

The proposed action and Alternative C would not contribute additional adverse effects to visually sensitive areas located along Highway 126. These modifications would still maintain modest scenic quality as required in the Forest Plan, and may result in visually interesting stand structure, depth of views, and mix of trees and understory species. Therefore, no long-term adverse incremental cumulative effects to scenic quality are anticipated considering the direct and indirect effects from the proposed action and the action alternatives. Also, no reasonably foreseeable future management actions are planned for the project area which would result in additional cumulative effects to the scenic quality.

Roadless and Unroaded Areas

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Roadless and Unroaded areas includes the project activity units and Forest Service lands in the Deer Creek 6th field watershed, which is also the Ball Park project area.

Affected Environment—Roadless and Unroaded Areas

The Ball Park project area does not contain any Inventoried Roadless Areas (IRA). The project area does contain about 1,500 acres of unroaded areas, 200 acres, of which is part of a contiguous unroaded area 1,000 acres or more in size as analyzed in the Willamette Pilot Roads Analysis, 2003 (USDA Forest Service, 2003). These unroaded areas do not exist in large blocks due to extensive road building in this area over the past 50 years. No project activities are proposed within the unroaded areas. Existing roads provide access to a majority of proposed harvest units. None of the harvest units have portions that are greater than 1/2 mile from an existing road or a previously harvested stand.

Environmental Consequences—Roadless and Unroaded Areas

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

Alternative A would not implement any management actions within the project area. Alternative A does not manage forested stands within IRA's or unroaded areas. There are no ongoing or reasonably foreseeable projects in the area. Therefore, Alternative A would have no direct, indirect, or cumulative effects on unroaded areas or on any roadless values that currently exist within the project area.

Alternatives B and C—Direct and Indirect Effects

There is no proposed harvest or road building in IRA's or unroaded areas. Therefore, Alternatives B and C would have no direct or indirect effects on IRA's or unroaded areas or on any of the following roadless values that currently exist within those areas:

- Soil, water, and air quality
- Diversity of plant and animal communities
- Habitat for TES species and biological strongholds
- Traditional Cultural Properties and Sacred Sites

Primitive, Semi-Primitive Non-Motorized Classes of Recreation

With clear evidence of past forest management, the landscape in the Ball Park project area is characterized as a patchwork of natural stands and second growth conifer plantations. As stated elsewhere in this chapter, the proposed partial cutting in Alternatives B and C, would all remain within Forest Plan standards and guidelines for ROS and VQO, and would not adversely affect the existing scenic quality of the landscape.

Landscape Character and Scenic Integrity

There are limited opportunities for recreation activities that depend on remoteness and wilderness-like experiences in this area, as discussed elsewhere in this chapter (see Recreation and Scenery). Roads are either visible or vehicles can be heard on roads from any location in the project area. Except for short term noise and traffic occurring during project implementation, the proposed action and other action alternatives would not diminish any sense of remoteness or solitude that currently exist within any unroaded areas in the project area.

Alternatives B and C—Cumulative Effects

Since the 1950s, timber sales have modified approximately 7,254 acres within the project area with primarily regeneration harvest (see Table 16). Timber sales have also contributed to the development of a 100-mile network of roads in the area. As a result, there are now roughly 1,500 acres of unroaded areas within the project area.

There is no proposed harvest or road building in IRA's or unroaded areas. No other management actions are planned for the project area that would result in additional affects to unroaded areas.

Social/Economics

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Social/Economic issues includes the project activity units is the Ball Park Thin Project area and the surrounding communities that would be affected by the proposed project.

Affected Environment—Social/Economics

The Ball Park Thin Project area is situated along Oregon State Highway 126, between the communities of Nimrod to the west, and McKenzie Bridge to the east. The communities of Blue River and Rainbow, Oregon are also located within or adjacent to the project area. Highway 126, a major travel route for commercial and recreation traffic passing through these communities, follows along the McKenzie River.

The economy of the local communities from the Springfield urban-growth boundary to McKenzie Bridge depends on a mixture of tourism, recreation, timber industry, and Forest Service jobs for stability. Local businesses that rely on tourism and recreation include: Hoodoo Ski Bowl, many inns, lodges, restaurants, stores, gas stations, along with the outfitters and guides. Timber industry jobs include a variety of woods and mill jobs.

Forest Service jobs in the Willamette and Deschutes National Forest vicinity are located at McKenzie Bridge, Sisters, Detroit, and Sweet Home Ranger Stations. Tourism and recreational activities connected with National Forest lands have been on the increase in recent years for the upper McKenzie River area. Employment connected with tourism and recreation-related services have also increased.

The current level of timber harvesting on the Willamette National Forest has dropped substantially from the levels of the mid-1980s. This decrease has contributed to a decline in the number of local jobs associated with the wood products industry in the area.

Environmental Consequences—Social/Economics

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

The no-action alternative would not harvest any timber, and therefore, would not support direct, indirect, and induced employment. It would not result in increased income to the regional or local economy. Current levels of employment in the wood products sector would not be affected by this project.

Alternatives B and C—Direct, Indirect, and Cumulative Effects

All action alternatives are economically viable, considering current selling values, timber volume per acre, yarding systems required, the proposed temporary road construction and system road maintenance needed, and the identified post-timber harvest projects identified in this analysis. The economic analysis run to make this determination is available in the Ball Park Thin Project analysis file at the McKenzie River Ranger District office.

In general, the primary effect on timber harvest-related employment would occur from commercial timber harvest associated with the action alternatives over the next three to seven years. As the alternative volume tables in Chapter 2 indicate, both action alternatives would provide some opportunity for timber harvest-related employment, and higher revenues. Alternative C, would provide slightly higher revenues than Alternative B. Table 42 discloses costs and revenues and the estimated present net value of each of the action alternatives, based on an average base period price of $22.76/CCF (100 Cubic Feet).

Though the combined economic benefit from implementation of any of the action alternatives is expected to be positive, each of the alternatives from the Bridge Thin Project would have a localized beneficial effect for the socio-economic environment of western and central Oregon.

Table 42. Estimated Present Net Value of Alternatives.

	Alternative A No Action	Alternative B Proposed Action	Alternative C
Volume (MBF / CCF)	0	12,347 / 24,238	13,133 / 25,759
Discounted Costs	$0	$5,320,534.	$5,861,458
Discounted Revenues*	$0	$5,449,820	$6,045,690
Present Net Value (PNV)	$0	$129,286	$184,232
PNV per Acre	$0	$121	$173
Benefit/Cost Ratio	0	1.0243	1.0314

* Discounted Revenues based on July 2008, selling values.

Heritage Resources

Scale of Analysis

The geographic scale used to assess direct, indirect and cumulative effects for Heritage Resources includes the project activity units in the Ball Park Thin Project area.

Affected Environment—Heritage Resources

Archaeological materials recorded within the Ball Park Thin project area represent Native American lithic scatters and lithic isolated finds. The archeological sites within the project area are considered potentially eligible to the National Register of Historic Places (NRHP) and would be protected from project activities. The proposed Ball Park Thin Timber Sale has the potential to affect one of the known cultural sites within or near the project area. To protect these potentially eligible sites the project was redesigned by dropping portions of timber sale stands.

Prehistoric Use

Ethnographic research has indicated that pre-contact and early historic aboriginal groups, probably the Molala, Kalapuya, and their ancestors used the general area for the main purpose of seasonal hunting, fishing, and plant gathering. In 1855 the surviving Molala and Kalapuya people signed the Dayton Treaty, which gave up all rights to land in the western Cascades and led to their removal to the Grand Ronde Reservation. By the end of the nineteenth century, the Kalapuya were reduced to less than 20% of their original numbers and only 31 Molalas remained.

Ethnographic evidence suggests that several highly mobile groups indigenous to the western Cascade Mountains lived during the winter along low elevation streams, accessing the uplands during the summer and fall to hunt game and gather berries and other important plant resources. The Molala are linguistically related to Willamette Valley groups, but are thought to be a montane-based band that were living in the western Oregon Cascades during the historic period. The Molala generally are known to be split into two subgroups: the Northern Molala located in the vicinity of Mount Hood's drainage systems and the Southern Molala located west of the Klamath Lake area. Little is known of a third group, referred to as the Upper Santiam/Santiam band of Molala know to have occupied Linn and Lane counties in areas between the Northern and Southern groups. The Molala are also often culturally grouped with the Kalapuya who were based in the Willamette Valley but probably made seasonal forays to the Cascades for large game and berries. Many of the Molala and Kalapuya were removed to the Grand Ronde Reservation in western Oregon after the signing of the Dayton and Molalla Treaties of 1855) Other Molala shifted to the Siletz Reservation along the Oregon coast, the Klamath reservation the to the south and east into Central Oregon where they were absorbed into the Confederated Tribes of Warm Springs Reservation of Oregon.

Pre-contact resources include chipped obsidian lithic scatters and obsidian lithic isolates, representing tool use, modification, or manufacture related to hunting and gathering. Ongoing stone tool analysis, both by agency archaeologist and contractors, suggests that this portion of the Cascades was occupied primarily by people indigenous to the Cascades. Those people were probably ancestral to the Molala people that were involved in early but unratified treaties of the 1850s.

Historic Land Use

Historic accounts document the presence of horse-mounted Warm Springs Indian traveling into and through the area in the late 1800s and early 1900s (Williams 1988); these seasonal travels were motivated by the need for forage for horses, huckleberry gathering, inter-tribal contacts and visiting, hunting, fishing, trading with white settlers, and travel to seasonal cash employment, such as picking hops in the Willamette Valley (Bergland 1992).

The earliest recorded permanent Euro American settler in the vicinity was John Templeton Craig, who homesteaded at Craig's Pasture (now McKenzie Bridge) in the 1860s. The prospect of a toll road over the McKenzie Pass began to draw settlers into the area after 900 cattle and nine wagons made it over the pass on a rough track (the Scott Wagon Road) in the fall of 1862.

The Town of Blue River was founded in 1886. Subsistence hunting, farming, and stock raising were the primary lifestyles of the early settlers. A greater influx of people into the area was encouraged by the passage of the Forest Homestead Act in 1906, which allowed homesteaders to claim land set aside as national forest. The first sawmill in the region was opened on the lower McKenzie in 1851 however systematic logging of huge forest did not occur until the 1890s. Hwy 126 was constructed by the CCC in the 1930s the Belknap CCC camp formerly occupied the site of the McKenzie River RD. The first sawmill in the region was opened on the lower McKenzie in 1851 however systematic logging of huge forest did not occur until the 1890s. Hwy 126 was constructed by the CCC in the 1930s the Belknap CCC camp formerly occupied the site of the McKenzie River RD.

Historic use Administrative use appears in the form of trails and early logging activity. The Santiam NF Maps (1913, 1931) and the Cascade National Forest 1925 map depict several historic or prehistoric trails crossing through the project area. These include the Castle Rock Trails and trails to Deathball Rock and Thors Hammer. Several historic structures clustering around the Blue River, McKenzie Bridge, and Rainbow areas are visible on Forest Service maps dating back to the 1920s. A historic ranger Station at McKenzie Bridge, along with the Paradise and Blue River Guard stations, is also noted on Forest Service maps between 1913 and 1931. The Belknap CCC camp was located at the present site of the McKenzie River Ranger Station (Gauthier et al. 2007).

Environmental Consequences—Heritage Resources

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

Implementation of the no action alternative would not directly or indirectly affect cultural resources since there would be no change to the integrity of heritage resource sites.

Alternatives B and C—Direct and Indirect Effects

Implementing both of these alternatives would result in ground disturbance on 915 acres of timber harvest of previously managed stands (i.e. plantations), less than 3.0 miles of temporary spur road construction, 0.53 miles of road decommissioning, 43.9 miles of road maintenance and 49 acres of natural fuels underburn. Since appropriate and approved surveys and cultural site protection measures are already in place for this project (see Mitigation Measures Chapter 2), then potential direct effects would be in the form on inadvertent damage to the integrity of cultural resources which were not discovered during initial survey. Any sites uncovered during implementation of the project would require the application of Design Measures described in Chapter 2.

Alternatives B and C—Cumulative Effects

It is not anticipated that there would be cumulative effects to the potentially eligible cultural resources in the Ball Park Timber Sale Project Area from any of the proposed actions as long as the Heritage mitigation and Design Criteria are implemented prior to timber harvest and associated activities.

Compliance with Other Laws, Regulations and Executive Orders

This section describes how the action alternatives comply with applicable State and Federal laws, regulations and policies.

State Laws:

Oregon State Scenic Waterway – Segments of the McKenzie River are also designated Oregon State Scenic Waterway, which is administered by the Oregon State Parks and Recreation Department. The State Scenic Waterway segments have a dual classification, with the west side of the McKenzie River classified as Scenic River Area and the east side of the river classified as Recreation River Area. Scenic Waterway Act and Commission rules require the evaluation of proposed development within ¼ mile from each side of the river. No timber harvest or any other actions are proposed within the State Scenic Waterway-Scenic River Area.

Federal Laws and Executive Orders:

The Preservation of Antiquities Act, June 1906 and the National Historic Preservation Act, as amended, October 1966 – Before project implementation, State Historic Preservation Office consultation is completed under the Programmatic Agreement among the United States Department of Agriculture, Forest Service, Pacific Northwest Region (Region 6), the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Officer regarding Cultural Resource Management on National Forests in the State of Oregon, dated June 2004. Field surveys where ground-disturbing activities would occur in the Ball Park Thin Project area have been completed. All known archaeological sites in the project area are protected by avoidance.

Should previously unknown sites be found during ground disturbing activities, contract provisions would provide protection and the McKenzie River District Archaeologist would be immediately notified.

These various measures resulted in a determination of No Historic Properties Affected. Because cultural resources would not be affected by proposed activities under any action alternative.

The Endangered Species Act (ESA), December 1973 – The ESA establishes a policy that all federal agencies would seek to conserve endangered and threatened species of fish, wildlife and plants. Biological Evaluations for plants and wildlife have been prepared, which describes possible effects of the proposed action on sensitive, and other species of concern that may be present in the project area. The ESA effects determination and rationale for bull trout and spring Chinook salmon is described as Not Likely to Adversely Affect and has been found consistent with the *Biological Assessment for Fiscal Year 2007-2009 Low-Risk Thinning Timber Sales on the Mt. Hood and Willamette National Forest, and portions of the Eugene and Salem Bureau of Land Management Districts* (Appendix B).

Clean Air Act Amendments, 1977 – The alternatives are designed to meet the National Ambient Air quality standards through avoidance of practices that degrade air quality below health and visibility standards. This project is consistent with by the 1990 Clean Air Act and the 1977 Clean Air Act and its amendments (see Fire and Fuels).

The Clean Water Act, 1987 – This act establishes a non-degradation policy for all federally proposed projects. Compliance with the Clean Water Act would be accomplished through planning, application and monitoring of Best Management Practices (BMPs).

Within the Ball Park Thin Project Area reaches of Deer Creek and its tributaries, Budworm and County Creeks, have been identified by the Oregon Department of Environmental Quality as 303(d); having impaired water quality for temperatures in excess of water quality standards. Based on the analysis presented in this EA, TMDL requirements for the McKenzie Basin would be met in each alternative (See Water Quality/Riparian Resources).

Federal Mine Safety and Health Act of 1977, Public Law 91-173, as amended by Public Law 95-164. Development of Rock Quarries would conform to the requirements of the act, which sets forth mandatory safety and health standards for each surface metal or nonmetal mine. The purpose for the standards is to protect life by preventing accidents and promoting health and safety.

Magnuson-Stevens Fishery Conservation and Management Act, 1976 (MSA) – The Ball Park Thin Project area is located in the Deer Creek Sub-watershed, which is included in the waters designated as Essential Fish Habitat for spring Chinook salmon by the Pacific Fishery Management Council (PFMC). The proposed action is not likely to adversely affect aquatic systems, recreational fisheries, or designated Essential Fish Habitat.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires the identification of habitat “essential” to conserve and enhance the federal fishery resources that are fished commercially. The Pacific Fishery Management Council (PFMC) designated Essential Fish Habitat (EFH) for Chinook, coho, and Puget Sound pink salmon in their Amendment 14 to the Pacific Coast Salmon Plan, issued September 27, 2000. The interim final rule implementing the EFH provision of the MSA (62 FR 66531) requires federal agencies to consult with the NOAA Fisheries Service for any action that may adversely affect EFH. Ball Park Thin Project is located in the Deer Creek sub-watershed, which includes waters designated as EFH for spring Chinook salmon by the PFMC.

Potential downstream effects from timber harvest, road reconstruction, and fire treatments on EFH habitat for spring Chinook salmon is expected to be negligible due to treatment scale, low severity and proximity of activity to stream channels. Sources of sedimentation are expected to increase in the short-term at the site-specific level from the ground disturbing activity. These increases would result primarily from road reconstruction, culvert replacement, haul and temporary road construction. No stream crossing reconstruction would occur within bull trout or spring Chinook habitat. Habitat of importance to spring Chinook could be subjected to short-term increases in turbidity if reconstruction activity were to occur in the immediate vicinity. However, the distance of reconstruction activity from habitat in the project area would substantially reduce the risk. Project effects are expected to be of short duration during seasons of implementation. Suspended sediments are not expected to adversely impact habitat important to spring Chinook due to low project scale and intensity, flow routes, distance of activity from listed species habitat. The use of best management practices is expected to further mitigate potential adverse aquatic effects.

As described above, project cumulative effects of past, current (Ball Park Thin action alternatives) and foreseeable actions is expected to maintain EFH habitat within and downstream of the project area. The proposed action would not adversely affect aquatic systems, recreational fisheries, or designated Essential Fish Habitat. The effects that are likely to occur are based on sound aquatic conservation and restoration principles for the benefit of recreational fisheries, as directed by Executive Order #12962. Since the project would not adversely affect EFH, no further consultation under the Magnuson-Stevens Fishery Conservation and Management Act is required. The No Action alternative would not adversely affect EFH habitat.

Wild and Scenic Rivers Act, 1968 – Alternatives in this proposal are designed to maintain the Outstandingly Remarkable Values of the McKenzie River Wild and Scenic River. No portion of the proposed thinning project is located within this Congressionally Reserved designation. Proposed project haul activities through the road system in the Wild and Scenic corridor are consistent with the McKenzie River Wild and Scenic River Plan (USDA Forest Service, 1993).

Inventoried Roadless Areas and Wilderness – There are no actions proposed within Inventoried Roadless Areas (IRAs) or Wildernesses in the Ball Park Thin Project, and no actions would affect these designations.

Executive Orders 11988 and 11990: Floodplains and Wetlands – Executive Order 11988 requires government agencies to take actions that reduce the risk of loss due to floods, to minimize the impact of floods on human health and welfare, and to restore and preserve the natural and beneficial values served by floodplains. Proposed harvest treatments would not occur within 100-year floodplains.

Executive Order 11990 –requires government agencies to take actions that minimize the destruction, loss, or degradation of wetlands. Streamside Riparian Reserves, seeps, springs, and other wet habitats exist in the Ball Park Thin Project Area. These areas would be either avoided, or managed according to Riparian Reserve Management Guidelines in Chapter 2 to comply with amended Willamette Forest Plan Standards and Guidelines. Riparian Reserves would also be protected with Mitigation Measures also detailed in Chapter 2. As a result, proposed harvest treatments would be consistent with Executive Orders 11988 and 11990.

Executive Order 12898: Environmental Justice – Executive Order 12898 requires that federal agencies adopt strategies to address environmental justice concerns within the context of agency operations. With implementation of either action alternatives, there would be no disproportionately high and adverse human health or environmental effects on minority or low-income populations. The actions would occur in a remote area. Nearby communities would mainly be affected by economic impacts connected with contractors implementing harvest, road reconstruction, tree thinning, planting, and other fuels treatment activities. Racial and cultural minority groups could also be prevalent in the work forces that implement activities. Contracts contain clauses that address worker safety.

Executive Order 12962: Recreational Fishing – The June 7, 1995, Executive Order requires government agencies to strengthen efforts to improve fisheries conservation and provide for more and better recreational fishing opportunities, and to develop a new policy to promote compatibility between the protection of endangered species and recreational fisheries, and to develop a comprehensive Recreational Fishery Resources Conservation Plan.

Executive Order 13186: Neotropical Migratory Birds – There are 85 bird species recognized as neotropical migrants on the Willamette National Forest. Thirty-five of these species found on the Willamette have been identified as species of concern (Sharp 1992). A Memorandum of Understanding was signed between the USFS and USFWS to complement the January 2001, Executive Order.

The Ball Park Thin Project Area contains populations of migratory landbirds typical of the western Cascades. See Migratory Land birds above for further discussion of effects to neotropical migratory birds.

The National Environmental Policy Act (NEPA), 1969 – NEPA establishes the format and content requirements of environmental analysis and documentation. Preparation of the Ball Park Thin Project EA was done in full compliance with these requirements.

The National Forest Management Act (NFMA), 1976 –All proposed timber harvest units are planned to occur on suitable land. If regeneration harvest is implemented the sites would be capable of restocking within 5 years of harvest by either natural or artificial means. All units were considered for potential uneven-aged management. Proposed commercial thinning would increase the rate of growth of remaining trees. Some locations would favor species or age classes most valuable to wildlife. The resultant reduced stress on residual trees would make treated stands less susceptible to pest-caused damage. Mitigation measures have been identified to protect site productivity, soils, and water quality.

The burning of activity fuels would reduce long-lasting hazards from wildfire and reduce the risk of pest outbreaks over the project area as a whole. Air quality would be maintained at a level that would meet or exceed applicable Federal, State, and local standards. All proposed activities would provide sufficient habitat to maintain viable populations of fish and wildlife. Critical habitat for threatened or endangered species would be protected through avoidance. The action alternatives would accelerate development of forest habitats that are currently deficient within the analysis area to enhance the diversity of plant and animal communities in the long-term. See discussions under the applicable resource sections above, for further support that proposed activities that would comply with the seven requirements associated with vegetative manipulation (36 CFR 219.27(b)), riparian areas (36 CFR 219.27(e)), and soil and water (36 CFR 219.27(f)).

Forest Plan Consistency – Actions analyzed in the Ball Park Thin EA are consistent with a broad range of Forest Plan Standards and Guidelines that have been discussed and disclosed throughout the document. The timber stand treatments associated with the project are consistent with the goals and management direction analyzed in the Willamette National Forest Land and Resource Management Plan FEIS and Record of Decision. Road improvements are designed to be consistent with the 1994 Northwest Forest Plan amendments to the Forest Plan and the Aquatic Conservation Strategy objectives.

Other Jurisdictions – There are a number of other agencies responsible for management of resources within the Ball Park Thin Project Area. The Oregon Department of Fish and Wildlife is responsible for management of fish and wildlife populations, whereas the Forest Service manages the habitat for these animals. The Oregon Department of Fish and Wildlife has been contacted regarding this analysis.

Proposed harvest treatments within riparian areas have been designed to comply with “Sufficiency Analysis for Stream Temperature – Evaluation of the adequacy of the Northwest Forest Plan Riparian Reserves to achieve and maintain stream temperature water quality standards” (USDA Forest Service and USDI BLM, 2004). This document was prepared in collaboration with Oregon Department of Environmental Quality and United States Environmental Protection Agency to provide documentation of Northwest Forest Plan compliance with the Clean

Water Act with regard to state water quality standards for stream temperatures. As such, it redeems several of the Forest Service responsibilities identified in "Memorandum of Understanding between USDA Forest Service and Oregon Department of Environmental Quality To Meet State and Federal Water Quality Rules and Regulations" (USDA Forest Service and Oregon DEQ, May 2002). The Sufficiency Analysis provides current scientific guidance for management of riparian vegetation to provide effective stream shade, including appropriate methods of managing young stands for riparian objectives other than shade, such as production of large wood for future recruitment.

Oregon Department of Environmental Quality and the Oregon Department of Forestry are responsible for regulating all prescribed burning operations. The USDA Forest Service Region 6 has a Memorandum of Understanding with Oregon Department of Environmental Quality, Oregon Department of Forestry, and the USDI Bureau of Land Management regarding limits on emissions, as well as reporting procedures. All burning would comply with the State of Oregon's Smoke Management Implementation Plan and, for greater specificity, see the memorandum of understanding mentioned above.

Energy Requirements and Conservation Potential – Some form of energy would be necessary for projects requiring use of mechanized equipment. Commercial thinning and some partial cutting units would involve both heavy and small machines for yarding logs during the implementation period. Projects such as road reconstruction and maintenance could require heavy machinery for a small amount of time. Both possibilities would result in minor energy consumption. Alternatives that harvest trees could create supplies of firewood as a by-product, which would contribute to a supply of energy for the local community for home heating.

Prime Farmland, Rangeland, and Forestland – No prime farmland, rangeland, or forestland occurs within the analysis area.

Unavoidable Adverse Effects – Implementation of any of the alternatives, including the No Action alternative, would inevitably result in some adverse environmental effects. The severity of the effects would be minimized by adhering to the direction in the management prescriptions and Standards and Guidelines in Chapter IV of the Willamette Forest Plan, and additional Mitigation Measures and Design Measures proposed in Chapter 2 of this document. These adverse environmental effects are discussed at length under each resource section.

Irreversible and Irretrievable Effects – "Irreversible" commitment of resources refers to a loss of future options with nonrenewable resources. An "Irretrievable" commitment of resources refers to loss of opportunity due to a particular choice of resource uses.

No new construction of permanent roads is planned. Temporary road would be constructed, but would be obliterated following operations. Rock used to surface roads would be an irreversible commitment of mineral resources.

The soil and water protection measures identified in the Forest Plan Standards and Guidelines, Mitigation and Design Measures in Chapter 2, and Best Management Practices are designed to avoid or minimize the potential for irreversible losses from the proposed management actions.

Concerning threatened and endangered plant, wildlife, and fish species, a determination has been made that the proposed actions would not result in irreversible or irretrievable commitment of resources that foreclose formulation or implementation of reasonable or prudent alternatives.

With all Action Alternatives (B and C)*:* Tree removal would result in an irretrievable loss of the value of removed trees for wildlife habitat, soil productivity, and other values. Log landings would produce irreversible changes in the natural appearance of the landscape. The visual effect of log landings would be somewhat reduced by mitigation measures and design measures to reduce soil compaction and erosion (scarification, seeding and waterbarring for example). Little irreversible loss of soil should occur due to extensive mitigation associated with timber harvest and prescribed fire (tractor harvest only on slopes less than 35 percent, skyline yarding with partial or full suspension to meet Forest Plan Standards and Guidelines, etc.).

With Alternative A (No Action): There would be an irretrievable loss of growth within the untreated, overstocked forest. The ability to protect forest within the analysis area from stand replacing fire could be irretrievably lost as well. There would be the potential for irreversible loss of timber value due to declining tree diameter growth related to crowded stand conditions, and loss of potential growth from insects and disease.

Monitoring

Invasive Plants

Post-sale invasive plant surveys would be completed by District personnel as a mitigation measure to determine if the weed treatments were effective. The monitoring survey would occur one year after treatments with results reported to the district Botanist. Bermed and decommissioned roads would be monitored for Invasive Plants for three years after the road treatment is completed. Follow up treatments would occur if necessary.

Logging Operations

During logging, operations would be monitored for adherence to contract specifications including thinning specifications, bole damage to residual trees, retention of down wood and snags, skid trail spacing and use of designated skid trails. Contract compliance monitoring would be performed by Timber Sale Administrators.

Reforestation

First, third and fifth year survival/stocking examinations to monitor seedling survival, natural regeneration, animal damage and need for release or replanting within planted groups would be conducted for harvested stands.

Forest Plan Implementation Monitoring

A district timber sale review with the District Ranger, IDT Members and Resource Specialists would be conducted within one year of timber sale, underburning and prescribed natural fire completion to determine if the prescribed treatments were successfully applied. The effectiveness of the prescribed treatments would be evaluated, providing valuable information for future projects. The Forest Supervisor's Staff performs annual project monitoring at each Ranger District, and compiles the results in the yearly Forest Monitoring Report. Timber sales from this project would be likely candidates for Forest Plan Implementation monitoring. Post-harvest stand density would require sampling of units prior to monitoring. Other implementation monitoring subjects may include temporary road decommissioning, system road closures, decommissioning for watershed restoration, snag creation due to fire and other processes, large down wood abundance, and small created gap reforestation.

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Chapter 4. Consultation and Coordination

The Forest Service consulted with Federal, State, and local agencies; with tribal organizations; and individuals known to have an interest in similar projects during the development of this EA. Refer to Public Involvement on page 14 of Chapter 1. On May 24, 2007 a scoping letter was mailed to following:

Federal, State, and Local Agencies:

- Oregon Dept. of Fish and Wildlife
- Megan Finnessey, Coordinator, McKenzie Watershed
- Karl Morgenstern, Source Water Protection Manager, Eugene Water and Electric Board
- Kitty Piercy, Mayor, Eugene City Council
- Sid Leiken, Mayor, Springfield City Council
- Steve Newcomb, Environmental Coordinator, Eugene Water and Electric Board
- U.S.D.I Fish and Wildlife Service

Tribal Governments:

- Allen Foreman, The Klamath Tribe
- Cheryle Kennedy, Confederated Tribes of the Grand Ronde
- Delores Pigsley, Confederated Tribes of the Siletz Indians
- Ron Suppah, Confederated Tribes of Warm Springs

Elected Officials:

- County Commissioners, Lane County
- County Commissioners, Linn County

Organizations and Individuals:

- Jim Baker, McKenzie Guardians
- Jim Berl, Oregon Guides and Packers
- Roger Borine, Oregon Hunters Assoc.
- Linda Christian
- Terry Damon, Rosboro Lumber Co.
- Fred Dutli
- Ken & Louise Engelman, River Reflections
- Forest Conservation Council
- Michael Godfrey
- Griffin Green, Mt. Jefferson Snowmobile Club
- Jake Groves, American Forest Resource Council
- Robert and Michele Hiddleston
- Jim and Nancy Holland
- Jan Houck, Oregon Dept. of Parks and Recreation
- Chandra LaGue, Oregon Wild
- Josh Laughlin, Cascadia Wildlands Project
- Conservation Leader, Lane Co Audubon Society
- Joan and Hector Leslie
- Steve and Kathy Keable
- Chairperson, Forest Issue, Many Rivers Group, Sierra Club
- Manager, McKenzie River Chamber of Commerce
- Jim Todd, Oregon Nordic Club, Willamette Chapter
- Conservation Chair, Obsidians
- Craig Patterson

- Greg Pitts, Oregon Council, Federation of Flyfishers
- Oregon Field Director, Rocky Mountain Elk Foundation
- Annette Simonson, Santiam Wilderness Committee
- Eugene Skrine
- Andy Stahl, FSEEE
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Appendices

Appendix A – Aquatic Conservation Strategy Consistency

Appendix B – Biological Assessment, Spring Chinook Salmon and Bull Trout

Appendix C – Biological Evaluation, Botany

Appendix D – Wildlife Biological Assessment, Biological Evaluation, Specialist Report

Appendix E – Soils Specialist Report

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Appendix G – Heritage Resources Specialist Report

United States
Department of
Agriculture

Forest Service

July 2008

Environmental Assessment

Ball Park Thin Project

Appendices ----- Volume 2

McKenzie River Ranger District
Willamette National Forest
Lane County, Oregon

Legal Locations: Within T14S, R5E, Sec. 24; T.14S, R.6E, Sec. 17-21, 28-30, 31-33; T.15S, R.6E, Sec. 3-6, 7-11, 14-18, 20-23; Willamette Meridian

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McKenzie Bridge, Oregon 97413
541-822-7271

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Appendix A – Aquatic Conservation Strategy Consistency

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APPENDIX A

An Evaluation of Activities Authorized by the Ball Park Thin Project Environmental Assessment for Consistency with the Aquatic Conservation Strategy

Introduction

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. A goal of this strategy is to maintain a "natural" disturbance regime. In addition, management activities must comply with nine objectives that are included in the strategy. A variety of tactics to accomplish these goals and objectives are incorporated into four primary components. These components are:

Riparian Reserves
Key Watersheds
Watershed Analysis
Watershed Restoration

These four components, along with Late Successional Reserves, are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems (Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl - USFS, BLM 1994, (ROD), pages B9-B12).

The Four Components

1. Riparian Reserves

The Northwest Forest Plan defined Riparian Reserves as “portions of watersheds where riparian-dependant resources receive primary emphasis and where special standards and guidelines apply” (ROD page B12). Riparian Reserves include those portions of a watershed directly coupled to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing water bodies such as lakes and ponds, wetlands, streams, stream processes, and fish habitats (ROD pgs. B-12 and B-13).

The Upper McKenzie Watershed Analysis (Willamette N.F. - 1995) (WA) recommended no adjustment of riparian reserve widths for Class 1-3 streams, and suggested that riparian reserve widths could be decreased for Class 4 streams in the watershed.

During the analysis for the Ball Park Thin project, no reductions of riparian reserve widths along any streams were proposed.

2. Key Watersheds

The Northwest Forest Plan created an overlay of Key Watersheds that are intended to provide refugia for at-risk stocks of anadromous salmonids and resident fish species. Refugia are a cornerstone of the conservation strategy for these species, consisting of watersheds that provide high quality habitat or are expected to provide habitat. Two different levels of protection, or tiers, are identified, as well as non-Key watersheds (ROD page B19). In key watersheds, completion of a watershed analysis is required prior to most management activities. The Ball Park Thin project area falls exclusively within Key Watershed designated lands.

3. & 4. Watershed Analysis and Watershed Restoration

The Upper Mckenzie Watershed Analysis (WA) was prepared by the Mckenzie Ranger District in 1995. The watershed was characterized in terms of past and current conditions, and a synthesis discussion was provided to guide development of management proposals to maintain and restore watershed conditions

The Ball park Thin Project has incorporated information from the WA into the project design. Current vegetative landscape patterns reflect past management activities that did not consider what the landscape might look like under natural disturbance regimes. Many of the proposed projects seek to create vegetative patterns, late successional stand structures, and fuel loadings that would have been typical of this landscape under the natural fire disturbance regimes that historically occurred in the area.

Aquatic Conservation Strategy Objectives

The previous discussions highlighted the consistency of the Ball Park Thin Project with the four components of the Aquatic Conservation Strategy. This section will outline how the activities proposed in the action alternatives conform to the nine objectives of the ACS. The information presented is summarized from Chapters 2 and 3 of the Environmental Assessment, where greater detail can be found, if needed.

Objective #1

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

Harvest and prescribed fire prescriptions for proposed units were developed so that the treatment would, to the extent possible, resemble the effects of the natural fire regime that historically occurred in the vicinity of each unit. The objectives for the treatments are to develop stand structures that will maintain existing habitat, while creating conditions resembling those that would occur in the presence of the historic natural fire regime.

This will provide a balance between the maintenance of existing habitat for species, populations, and communities, with opportunities to develop landscape scale features with distribution, diversity and complexity typical of landscapes that developed under fire regimes that historically occurred in the area. This includes aquatic and riparian elements of the landscape.

Objective #2

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

Riparian reserves, as established by the Record of Decision for the Northwest Forest Plan and re-assessed in the upper McKenzie Watershed Analysis have been incorporated into the design of all treatment units where streams occur. Treatments are proposed within riparian reserves, where they have the potential to enhance functions such as the development of future large wood, stand structural diversity, vegetative species richness and diversity and other late successional characteristics. Road treatments include upgrade of stream crossings to accommodate 100 year flood events, so that these events can flow through the landscape unimpeded and without the risk of catastrophic fill failures. Where needed, these crossings will be retrofitted to permit passage of fish, amphibian, and other aquatic and riparian species to and from wetland habitat located both upstream and downstream from the crossing.

Objective #3

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

All harvest treatments restrict the use of ground disturbing equipment in and around streams, and provide for retention of all vegetation that is contributing to the stability of banks and channels. Where aerial yarding methods are prescribed, full suspension is required when yarding over streams to prevent disturbance of stream banks and channels.

Roads are a known potential source of damage to stream habitat, where improper design or location, or inadequate maintenance results in failures or roadway erosion. The Ball Park Thin Project addresses this concern, by minimizing road construction in all alternatives. The only new roads to be constructed are temporary roads located on stable locations, and all of these will be obliterated following harvest activities.

Maintenance of portions of the existing road network that are in poor repair, replacement of undersized or old culverts, drainage improvement, and application of aggregate where necessary, will reduce chronic, low amplitude sources of fine sediment from the existing transportation system, and the potential of crossing fill failures. This will reduce the possibility of gravels and cobbles becoming embedded in fine materials in the stream channel bottoms.

Objective #4 *and* Objective #5

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

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.

Project design elements intended to maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations, as discussed above under Objective 3 provide protection to water quality from the introduction of sediment into streams and resulting effects on stream turbidity. Many of the roadwork projects will reduce or eliminate existing sources of sediment induced turbidity.

Roads are a known potential source of damage to stream habitat, where improper design or location, or inadequate maintenance results in failures or roadway erosion. The Ball Park Thin Project addresses this concern, by minimizing road construction in all alternatives. The only new roads to be constructed are temporary roads located on stable locations, and all of these will be obliterated following harvest activities. No stream crossings are proposed.

Maintenance of portions of the existing road network that are in poor repair, replacement of undersized or old culverts, drainage improvement, and application of aggregate where necessary, will reduce chronic, low amplitude sources of fine sediment from the existing transportation system, and the potential of crossing fill failures. This will reduce the possibility of gravels and cobbles becoming embedded in fine materials in the stream channel bottoms.

In addition, where beneficial vegetative treatments are proposed within riparian reserves, effective stream shading in compliance with the Regional TMDL Implementation Strategy is retained so that stream temperatures are not impacted

Objective #6 *and* Objective #7

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. *And*

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

Implementation of a landscape design that is intended to restore vegetative structures, landscape patterns, and disturbance regimes to a more natural condition will result in watershed conditions that more closely resemble those under which historic stream flow conditions developed.

In the short term, potential adverse effects on the timing, magnitude, duration, and spatial distribution of peak and high flows will be minimized by managing the planning sub-drainages within the analysis area to Aggregate Recovery Percentage (ARP) levels that comply with the Willamette National Forest Land and Resource Management Plan, (Willamette National Forest, 1990)

Floodplains and wetland areas were excluded from consideration for harvest activities and where treatment units occur adjacent to these features, ground based equipment that could impact the soil and result in altered ground water movement are restricted.

Objective #8

Maintain and restore the species compositions 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 distribution of coarse woody debris sufficient to sustain physical complexity and stability.

Harvest and prescribed fire prescriptions for proposed units were developed so that the treatment would, to the extent possible, resemble the effects of the natural fire regime that historically occurred in the vicinity of each unit. The objectives for the treatments are to develop stand structures that will maintain existing habitat, while creating conditions resembling those that would occur in the presence of the historic natural fire regime.

This will provide a balance between the maintenance of existing habitat for species, populations, and communities, with opportunities to develop landscape scale features with distribution, diversity and complexity typical of landscapes that developed under fire regimes that historically occurred in the area. This will create conditions that favor development species composition and structural diversity of plants across the landscape of the Ball Park Thin Project Area, including riparian areas and wetlands.

Stands in riparian reserves are proposed for treatment to encourage development of large wood and late successional stand structure, where possible to do so without risk to bank and channel stability, and where effective stream shade can be retained to provide thermal regulation.

Wetlands and floodplain areas that are critical to nutrient filtering are eliminated from treatment areas and use of ground disturbing equipment adjacent to them is restricted.

Use of low severity fire is restricted to portions of riparian reserves where the risk of adverse effects on ground cover and duff retention cannot impact water quality. However, portions of riparian reserves that will be treated are expected to develop a more diverse pattern of small openings and patches, and a richer vegetative species composition and diversity.

Objective #9

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

Implementation of a landscape design that is intended to restore landscape processes, vegetative structures, and landscape patterns to more natural conditions, will restore the ability of the landscape to create a rich variety of habitats for native species.

In addition, this project complies with the Northwest Forest Plan, and all of its applicable standards and guidelines. Option 9 was expected to maintain and restore late-successional and old-growth forest ecosystems, and provide adequate viability levels for all late successional species including species listed in the FSEIS ROD Table C-3. The Watershed Analyses for the Upper McKenzie Watershed (Upper Mckenzie WA) did not identify any need for increased protection above the ROD recommendations. Adequate amounts of down woody debris will be retained on site. This project will not affect the amount or distribution of these habitats or species that use these habitats.

Project Consistency Worksheet

NLAA Thinning Sale Programmatic Consultation

The programmatic timber sale consultation process requires the completion of three parts:
A) Completion of a project description and including maps,
B) Completion of project consistency with PDC forms,
C) Certification by the preparer and each Level I team member.

Part A - Project Description and Maps

Date: April 8, 2008

Project Title: Ball Park Thin

NEPA Reference #: N/A

Administrative Unit: Willamette National Forest – McKenzie River Ranger District

HUC 5 Watershed(s) (name and number): Upper McKenzie River #1709000401

Planned Project Implementation Date: 2011-2013

ESA Species, Critical Habitat and Effect Determination:

ESA Species or Critical Habitat	Effect Determination (NE, NLAA)
Columbia River Bull Trout DPS	NLAA
Upper Willamette River Chinook Salmon ESU	NLAA
Columbia River Bull Trout Critical Habitat	NE
Upper Willamette River Chinook Salmon Critical Habitat	NLAA

EFH Effect Determination:

EFH	Effect Determination (NE, NAA)
Chinook Salmon	NAA

Maps:
Figure 1. Ball Park Vicinity Map
Figure 2. Ball Park Action Area
Figure 3. Bull Trout and Spring Chinook Listed Fish Habitat and Spring Chinook Critical Habitat Within the Ball Park Action Area
Figure 4. Culvert Replacements in the Ball Park Action Area
Figure 5. Culvert Replacements within 1 mile of LFH
Figure 6. Wet Season Haul Route in Close Proximity to LFH
Figure 7. Road Reconstruction within 200 feet of LFH
Figure 8. Ball Park Proposed Winter Falling/Yarding

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Table 1. General unit information and stand data.
Table 2. Unit harvest treatment information.
Table 3. Yarding and skyline corridor information.
Table 4. Aggregate and native surface haul route information.
Table 5. Stream culvert installation, replacement and decommissioning.
Table 6. New road construction/ reconstruction and road decommissioning.
Table 7. Road maintenance/renovation.
Table 8. Stream channel proximity to LFH/CH by unit.

Table 1. General unit information and stand data.

Unit	Total Size	RR Treated Area	SIZ[1] Treated Area	Proximity[2] to LFH/CH	Overland Proximity to LFH/CH[3]	Precip Zone[4]	Mean Tree Age	Mean Tree Diameter	Mean Tree Height
	Acres	Acres	Acres	Feet	Feet	DRZ, TSZ, or DSZ	Years	Inches	Feet
10	42	11	11	33,800	29,000	DSZ	55	15	71
20	42	4	4	29,800	25,400	DSZ	54	16	77
30	52	13	13	29,500	22,500	DSZ	45	12	62
40	40	6	6	27,200	24,400	TSZ	54	16	74
50	6	0	0	No Connection	21,500	TSZ	42	11	62
60	52	16	16	23,500	19,600	TSZ	40	15	85
70	39	9	9	23,200	20,700	TSZ	39	11	64
80	34	4	4	23,500	18,600	TSZ	49	12	66
110	44	13	13	18,900	16,800	TSZ	47	13	69
120	57	9	9	21,200	17,700	TSZ	35	13	60
130	18	0	0	19,200	15,000	TSZ	41	11	64
140	29	0	0	No Streams	13,700	TSZ	44	12	74
150	44	5	5	18,100	14,100	TSZ	47	11	64
160	46	0	0	18,400	15,800	TSZ	44	12	67
170	47	1	1	19,900	17,500	TSZ	35	13	70
190	39	0	0	No Streams	15,500	TSZ	47	12	64
200	5	0	0	No Streams	10,100	DSZ	33	12	49
210	10	0	0	11,100	9,200	TSZ	33	12	59
220	24	2	2	11,600	10,000	TSZ	45	16	86
230	11	0	0	No Streams	8,700	TSZ	33	12	58
240	43	1	1	9,800	7,500	TSZ	34	10	53
270	14	0	0	6,650	5,300	TSZ	34	12	66
280	9	5	5	6,400	5,700	TSZ	48	13	70
290	51	2	2	3,500	3,200	TSZ	45	13	77
310	52	1	1	13,400	10,700	TSZ	37	13	61
330	18	0	0	2,300	930	TSZ	34	13	63
360	19	6	6	100	100	TSZ	47	12	79
370	48	0	0	800	800	TSZ	44	12	74
390	82	3	3	260	260	TSZ	43	13	70
400	48	12	12	32,800	27,200	DSZ	54	14	77
Total	1065	123	123						

Notes: Shaded rows indicate stream channel proximity to LFH within 1 mile

[1] = SIZ - Stream Influence Zone, this is 1 SPT height distance from the stream

[2] = Proximity is the downstream distance through connecting stream channels to listed fish distribution or CH.

[3] = Proximity is the overground distance to LFH/CH from the closest point of the unit.

[4] = Dominant rain zone (DRZ), transient snow zone (TSZ), dominant snow zone (DSZ)

Table 2. Unit harvest treatment information.

Unit	Canopy Closure				Trees Per Acre				Relative Density				Basal Area			
	Unit		SIZ		Unit		SIZ		Unit		SIZ		Unit		SIZ	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
10	66	43	66	50	165	76	165	109	51	24	51	33	198	92	198	123
20	52	40	52	50	110	109	110	109	37	35	37	35	145	137	145	137
30	61	41	61	50	169	90	169	121	38	20	38	30	132	70	132	95
40	53	40	53	50	107	70	107	99	36	24	36	33	145	93	145	129
50	76	48	76	50	291	109	291	291	58	21	58	58	194	70	194	194
60	74	45	74	50	204	76	204	99	67	25	67	34	264	97	264	133
70	88	41	88	50	430	109	430	134	82	22	82	30	270	71	270	88
80	78	40	78	50	292	99	292	134	66	23	66	30	230	78	230	104
110	63	46	63	50	171	90	171	121	43	22	43	30	156	80	156	109
120	58	40	58	50	144	90	144	121	35	21	35	30	124	76	124	101
130	68	42	68	50	241	99	241	134	48	19	48	30	160	62	160	90
140	67	41	N/A	N/A	229	109	N/A	N/A	51	23	N/A	N/A	175	79	N/A	N/A
150	79	40	79	50	294	109	294	134	61	21	61	30	204	69	204	89
160	67	42	67	50	227	109	227	227	49	23	49	49	168	78	168	168
170	59	40	59	50	160	76	160	121	40	31	40	31	144	109	144	109
190	55	40	N/A	N/A	156	99	N/A	N/A	36	24	N/A	N/A	125	82	N/A	N/A
200	61	41	N/A	N/A	167	90	N/A	N/A	40	22	N/A	N/A	140	77	N/A	N/A
210	61	43	61	50	168	82	168	168	40	23	40	40	140	81	140	140
220	69	40	69	50	158	70	158	90	54	25	54	32	215	99	215	128
230	74	41	N/A	N/A	288	121	N/A	N/A	63	25	N/A	N/A	215	86	N/A	N/A
240	67	40	67	50	233	90	233	151	40	22	40	30	125	70	125	78
270	68	40	68	50	185	76	185	185	43	22	43	43	150	78	150	150
280	90	68	90	50	421	134	421	134	105	32	105	32	274	114	274	114
290	73	41	73	50	216	64	216	109	56	30	56	30	205	108	205	108
310	54	40	54	50	134	76	134	121	34	26	34	31	120	91	120	110
330	76	41	76	50	222	82	222	222	59	21	59	59	215	77	215	215
360	74	50	74	50	266	90	266	134	63	22	63	30	220	76	220	106
370	84	40	84	50	320	90	320	320	74	21	74	74	260	73	260	260
390	56	40	56	50	134	90	134	121	34	21	34	30	120	76	120	102
400	71	40	71	50	199	82	199	109	58	25	58	33	218	92	218	123

Note: Pre and post conditions only consider merchantable trees (>7” dbh).

N/A = No streams/SIZ in unit

Table 3. Yarding and skyline corridor information.

Unit	Acres by Yarding System		Skyline Corridors Across Streams			
			Perennial		Intermittent	
	Grd	Sky	Number of Crossings	Distance to LFH/CH (ft)	Number of Crossings	Distance to LFH/CH (ft)
10	12	30	17	33,800	3	33,800
20	0	42	0	N/A	3	29,800
30	0	52	34	29,500	4	29,500
40	0	40	2	27,200	2	27,200
50	6	0	0	N/A	0	N/A
60	52	0	0	N/A	0	N/A
70	13	26	5	23,200	0	N/A
80	34	0	0	N/A	0	N/A
110	0	44	23	18,900	3	18,900
120	57	0	0	N/A	0	N/A
130	18	0	0	N/A	0	N/A
140	24	5	0	N/A	0	N/A
150	36	8	4	18,100	0	N/A
160	36	10	0	N/A	4	18,400
170	37	10	5	19,900	7	19,900
190	20	19	0	N/A	0	N/A
200	5	0	0	N/A	0	N/A
210	10	0	0	N/A	0	N/A
220	24	0	0	N/A	0	N/A
230	11	0	0	N/A	0	N/A
240	43	0	0	N/A	0	N/A
270	14	0	0	N/A	0	N/A
280	0	9	0	N/A	0	N/A
290	51	0	0	N/A	0	N/A
310	27	25	2	13,400	3	13,400
330	0	18	0	N/A	1	2,300
360	16	3	0	N/A	0	N/A
370	38	10	0	N/A	0	N/A
390	22	60	0	N/A	1	260
400	0	48	13	32,800	0	N/A
Total	606	459	105		31	

Table 4. Aggregate and native surface haul route information.

Haul Route by road #	Season of Use[1]	Miles of Haul	Road Surface (A,N)	# of Loads	Number of Crossings Over:				Nearest Distance (ft) from Crossing To LFH by Type:		Road Length Within 100' of LFH/CH [2]
					LFH		Other Peren	Inter	Peren	Inter	
					Bridge	Culvert					
Timber and Rock Haul											
1500	D	3.50	A	180	0	0	4	16	27,200	22,400	0
1500-694	D	0.10	N	10	0	0	0	0	N/A	N/A	0
1500-700	D	1.70	A	249	0	0	3	4	16,000	16,100	0
1500-701	D	0.29	A	40	0	0	0	0	N/A	N/A	0
1500-703	D	0.20	A	40	0	0	0	0	N/A	N/A	0
1500-705	D	1.25	A	40	0	0	0	2	N/A	13,700	0
1500-708	D	0.15	A	25	0	0	0	0	N/A	N/A	0
1506	D	2.10	A	549	0	0	2	1	18,100	18,900	0
2654	YR	0.44	A	836	0	0	0	0	N/A	N/A	150
2654	D	9.86	A	2,885	0	0	16	15	600	450	0
2654-773	D	0.40	N	397	0	0	0	0	N/A	N/A	0
2654-776	D	0.10	N	5	0	0	0	0	N/A	N/A	0
2654-782	YR	2.66	A	600	0	0	0	2	N/A	2,600	0
2654-789	D	0.21	A	35	0	0	0	0	N/A	N/A	0
2654-790	D	0.70	A	220	0	0	1	0	19,100	N/A	0
2654-791	D	0.10	A	25	0	0	0	0	N/A	N/A	0
2654-792	D	0.45	A	217	0	0	1	0	23,800	N/A	0
2654-794	D	0.20	A	35	0	0	0	0	N/A	N/A	0
2654-795	D	0.40	N	336	0	0	1	0	24,800	N/A	0
2654-796	D	0.29	N	309	0	0	2	0	23,700	N/A	0
2654-797	D	0.80	A	120	0	0	1	1	31,400	31,700	0
2654-798	D	0.65	A	25	0	0	0	2	N/A	31,800	0
2654-801	D	0.10	N	30	0	0	0	0	N/A	N/A	0
2654-825	D	0.19	N	50	0	0	1	0	34,300	N/A	0
2655	YR	3.94	A	836	0	0	0	7	N/A	2,000	0
2655	D	1.10	A	225	0	0	1	3	35,800	35,800	0
2655-501	D	0.10	A	50	0	0	0	0	N/A	N/A	0
2655-503	YR	2.83	A	138	0	0	1	6	7,300	6,000	0
2655-507	YR	0.65	A	131	0	0	0	3	N/A	9,200	0
2655-509	YR	0.20	A	25	0	0	0	0	N/A	N/A	0
2655-512	D	0.20	N	5	0	0	0	0	N/A	N/A	0
2656	YR	1.12	A	549	0	0	3	3	18,100	18,900	0
	SUB-TOTAL	36.98									
Rock Haul Only											
1500	D	2.48	A	25	0	0	3	9	32,500	31,700	0
1500-690	D	0.19	A	90	0	0	0	1	N/A	26,900	0
1509	D	1.24	A	50	0	0	0	0	N/A	N/A	0
2653	D	2.16	A	40	0	0	0	1	N/A	4,700	0

2653-704	D	0.30	A	20	0	0	0	0	N/A	N/A	0
2653-708	D	0.20	A	20	0	0	0	0	N/A	N/A	0
2653-709	D	0.20	A	20	0	0	0	0	N/A	N/A	0
2653-714	D	0.16	A	20	0	0	0	0	N/A	N/A	0
2653-715	D	0.17	A	20	0	0	0	0	N/A	N/A	0
2653-720	D	0.40	A	20	0	0	0	1	N/A	6,400	0
	TOTAL	44.48			0	0	40	77			

Notes: Shaded rows indicate stream channel proximity to LFH within 1 mile

1 Season of use: dry season only, year-round

2 Road length within 100' of LFH is a measure of "drawbottom" roads used by haul route, does not include distance at crossings, which is already accounted for in the previous columns.

Table 5. Stream culvert installation, replacement and decommissioning.

Road Number	New Culvert Diameter	Streamflow[1]	Install/ Replace/ Decommission	Height of Fill to be Removed	Distance to LFH/CH
	Inches	Class	I/ R/ D	Feet	Feet
1500	30	P	R	15	27,100
	36	I	R	10	27,100
	30	I	R	15	27,000
	18	I	I	5	26,600
	18	I	R	5	28,100
	30	P	R	20	32,600
	18	I	R	5	31,700
	18	I	R	5	32,400
	18	I	R	5	32,400
	18	I	R	5	33,100
	18	I	R	5	33,300
	36	P	R	10	35,000
	18	I	R	5	34,500
	18	I	R	5	34,900
	18	I	R	5	39,600
1500-705	18	I	R	5	13,650
2654	18	I	R	5	450
	18	I	R	5	450
	18	I	R	5	3,100
	18	I	R	5	4,500
	18	I	R	5	10,900
	36	P	R	10	14,400
	18	I	R	5	14,400
	18	I	R	5	14,700
	18	I	R	5	14,400
	36	P	R	10	25,200
	18	I	R	5	31,900
	18	P	R	5	33,200
	18	I	R	5	33,800

	24	P	R	10	34,100
2654-796	24	P	R	15	23,600
2654-797	18	I	R	5	31,400
2655	36	I	R	10	3,500
	18	I	R	5	1,600
	18	I	R	5	4,200
	18	I	R	5	33,100
	18	I	R	5	33,200
	36	P	R	10	35,500
2655-507	18	I	I	5	9,200
	18	I	I	5	10,300
2656	36	P	R	15	18,400
	36	P	R	15	19,100
	36	P	R	15	19,000
	30	I	R	15	22,400
2654-795	84	P	D	15	28,000
	36	I	D	10	28,000
2654-812	36	I	D	10	28,800
TOTAL REPLACE		41			
TOTAL INSTALL		3			
TOTAL DECOMMISSION		3			

Notes: Shaded rows indicate stream channel proximity to LFH within 1 mile

Don't list ditch relief culverts here. List each stream crossing culvert separately

[1] = Streamflow: perennial or intermittent

Table 6. New road construction/ reconstruction and road decommissioning.

Surface-Type	Miles of New Road Construction			Miles of Road Reconstruction	Miles of Pre-existing Roads Decommissioned
	Permanent[1]	Semi-permanent[2]	Temporary[3]		
Natural	0.0	2.6	0.0	1.3	0.3
Aggregate	0.0	0.0	0.0	34.2	0.2
Paved	0.0	0.0	0.0	0.0	0.0
Total Miles	0.0	2.6	0.0	35.5	0.5

[1] Permanent – road will remain available for use after the sale ends

[2] Semi-permanent – road will be decommissioned at the end of the sale

[3] Temporary – road will be built and decommissioned within the same dry season

Construction – builds new road, reconstruction – improves existing unusable road to new road standards

Table 7. Road maintenance/renovation.

Road Number	Surface Type	Reconstruction Miles	Maintenance Miles	Number of Stream Crossings (perennial and intermittent)	Distance to LFH/CH from Nearest Crossing
1500	A	3.50	2.48	32	22,400
1500-690	A	0.00	0.19	1	26,900
1500-694	N	0.00	0.10	0	N/A
1500-700	A	1.70	0.00	7	16,000
1500-701	A	0.29	0.00	0	N/A
1500-703	A	0.00	0.20	0	N/A
1500-705	A	1.25	0.00	2	13,700
1500-708	A	0.00	0.15	0	N/A
1506	A	2.10	0.00	3	18,100
2654	A	10.30	0.00	31	450
2654-773	N	0.40	0.00	0	N/A
2654-776	N	0.00	0.10	0	N/A
2654-782	A	2.66	0.00	2	2,600
2654-789	A	0.21	0.00	0	N/A
2654-790	A	0.70	0.00	1	19,100
2654-791	A	0.00	0.10	0	N/A
2654-792	A	0.45	0.00	1	23,800
2654-794	A	0.00	0.20	0	N/A
2654-795	N	0.40	0.00	1	24,800
2654-796	N	0.29	0.00	2	23,700
2654-797	A	0.80	0.00	2	31,400
2654-798	A	0.65	0.00	2	31,800
2654-801	N	0.00	0.10	0	N/A
2654-825	N	0.19	0.00	1	34,300
2655	A	5.04	0.00	11	2,000
2655-501	A	0.00	0.10	0	N/A
2655-503	A	2.83	0.00	7	6,000
2655-507	A	0.65	0.00	3	9,200
2655-509	A	0.00	0.20	0	N/A
2655-512	N	0.00	0.20	0	N/A
2656	A	1.12	0.00	6	18,100
1509	A	0.00	1.24	0	N/A
2653	A	0.00	2.16	1	4,700
2653-704	A	0.00	0.30	0	N/A
2653-708	A	0.00	0.20	0	N/A
2653-709	A	0.00	0.20	0	N/A
2653-714	A	0.00	0.16	0	N/A
2653-715	A	0.00	0.17	0	N/A
2653-720	A	0.00	0.40	1	6,400
	TOTAL	35.53	8.95	117	

Notes: Shaded rows indicate stream channel proximity to LFH within 1 mile

Maintenance/Renovation/Reconstruction – includes blading, brushing, spot rocking, ditch cleaning

Part B - Project Consistency with Programmatic Design Criteria

In order for a project to be considered consistent with the effect determination reached under the programmatic consultation for low impact timber sales, it must be designed and implemented with specific project design criteria. Projects designed with exceptions to these criteria must independently describe how the effects associated with the planned exceptions still fall within the expected range of effects as described in the programmatic biological assessment. This form allows for the documentation that design criteria will be implemented, and provides for a process for identifying the exceptions and conducting the additional analysis to rationalize the conclusion that the effects are similar to those described in the programmatic biological assessment. Projects can not be covered by the programmatic consultation if they do not meet the criteria or if the exceptions are not properly analyzed.

Date: April 8, 2008

Project Name: Ball Park Thin

Admin Unit: Willamette National Forest – McKenzie River Ranger District

Part B – Project Consistency with Programmatic Design Criteria

Date: April 8, 2008 **Project Name:** Ball Park Thin **Admin Unit:** Willamette N.F.

A. General Criteria

The following general criteria must be met in order for a project to be eligible for coverage under this programmatic consultation:

A1. Projects must be consistent with the Standards and Guidelines found in the NW Forest Plan, and the appropriate action agency Best Management Practices for the protection of water quality.

Was PDC A1 met? ☒

A2. Timber harvest must only be planned in previously managed stands (e.g. previously harvested timber, stands planted after a fire, stands pre-commercially thinned). Stands that were planted after a fire or pre-commercially thinned are considered managed. This programmatic consultation does not cover regeneration harvest or fire salvage harvest.

Was PDC A2 met? ☒

A3. Stands to be harvested must be less than 80 years old.

Was PDC A3 met? ☒ **or varied?** ☐

A4. Timber harvest within riparian reserves must retain all legacy trees (trees left from previous harvest that are typically larger than the remaining trees in the stand), and be designed as "thin from below" to retain the dominant and/or co-dominant trees. Patch cuts (typically associated with a density management prescription), are allowed in riparian reserves, only if each resulting opening is one acre or less in size.

Was PDC A4 met? ☒

A5. Portions of these projects that occur within the NW Forest Plan Riparian Reserves must be implemented only if this work maintains or improves habitat for aquatic and riparian-dependent species.

Was PDC A5 met? ☒

A6. Streams within the project area must be protected with buffers as shown in Table 1. Within these buffers, tree felling or yarding is prohibited (with the exception of felling and yarding through skyline corridors, see specific PDC under Yarding). Stream buffers are measured from the edge of active channel (stream banks) on both sides of the stream. The minimum buffers must be expanded to include the following features, if applicable:

a. Slope break = the point of topographic change below which management will result in active erosion or introduction of material into the stream channel or floodplain area.
b. Floodprone area = area accessed by the stream during medium to large peak flow events, typically defined as 2 times the bankfull depth.
c. High water table area = wetlands, seasonally saturated soils, standing water, seeps, bogs, etc.

Table 1. Minimum Stream Protection Buffer Widths by Stream Type and Proximity to Listed Fish Habitat (LFH[1]).

Adjacent to LFH habitat	Within 1 mile of LFH	Greater than 1 mile upstream from LFH	
	Perennial and Intermittent Streams	Perennial Streams	Intermittent Streams
Maintain a minimum 100' wide buffer	Maintain a minimum 50' wide buffer	Maintain a minimum 50' wide buffer	Maintain a minimum 30' wide buffer

Was PDC A6 met? ☒ or varied? ☐ (variance only allowed on buffers greater than 1 mile upstream from LFH).

A7. Due to a risk of water contamination, fuel and other petroleum products must be stored, and refueling must occur at least 150 feet from any stream or other sensitive waterbodies.

Was PDC A7 met? ☒ or varied? ☐

A8. Unstable slopes (areas adjacent to streams with indicators of active erosion such as ravel on the surface or jack-strawed trees), or sensitive stream reaches (such as streams where the dominant channel substrate is sand), or channels with high residual impacts (i.e. bank erosion, downcutting, heavy fine sediment load) must be protected with a buffer of at least 100 feet wide from the edge of the edge of the unstable or sensitive area.

Was PDC A8 met? ☒ or varied? ☐

A9. Limit ground disturbing activities, such as mechanized falling, ground-based yarding, road construction/reconstruction/renovation, road decommissioning and landing construction, to the dry season (generally between May 15 and October 15) when the soil is more resistant to compaction and soil moisture is low.

Was PDC A9 met? ☐ or varied? ☒

A10. Changes in peak or base stream flows due to the implementation of this action must be insignificant or discountable (i.e. not measurable), based on hydrologic analysis.

Was PDC A10 met? ☒

B. Tree Felling:

B1. Trees must not be felled within the primary shade zone[2] associated with any perennial stream (with the exception of trees within skyline yarding corridors; see below).

Was PDC B1 met? ☒

B2. Thinning within the secondary shade zone on perennial streams may occur; however, at least 50% canopy closure must remain in this treated zone.

Was PDC B2 met? ☒ or varied? ☐

B3. Overlaying the above thinning criteria are these additional criteria as shown in Table 2.

Table 2. Thinning restrictions for streams near and upstream from LFH.

Stands of trees adjacent to LFH habitat, or adjacent to tributary streams within one stream mile of LFH habitat	Stands of trees adjacent to stream reaches that are greater than one mile upstream from LFH
Maintain a conifer RD[3] value of at least 30 in the stand area located between the protection buffer (Table 1) and one site potential tree height from the stream.	Maintain a conifer RD value of at least 30 within 100' from the stream.

[1] LFH = Listed Fish Habitat, defined as any stream reach potentially occupied by a ESA protected fish species, any stream reach designated as Critical Habitat, or any stream reach designated as Essential Fish Habitat.

[2] The primary shade zone is defined in the Northwest Forest Plan Temperature TMDL Implementation Strategies, USDA Forest Service and Bureau of Land Management, 2005.

[3] Relative density (RD) is defined as the basal area divided by the square root of the quadratic mean diameter

Was PDC B3 met? ☒

B4. Harvested trees that will be yarded must be felled away or parallel to the stream buffer. Trees that are inadvertently felled into the stream buffer, or trees felled to create yarding corridors within the stream buffer, must be left on site.

Was PDC B4 met? ☒

B5. Felling must not create openings greater than one acre in size.

Was PDC B5 met? ☒ or varied? ☐

B6. The distance separating a patch cut unit from LFH must be greater than the height of a site potential tree. The distance separating a patch cut unit from all other streams must be at least 100 feet.

Was PDC B6 met? ☒

C. Yarding

C1. Skyline or ground based yarding must not occur within the buffers associated with LFH. Skyline yarding over streams with LFH is acceptable if the logs can be fully suspended above the existing stream buffer tree canopy.

Was PDC C1 met? ☒

C2. Require full suspension when yarding logs over non-LFH stream channels and within their protection buffers (Table 1). Require full or one-end suspension when yarding in the remaining (outer) portion of the riparian reserve. Require full or one-end suspension with lateral skyline yarding, to the extent practicable.

Was PDC C2 met? ☒

C3. Limit the establishment of skyline yarding corridors over perennial streams to no more than five corridors per 1,000 lineal feet of stream. Individual corridor widths must not exceed 15 feet. Corridors will be spaced at least 100 feet apart (along the stream).

Was PDC C3 met? ☒

C4. The use of ground based yarding and felling equipment is prohibited:

a) on slopes exceeding 35%, and
b) within the stream protection buffers (Table 1).

Was PDC C4 met? ☒ or varied? ☐ No ground based yarding or felling equipment allowed ☐

C5. Prohibit the use of existing landings if they are:

a) within 200 feet of LFH,
b) within 200 feet of a non-LFH stream, if the potentially affected stream reach is within 0.5 miles of LFH, or
c) within 100 feet of any stream channel.

Was PDC C5 met? ☒ or varied? ☐

C6. If an existing landing within 200 feet of a stream is used, erosion control measures must be installed prior to use to prevent soil movement downslope from the landing. The landing must be rehabilitated (compacted soils fractured, seeded) after use.

Was PDC C6 met? ☒ or varied? ☐

C7. Existing landings planned for use between Oct 16 and May 14, must be surfaced with aggregate material.

Was PDC C7 met? ☒ or varied? ☐

C8. Use existing landings and skid trails to the maximum extent possible. The maximum extent of soil compaction (defined as management-caused crowding of soil particles which causes a decrease in soil porosity, and an increase in soil density) due to skid trails, corridors, and landings associated with activities in the proposed action must not be more than 10% of the harvest unit area (i.e., regardless of the extent of existing soil compaction, not more than 10% of the harvest area may be compacted as a result of activities associated with the proposed action).

Was PDC C8 met? ☒ or varied? ☐

C9. Skid trails must not be constructed through areas with a high water table, or be located in areas that will channel water onto unstable headwall areas.

Was PDC C9 met? ☒

C10. All primary skid roads (defined as more than 5 passes by a machine) used for ground-based operations will be designated on the ground to limit extent of soil compaction.

Was PDC C10 met? ☒ or varied? ☐

C11. Where practicable, ground-based machines will place logging slash on skid trails to create slash mats for machines to walk on. These mats act as a buffer for soils during logging.

Was PDC C11 met? ☒ or varied? ☐

D. New Road and Landing Construction

No new road or landing construction, skip to E. ☐

D1. Prohibit the construction of new roads or landings within 500 feet of LFH or within 200 feet of any other stream.

Was PDC D1 met? ☐ or varied? ☒

D2. Only allow new construction on or near stable ridgetop locations, or on stable, relatively flat topography. Do not allow sidecast road construction when the hill slope exceeds 30%.

Was PDC D2 met? ☒ or varied? ☐

D3. Require an aggregate or paved surface for all new roads or landings that will be used in the wet season (generally Oct 16 to May 14).

Was PDC D3 met? ☒

D4. New road construction must not increase the stream drainage network (i.e. new roads will be outsloped, or the outflow of new ditch relief culverts or other drainage structures will not drain to streams).

Was PDC D4 met? ☒

D5. New cross drains discharge to stable slopes where the outflow will quickly infiltrate the soil and not develop a channel to a stream.

Was PDC D5 met? ☒

D6. There must be no net increase in the length of the permanent road network. Permanent roads are those that will remain as a system road after the project has been completed. The effect of new permanent road construction must be offset by the obliteration or decommissioning of an equivalent or greater length of existing road during the period of project implementation.

Was PDC D6 met? ☒ or varied? ☐

D7. When constructing new roads, the width of the compacted surface and ditch line must not be wider than 24 feet, and must be full bench construction.

Was PDC D7 met? ☒ or varied? ☐

D8. Implement erosion control measures to prevent offsite movement of disturbed or exposed soil associated with new road and landing construction (including cutbanks, fills, ditches, etc.) on road segments that have the potential to directly or indirectly deliver sediment to any stream channel. Erosion control measures include silt fences, straw bales, matting, mulch, slash, water bars, grass seed [or other products], etc. This work will occur prior to the wet season.

Was PDC D8 met? ☒

E. Road Renovation, Reconstruction, and Maintenance

E1. Limit <u>scheduled</u> soil disturbing timber sale road maintenance activities to the dry season (generally between May 15 and October 15), unless the road segment has no hydrologic connection.

Was PDC E1 met? ☒

E2. Do not implement scheduled road renovation or reconstruction within 200 feet of LFH.

Was PDC E2 met? ☐ **or varied?** ☒

E3. For road renovation and reconstruction, the width of the compacted surface and ditch line must not be wider than 24 feet. Road work on existing roads that are wider than 24 feet must not result in an increase in the road width.

Was PDC E3 met? ☒ **or varied?** ☐

E4. (Omitted in final review)

Was PDC E4 met? ☐ **or varied?** ☐

E5. Implement erosion control measures to prevent offsite movement of disturbed or exposed soil associated with road renovation and reconstruction (including cutbanks, fills, ditches, etc.) on road segments that have the potential to directly or indirectly deliver sediment to any stream channel. Erosion control measures include silt fences, straw bales, matting, mulch, slash, water bars, grass seed [or other products], etc. This work will occur prior to the wet season.

Was PDC E5 met? ☒

E6. Existing vegetation in **ditchlines that discharge to streams** must not be removed unless an effective sediment trap is installed and maintained until vegetation is reestablished.

Was PDC E6 met? ☒

E7. Do not grade material removed from ditchlines onto the road surface where the road surfaces are hydrologically connected to a stream. Remove and store this material and all other waste materials in a stable site which is not hydrologically connected to any stream.

Was PDC E7 met? ☒ **or varied?** ☐

E8. The installation of cross drain culverts must result in a culvert which drains to a stable hill slope with porous soils, allowing for water infiltration, with a low probability of erosion, and subsequent new channel formation that connects to an existing stream.

Was PDC E8 met? ☒

E9. Woody material removed from stream channels during culvert maintenance must be retained in the stream network. Typically this would entail repositioning wood located upstream from a culvert to a location downstream of the culvert. This activity is prohibited in LFH.

Was PDC E9 met? ☒ **or varied?** ☐

E10. Close and waterbar native surfaced roads prior to the wet season (Oct 16 and May 14) and between operating seasons to prevent use and reduce erosion.

Was PDC E10 met? ☒ **or varied?** ☐ **No natural surface roads** ☐

E11. Dust abatement is limited to the application of water only. Do not draft water from LFH. Use a screen on the drafting hose when drafting from other fishbearing streams.

Was PDC E11 met? ☒ **No dust abatement** ☐

E12. Pumping of water for use in road maintenance must allow for the retention of at least 90% of the original stream flow below the pumping site. . Do not draft water from LFH. Use a screen on the drafting hose when drafting from other fishbearing streams.

Was PDC E12 met? ☒ **or varied?** ☐

E13. New aggregate surfacing must use durable rock (AASHTO T210), and have no more than 15% fines (#200 sieve).

Was PDC E13 met? ☒ **or varied?** ☐

E14. At the termination of the sale, native surfaced roads must have drainage structures (e.g., waterbars) installed, and the road closed to prevent use, if the road is hydrologically connected to any stream,.

Was PDC E14 met? ☒ **or varied?** ☐ **No natural surface roads** ☐

Culvert or Bridge Replacement PDCs **No culvert or bridge replacement, skip to F** ☐

E15. Prohibit the replacement of culverts or bridges if the crossing is located:

a) on LFH,
b) on a perennial stream less than one mile upstream from LFH, or
c) on an intermittent stream less than 0.5 miles upstream from LFH.

Was PDC E15 met? ☐ **or varied?** ☒

E16. All new replacement culverts and bridges at stream crossings must be designed to pass at least a 100-year flood streamflow.

Was PDC E16 met? ☒

E17. Instream work must be completed during the ODFW instream work window.

Was PDC E17 met? ☒ **or varied?** ☐

E18. Continuous stream flow must be maintained downstream from the installation site. Replacements over streams with intermittent flow must only occur when the stream is not flowing.

Was PDC E18 met? ☒ **or varied?** ☐

E19. Require the complete excavation of overburden (road fill material) at each culvert replacement site prior to extracting the existing culvert.

Was PDC E19 met? ☒

E20. Replacements bridges must consist of a single span with the abutments located outside of bankfull width.

Was PDC E20 met? ☐ **or varied?** ☐ **No bridge replacement** ☒

E21. Abutment work areas must be isolated from any flowing water.

Was PDC E21 met? ☐ **or varied?** ☐ **No bridge replacement** ☒

E22. Heavy machinery is prohibited from entering the active channel area of the stream.

Was PDC E22 met? ☒ **or varied?** ☐

E23. Concrete will not be poured if any of the uncured concrete or contaminated wash water might enter a stream channel.

Was PDC E23 met? ☐ **or varied?** ☐ **No concrete use planned** ☒

F. Rock Quarry Operation

No rock quarry operation planned, skip to G ☐

F1. Quarry operations (including interrelated activities) will not cause sediment and contaminant delivery mechanisms to any stream channel.

Was PDC F1 met? ☒

F2. Quarries located in riparian reserves will only be operated during the dry season (generally May 15 to Oct 15).

Was PDC F2 met? ☒ **or varied?** ☐

F3. For quarries located within one mile of LFH, do not allow any disturbance within 200 feet of any stream channel.

Was PDC F3 met? ☒ **or varied?** ☐

G. Road Decommissioning and Closure **No road decommissioning or closure, skip H** ☐

G1. Do not decommission roads that are within 500 feet of LFH.

Was PDC G1 met? ☒ **or varied?** ☐

G2. Remove all culverts, stream crossings, and cross-drains from roads that will be decommissioned (i.e. taken of the road network and will not be used again).

Was PDC G2 met? ☒ **or varied?** ☐

G3. Reduce the fill material over culverts left in place on roads scheduled for closure.

Was PDC G3 met? ☒ **or varied?** ☐

G4. Decommissioned roads must be effectively closed to all vehicle traffic.

Was PDC G4 met? ☒ **or varied?** ☐

G5. Closed roads must have waterbars or other water drainage features installed.

Was PDC G5 met? ☒

G6. Culverts to be removed on perennial streams must be at least one mile upstream from LFH and removals on intermittent streams must be at least 0.5 miles upstream from LFH.

Was PDC G6 met? ☒ **or varied?** ☐

G7. Instream work must be completed during the ODFW instream work window.

Was PDC G7 met? ☒ **or varied?** ☐

G8. On perennial streams, continuous stream flow must be maintained around the culvert removal site.

Was PDC G8 met? ☒

G9. Excavations to remove stream culverts would be matched to the approximate bed elevation and bank-full stream width of the existing streambed. Cuts must match natural bank slopes.

Was PDC G9 met? ☒ **or varied?** ☐

G10. At culvert removal sites, the road must have waterbars or other drainage features constructed to route surface water away from the newly excavated slopes.

Was PDC G10 met? ☒

G11.De-compact the decommissioned road bed on natural and aggregate surfaced roads, and use seed or other materials to establish effective ground cover prior to the wet season.

Was PDC G11 met? ☒ **or varied?** ☐

H. Timber Transport

There are no restrictions on the transport of timber over paved roads.

H1. Avoid haul routes that require travel over unstable road segments, if road use or failure would result in sediment delivery to any stream.

Was PDC H1 met? ☒

H2. Timber transport operations will be stopped immediately if road use is causing rutting of the road surface, ponding of water on the road, failure of any drainage structure, or any other action occurs which increases the sediment delivery to a stream. Actively implement restorative work to reduce or eliminate the erosion. The road surface must be repaired before haul can resume.

Was PDC H2 met? ☒

Dry Season Haul:

H3. Timber transport on aggregate surfaced and natural surfaced roads is allowed during the dry season (generally May 15 to Oct. 15) if the following criteria are met:

a) The approach and crossing of each LFH stream is paved or has a high quality, well drained, and recently maintained aggregate surface.

Was PDC H3a met? ☒

b) Approaches and crossings for all other streams: The ditch lines draining to these streams are densely vegetated or have other effective sediment retaining structures in place.

Was PDC H3b met? ☒ **or varied?** ☐

c) The fill slopes on all haul route stream crossings will be vegetated or otherwise stabilized such that road surface sediments are retained prior to entering the stream channel.

Was PDC H3c met? ☒ **or varied?** ☐

d) Adequate cross drainage has been installed so that there is less than 200 feet of road draining to any stream/road crossing.

Was PDC H3d met? ☐ **or varied?** ☒

Wet Season Haul: **No wet season haul, skip to I** ☐

H4. Bridges on the haul routes do not discharge runoff directly to stream (i.e., no scuppers).

Was PDC H4 met? ☐ **or varied?** ☒

H5. Timber transport is not allowed on native surfaced roads during the wet season (Oct 16 to May 14).

Was PDC H5 met? ☒ **or varied?** ☐

H6. Timber transport is allowed during the wet season (Oct 16 to May 14) on aggregate surfaced roads if the following criteria are met:

a) Aggregate surfaced haul routes must not cross LFH, or cross other streams that are within 1,000 feet from LFH. The haul route must not be closer than 500 feet of LFH at any given point.

Was PDC H6a met? ☐ **or varied?** ☒

b) Haul routes must be inspected weekly, or more frequently if weather conditions warrant. Inspections will focus on road surface condition, drainage maintenance, and sources of soil erosion and sediment delivery to streams.

Was PDC H6b met? ☒ **or varied?** ☐

c) Do not allow timber haul during periods of daily alternating freezing and thawing periods over a several day period. Haul is allowed on completely frozen or snow covered roads.

Was PDC H6c met? ☒ **or varied?** ☐

d) Hauling is not allowed when conditions exist (e.g. during intense or prolonged rainfall), that may cause generation of road related runoff to streams.

Was PDC H6d met? ☒ or varied? ☐

e) Spot rocking and/or sediment traps would be employed to reduce potential sediment inputs to streams. Sediment traps would be inspected weekly during the wet season and entrained soil would be removed when the traps have filled to ¾ capacity. Dispose of these materials in a stable site which is not hydrologically connected to any stream.

Was PDC H6e met? ☒ or varied? ☐

I. Fuels Treatment

No fuels treatments, end ☐

I1. Fuels treatment of any kind is prohibited within the stream protection buffers (Table 1).

Was PDC I1 met? ☒

I2. Lop and scatter fuels treatment is allowed outside of the protection buffers.

Was PDC I2 met? ☒ or varied? ☐

I3. Hand piling of fuels intended for burning is prohibited closer than 100 feet from any stream channel.

Was PDC I3 met? ☒ or varied? ☐

I4. Mechanical fuels treatment, or the mechanical construction of fire control line is prohibited closer than 500 feet of LFH or closer than 200 feet from any other stream channel.

Was PDC I4 met? ☒ or varied? ☐ **No mechanical fuels treatment/fireline construction ☐**

I5. Prohibit the construction of hand-built fire lines where water could be channeled into areas of instability, headwalls or streams. Construct waterbars on fire line to reduce soil erosion.

Was PDC I5 met? ☒ or varied? ☐

Project Consistency Worksheet

NLAA Thinning Sale Programmatic Consultation

Part C - PDC Variance Factor Analysis

Describe here why the proposed site specific PDC will not have an effect greater than that described in the programmatic using proximity, probability and magnitude as appropriate. Include discussion of other factors (nature, duration, timing, distribution and frequency), if applicable, that may help support define discountable or insignificant effects. Completion of this form is required for all PDCs that are varied; the analysis must be done for each indicator that is potentially affected by the PDC (see Appendix F).

VARIANCE #1

Original Element and PDC: *General Criteria – A9*: “Limit ground disturbing activities, such as mechanized falling, ground-based yarding, road construction/ reconstruction/ renovation, road decommissioning and landing construction, to the dry season (generally between May 15 and October 15) when the soil is more resistant to compaction and soil moisture is low.”

Proposed PDC: The Forest Service would like to maintain the flexibility to conduct mechanized falling and ground-based yarding outside of the dry season. All other activities listed would occur during the dry season. Yarding and falling would be allowed in the winter if there is at least 10 inches of compacted snow under the track of yarding equipment in units within one mile of LFH (Units 290, 330, 360, 370, 390) and at least 6 inches of compacted snow under the track of yarding equipment in all other units scheduled for winter logging (Units 200, 210, 230, 240, 270). Yarding and falling would also be allowed outside of the riparian reserves when there is at least 6 inches of frozen soil in all these units (Figure 8). Operations would be suspended when these conditions cease to exist.

Analyze all indicators for which there is a casual mechanism. Identify those indicators which are there is no casual mechanism and explain why.

Indicator(s): Appendix F of the thinning programmatic BA (crosswalk for project design criteria and habitat indicators) lists two indicators applicable to this general criteria – [1] Suspended Sediment/ Turbidity and [2] Substrate Character and Embeddedness. Effects to all other indicators were considered, but it was determined that there was no causal mechanism that may result in effects.

[1] Suspended Sediment/ Turbidity and [2] Substrate Character and Embeddedness

Proximity: Yarding and falling in the winter could occur in Units 200, 210, 230, 240, 270, 290, 330, 360, 370 and 390 (units from which wet season haul may occur). The only units that have streams with hydrologic connection to LFH/CH are 240, 270, 290, 330, 360, 370 and 390 (Figure 3). Table 8 (a subset of Table 1) shows proximity through connecting stream channels of each unit to LFH/spring Chinook CH. Units 290, 330, 360, 370 and 390 are within 1.0 mile of LFH/CH. No-cut buffers for each unit are in accordance with PDC A6.

Table 8. Stream channel proximity to LFH/CH by unit.

Unit	Acres	Proximity to LFH/CH
240	43	9,800
270	14	6,650
290	51	3,500

330	18	2,300
360	19	100
370	48	800
390	82	260

Probability: Yarding outside of the dry season, but requiring snow cover or frozen ground has been shown to adequately protect the soil structure, resulting in the same or less compaction than yarding in the dry season (Rashin et. al. 2006). This practice was followed on the Willow timber sale (Unit 2) in the Upper McKenzie Watershed during the winter of 2006. Implementation and effectiveness monitoring conducted during and after the activity showed minimal to no effect on soil compaction or erosion and found no increase in stream turbidity.

Currently, activities in Unit 6 of the Andy timber sale in the Upper McKenzie Watershed are being monitored. On February 13 and February 26, 2008, two test holes were dug to gage the depth of snow remaining below equipment tracks. The two depths measured 10 and 20 inches of residual snow. Total snow depth was estimated to range from 30 to 36 inches. Snow density was good due to high water content, and was compacting well beneath the equipment and maintaining its integrity as evidenced by multiple passes over the same point. The only soil observed on the snow surface was from equipment sprung saplings that had uprooted, and brought soil to the surface (several in about 5 acres). We did not observe equipment tracks making contact with duff or mineral soil.

Unit 360 is proposed for winter logging and is 100 feet from Deer Creek – the nearest unit to LFH (Figure 6). The portion of the unit closest to Deer Creek – the west side – is an average of 5% slope and will be ground-based. Similarly, Units 330, 370 and 390 are an average 0 – 5% slope in ground-based portions leading to tributary streams. Nearly immeasurable soil disturbance is expected in these units from winter logging. With gentle slopes, there is near zero probability for transport of sediment to LFH.

Research and effectiveness monitoring of ground activities during the winter has shown that operating on continuous snowpack or frozen ground can minimize soil disturbance and compaction, and is often favorable to dry season operations. Based on monitoring data and professional experience, we feel that 10 inches of compacted snow is more than sufficient to ensure little to no soil disturbance. In addition, the streams within the Ball Park Thin units are adequately buffered to protect any potential, but unlikely to occur, accelerated soil erosion from the unit. The probability that sediment will be delivered to LFH/CH is extremely low, similar to or less than the level described in the low-risk thinning programmatic consultation. Therefore, the probability that either the **Suspended Sediment/Turbidity** indicator and/or the **Substrate Character and Embeddedness** will be affected is **discountable**.

Project Element and Indicator Summaries: It is probable that the variance to PDC A9 will not result in any increased chance of sediment transport to LFH/CH. Effects to these indicators are expected to be equal to or less than those described in the programmatic consultation documents.

Conclusion: The effects of the proposed action on ESA listed spring Chinook salmon and bull trout and their Critical Habitat due to this modification of the PDC, are discountable, unlikely to occur, and are consistent with the effects considered in the programmatic consultation documents.

VARIANCE #2

Original Element and PDC: ***New Road and Landing Construction - D1*****:** "Prohibit the construction of new roads or landings within 500 feet of LFH or within 200 feet of any other stream.

Proposed PDC: Two semi-permanent spur roads will be constructed across two intermittent streams more than 500 feet from LFH – one in Unit 370 and one in Unit 290 (Figure 3).

Indicator: Analyze all indicators for which there is a casual mechanism. Identify those indicators which are there is no casual mechanism and explain why.

Indicator(s): Appendix F of the thinning programmatic BA (crosswalk for project design criteria and habitat indicators) lists five indicators applicable to this general criteria – [1] Suspended

Sediment/ Turbidity, [2] Substrate Character and Embeddedness, [3] Floodplain Connectivity, [4] Road Density and Location and [5] Riparian Reserves. Effects to all other indicators were considered, but it was determined that there was no causal mechanism that may result in effects.

Proximity: Two semi-permanent spur roads will be constructed across two intermittent streams. One is in Unit 370 and is 1,400 feet from LFH. The other is in Unit 290 and is 4,000 feet from LFH.

[1] Suspended Sediment/ Turbidity and [2] Substrate Character and Embeddedness

Probability: These two semi-permanent roads are both situated in existing plantations on flat or nearly flat ground near ridge tops, at the headwaters of very small intermittent streams. Downstream from the proposed road locations, both streams re-enter mature forests that provide an abundant supply of large wood to these streams. Large wood in these streams combine with boulder-cobble substrate to result in very large storage capacity for fine sediment.

Standard mitigation will include both construction and removal of these roads during dry conditions when these streams are not flowing water. During the short life of these roads (less than two years), disturbed soils created by construction or removal activities will be re-vegetated. During periods when the roads are not actually in use, they will be water-barred to prevent concentration of surface run-off and sediment.

Past experience with installation and removal of this type of road with the inclusion of required mitigation is that a minimal amount of sediment (approximately 0.5 cubic yards; Kretzing, pers. com.) will be introduced into the dry stream channel at time of construction and again at the time of removal. The relatively small amounts of sediment that will be produced by these activities will be easily stored by downstream portions of these intermittent streams before reaching LFH.

Due to the site-specific conditions of the two semi-permanent spur roads and intermittent stream crossings in addition to the mitigation measures, the likelihood of transporting sediment to LFH/CH is very low. Therefore, the probability that either the **Suspended Sediment/Turbidity** indicator and/or the **Substrate Character and Embeddedness** will be affected is **discountable**.

Project Element and Indicator Summaries: It is probable that the variance to PDC D1 will not result in any increased chance of sediment transport to LFH/CH. Effects to these indicators are expected to be equal to or less than those described in the programmatic consultation documents.

[3] Floodplain Connectivity, [4] Road Density and Location and [5] Riparian Reserves.

Probability: These small intermittent streams do not have meaningful floodplains at the proposed road locations. With the absence of floodplains associated with these small streams at the proposed crossing locations, impacts to floodplain connectivity are not anticipated. The proposed roads are situated in existing plantations and will be removed after two years. As a result of the short duration of their use, they are not expected to have a lasting impact on Riparian Reserves, and their use will facilitate treatments that will accelerate the restoration of late successional stand structures within the Riparian Reserves of these streams.

Project Element and Indicator Summaries: It is probable that the variance to PDC D1 will not result in any change to floodplain connectivity, permanent road density or riparian reserves. Effects to these indicators are expected to be equal to or less than those described in the programmatic consultation documents.

Conclusion: The effects of the proposed action on ESA listed spring Chinook salmon and bull trout and their Critical Habitat due to this modification of the PDC, are discountable, unlikely to occur, and are consistent with the effects considered in the programmatic consultation documents.

VARIANCE #3
Original Element and PDC: ***Road Renovation, Reconstruction and Maintenance – E15***:
"Prohibit the placement of culverts or bridges if the crossing is located:
a) on LFH; b) on a perennial stream less than one mile upstream from LFH; or c) on an intermittent stream less than 0.5 miles upstream from LFH. "

Proposed PDC: There are 3 culverts on intermittent streams within 0.5 miles of LFH that need to be replaced (Figures 4 and 5).

Analyze all indicators for which there is a casual mechanism. Identify those indicators which are there is no casual mechanism and explain why.

Indicator(s): Appendix F of the thinning programmatic BA (crosswalk for project design criteria and habitat indicators) lists two indicators applicable to this general criteria – [1] Suspended Sediment/ Turbidity and [2] Substrate Character and Embeddedness. Effects to all other indicators were considered, but it was determined that there was no causal mechanism that may result in effects.

[1] Sediment/ Turbidity and [2] Substrate Character and Embeddedness

Proximity: Two of the three culvert replacements on intermittent streams are 450' from LFH and one is 1,600' from LFH (Figures 4 and 5). All other culvert replacements are over 0.5 miles from LFH.

Probability: All three of the intermittent streams will be completely dry when culvert replacements occur. Approximately 0.5 cubic yards of sediment per crossing is expected to be mobilized (Kretzing, pers. com.). The stream 1,600 feet from LFH, empties into Trail Bridge Reservoir. Any potential mobilized sediment will settle out and will have negligible effect on ESA listed species or their habitat.

The two intermittent streams within 450 feet of LFH have a slightly higher probability of transporting fine sediment to listed fish habitat (Deer Creek). However, such increases are likely to be of local extent and of short duration. The 450 feet of each channel is sufficiently complex to store mobilized sediment due to the presence of instream wood and channel roughness. These streams predominantly consist of boulder/cobble substrate and are relatively low gradient. To minimize potential effects, we will seed exposed soil to stabilize sediment before fall runoff begins. Due to channel conditions, the probability of transporting sediment to LFH/CH is very low.

Although there is very little potential to transport sediment from culvert replacements to LFH, sediment and turbidity increases are expected to be negligible in comparison to current levels. The two culvert replacements nearest LFH have the potential to mobilize a total of 1.0 cubic yard of sediment (Kretzing, pers. comm.). Based on average sediment yields of streams in the Pacific Northwest (Dunne and Leopold 1978), Deer Creek sub-watershed has an annual sediment yield of 8,200 cubic yards. This includes considerable sediment input from natural earth flow processes and an extensive existing road network. The vast majority of the annual sediment yield occurs during episodic events in the wet season, the same time any sediment yield from the culvert replacements would occur. Even if 100% of the estimated sediment yield (1 cubic yard) made it to LFH, it would only be an estimated 0.01 – 0.02% increase above current levels*. This level of increase above existing conditions is considered negligible.

Not only is the probability that measurable sediment, generated by the two culvert replacements, will reach LFH very low, but the probability of any sediment intercepting a redd or causing take on any lifestage of Chinook or bull trout is near zero or zero. Stillwater Sciences conducted snorkel surveys during relicensing studies (2004-2005). They did not observe any juvenile Chinook in Deer Creek. They did see sub-adult bull trout in Deer Creek, presumably foraging. The Forest Service has conducted redd surveys in lower Deer Creek, but no spawning Chinook have been documented. Typically, the flows are much too low in the Fall for adult Chinook to access the stream. Temperature is likely an impeding factor as well. The average temperature of lower Deer Creek is approximately 19 degrees Celsius during the spawning season, and the McKenzie River is around 10 degrees Celsius. Based on field monitoring and observation and professional judgement, adult Chinook likely bypass Deer Creek as a potential spawning area and head up the McKenzie River.

Because culvert replacements will take place when streams are dry, areas with disturbed soil will be re-vegetated before fall runoff, the likelihood of transporting sediment to LFH/CH is very low. If any amount of sediment is transported to LFH, it will be of local extent and of short duration, and is considered negligible compared to existing levels. In addition, because there is no documented Chinook or bull trout spawning and likely very little rearing, there is virtually zero probability that take will occur. Therefore, any negative effects to the **Suspended Sediment/Turbidity** and/or the **Substrate Character and Embeddedness** indicators are expected to be **of discountable probability.**

Project Element and Indicator Summaries: It is probable that the variance to PDC E15 will not result in any measurable increase in sediment to LFH/CH. Effects to these indicators are expected to be equal to or less than those described in the programmatic consultation documents.

Conclusion: The effects of the proposed action on ESA listed spring Chinook salmon and bull trout and their Critical Habitat due to this modification of the PDC, are discountable, unlikely to occur, and are consistent with the effects considered in the programmatic consultation documents.

**Considering 50 – 100% of the estimated average annual sediment yield occurs during the wet season, then 1 cubic yard of generated sediment would be approximately 0.01 – 0.02% increase.*

VARIANCE #4

Original Element and PDC: ***Timber Transport – Dry Season Haul – H3d:*** "Timber transport on aggregate surfaced and natural surfaced roads is allowed during the dry season (generally May 15 to Oct. 15) if the following criteria are met: d) Adequate cross drainage has been installed so that there is less than 200 feet of road draining to any stream/road crossing. "

Proposed PDC: Forest Service roads throughout the Ball Park action area, to be used for timber and rock haul, have cross drains that range from 200-500 feet from the nearest stream crossings. The existing road location, slope, surface and ditchline condition and drainage features are such that the cross drain spacing will adequately protect water quality.

Analyze all indicators for which there is a casual mechanism. Identify those indicators which are there is no casual mechanism and explain why.

Indicator(s): Appendix F of the thinning programmatic BA (crosswalk for project design criteria and habitat indicators) lists two indicators applicable to this general criteria – [1] Suspended Sediment/ Turbidity and [2] Substrate Character and Embeddedness. Effects to all other indicators were considered, but it was determined that there was no causal mechanism that may result in effects.

[1] Suspended Sediment/ Turbidity and [2] Substrate Character and Embeddedness

Proximity: There are 34 perennial and 63 intermittent stream crossings along the entire length of the haul route – most are several miles from LFH. There are 15 intermittent stream crossings within 1 mile of LFH/spring Chinook CH. There are only 2 perennial streams within 1 mile of LFH/CH that will likely be flowing during dry season haul – approximately 600 feet and 1,000 feet (Fritz Creek) from LFH/CH. On all roads, the existing cross drains have been installed approximately 200-500 feet above each stream crossing.

Probability: Where constructed cross drains are over 200 feet from stream crossings, the existing roadway between structures are designed and maintained so that they are self-draining to the outslope side of the road and eliminate concentration of sediment-carrying runoff. Most roads, including Road 2654 that parallels Deer Creek and Road 2655 that crosses into the Smith River 6th Field Sub-watershed (Figure 4), are low gradient roads with well vegetated ditchlines. Prior to the timber sale, all roads will be surfaced with high quality aggregate.

Field reconnaissance and years of field observation of haul roads throughout the Deer Creek sub-watershed, with cross drains more than 200 feet from stream crossings, has shown little evidence of surface transport of fine sediment to streams in all weather and seasonal conditions. The self-draining roads reduce the amount of water delivered to ditchlines, and the water that does get captured quickly infiltrates the soil before reaching the stream crossing. Any amount of surface erosion that occurs is adequately captured by vegetated ditchlines. With increased traffic in the wet season, there may be more fines generated, but there will be no increase in the amount of runoff. Since water currently is dissipated before reaching stream crossings, no increased sediment is expected to occur in streams.

Due to the existing road locations, slope, surface and ditchline conditions at the only 2 perennial streams within 1 mile of LFH, the likelihood of transporting sediment to LFH/CH is very low. Therefore, the probability that either the **Suspended Sediment/Turbidity** indicator and/or the **Substrate Character and Embeddedness** will be affected is **discountable**.

Project Element and Indicator Summaries: It is probable that the variance to PDC H3d will not result in any increased chance of sediment transport to LFH/CH. Effects to these indicators are expected to be equal to or less than those described in the programmatic consultation documents.

Conclusion: The effects of the proposed action on ESA listed spring Chinook salmon and bull trout and their Critical Habitat due to this modification of the PDC, are discountable, unlikely to occur, and are consistent with the effects considered in the programmatic consultation documents.

VARIANCE #5

Original Element and PDC: ***Timber Transport – Wet Season Haul – H4***: "Bridges on the haul routes do not discharge runoff directly to streams (i.e., no scuppers). "

Proposed PDC: There is one bridge on the proposed wet season haul route that has scuppers. The Forest Service would like the flexibility to haul over this bridge with the scuppers plugged (Figure 6). Included in the contract will be standard provisions that require the contractor to monitor and suspend haul if sediment transport to streams is observed, and require them to implement erosion control measures to contain sediment (BT 6.6 and BT 6.02).

Indicator: Analyze all indicators for which there is a casual mechanism. Identify those indicators which are there is no casual mechanism and explain why.

Indicator(s): Appendix F of the thinning programmatic BA (crosswalk for project design criteria and habitat indicators) lists three indicators applicable to this general criteria – **[1] Suspended Sediment/ Turbidity, [2] Substrate Character and Embeddedness and [3] Chemical Contaminants/Nutrients.** Effects to all other indicators were considered, but it was determined that there was no causal mechanism that may result in effects.

Proximity: This bridge crosses LFH/spring Chinook CH at the lower end of Deer Creek on Road 2654 (Figure 6).

[1] Suspended Sediment/ Turbidity, [2] Substrate Character and Embeddedness and [3] Chemical Contaminants/Nutrients

Probability: The bridge is concrete and the road on the west side of the bridge is paved all the way to Highway 126. The apron on this side is sloped away from the bridge at <1% grade. The road on the east side of the bridge is high quality aggregate, with an apron sloping toward the bridge at <1% grade. The side slopes are densely vegetated and there is no evidence of surface transport of fine sediment to streams. The ditchlines adequately capture any amount of surface erosion.

As a precautionary measure, the scuppers on the bridge will be plugged. Drainage will occur on the downslope side of the bridge toward the paved side (west side). The road is arched, so any potential runoff will occur in both ditches, which are densely vegetated.

Due to the existing condition of the adjacent aggregate road surface, the plugging of scuppers, and ditchline conditions, the likelihood of transporting sediment or chemical contaminants to LFH/CH is very low. Therefore, the probability that either the **Suspended Sediment/Turbidity** indicator, the **Substrate Character and Embeddedness** and/or **Chemical Contaminants/Nutrients** will be affected is **discountable**.

Project Element and Indicator Summaries: It is probable that the variance to PDC H4 will not result in any increased chance of sediment transport to LFH/CH. Effects to these indicators are expected to be equal to or less than those described in the programmatic consultation documents.

Conclusion: The effects of the proposed action on ESA listed spring Chinook salmon and bull trout and their Critical Habitat due to this modification of the PDC, are discountable, unlikely to occur, and are consistent with the effects considered in the programmatic consultation documents.

VARIANCE #6

Original Element and PDC: ***Timber Transport – Wet Season Haul – H6a***: "Aggregate surfaced haul routes must not cross LFH, or cross other streams that are within 1,000 feet from LFH. The haul route must not be closer than 500 feet of LFH at any given point. "

Proposed PDC: There is approximately 5,400 feet of proposed wet season haul route that is closer than 500 feet of LFH/spring Chinook CH (Figure 6). The Forest Service would like the flexibility to haul on this section.

Indicator: Analyze all indicators for which there is a casual mechanism. Identify those indicators which are there is no casual mechanism and explain why.

Indicator(s): Appendix F of the thinning programmatic BA (crosswalk for project design criteria and habitat indicators) lists two indicators applicable to this general criteria – **[1] Suspended Sediment/ Turbidity and [2] Substrate Character and Embeddedness.** Effects to all other indicators were considered, but it was determined that there was no causal mechanism that may result in effects.

[1] Suspended Sediment/ Turbidity and [2] Substrate Character and Embeddedness

Proximity: Approximately 5,400 feet of proposed wet season haul route is closer than 500 feet of LFH/spring Chinook CH near the lower end of Deer Creek - two small segments of Road 2654 and Road 2654-782. Within these road segments there are no stream crossings.

Probability: Both of these road segments are required to be surfaced with high quality aggregate prior to haul and are nearly flat (1- 3% slope). The roads are located on relatively flat terraces with gentle slopes leading down to Deer Creek LFH (Figure 6). The roads are crowned and the ditchlines are well vegetated and adequately capture any amount of surface erosion. Between the road and LFH/CH is vegetated side slope with proper drainage. In addition, this terrain consists of highly porous, alluvial materials that readily infiltrate roadway runoff within a short distance of the road.

Due to road and side slope conditions and infiltrative soils, the likelihood of transporting sediment to LFH/CH is extremely low. Therefore, the probability that either the **Suspended Sediment/Turbidity** indicator and/or the **Substrate Character and Embeddedness** will be affected is **discountable**.

Project Element and Indicator Summaries: It is probable that the variance to PDC H6a will not result in any increased chance of sediment transport to LFH/CH. Effects to these indicators are expected to be equal to or less than those described in the programmatic consultation documents.

Conclusion: The effects of the proposed action on ESA listed spring Chinook salmon and bull trout and their Critical Habitat due to this modification of the PDC, are discountable, unlikely to occur, and are consistent with the effects considered in the programmatic consultation documents.

VARIANCE #7

Original Element and PDC: ***Road Reconstruction, Renovation and Maintenance – E2***: "Do not implement scheduled road renovation or reconstruction within 200 feet of LFH. "

Proposed PDC: There is approximately 800 feet of proposed haul road, closer than 200 feet of LFH/ Chinook CH, which is scheduled for reconstruction (Figure 7). The Forest Service would like the flexibility to undergo reconstruction on these sections.

Indicator: Analyze all indicators for which there is a casual mechanism. Identify those indicators which are there is no casual mechanism and explain why.

Indicator(s): Appendix F of the thinning programmatic BA (crosswalk for project design criteria and habitat indicators) lists four indicators applicable to this general criteria – **[1] Suspended Sediment/ Turbidity, [2] Substrate Character and Embeddedness, [3] Temperature and [4] Large Woody Debris.** Effects to all other indicators were considered, but it was determined that there was no causal mechanism that may result in effects.

Proximity: Approximately 800 feet of proposed haul road is closer than 200 feet of LFH/ Chinook CH and is scheduled for reconstruction (Figure 7). Road 2654-782 has two small segments – 450 and 200 feet – that are within 200 feet of Deer Creek (Figure 7). Approximately 150 feet of Road 2654 is within 200 feet of LFH. Within these three road segments there is no hydrologic connection to Deer Creek.

[1] Suspended Sediment/ Turbidity and [2] Substrate Character and Embeddedness

Probability: Road reconstruction will occur only in the dry season. These road segments are nearly flat (1-3% grade) and are located on flat terraces with gentle slopes leading down to Deer Creek (Figure 7). The roads are crowned and the ditchlines are well vegetated and adequately capture any amount of surface erosion. Between the road and LFH is heavily vegetated side slope with proper drainage. In addition, this terrain consists of highly porous, alluvial materials that readily infiltrate roadway runoff within a short distance of the road.

Due to road location, side slope conditions and no hydrologic connection with Deer Creek, the likelihood of transporting sediment to LFH/CH is extremely low. Therefore, the probability that either the **Suspended Sediment/Turbidity** indicator and/or the **Substrate Character and Embeddedness** will be affected is **discountable**.

Project Element and Indicator Summaries: It is probable that the variance to PDC E2 will not result in any increased chance of sediment transport to LFH/CH. Effects to these indicators are expected to be equal to or less than those described in the programmatic consultation documents.

[3] Temperature

Probability: Road reconstruction and maintenance on these three road segments will include relocating trees and shrubs that occur within the existing road prism or that have fallen over the road (i.e. no overstory trees will be cut). Within 200 feet of LFH, all woody debris will be retained on-site. Because there are no streams or hydrologic connection within these road segments, removal of these trees and shrubs will not affect existing shade over streams. Therefore, there is **discountable** probability of affecting temperature in reaches where listed fish occur.

Project Element and Indicator Summaries: It is probable that the variance to PDC E2 will not result in any increase in stream temperature. Effects to this indicator is expected to be equal to or less than those described in the programmatic consultation.

[4] Large Woody Debris

Probability: Any trees or shrubs that reside or have fallen within the road prism, within 200 feet of LFH, will be moved and retained on-site. Because all woody debris will be retained, there is **discountable** probability of affecting the **Large Woody Debris** indicator in reaches where listed fish occur.

Project Element and Indicator Summaries: It is probable that the variance to PDC E2 will not result in any decrease in large woody debris. Effects to this indicator are expected to be equal to or less than those described in the programmatic consultation.

Conclusion: The effects of the proposed action on ESA listed spring Chinook salmon and bull trout and their Critical Habitat due to this modification of the PDC, are discountable, unlikely to occur, and are consistent with the effects considered in the programmatic consultation.

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Stillwater Sciences. 2006. Fish population distribution and abundance at the Carmen-Smith Hydroelectric Project, upper McKenzie River basin, Oregon. Final report. Prepared by Stillwater Sciences, Arcata, California for Eugene Water & Electric Board, Eugene, Oregon.

Part D - Project Certification

Project Title: Ball Park Thin

Administrative Unit: Willamette National Forest – McKenzie River Ranger District

Biologist Certification: I have reviewed the above project and have determined that it meets the terms of the TS Programmatic Biological Assessment, and that the appropriate determination of effect for this project is "May Affect, Not Likely to Adversely Affect" the ESA listed fish and/or critical habitat as listed in the project description.

I have also concluded that the effect to any EFH for any species protected by the MSA does not exceed the May Affect threshold.

Fish Biologist (preparer): Kate M. Meyer **Date:** April 8, 2008

Level 1 Team Certification (Sign Below): **Date:**

We have reviewed this project information and find that it is consistent with the programmatic timber sale consultation Biological Assessment and Letter of Concurrence

3/28/08

4-7-2008

4-8-2008

(Robert Markle) 4-8-2008

4/8/08

4/8/08 Willamette NF

4/8/08

Figure 1. Ball Park Vicinity Map

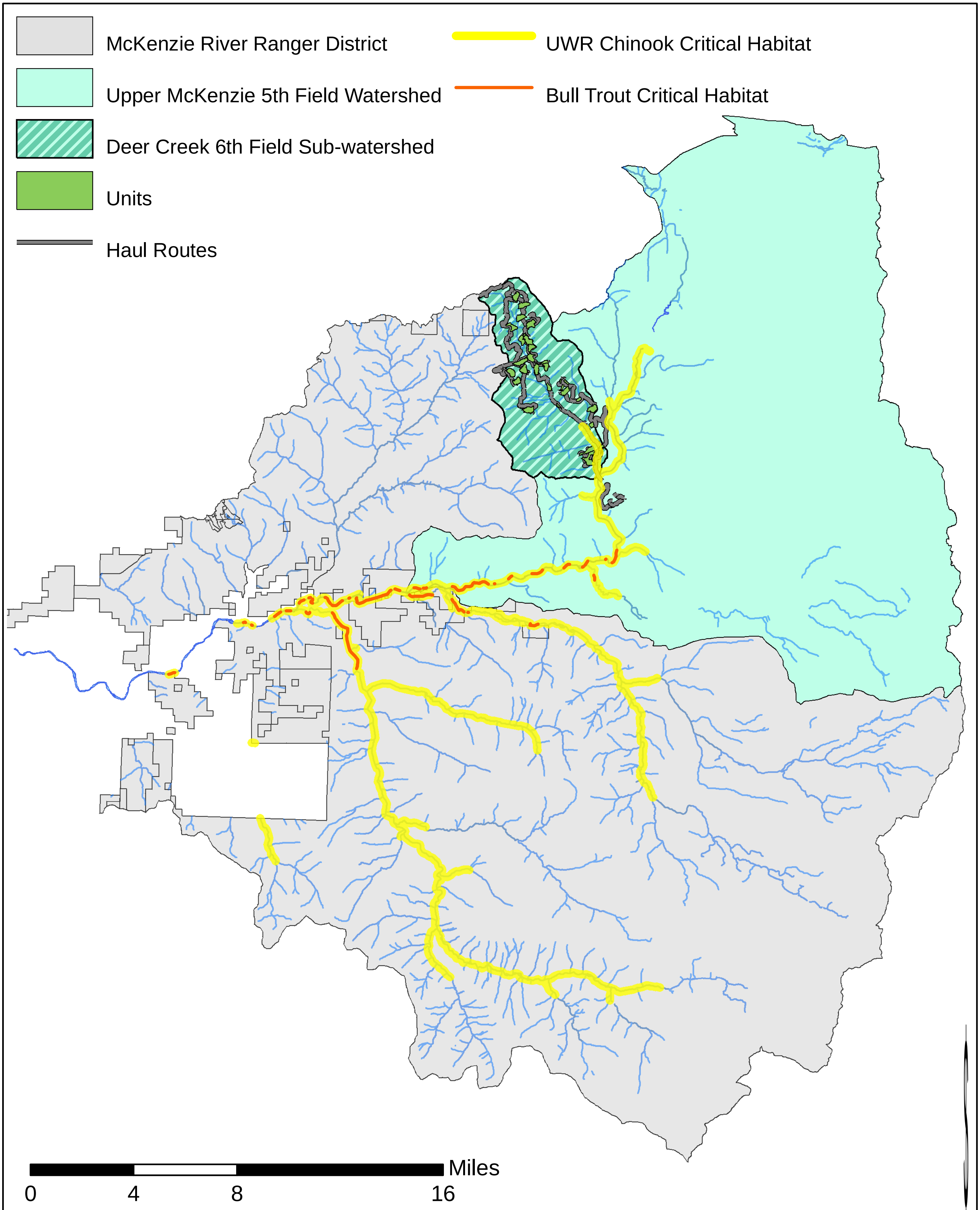


Figure 2. Ball Park Action Area

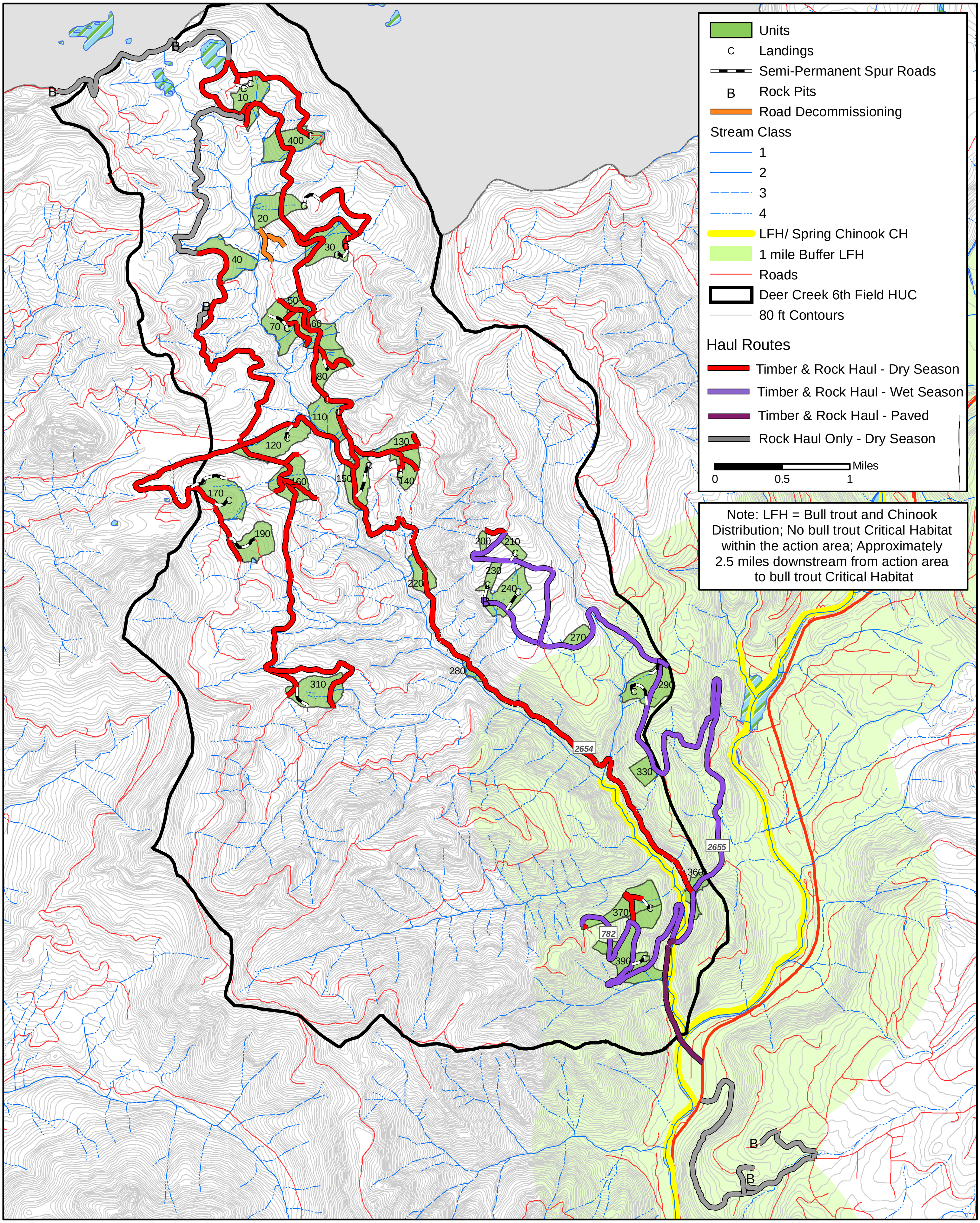


Figure 3. Bull Trout and Spring Chinook Habitat and Spring Chinook Critical Habitat Within the Ball Park Action Area

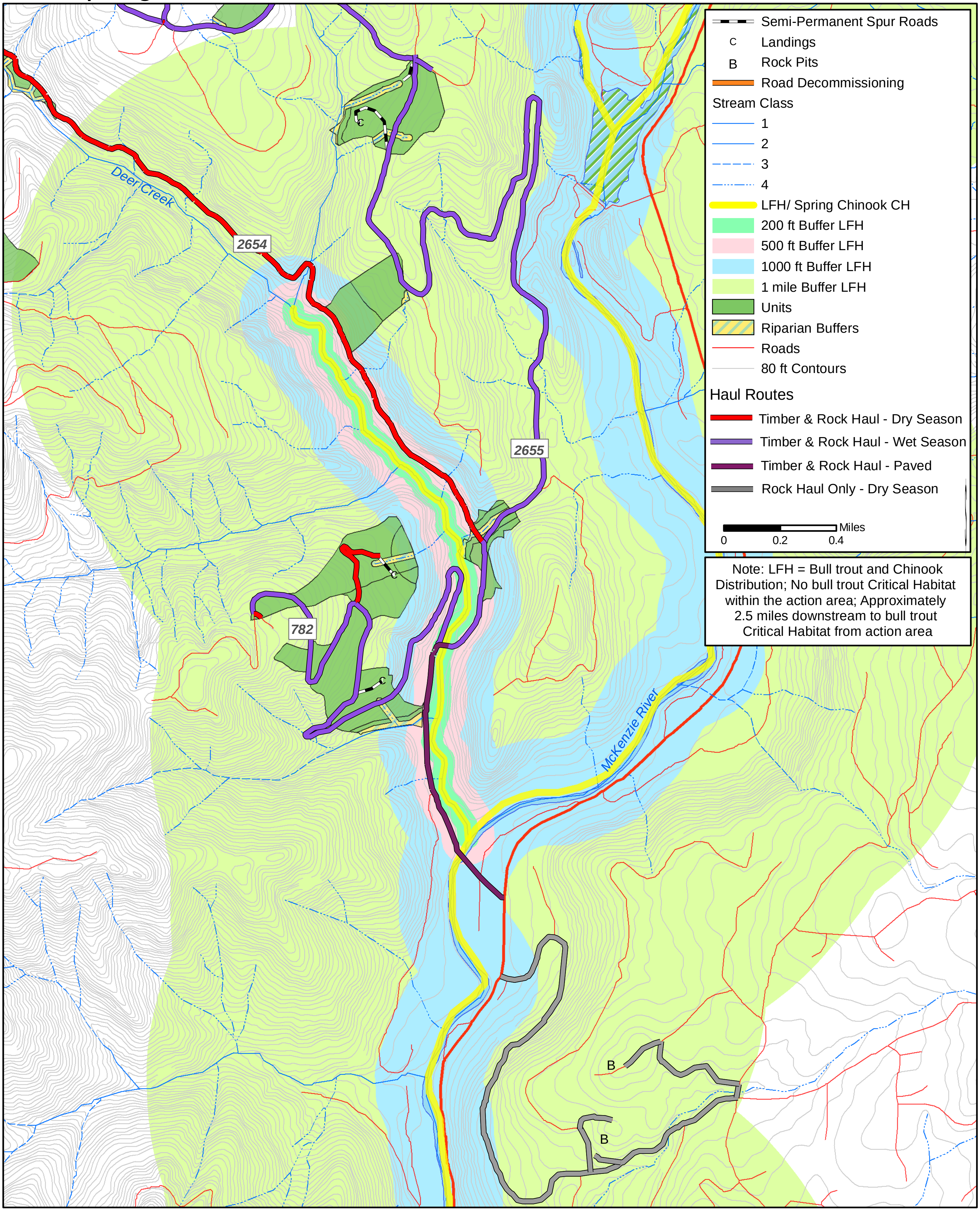


Figure 4. Culvert Replacement, Installation and Decommissioning

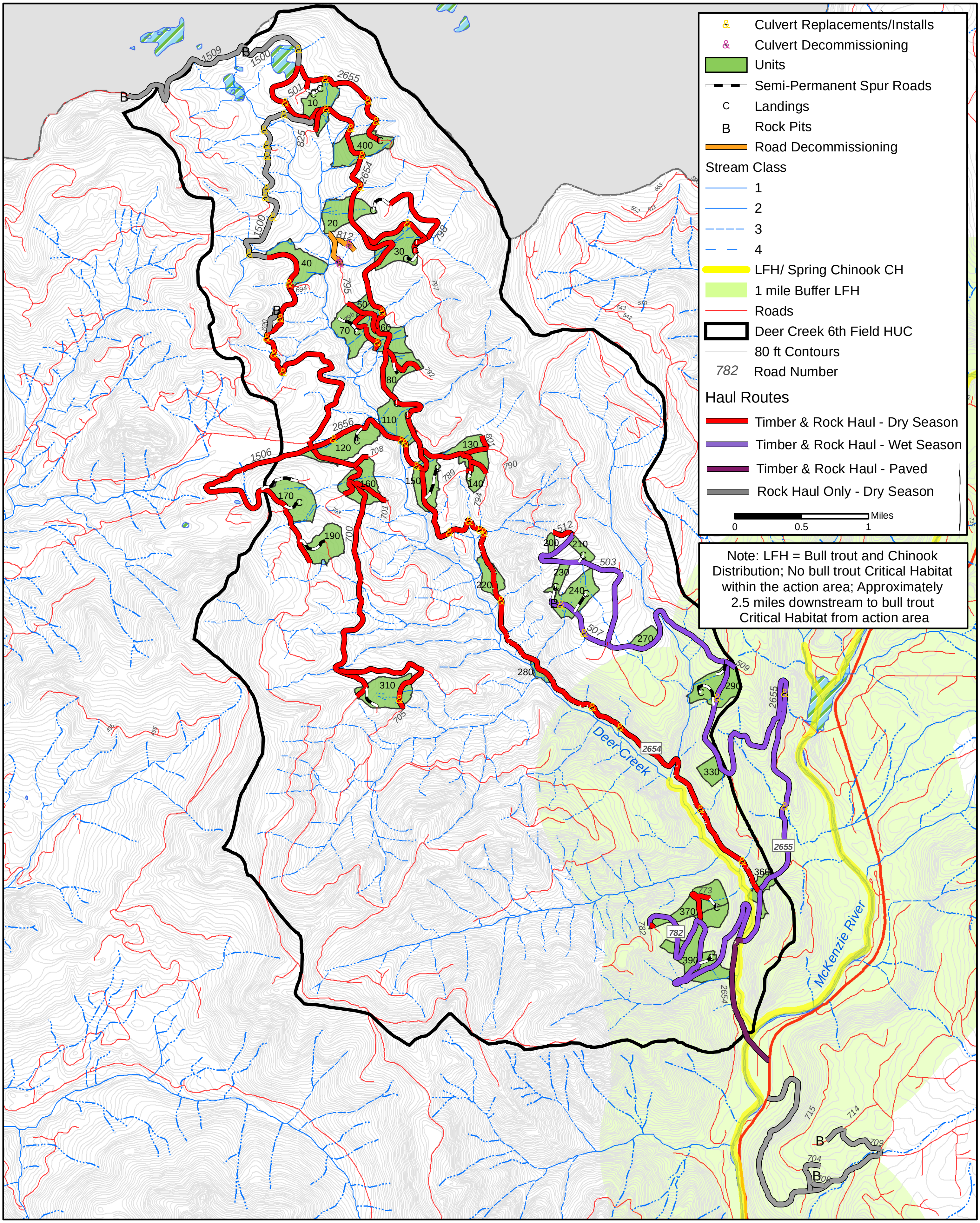


Figure 5. Culvert Replacements Near Listed Fish Habitat

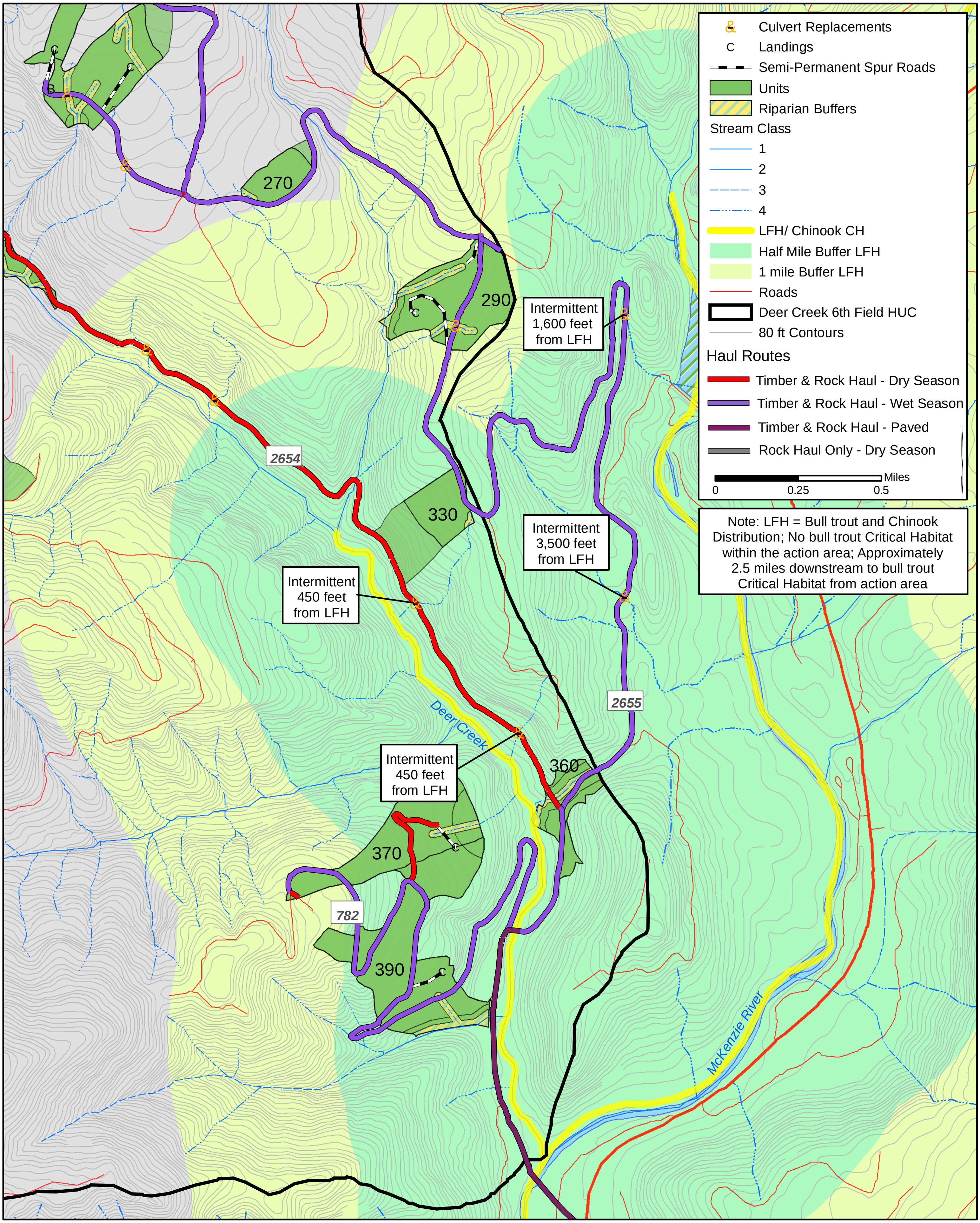


Figure 6. Wet Season Haul Route in Close Proximity to LFH

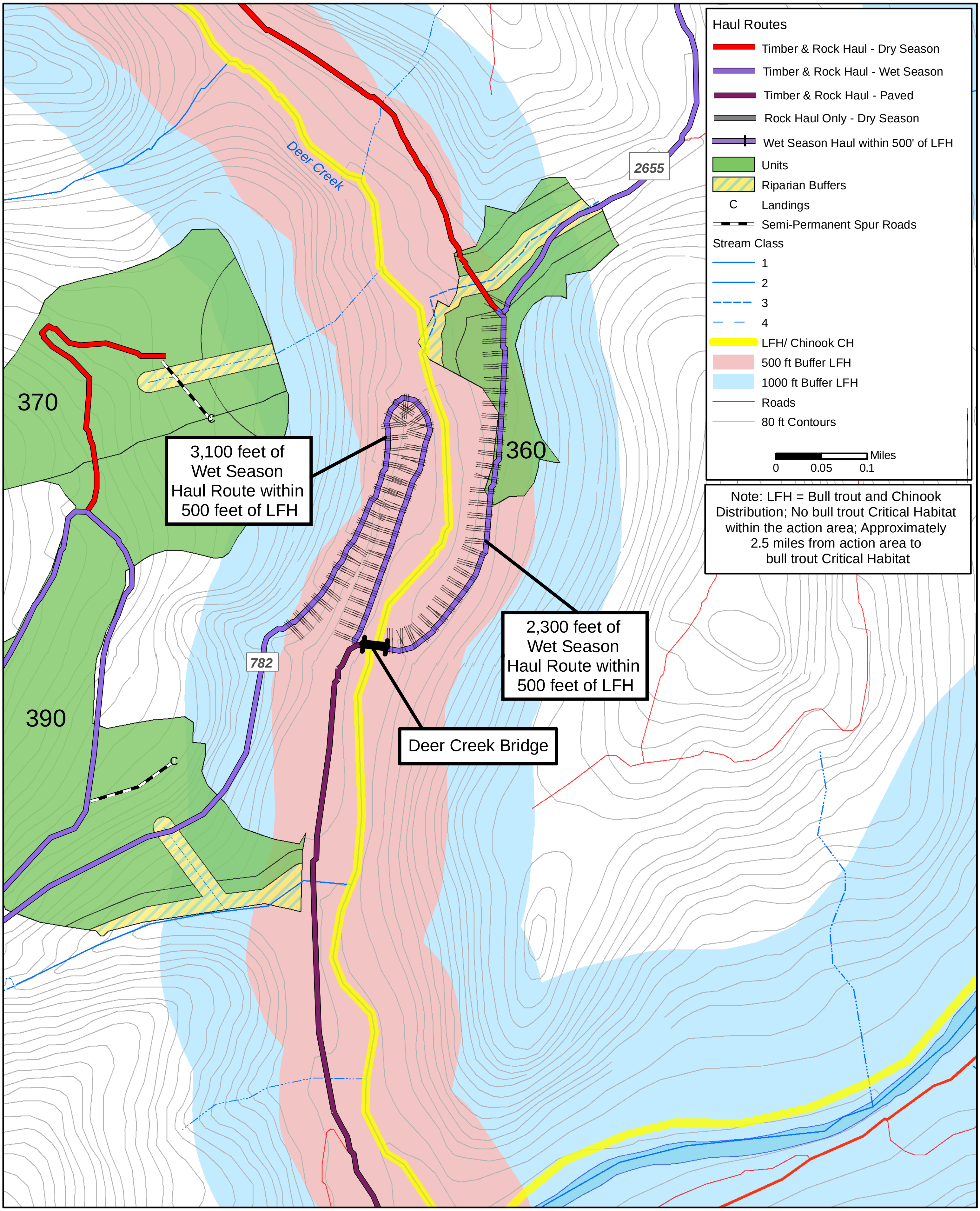


Figure 7. Road Reconstruction within 200 feet of LFH

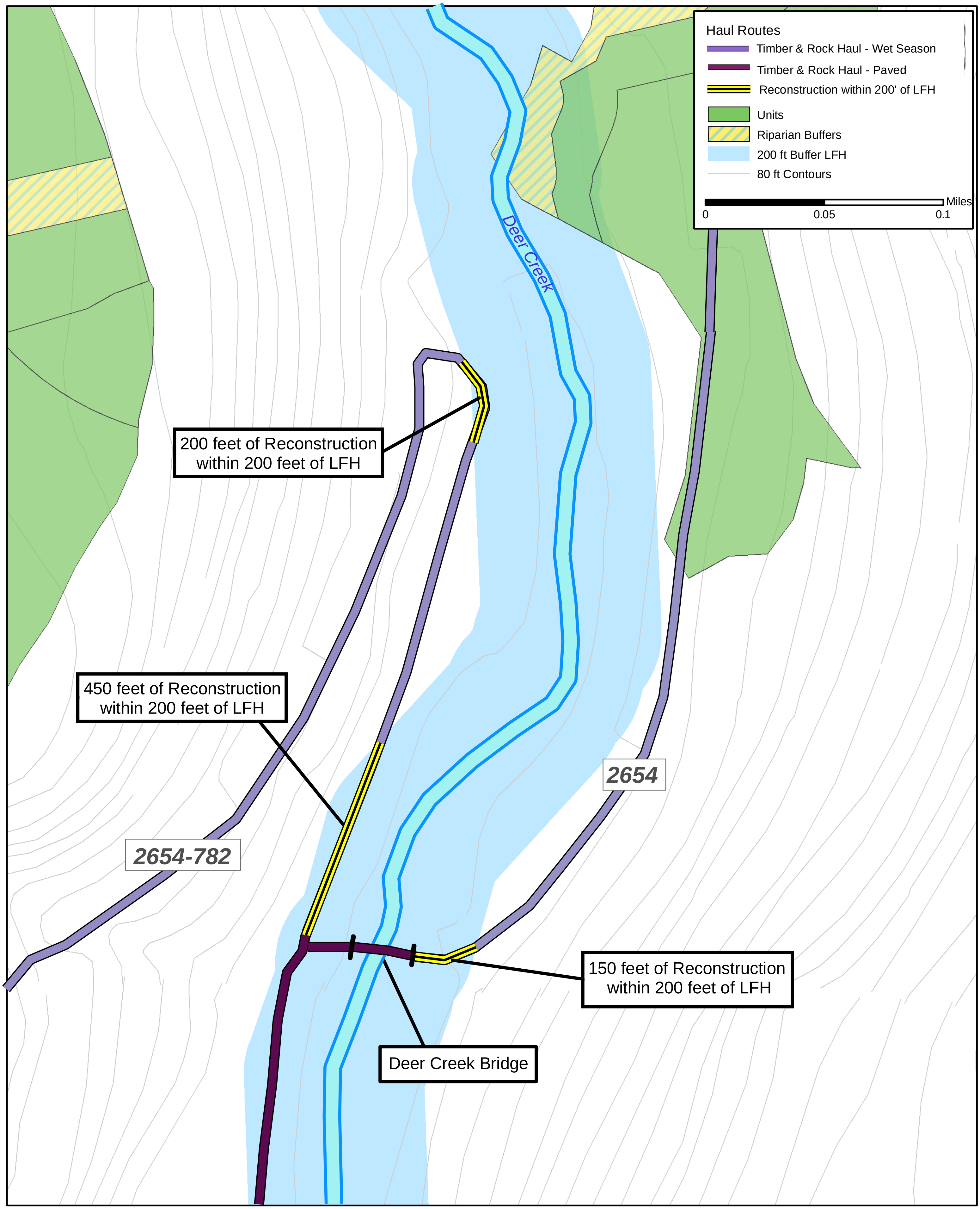
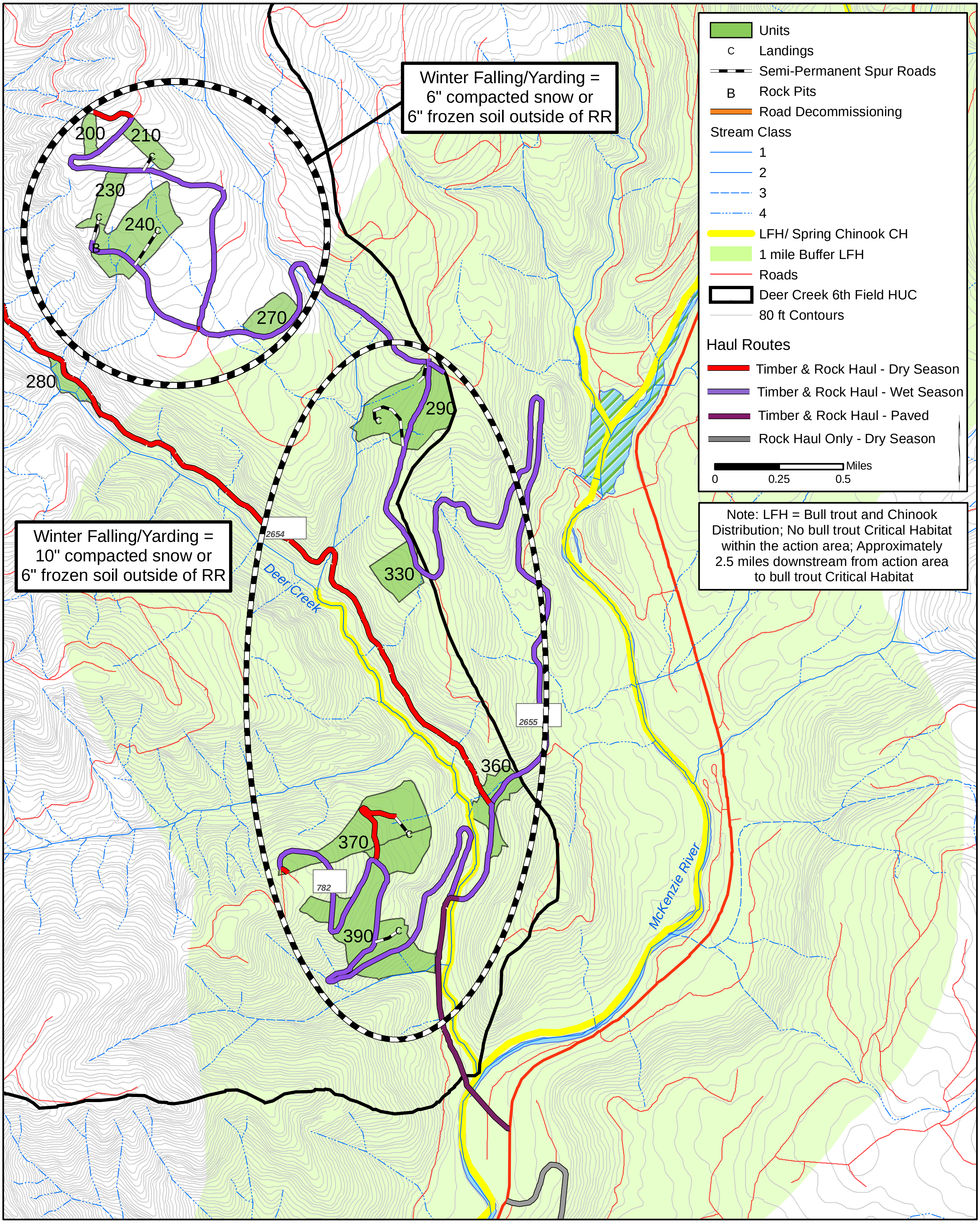


Figure 8. Ball Park Proposed Winter Falling/Yarding



File Code: 2670 **Date:** May 5 , 2008
Route To:

Subject: Botanical Resource Report-Ball Park Thin Project

To: Ball Park Thin Team Leader/Analysis Files

I. Introduction

Purpose:

The purpose of this report is to review the Ball Park Thin project in sufficient detail as to determine whether the proposed action will result in a trend toward Federal listing of any sensitive botanical species.

Forest management activities that may impact populations of or alter habitat for PETS (proposed, endangered, threatened, or sensitive) species require a Biological Evaluation (FSM 2671.44) to be completed. The Biological Evaluation process (FSM 2672.43) is used to assist in determining the possible effects the proposed management activities have on:

A. Species listed or proposed to be listed as endangered (E) or threatened (T) by the U.S. Fish and Wildlife Service (FWS).

B. Species listed as sensitive (S) by the USDA Forest Service, Region 6. There are 73 plants listed on the Regional Forester's Sensitive Botanical List that are documented or suspected to occur on the Willamette National Forest (Attachment 1).

II. Description of the Proposed Project

Location:
The Ball Park Thin Project area is within the Deer Creek Subwatershed (6th field) of the Upper McKenzie Watershed (5th field) on the McKenzie River Ranger District. The project area consists of 14,508 acres located northwest of the McKenzie River, east of the H. J. Andrews Experimental Forest, and south of the District boundary that is adjacent to the Sweet Home District. Major drainages include Deer Creek, Budworm Creek, Fritz Creek, and Carpenter Creek.

Legal description of the project: T.14S, R.6E, Sec. 20,28-30,32,33; T.15S, R.6E, Sec. 3-6, 8-11, 14-16,22,23; Willamette Meridian; Lane and Linn Counties, Oregon.

Proposed Action:
The McKenzie River Ranger District proposes to conduct activities on approximately 1,160 acres of the Bridge Project Area. The proposed activity acres include timber harvest (1064), fuel treatments (91), and rock quarry/borrow pits use (5). The timber

harvest would yield a gross estimate of 13.1 million board feet (MMBF) of wood products. This proposal, represented in Alternative B in this EA, would include heavy thinning on 663 acres, wildlife forage thinning on 129 acres, and riparian thinning on 122 acres. The timber sales from this proposal would likely be sold over a three year time span, beginning in fiscal year 2009.

III. Existing Environment and Survey Results

Regulatory Framework/Management Direction-Sensitive Plants/Rare and Uncommon Species

Forest Service Manual (FSM) 2670 direction is to ensure the viability of sensitive botanical species and to preclude actions that will contribute to the federal listing of a species. To ensure compliance with this direction, a biological evaluation is required for forest management activities that may alter habitat for proposed, endangered, threatened or sensitive species (*FSM 2671.44*) in order to determine the possible effects of the proposed activities on these species.

Amendment 158 to the Willamette Land and Resource Management Plan (USDA, 1990) adds four Conservation Strategies as amendments to the Forest Plan. The Conservation Strategies are for*: Aster gormanii, Ophioglossum pusillum, Cimicifuga elata and Frasera umpquaensis*. Conservation strategies include management plan and monitoring requirements as well as background material on status and distribution of the species.

Existing Condition-Sensitive/Rare and Uncommon Botanical Species

Current management direction mandates conservation of several categories of rare plants on the Willamette National Forest (Attachment 1). The Endangered Species Act mandates protection of federally listed Threatened and Endangered species. No federally listed Threatened and Endangered, or Proposed plants occur in the project area. Sensitive species are protected by USDA Forest Service regulations and manual direction (FSM 2672.4).

Numerous sensitive plants on the Regional Forester's Sensitive Species list have potential to occur in the Ball Park Thin project area, which encompasses a wide range of western Cascade forest habitats. Prefield reviews are conducted to determine which species from the Regional Forester's List for the Willamette National Forest are known from the project area or have suitable habitat present and potentially occur in the project area.

Prefield review for the Ball Park Thin project indicated a known population of *Romanzoffia thompsonii* in the project area. Surveys conducted during the summer of 2007 also documented the occurrence of other Region 6 sensitive species. (see Table 1).

Table 1. Sensitive Species in the Ball Park Thin Project Area

Proposed Units	Sensitive Species	Buffer
280	*Nephroma occultum*	180 ft.

Proposed Units	Sensitive Species	Buffer
80	*Rhizomnium nudum*	360 ft.
280	*Romanzoffia thompsonii*	360 ft.

Existing Condition-Special Habitats

Special habitats are non-forested habitats that are limited in size and distribution across the landscape. It is important to consider the biological diversity and ecosystem function of these small, scattered habitats for a number of reasons. Special habitats often play important roles for not only for full-time wildlife residents of the sites, but also for those who use them seasonally, or for only a portion of their life cycles. Numerous factors contribute to the creation or maintenance of special habitats. Among such factors, topography and hydrology often determine the microclimatic conditions at these sites.

Numerous special habitats were located in the Ball Park Thin project area during summer 2007 surveys. They range in size from one-half acre up to 6 acres. The special habitats documented in the Ball Park Thin project area and the buffer sizes recommended in the Willamette National Forest Special Habitat Management Guide are listed in Table 2.

Table 2. Special Habitats in the Ball Park Thin Project Area

Proposed Units	Special Habitat	Buffer
390	Rock outcrop	180 ft.
380	Rock outcrop	180 ft.
130	Swamp	1 acre
140	Wet meadow	1 acre
150	Seep	1 acre
180	Rock outcrop	180 ft.
170	Wet meadow	1 acre
240	Rock outcrop	180 ft.

Existing Condition-Invasive Plants

Invasive plants on the Willamette National Forest are categorized as potential invaders, new invaders and established invaders and control strategies will differ, depending on species' classification.

- **Potential invaders** are those species located in adjacent National Forest or other lands that have a high probability of being detected on the Forest in the foreseeable future (next 15 years) because potential habitat exists here.
- **New invaders** are those weed species just entering the National Forest or whose populations are possible to eradicate.

- **Established infestations** include weed species that are so widespread on the Forest they are not likely to eradicate. Some species, such as blackberry, can have both new invader populations that are less than 10 plants and are outliers as well as established infestations such as those that are found bordering streams at lower elevations.

Four species of "new invader" plants are documented in the Ball Park Thin project area. Some new invader species have greater potential to out-compete native plants and are more difficult to control than others are, however all of them are capable of adverse ecological impacts. The new invader species known to occur in the Ball Park Thin project area are listed below in Table 3:

- False brome (*Brachypodium sylvaticum*)-False brome is a perennial grass species of Eurasian origin. It has short bunches of bright green leaves that persist into fall and early winter. False brome can quickly become the dominant plant species in forest understories and in streamside corridors, demonstrating both shade-tolerance and moisture tolerance. Once established, false brome is spread by road maintenance equipment. From the road shoulder, the species can move into forested stands, especially those with openings such as thinned timber sale units. Seed is short-lived, so treatments for 3 years or less can exhaust the seed bank. Small populations may be manually controlled but large populations require herbicide application to eradicate because the populations, once established, can grow exponentially in short periods of time.

- Spotted knapweed (*Centaurea maculosa*)-Biennial or short-lived perennial with a stout taproot. Can have one or more stems, branched 1-3 feet tall. Produces purpleish-pink ray flowers. Introduced from Eurasia as contaminant of alfalfa and clover seed. Early spring growth makes spotted knapweed competitive for soil moisture and nutrients.

- Dalmatian toadflax (*Linaria dalmatica*)-Perennial, 1 to 2 feet tall, reproducing by seed and underground root stock. Flowers are 1 inch long with bearded, orange throat. Native of Eurasia, introduced to the United States in 1800's as an ornamental. Extensive root system makes control difficult.

- Deptford pink (*Dianthus armeria)* is a species of *Dianthus* ("pink") native to most f Europe, from Portugal north to southern Scotland and southern Finland, and east to Ukraine and the Caucasus. It is a herbaceous annual or biennial plant growing to 60 cm tall. The leaves are hairy, dark green, slender, up to 5 cm long. The flowers are 8–15 mm diameter, with five petals, bright reddish-pink; they are produced in small clusters at the top of the stems from early to late summer.

Table 3. Invasive Plants in the Ball Park Thin Project Area

Invasive Species	Proposed Units	Recommended treatments (in addition to Ch. 2 mitigation measures, design criteria, and BMPs)
False brome (*Brachypodium sylvaticum*)	360	Mechanical Chemial
Spotted knapweed (*Centaurea maculosa*)	30, 130, 140	Mechanical Chemial
Dalmatian toadflax (*Linaria dalmatica*)	40	Manual/Mechanical/Chemical
Deptford pink (*Dianthus armeria.*)	360	Mechanical Chemial

Manual=hand pulling/digging before seed production
Mechanical=mowing/cutting just after flowering has ended, *but* before seed matures

Chemical=use of one or more herbicides approved for application in the Willamette National Forest Integrated Weed Management EA (March 2007)

Proposed actions may introduce or spread invasive and non-native plants. In most cases, the risk of worsening Forest invasive plant populations can be minimized through proper inventory and project design. Implementation equipment and disturbance from yarding, road maintenance, and fuels treatments resulting from either alternative can provide an opportunity for invasive plants to establish and out-compete native vegetation.

Many invasive plants are shade-intolerant, so canopy closure can be particularly effective at
minimizing weed establishment. Forest and Regional (USDA, 2004) policy recommends revegetation of disturbed sites with native species from *local genetic stock*.

Since most of the Forest's invasive plant infestations occur along road shoulders, road maintenance represents a particular risk for inadvertently spreading weeds. Road maintenance activities across the Forest risk the spread of new invader species from one watershed to another. Activities such as grading, brushing and mowing, culvert upgrades, and ditch cleaning can contribute to the spread of invasive plants along road corridors by transporting seeds and vegetative material from infested sites to un-infested areas.

To mitigate the spread of existing invasive plants and reduce the risk of introducing other invasive species into the Ball Park Thin project area, the following measures will be used:

- Off road or ground disturbing equipment will be washed prior to entering National Forest land. Equipment will be free of all seed and debris that may contain plant seeds such as soil and vegetation.

- Material brought in for construction, such as fill soil, gravel, and straw will be free of vegetative material and invasive plant seed.

- Monitoring for changes in existing populations or new occurrences of invasive plants in the project area.

- Retain barriers of undisturbed vegetation between weed infested areas and project areas.

- Treat existing infestations prior to project implementation to minimize seed spread.

- Clean equipment prior to coming on to the Forest and potentially between projects or sites, depending on the occupancy of weeds at the affected areas. Use appropriate clauses 154 to ensure contractors whose vehicles operate off the road surface are cleaning vehicles appropriately. See Appendix 1 for contract clauses (WO-C6.36 & WO-CT6.36).

- Work in weed-free areas prior to moving to weed-infested areas.

- Avoid putting landings, yarding stations, staging and equipment storage areas, in weed infested areas. Provide timber and other contractors with a map of infestations in the prework process. Weed infestations will be identified on the sale map.

- Revegetate site as soon as possible (during the appropriate planting or seeding window) following disturbance. Revegetation may include topsoil replacement, site prep such as ripping, planting, seeding, fertilizing and weed-fee mulching as necessary. Monitor sites and reseed or replant as necessary.

IV. Impacts of the Proposed Project

Alternative A (No-Action) - Sensitive/Rare and Uncommon Species
Direct and Indirect Effects

This alternative would have no direct or indirect effect on sensitive plants or rare botanical species. There would be no ground-disturbance or disturbance of the microclimate with this alternative.

Selecting Alternative A may have potential adverse effects on certain species of sensitive fungi. Without management action, downed wood accumulation would likely increase over time. Landscapes with heavy fuel loads are at greater risk of high-intensity, stand replacing fires. As a result, high intensity fire is more likely to sterilize the soil, thus destroying fungal spores and mycelium found in organic mater on the surface and uppermost soil horizons.

Alternatives B and C - Sensitive/Rare and Uncommon Species
Direct and Indirect Effects
No direct or indirect effects on sensitive plants or rare botanical species are expected with either alternative. All known sensitive plant occurrences have been mapped and would be protected with the *no-disturbance* buffers identified in Table 2 in order to maintain the viability of the populations. The buffers would maintain the microclimate for those species requiring cover or moisture retention and aid in protecting other species from physical damage during project implementation. This buffer applies to all harvest activities, ground disturbing activities, and fuels treatments.

Indirectly, canopy removal would have the most impact fungi that are sensitive to microclimatic change. Subsequent slash pile/fuels treatments have potential to affect some fungi species in the Ball Park Thin project area. Without knowing the presence or absence of these fungi, a reasonable assumption is that there may be some localized effects to them from timber felling, yarding and fuels treatments. However, these actions have a low risk of adverse effects to sensitive fungi and are not likely to cause a trend toward federal listing of a particular species.

Of the action alternatives, Alternative B has the least risk of potential adverse effects to known sensitive plants or suitable habitat for those *potentially* occurring in the Ball Park Thin project area because it proposes lower frequency of group select thinning in potential habitat. For further information on botanical resources, see the botanical resource report in Appendix C of the Ball Park ThinEA.

Cumulative Effects - Sensitive/Rare and Uncommon Species
The analysis area for sensitive and rare botanical species cumulative effects is the Ball Park Thin Project area. There are no planned activities adjacent to the analysis area, therefore actions beyond this analysis area would have no effect on sensitive species, or other rare botanical species potentially located in the Ball Park Thin analysis area.

Implementation of the proposed action or any action alternatives would have no cumulative effect on sensitive plants in the project area because of the buffer and no-disturbance mitigation. Based on the analysis of this project there would be no incremental change to existing populations of sensitive species or other botanical species in the project area due to selecting any alternative detailed in the Ball Park Thin EA. Despite limitations in survey reliability, the risk of the proposed project activities endangering the viability of sensitive fungi species is low.

Alternative A (No Action) - Special habitats
Direct and Indirect Effects
Selecting the No-Action alternative would allow for the same level of special habitat management annually programmed. This alternative would have no adverse effect on special habitats.

Alternatives B and C - Special Habitats
Direct and Indirect Effects
The action alternatives would have no direct or indirect impact on special habitats. Special habitats would also be buffered from harvest and ground disturbing activities. These buffers would maintain the microclimate, hydrology, and prevent damage to the areas during project implementation.
The main direct impacts to special habitats from the proposed actions are removal of overstory and ground disturbance. Without the buffer and no-disturbance mitigation, reduced cover could potentially decrease humidity and increase temperature earlier in the growing season, thus altering habitat viability. By comparison, Alternative C proposes higher frequency group select thinning than Alternative B; therefore, it poses the highest risk of adverse impacts to special habitats in the Ball Park Thin project area.

Cumulative Effects - Special Habitats
The analysis area for special habitat cumulative effects is the Ball Park Thin Project area. This area was chosen because activities outside the analysis area would have no effect on special habitats located within the project analysis area.

Implementation of the proposed action or any action alternatives would have no cumulative effect on special habitats in the project area because of the buffer and no-disturbance mitigation. Based on the analysis of this project there will be no incremental change to existing populations of special habitats in the project area as a result of selecting any alternative detailed in the Ball Park Thin EA.

Alternative A (No Action) - Invasive Plants
Direct and Indirect Effects
Selecting Alternative A would allow the same level of invasive plant control as currently programmed. New and potential invader plant populations documented in the Ball Park Thin project area would remain highest priority in receiving treatment and monitoring. The No-Action alternative would not provide further opportunities to contain or control invasive plant populations. It would also not reduce the current rate of spread of these species within the project area.

Alternatives B and C - Invasive Plants
Direct and Indirect Effects
Alternatives B and C both would have congruent direct impacts on invasive plants because both propose similar acres of harvest or fuel treatments and miles of road maintenance. The ground disturbance caused from implementation may provide suitable conditions for invasive plants to establish or out-compete native vegetation.

Most of the invasive plant populations in the Ball Park Thin project area are established along roads and are mainly spread by vehicular traffic. However, false brome occurs adjacent to units proposed for harvest, ground-based yarding, and under-burning fuels treatments.

With mitigation measures identified in Chapter 2, selecting either of the alternatives would result in moderate risk of further spreading or introducing invasive plants. With mitigation measures, the proposed actions would have a low risk of spreading invasive plants onto adjacent properties by hauling across ownership boundaries.
Alternatives B and C both would have similar direct impacts on invasive plants because both propose similar acres of harvest or fuel treatments and miles of road maintenance. Additionally, both action alternatives propose similar acreage in terms of harvest systems. The ground disturbance caused from implementation may provide suitable conditions for invasive plants to establish or out-compete native vegetation. However, if one considers the potential ground disturbance resulting from harvest activities and an additional difference of 10% in canopy retention between the action alternatives, Alternative B poses the least risk of impacts to invasive plants.

False brome and Deptford pink occur on roads adjacent to units proposed for harvest, ground-based yarding, and under-burning fuels treatments. These populations should be treated prior to implementing any action alternative, subsequently treated and monitored for at least three years.
With mitigation measures identified in Chapter 2, selecting either of the alternatives would result in moderate risk of further spreading or introducing invasive plants. With mitigation measures, the proposed actions would have a low risk of spreading invasive plants onto adjacent properties by hauling across ownership boundaries.

Cumulative Effects - Invasive Plants
The entire Ball Park Thin project area is the area done for the cumulative effects analysis associated with ground-disturbance activities and adjacent roads. This analysis addresses known distribution of invasive plants and likely travel routes for the proposed projects.

Past management activities in the last 50 years include road construction, road maintenance, and timber harvest. Included in these activities are the Eugene Water and Electric Board (EWEB) power line corridor as well as the vegetation management activities associated with it. Because of the design criteria and mitigation measures, there is no expected increase of cumulative effects on invasive plants.

With the exception of false brome, the other new invader plants documented in the project area are considered shade-intolerant and generally confined to roadsides and open areas. One of many ecological advantages of invasive or non-native plants is the lack of native competition to keep populations balanced. More so, prolific propagation and the ability to disperse large amounts of seed is probably the greatest advantage invasive plants have in native ecosystems.

Even without past or present management actions, invasive plants would still be present from natural and biological vectors. Invasive plants are present on the properties of adjacent landowners and along the Highway 126 corridor. However, past harvest and road maintenance activities within the Ball Park Thin project area have provided additional opportunities for establishment and spread of invasive plants. Some management actions, such as harvest and yarding, result in short-term disturbance conducive for invasive plant establishment. The effects of these actions are greatest at the on-set of implementation and often decrease over time and with stand succession.

Other management activities, like road construction or maintenance, often result in longer-term effects to invasive plant infestations. This is because roads serve dual functions by acting as suitable ground for the establishment of invasive plants and by providing the plants access to a host of potential vectors.

Implementing any of the alternatives detailed in the Ball Park Thin EA would have a non-measurable cumulative effect on invasive plants because both action alternatives propose to decommission 0.5 miles of road and the No-Action alternative proposes no road management all.

V. Determination/Conclusion

Risk Determination - Sensitive Plants/Rare and Uncommon Species
It is my determination that implementation of this project will have **no impact** on sensitive botanical species known to occur in the Ball Park Thin project area because of the no-disturbance buffers. Because of the no-disturbance buffer and mitigation, the likelihood of adverse effects to sensitive plants in the Ball Park Thin project area is low.

For unknown fungi, implementation of this project "**may impact** individuals or habitat, **but will not** likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species".

Risk Determination - Special Habitats
It is my determination there is low to moderate risk of adverse impacts to special habitats in the Ball Park Thin project area from proposed actions with the no-disturbance buffer and mitigation.

Unit	Risk Assessment	Connected Actions and Rationale	Mitigation Measures Relative to Unit (prior to implementation)
390 Rock outcrop	Low	-proposed fuels treatments	-avoid fuel treatments in special habitat
380 Rock outcrop	Low	-proposed fuels treatments	-avoid fuel treatments in special habitat
130 Swamp	Moderate	-known new invader site -proposed fuels underburn	manual/mechanical/chemical control of CEMA and CYSC -avoid fuels treatments in special habitat

140 Wet meadow	Moderate	-known new invader site -proposed fuels underburn	manual/mechanical/chemical control of CEMA and CYSC -avoid fuels treatments in special habitat
150 Seep	Moderate	-proposed harvest and fuels treatments	-potential Rhizomnium habitat -avoid harvest and fuels treatments in special habitat
180 Rock outcrop	NA	Dropped in EA	NA
170 Wet meadow	Moderate	- proposed harvest and fuels treatments	- avoid harvest and fuels treatments in special habitat
240 Rock outcrop	Moderate	- proposed harvest and fuels treatments	- documented established invader species - avoid harvest and fuels treatments in special habitat

Risk Determination - Invasive Plants

The risk of adverse effects to invasive plants in the Ball Park Thin project area is **moderate**. With the specific mitigation measures, design criteria, and best management practices outlined in the Ball Park Thin EA and this report, risk of further spread by invasive species may be minimized. To mitigate the spread of existing invasive plants and reduce the risk of introducing other invasive species into the Ball Park Thin project area, the following measures will be used:

- Off road or ground disturbing equipment will be washed prior to entering National Forest land. Equipment will be free of all seed and debris that may contain plant seeds such as soil and vegetation.

- Material brought in for construction, such as fill soil, gravel, and straw will be free of vegetative material and invasive plant seed.

- Monitoring for changes in existing populations or new occurrences of invasive plants in the project area.

- Retain barriers of undisturbed vegetation between weed infested areas and project areas.

- Treat existing infestations prior to project implementation to minimize seed spread.

- Clean equipment prior to coming on to the Forest and potentially between projects or sites, depending on the occupancy of weeds at the affected areas. Use appropriate clauses 154 to ensure contractors whose vehicles operate off the road surface are cleaning vehicles appropriately. See Appendix 1 for contract clauses (WO-C6.36 & WO-CT6.36).

- Work in weed-free areas prior to moving to weed-infested areas.

- Avoid putting landings, yarding stations, staging and equipment storage areas, in weed infested areas. Provide timber and other contractors with a map of infestations in the prework process. Weed infestations will be identified on the sale map.

- Revegetate site as soon as possible (during the appropriate planting or seeding window) following disturbance. Revegetation may include topsoil replacement, site prep such as ripping, planting, seeding, fertilizing and weed-fee mulching as necessary. Monitor sites and reseed or replant as necessary.

Prepared by: _/s/Burtchell Thomas______________ Date:_May 5 , 2008
Burtchell Thomas, Botanist
McKenzie River Ranger District

Attachment 1: Summary of Potential Habitat and Presence for Sensitive Botanical Species

Species	**Prefield Review**	**Species Presence**
Agoseris elata	habitat present	No
Arabis hastatula	habitat not present	No
Arnica viscosa	habitat not present	No
Asplenium septentrionale	habitat not present	No
Aster gormanii	habitat not present	No
Boletus pulcherrimus	habitat present	No
Botrychium minganense	habitat not present	No
Botrychium montanum	habitat present	No
Botrychium pumicola	habitat not present	No
Bridgeoporus nobillisimus	habitat not present	No
Calamagrostis breweri	habitat not present	No
Carex livida	habitat not present	No
Carex scirpoidea var. *stenochlaena*	habitat not present	No
Castilleja rupicola	habitat not present	No

Chaenotheca subroscida	habitat not present	No
Cimicifuga elata	habitat present	No
Coptis trifolia	habitat present	No
Cordyceps capitata	habitat not present	No
Corydalis aqua-gelidae	habitat not present	No
Cortinarius barlowensis	habitat present	No
Cudonia monticola	habitat not present	No
Dermatocarpon luridum	habitat not present	No
Eucephalis(Aster) vialis	habitat present	No
Frasera umpquaensis	habitat not present	No
Gentiana newberryi	habitat not present	No
Gomphus kaufmanii	habitat present	No
Gyromitra californica	habitat present	No
Hypogymnia duplicata	habitat present	No
Iliamna latibracteata	habitat not present	No
Leptogium burnetiae var. hirsutum	habitat present	No
Leptogium cyanescens	habitat present	No
Leucogaster citrinus	habitat present	No
Lewisia columbiana var. columbiana	habitat not present	No
Lobaria linita	habitat not present	No
Lupinus sulphureus var. kincaidii	habitat not present	No
Lycopodiella inundata	habitat not present	No
Lycopodium complanatum	habitat not present	No
Montia howellii	habitat not present	No
Mycenia monticola	habitat not present	No
Nephroma occultum	habitat present	Yes (Unit 280)
Ophioglossum pusillum	habitat present	No
Pannaria rubiginosa	habitat present	No
Pellaea andromedaefolia	habitat not present	No
Peltigera neckeri	habitat present	No
Peltigera pacifica	habitat present	No
Phaecollybia attenuata	habitat present	No
Phaeocollybia dissiliens	habitat present	No
Phaeocollybia pseudofestiva	habitat present	No
Phaeocollybia sipei	habitat present	No
Pilophorus nigricaulis	habitat not present	No
Polystichum californicum	habitat not present	No
Potentilla villosa	habitat not present	No
Pseudocyphellaria rainierensis	habitat present	No

Ramalina pollinaria	habitat not present	No
Ramaria amyloidea	habitat present	No
Ramaria aurantiisiccescens	habitat present	No
Ramaria gelatinaurantia	habitat present	No
Ramaria largentii	habitat present	No
Rhizomnium nudum	habitat present	Yes (Unit 80)
Romanzoffia thompsonii	habitat present	Yes (Unit 280)
Scheuchzeria palustris var. Americana	habitat not present	No
Schistostega pennata	habitat not present	No
Scouleria marginata	habitat not present	No
Sisyrinchium sarmentosum	habitat present	No
Sowerbyella rhenana	habitat not present	No
Tetraphis geniculata	habitat not present	No
Thorluna disimilis	habitat not present	No
Usnea longissima	habitat not present	No
Utricularia minor	habitat not present	No
Wolffia borealis	habitat not present	No
Wolffia columbiana	habitat not present	No

ATTACHMENT 2: **Regional Forester's Sensitive Botanical Species List for the Willamette National Forest FY 2008.** Species of federal, state and local importance are included on the R-6 list.

Species	Occurrence on WNF	ONHP Status	State Status	Federal Status	Habitat Types
Agoseris elata	S	2			MM,DM
Arabis hastatula	D	1		SofC	RO
Arnica viscosa	S	2			RS
Asplenium septentrionale	S	2			RO
Aster gormanii	D	1			RS
Boletus pulcherrimus	D	1			CF
Botrychium minganense	D	2			RZ,CF
Botrychium montanum	D	2			RZ,CF
Botrychium pumicola	S	1	LT		HV
Bridgeoporus nobilissimus	D	1			CF
Calamagrostis breweri	D	2			MM,RZ
Carex livida	S	2			WM
Carex scirpoidea var. stenochlaena	D	2			RO
Castilleja rupicola	D	2			RO
Chaenotheca subroscida	D	3			CF
Cimicifuga elata	D	1	C		CF
Coptis trifolia	S	2			WM,CF
Cordyceps capitata	D	unlisted			CF
Corydalis aqua-gelidae	D	1	C		RZ,CF
Cudonia monticola	D	not listed			CF
Dermatocarpon luridum	S	3			RZ on rock
Eucephalis (Aster) vialis	S	1	LT	SofC	CF
Frasera umpquaensis	D	1	C		MM
Gentiana newberryi	D	2			MM
Gomphus kaufmanii	D	3			CF
Gyromitra californica	D	2			CF
Hypogymnia duplicata	S	3			CF
Iliamna latibracteata	S	2			CF,RZ
Leptogium burnetiae var. hirsutum	S	3			CF
Leptogium cyanescens	D	3			CF
Leucogaster citrinus	D	3			CF
Lewisia columbiana var. columbiana	D	2			RS
Lobaria linita	D	2			RO

Lupinus sulphureus var. kincaidii	S	1	LT	LT	MM,DM
Lycopodiella inundata	D	2			WM
Lycopodium complanatum	D	2			CF

Species	**Occurrence on WNF**	**ONHP Status**	**State Status**	**Federal Status**	**Habitat Types**
Montia howellii	D	4	C		RZ
Mycenia monticola	D	not listed			CF
Nephroma occultum	D	4			CF
Ophioglossum pusillum	D	2			WM
Pannaria rubiginosa	D	2			CF
Pellaea andromedaefolia	S	2			RO
Peltigera neckeri	D	not listed			CF
Peltigera pacifica	D	not listed			CF
Phaeocollybia attenuata	D	4			CF
P. dissiliens	D	3			CF
P. pseudofestiva	D	3			CF
P. sipei	D	3			CF
Pilophorus nigricaulis	D	2			RO
Polystichum californicum	D	2			RO
Potentilla villosa	D	2			RS, RO
Pseudocyphellaria rainierensis	D	4			CF,RZ
Ramalina pollinaria	D	2			CF, RZ
Ramaria amyloidea	D	2			CF
R. aurantiisiccescens	D	4			CF
R. gelatiniaurantia	D	3			CF
R. largentii	D	3			CF
Rhizomnium nudum	D	2			CF
Romanzoffia thompsonii	D	1			RS
Scheuchzeria palustris var. americana	D	2			WM
Schistostega pennata	D	2			CF
Scouleria marginata	S	3			RZ
Sisyrinchium sarmentosum	S	1	C	SofC	MM,DM
Sowerbyella rhenana	D	3			CF
Tetraphis geniculata	S	2			CF
Thorluna disimilis	D	2			CF
Usnea longissima	D	3			CF,RZ
Utricularia minor	D	2			SW
Wolffia borealis	S	2			SW

Wolffia columbiana	S	2	SW

Occurrence on Willamette National Forest:
S = Suspected
D = Documented

Oregon Natural Heritage Program (ORNHP):
1 = Taxa threatened or endangered throughout range.
2 = Taxa threatened or endangered in Oregon but more common or stable elsewhere.
3 = Species for which more information is needed before status can be determined, but which may be threatened or endangered (Review).
4 = Species of concern not currently threatened or endangered (Watch).

Oregon State Status:
LT = Threatened
LE = Endangered
C = Candidate

Federal Status: These plant species were originally published as CANDIDATE THREATENED (CT) in the Smithsonian Report, **Federal Register**, July 1, 1975, or as PROPOSED ENDANGERED (PE) in a later report, **Federal Register**, June 16, 1976. The latest **Federal Register** consulted was dated September 30, 1993. Updated listings appear periodically in the Notice of Review (USFWS); the status of several species is categorized as follows:
LE = Listed as an Endangered Species
LT = Listed as a Threatened Species
PE = Proposed as an Endangered Species
PT = Proposed as a Threatened Species
C = Candidate for Listing as Threatened or Endangered
Sof C = Species of Concern; taxa for which additional information is needed
to support proposal to list under the ESA.

Habitat Types:

MM = Mesic meadows	RS = Rocky slopes, scree
WM = Wet meadows	RO = Rock outcrops, cliffs
DM = Dry meadows	DW = Dry open woods
RZ = Riparian zones, floodplains	HV = High volcanic areas
CF = Coniferous forest	SW = Standing water

ATTACHMENT 3: **Field reconnaissance survey levels for determining presence potential for TES species.**

Level A: Aerial photo interpretation and review of existing site records. Determination of the potential for a listed species to occur within the proposed project area. No field surveys completed.

Low potential: Less than 40% potential for listed species inhabiting the project area.

Moderate potential: 40-60% potential for a listed species inhabiting the proposed project area.

High potential: Greater than 60% potential for listed species inhabiting the proposed project area.

Level B: Single entry survey of probable habitats. Areas are identified by photos and existing field knowledge. Field surveys are conducted during the season most favorable for species identification.

Low intensity: Selected habitat surveys (approximately 5-10% of area) are conducted with a single entry for listed species inhabiting the proposed project area.

Moderate intensity: Selected habitat surveys (approximately 10-40% of area) are conducted with a single entry for listed species inhabiting the proposed project area.

High intensity: Selected habitat surveys (approximately 40-60% of area) are conducted with a single entry for listed species inhabiting the proposed project area.

Level C: Multiple entry surveys are conducted for listed species likely to inhabit the proposed project area.

Low intensity: Selected habitat surveys (approximately 5-10% of area) are conducted with repeated entries for

	listed species inhabiting the proposed project area.
Moderate intensity:	Selected habitat surveys (approximately 10-60% of area) are conducted with repeated entries for listed species inhabiting the proposed project area.
High intensity:	Selected habitat surveys (approximately 60-80% of area) are conducted with repeated entries for listed species inhabiting the proposed project area.

ATTACHMENT 4:

Conclusions Of Effects For Use In Biological Evaluations and Assessments
USDA Forest Service - Regions 1, 4, and 6
August, 1995

Listed Species:

1. No Effect

   Occurs when a project or activity will not have any "effect", on a listed species, or critical habitat.

2. May Affect - Likely to Adversely Affect (LAA)

   If the determination in the biological assessment is that the project May Affect - Likely to Adversely Affect a listed species or critical habitat, formal consultation must be initiated (50 CFR 402.12). Formal consultation must be requested in writing through the Forest Supervisor (FSM 2670.44) to the appropriate FWS Field Supervisor, or NOAA Fisheries office.

3. May Affect - Not Likely to Adversely Affect (NLAA)

   If it is determined in the biological assessment that there are "effects" to a listed species or critical habitat, but that those effects are not likely to adversely affect listed species or critical habitat, then written concurrence by the FWS or NOAA Fisheries is required to conclude informal consultation (50 CFR 402.13).

4. Beneficial Effect

   Written concurrence is also required from the FWS or NOAA Fisheries if a beneficial effect determination is made.
   Requests for written concurrence must be initiated in writing from the Forest Supervisor to the State Field Supervisor (FWS or NOAA).

Proposed Species:
Whenever serious adverse effects are predicted for a proposed species or proposed critical habitat, conferencing is required with the FWS or NOAA Fisheries.

1. No Effect

When there are "no effects" to proposed species, conferencing is not required with FWS or NOAA.

2. Not Likely to Jeopardize the Continued Existence of the Species or Result in Destruction or Adverse Modification of Proposed Critical Habitat

This conclusion is used where there are effects or cumulative effects, but where such effects would not have the consequence of losing key populations or adversely affecting "proposed critical habitat". No conferencing is required with FWS or NOAA if this conclusion is made. However, for any proposed activity that would receive a "Likely To Adversely Affect" conclusion if the species were to be listed, conferencing may be initiated.

3. Likely to Jeopardize the Continued Existence of the Species or Result in Destruction or Adverse Modification of Proposed Critical Habitat

This conclusion must be determined if there are significant effects that could jeopardize the continued existence of the species, result in adverse modification or destruction of proposed critical habitat, and/or result in irreversible or irretrievable commitments of resources that could foreclose options to avoid jeopardy, should the species be listed. If this is the conclusion, conferencing with FWS or NMFS is required.

Sensitive Species:

1. No Impact (NI)

A determination of "No Impact" for sensitive species occurs when a project or activity will have no environmental effects on habitat, individuals, a population or a species.

2. May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species (MIIH)

Activities or actions that have effects that are immeasurable, minor or are consistent with Conservation Strategies would receive this conclusion. For populations that are small - or vulnerable - each individual may be important for short and long-term viability.

3. Will Impact Individuals or Habitat With a Consequence That the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species (WIFV)

Loss of individuals or habitat can be considered significant when the potential effect may be:

1. Contributing to a trend toward Federal listing (C-1 or C-2 species);
2. Results in a significantly increased risk of loss of viability for a species; or,
3. Results in a significantly increased risk of loss of viability for a significant population (stock).

4. Beneficial Impact (BI)

Projects or activities that are designed to benefit, or that measurably benefit a sensitive species should receive this conclusion.

ATTACHMENT 5:

Conclusions Of Effects For Use In Biological Evaluations and Assessments

USDA Forest Service - Regions 1, 4, and 6

August, 1995

Listed Species:

1. No Effect

Occurs when a project or activity will not have any "effect", on a listed species, or critical habitat.

2. May Affect - Likely to Adversely Affect (LAA)

If the determination in the biological assessment is that the project May Affect - Likely to Adversely Affect a listed species or critical habitat, formal consultation must be initiated (50 CFR 402.12). Formal consultation must be requested in writing through the Forest Supervisor (FSM 2670.44) to the appropriate FWS Field Supervisor, or NOAA Fisheries office.

3. May Affect - Not Likely to Adversely Affect (NLAA)

If it is determined in the biological assessment that there are "effects" to a listed species or critical habitat, but that those effects are not likely to adversely affect listed species or critical habitat, then written concurrence by the FWS or NOAA Fisheries is required to conclude informal consultation (50 CFR 402.13).

4. Beneficial Effect

Written concurrence is also required from the FWS or NOAA Fisheries if a beneficial effect determination is made.

Requests for written concurrence must be initiated in writing from the Forest Supervisor to the State Field Supervisor (FWS or NOAA).

Proposed Species:
Whenever serious adverse effects are predicted for a proposed species or proposed critical habitat, conferencing is required with the FWS or NOAA Fisheries.

1. No Effect

When there are "no effects" to proposed species, conferencing is not required with FWS or NOAA.

2. Not Likely to Jeopardize the Continued Existence of the Species or Result in Destruction or Adverse Modification of Proposed Critical Habitat

This conclusion is used where there are effects or cumulative effects, but where such effects would not have the consequence of losing key populations or adversely affecting "proposed critical habitat". No conferencing is required with FWS or NOAA if this conclusion is made. However, for any proposed activity that would receive a "Likely To Adversely Affect" conclusion if the species were to be listed, conferencing may be initiated.

3. Likely to Jeopardize the Continued Existence of the Species or Result in Destruction or Adverse Modification of Proposed Critical Habitat

This conclusion must be determined if there are significant effects that could jeopardize the continued existence of the species, result in adverse modification or destruction of proposed critical habitat, and/or result in irreversible or irretrievable commitments of resources that could foreclose options to avoid jeopardy, should the species be listed. If this is the conclusion, conferencing with FWS or NMFS is required.

Sensitive Species:

1. No Impact (NI)

A determination of "No Impact" for sensitive species occurs when a project or activity will have no environmental effects on habitat, individuals, a population or a species.

2. May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species (MIIH)

Activities or actions that have effects that are immeasurable, minor or are consistent with Conservation Strategies would receive this conclusion. For populations that are small - or vulnerable - each individual may be important for short and long-term viability.

3. Will Impact Individuals or Habitat With a Consequence That the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species (WIFV)

Loss of individuals or habitat can be considered significant when the potential effect may be:

4. Contributing to a trend toward Federal listing (C-1 or C-2 species);
5. Results in a significantly increased risk of loss of viability for a species; or,
6. Results in a significantly increased risk of loss of viability for a significant population (stock).

4. Beneficial Impact (BI)

Projects or activities that are designed to benefit, or that measurably benefit a sensitive species should receive this conclusion.

File Code:	2670 Threatened, Endangered, and Sensitive Wildlife	**Date:**	May 14, 2008
Route To:	Project Files		
Subject:	Terrestrial Fauna Biological Evaluation (BE) for: Ball Park Thin Project		

SUMMARY OF DETERMINATIONS

Determinations:

The following summarizes effect or impact determinations to species currently listed as threatened, endangered, or sensitive (TES) that may have suitable habitat identified, and have either documented or suspected occurrence within the project area. **There are no recognized effects or impacts to TES species from No Action.**

Activities associated with the proposed project **may affect, but are not likely to adversely affect** the northern spotted owl. A full discussion of effects can be found in the Biological Assessment dated February 29, 2008 that was submitted to the U.S. Fish and Wildlife Service.

Activities associated with the proposed project should have **no impact** on individuals of the following regionally listed sensitive species or their habitat:

Peregrine Falcon
Harlequin Duck
Baird's Shrew
Pacific Shrew
Wolverine
Pacific Fisher
Cascade Torrent Salamander
Crater Lake Tightcoil

Activities associated with the proposed project **may impact** individuals of the following regionally listed sensitive species or their habitat, but also **may benefit** future development of habitat:

Pacific Fringe-tailed Bat
Oregon Slender Salamander

Cumulative effects of this project in conjunction with other reasonably foreseeable projects in and adjacent to the project area are not expected to jeopardize the continued existence of any TES species as a result of modification of their essential habitat; nor would they likely contribute to a trend towards Federal listing or cause a loss of viability to populations of species designated as R-6 Sensitive or as Management Indicator Species on the Willamette National Forest. Maintenance and/or recovery of late successional habitat serving as current or potential dispersal corridors surrounding the project area will ensure ongoing opportunities for occupancy and movement of terrestrial TES wildlife species that may occur in vicinity of this project and are dependent on such habitat.

SUMMARY OF SEASONAL RESTRICTIONS/RECOMMENDATIONS

Implementing the following recommendations would ensure effects or impacts to listed species from proposed activities would be no greater than those addressed in this document, and also would mitigate those impacts.

Spotted Owl

- Impose seasonal restriction on activities associated with project that generate above-ambient noise levels which may disturb spotted owls during the critical nesting period between March 1 and July 15.

Harlequin Duck

- Impose seasonal restriction on activities associated with project that generate above-ambient noise levels which may disturb nesting harlequin ducks during the critical nesting period between April 30 and July 30.

Pacific Shrew, Pacific Fisher, and Oregon Slender Salamander

- Protect large down woody material within the project area to the greatest extent feasible during logging, subsequent underburning, and natural fuels underburning activities. At least 240 lineal feet per acre of decay class I and II material greater than 18" diameter would be retained within all harvest units. Full tree length down wood material is preferable to maximize wildlife habitat value; lengths less than 20 feet will not count towards this total. Where the preferred size of material is not available, 240 lineal feet per acre of the largest diameter leave trees would be retained.

Pacific Fringe-tailed Bat

- Protect decadent trees and snags >12"dbh (roosting habitat) within the project area to the greatest extent feasible.

Crater Lake Tightcoil

- Ensure that measures identified to prevent habitat disturbance within 10 meters of perennially wet areas are implemented during project activities.

Table 1. Seasonal Restrictions to Protect Northern Spotted Owl, Harlequin Ducks, and Cavity Nesters

Unit/Area	Seasonal restriction for logging equipment or other heavy equipment	Seasonal restriction burning	Seasonal restriction on blasting
130 lower 150 feet near Hardy Creek	Yes, April 1-July 30 bottom 150 feet near Hardy Creek	Yes, April 1-July 30 bottom 150 feet near Hardy Creek	NA
280	No	Yes, March 1-July 15	NA
360 west of FS Road 2654	Yes, March 30-July 15	Yes, March 1-July 15	NA

Unit/Area	Seasonal restriction for logging equipment or other heavy equipment	Seasonal restriction burning	Seasonal restriction on blasting
370 east of FS Road 2654-773 and below 2654	Yes, March 1-July 15	Yes, March 1-July 15	NA
390 northeast of FS Road 2654 in the north part of the unit at the junction of the 2654-773	Yes, March 1-July 15	Yes, March 1-July 15	NA
Latiwi Rockpit	Yes, March 1-July 15	NA	Yes March 1-July 15
Dogwood Rockpit	No	NA	Yes, March 1-July 15
Boulder Rockpit	No	NA	Yes, March 1-July 15
Boulder Phase II Rockpit	No	NA	Yes, March 1-July 15
Haul Route Hazard Tree Falling	Yes, April 1-June 30	NA	NA

Introduction

This document addresses potential effects to proposed, threatened, endangered or sensitive (TES) fauna listed in the Region 6 Regional Forester's Federally Listed or Proposed, and Sensitive Species Lists (dated July 21, 2004) with documented or suspected occurrences on the Willamette National Forest from activities associated with a habitat restoration project. Biological evaluations of potential effects to threatened, endangered and sensitive fish and flora are in separate documents prepared by this project's Fish Biologist and Botanist. This evaluation, required by the Interagency Cooperative Regulations (Federal Register, January 4, 1978), ensures compliance with the provisions of the Endangered Species Act (ESA) of 1973, P.L. 93-205 (87Stat. 884), as amended. A review of potential effects to non-TES wildlife species from this project proposal is presented in a separate Wildlife Specialist Report.

Project Location and Description

The McKenzie River Ranger District proposes to conduct activities on approximately 1,160 acres of the Ball Park Project Area. The proposed activity acres include timber harvest (1064), natural fuels underburns (49), and rock quarry/borrow pits use (5). The timber harvest would yield a gross estimate of 13.1 million board feet (MMBF) of wood products. This proposal, represented in Alternative B in this EA, would include canopy thinning on 663 acres, wildlife forage thinning on 129 acres, and riparian thinning on 122 acres. The timber sales from this proposal would likely be sold over a three year time span, beginning in fiscal year 2009.

The Ball Park Thin Project area is within the Deer Creek Subwatershed (6th field) of the Upper McKenzie Watershed (5th field) on the McKenzie River Ranger District. The project area consists of

14,508 acres located northwest of the McKenzie River, east of the HJ Andrews Experimental Forest, and south of the District boundary that is adjacent to the Sweet Home District. Major drainages include Deer Creek, Budworm Creek, Fritz Creek, and Carpenter Creek.

Legal description of the project: T.14S, R.6E, Sec. 20,28-30,32,33; T.15S, R.6E, Sec. 3-6, 8-11, 14-16,22,23; Willamette Meridian; Lane and Linn Counties, Oregon.

The Willamette National Forest Land and Resource Management Plan shows land allocations in the project area as: 4-Research Natural Area, 5a- Special Interest Area, 6d McKenzie River Wild and Scenic, 9c- Wildlife Marten Area, 9d- Special Wildlife Habitat Area, and 14a-General Forest. Northwest Forest Plan land allocations are Late Successional Reserve, Administratively Withdrawn, Congressionally Withdrawn, Adaptive Management Area, and Matrix.

<u>Alternatives</u>:
The Ball Park Thin Project will be analyzed in an Environmental Assessment that reviews three alternatives – a No Action alternative and two Action Alternatives. The Action Alternatives involve activities described above.

Action Alternative: The influence of proposed activities on terrestrial wildlife is considered in the context of whether or not suitable habitat may be modified, or if a species may be present at or near sites where physical disturbance may occur, or be sensitive to and thereby influenced by anthropogenic activities occurring during implementation of this project. Habitat disturbance that may affect some terrestrial wildlife species could occur as a result of this project. That potential is addressed later in this report.

No Action Alternative: There is no rationale to suggest the No Action alternative would affect or impact any terrestrial wildlife species based on their ecological requirements and current habitat conditions in the project area. Considering the No Action Alternative would have no effect/impact on terrestrial wildlife species is based on the following assumption - taking no action would not affect current habitat or wildlife species that may be present as either evolves without human management. The dynamic nature of habitat suitability that may be subject to an unknown frequency and variety of stochastic events is considered beyond the scope of this evaluation. Only potential effects or impacts of the Action Alternative will be discussed further in this document.

WATERSHED ANALYSIS / ADDITIONAL DOCUMENT SUPPORT

Proposed activities respond positively to recommendations made that address vegetation and wildlife in the Upper McKenzie Watershed Analysis.

MANAGEMENT DIRECTION COMPLIANCE

The alternative selected for management of the Willamette National Forest includes a strategy that provides Management Requirements (MRs) exceeding the minimum MRs established for Management Indicator Species (MIS) as presented in the Willamette Forest Plan FEIS Appendices - Volume 1 (USDA 1990, pp B-79 through 82). Maintenance of the MRs ensures the viability of MIS and the other species they represent. The MRs have been further enhanced for most MIS species (i.e. those species dependent on old growth and mature conifer habitat, and dead and defective tree habitat) under the Forest Plan S&Gs as amended by the Northwest Forest Plan.

The proposed action associated with this project complies with current forest Standards and Guidelines (S&Gs) pertaining to MIS and other rare and uncommon species management. This proposal also complies with other S&Gs established in the Willamette National Forest Land and Resource Management Plan (1990) as amended by the Northwest Forest Plan Records of Decision (ROD) (1994, 2001, and 2004).

TES SPECIES – REVIEW AND ASSESSMENT

The Biological Evaluation (BE) is a 6-step process that identifies known or suspected threatened, endangered, and sensitive (TES) or Proposed wildlife species that may be associated with a project area, and evaluates impacts the project may have to those species. The six steps are as follows:

1. Prefield review of existing information.
2. Field reconnaissance of the project area to document evidence of a species or habitat.
3. Assessment of whether known or suspected populations of TES or Proposed species will be affected by the project.
4. Analysis of the significance of the project's effects on local and entire populations of TES or Proposed species.
5. If step 4 cannot be completed due to lack of information, a biological investigation is done.*
6. Conferencing or informal/formal consultation with the U.S. Fish & Wildlife Service (USFWS) is initiated at the appropriate stage as outlined in FSM 2673.2-1, or is otherwise arranged through formal channels.

* Step 5 pertains only to listed species and will not be indicated except when applicable.

A summary of ecological requirements for Federally listed[1] or proposed[2] species, and animal species on the Regional Forester's Sensitive Species List[3] for species with documented or suspected occurrence in the the Willamette National Forest is displayed in Table 1.

A summary of the BE process showing **effects determinations**[4] for Federally listed or proposed species, and **impact determinations**[5] for animal species on the Regional Forester's Sensitive Species List for species with known or potential occurrence in the project area is displayed in Table 2.

1 Species listed based on the USDA Forest Service Pacific Northwest Region Federally Listed or Proposed Species list (updated 7/21/04) having documented or suspected occurrence on the Willamette National Forest.

2 When a species is proposed for listing under the Endangered Species Act of 1973 (with amendments), a notice is published in the Federal Register, a daily publication of the Federal Government. The Federal Register is available on the internet at the following site: http://www.access.gpo.gov/nara/nara005.html

3 Species listed based on the USDA Forest Service Regional Forester's Sensitive Animal List (updated 7/21/04) (USDA 2004a,b) having documented or suspected occurrence on the Willamette National Forest.

4 The criteria for effects determinations can be found in the *Endangered Species Act Consultation Handbook: Procedures for Conducting Section 7 Consultations and Conferences* (USFS and NMFS 1998).

5 Impact determinations are required for all species listed under the Regional Forester's Sensitive Species List (Forest Service Manual 2670.32, 2670.5). Direct, indirect, and cumulative effects should be considered. For a discussion of cumulative effects analysis, see the document *Considering Cumulative Effects under the National Environmental Policy Act* (Council on Environmental Quality 1997).

Table 1. Summary of Ecological Requirements for Animal Species on the Regional Forester's Federally Listed and Sensitive Species Lists for species with documented or suspected occurrence on the Willamette National Forest (July 21, 2004).

Species	Habitat
Northern Spotted Owl ***Strix occidentalis*** ***Status: Federally Threatened***	Occur primarily in the interior of older timber stands with structure required for food, cover, nest sites, and protection from weather and predation. Reproductive habitat = forest w/ canopy closure 60 – 80%; multi-layered, multi-species canopy dominated by large overstory trees (> 30"dbh); abundant large trees w/ deformities (e.g. large cavities, broken tops, dwarf-mistletoe infections, decadence); abundant large snags/down logs; and sufficient open flying space below the canopy. Foraging habitat = forest w/ > 2 canopy layers; overstory trees > 21" DBH; abundant snags/down wood; and a 60-80% canopy closure. Dispersal habitat = forest w/ > 11" DBH trees and > 40% canopy closure. Numerous sightings and occupied territories recorded on the McKenzie River RD.
Northern Bald Eagle ***Haliaeetus leucocephalus*** ***Status: Federally Threatened***	Use scattered old-growth conifer trees in proximity to open water near rivers, lakes, and reservoirs with plentiful prey. Feed primarily on fish, but will also eat waterfowl and carrion. One active nest currently on the McKenzie River RD, with two additional territories that were historically occupied or suspected at Clear Lake and Lost Lake.
Least Bittern ***Ixobrychus exilis***	Freshwater or brackish marshes with tall vegetation that it stalks through to find prey. Eats small fish, frogs, insects, small mammals, and sometimes bird eggs and chicks. Nests are small platform of sticks and live or dead vegetation, placed in cattails, bulrushes, or bushes 8-14" above water. Sightings of individuals at Fern Ridge and Salem. No confirmed sightings on the McKenzie River RD.
Bufflehead ***Bucephala albeola***	Summers on wooded lakes and rivers, winters on lakes and coastal waters. Nesting normally occurs near lakes in tree cavities 5-50 feet high. Dives underwater and eats small mollusks, fish, snail, and crustaceans. Also eats aquatic insects. Winter sightings common along reservoirs, and nesting activity suspected at sites associated with numerous high elevation lakes on the McKenzie River RD.
Harlequin Duck ***Histrionicus histrionicus***	During nesting (April-June) adults require fast-flowing water with midstream loafing sites nearby, dense shrub or timber/shrub mosaic vegetation on the bank, and an absence of human disturbance. Nest on ground under the shelter of vegetation, rocks, or large woody debris in close proximity to water. Broods prefer low gradient streams with adequate macro invertebrate abundance. Breeding and foraging known to occur along portions of the Main stem and South fork of the McKenzie River, as well as Lookout and French Pete Creeks.
American Peregrine Falcon ***Falcon peregrinus anatum***	Preferred nesting sites are sheer cliffs usually 75 ft. or more in height having horizontal ledges or small caves. Foraging is associated with a variety of open and forested habitats, however is most closely associated with riparian settings. Numerous potential nest sites and occupied territories occur on the McKenzie River RD.
Yellow Rail ***Coturnicops noveboracensis***	Feeds in shallow water, eating snails, insects, and some seeds and grasses. Summers on wet meadows, marshes; winters on grasslands, fields, and coastal marshes. No documented occurrence in potential habitat on McKenzie River RD.
Black Swift ***Cypseloides niger***	Found near wet cliffs in mountainous regions. Feeds on-the-wing, eating flying insects. Nests in small colonies on ledges or mountain crevices associated with waterfalls. Historical summer records in the Santiam Pass area, Linn County, which suggests breeding in that area of the McKenzie River RD.

Baird's Shrew ***Sorex bairdii permiliensis***	Poorly understood but generally considered a non-riparian associate. In 1986 two specimens were trapped from an open Douglas-fir forested area with numerous rotting logs in Polk Co. It has also been trapped on McKenzie River RD in the Mill Creek area and in the Blue River watershed.
Pacific Shrew ***Sorex pacificus cascadensis***	Poorly understood, but considered a riparian associate generally found in moist areas along class III-IV streams with abundant vegetation and down material. Occasionally found in adjacent conifer forest with moist abundant decaying logs and brush. Nests made of grasses, mosses, lichens, or leaves. Feed on slugs, snails, insects, and sometimes vegetation. No known locations on McKenzie River RD.
Pacific Fisher ***Martes pennanti***	Considered a riparian associate but found in a wide variety of densely forested habitats at low to mid-elevations. Diet consists of small and medium-sized forest mammals (porcupines, snowshoe hares, tree squirrels, mice, and voles most common). Also eats carrion, and will seasonally eat birds, bird eggs, amphibians, fish, and insects. Uses ground burrows, tree cavities, witches brooms or other clumped growth, or occasionally bird or small mammal nests as resting sites. Tree cavities are used by most maternal females with young and ground burrows are used mostly in winter. Data suggests they do better in areas with minimized fragmentation of old growth, second-growth, and riparian areas. Areas with abundant down and standing woody material important. A few sightings recorded on the McKenzie River RD.
California Wolverine ***Gulo gulo***	Found primarily in wilderness or remote country with limited human activity. High elevation areas appear to be preferred in summer, which may effectively separate wolverines and intensive human disturbance in most areas. In winter wolverines may move to lower elevations that are snowbound and/or have very limited human activity. They are capable of foraging widely (30-40 km) on a daily basis, and do not significantly use young, dense stands of timber or clearcuts. The majority of activity occurs in large expanses of scattered mature timber, with some use of ecotonal areas such as small timber pockets, and rocky, broken areas of timbered benches. Heavy use of openings w/ good winter populations of big game, a principal source of carrion which makes up much of the wolverine's diet. They also feed on marmots, snowshoe hares, various rodents, insects, insect larvae, eggs, and berries. Several unconfirmed observations mostly in wilderness areas.
Pacific Fringe-tailed Bat ***Myotis thysanodes vespertinu***	Occurs in Oregon, however habitat use is poorly documented. Three captured in 1971 were associated with young coniferous forest. They are known to use caves, mines, rock crevices, and buildings as both day and night roosts. Nothing is known about habits in winter. Diet of moths, leafhoppers, lacewings, daddy-longlegs, crickets, flies, true bugs, and spiders. Occurrence has been documented on McKenzie River RD.
Oregon Slender Salamander ***Batrachoseps wrighti***	Inhabits forested areas, especially old-growth Douglas-fir and younger stands with abundant downed large logs. They lay their eggs under thick bark, inside a crevice in a log, or in talus. Juveniles and adults live under thick bark, inside partially decayed logs, or in debris piles around the bases of large snags. They also occur in moist talus w/ abundant woody debris. Sightings have been documented at lower elevation sites on McKenzie River RD.
Cascade Torrent Salamander ***Rhyacotriton cascadae***	Live in very cold, clear springs, seeps, headwater streams, and waterfall splash zones. Forage in moist forests adjacent to these areas. Eggs are laid in rock crevices in seeps. Larvae and adults live in gravel or under small cobbles in silt-free, very shallow water that is flowing or seeping. Adults may be found under debris on streambanks or in streamside forests and talus during rainy periods. Documented in the Blue River landscape area.

Foothill Yellow-legged Frog ***Rana boylii***	Live in sections of low-gradient streams with exposed bedrock or rock and gravel substrates. Attach eggs to the bottom of quiet scour-pools or riffles in gentle-gradient streams, often where there is only slight flow from the main river. Hatchlings cling to egg masses initially and then to rocks. Nearest known sightings on private lands adjacent to the Sweet Home RD to the north.
Oregon Spotted Frog ***Rana pretiosa***	Favor lakes and slow moving streams associated w/ permanent water source w/ soft and muddy bottom. A marsh specialist w/ strong preference/requirement for warmer waters; more aquatic than other frogs; often found in water or water's edge floating on the surface or resting on aquatic vegetation. Diet is invertebrates caught above and below the surface. Early breeders: egg masses are typically deposited on top of one another in a communal fashion, not attached to vegetation, and deposited in warmer shallow water, making them susceptible to mortality due to freezing or drying. Documented populations on the McKenzie River RD in the Mink Lake basin area of the Three Sisters Wilderness.
Northwestern Pond turtle ***Clemmys marmorata marmorata***	Inhabit marshes, sloughs, moderately deep ponds, slow moving portions of creeks and rivers. Observed in altered habitats including reservoirs, abandoned gravel pits, stock ponds, and sewage treatment plants. Occur from sea level to about 1,830 meters. Require basking sites, such as partially submerged logs, vegetation mats, rocks and mud banks, and may even climb a short way onto tree branches that dip into the water. They use uplands for egg laying, overwintering, and dispersal. They may move up to 500 meters and possibly more for overwintering where they burrow into leaf litter or soil. Nest distances from the water course range from 3 meters to over 402 meters. Sparse vegetation, usually short grasses or forbs characterize most nesting areas. Documented sites along McKenzie River on private ground.
Mardon Skipper ***Polites mardon***	A small, tawny-orange butterfly currently known to exist in geographically disjunct areas in Washington, Oregon, and California. In the southern Washington Cascades, the mardon skipper is found in open, fescue grasslands within Ponderosa pine savanna/woodland habitat at elevations ranging from 1900' to 5100'. South Cascade sites vary in size from small, ½ acre or less meadows, to large grassland complexes, and site conditions range from dry, open ridgetops, to areas associated with wetlands or riparian habitats. Within these environments a variety of nectar source plants are important. The short, open stature of native fescue bunchgrass allows mardon skippers to access nectar and oviposition plants. There are no known populations on the Willamette NF.
Crater Lake Tightcoil ***Pristiloma arcticum crateris***	Sparsely distributed throughout Oregon Cascades above 2000' elevation associated with perennially wet environment in mature conifer forests and meadows among vegetation or under rocks and down woody material. Suitable locations within 10 meters of open water generally in areas under snow for extended periods during winter. One documented site on Middle Fork RD along with a few sites on Mt Hood, Deschutes, Umpqua, Winema, and Rogue River National Forests. No documented sites on the McKenzie River RD.

Table 2. Biological Evaluation process for Willamette TES (or Proposed) fauna associated with potential effects from the Ball Park Thin Project Action Alternative B.

	STEP 1	***STEP 2***	**STEP 3**	**STEP 4**	**STEP 6**
	Prefield Review	*Field Reconn.*	*Risk Assessment*	*Analysis of Significance*	*USFWS Review*
SPECIES	**Habitat Present (B,R,F,D)***	**Occupancy Status**	**Conflicts? Action Alt B**	**Effects / Impacts Action Alt B**	**Consul-tation? BA[1]/BO[2]**
Northern Spotted Owl Strix occidentalis caurina	B,R,F,D	Occupied	Potential Conflict	NLAA with seasonal restrictions	1/10/2008/ 02/07/2008
Northern Bald Eagle Haliaeetus leucocephalus	No			NE	
Least Bittern Ixobrychus exilis	No			NI	
Bufflehead Bucephala albeola	No			NI	
Harlequin Duck Histrionicus histrionicus	B,R,F,D	Unknown	No Conflict	NI with seasonal restriction	
American Peregrine Falcon ***Falcon peregrinus anatum***	F,D	Unknown	No Conflict	NI	
Yellow Rail ***Coturnicops noveboracensis***	No			NI	
Black Swift ***Cypseloides niger***	No			NI	
Baird's Shrew ***Sorex bairdii permiliensis***	B, R, F, D	Unknown	No Conflict	NI	
Pacific Shrew ***Sorex pacificus cascadensis***	B, R, F, D	Unknown	No Conflict	NI	
Wolverine ***Gulo gulo***	F,D	Unknown	No Conflict	NI	
Fisher ***Martes pennanti***	B, R, F, D	Unknown	No Conflict	NI	
Pacific Fringe-tailed Bat ***M. thysanodes vespertinu***	R,F	Unknown	No Conflict	NLCT, BI	
OR Slender Salamander ***Batrachoseps wrighti***	B,R,F,D	Unknown	No Conflict	NLCT, BI	
Cascade Torrent Salamander ***Rhyacotriton cascadae***	B, R, F, D	Unknown	No Conflict	NI	
Foothill Yellow-legged Frog ***Rana boylii***	No			NI	
Oregon Spotted Frog ***Rana pretiosa***	No			NI	
Northwestern Pond Turtle ***C. marmorata marmorata***	No			NI	
Mardon Skipper ***Polites mardon***	No			NI	
Crater Lake Tightcoil ***Pristiloma arcticum crateris***	B,R,F,D	Unknown	No Conflict	NI	

* B = breeding (nesting/denning) habitat, R = roosting/cover habitat, F = foraging habitat, D = dispersal habitat

[1] Date of Biological Assessment (BA) Consultation initiated with USFWS
[2] Date Biological Opinion (BO) or Concurrence issued from USFWS
NA = not applicable
NE = **N**o **E**ffect
BE = **B**eneficial **E**ffect
NLAA[a] = May Affect, **N**ot **L**ikely to **A**dversely **A**ffect
LAA[b] = **May** Affect, **L**ikely to **A**dversely **A**ffect
NI = **N**o **I**mpact.
NLCT = May impact individuals or their habitat, but the action will **N**ot **L**ikely **C**ontribute to a **T**rend towards Federal Listing or loss of viability to the population or species.
MCT[c] = May impact individuals or their habitat, with a consequence that the action **M**ay **C**ontribute to a **T**rend towards Federal Listing or a loss of viability to the population or species.
BI = **B**eneficial **I**mpact

a A **NLAA** determination requires *informal consultation* with the U.S. Fish and Wildlife Service.
b For *listed* species, a **LAA** determination requires *formal consultation* with the U.S. Fish and Wildlife Service. For *proposed* species, a LAA determination requires *conferencing* with the U.S. Fish and Wildlife Service (WO Amendment 2600-91-3, Forest Service Manual 2671.45, March 31, 1991).
c A **MCT** determination may require that an Environmental Impact Statement be written.

AFFECTED WILDLIFE – Discussion/Determinations/Recommendations

A discussion of the affects of the proposed project on TES species follows. **If it was determined that suitable habitat for a species does not occur in the proposed project area** (Table 2), **it is concluded that the proposed action would have no potential to effect or impact those listed TES species**, and the species will not be discussed further in this document. **A No Action proposal is expected to have no effect on federally listed threatened, endangered, or proposed species, and is also expected to have no impact on sensitive species identified by the Regional Forester.** References used to support discussion, determinations, and recommendations are listed at the end of this document (Appendix 1).

1) Northern Spotted Owl (*Strix occidentalis caurina*)

Status: Federal: Threatened
State: Threatened
FS R-6: Sensitive
Willamette National Forest: Identified as Management Indicator Species (MIS)

Determination: May affect, not likely to adversely affect northern spotted owls and designated critical habitat. A full discussion of effects can be found in the Biological Assessment dated February 29, 2008 that was submitted to the U.S. Fish and Wildlife Service.

Status Background: It has been reported that in some regards the northern spotted owl is the most studied raptor in the world (Blakesley 2004), yet prior to the early 1970s little was known about this species in the Pacific Northwest. Knowledge and interest quickly accumulated throughout the 1970s and in 1977 management guidelines for spotted owls on public land in Oregon were established. Driven by concerns over habitat loss, the USFWS conducted their first status review of the species in 1982. In 1987 a petition was submitted to list the spotted owl as endangered under the Federal ESA. The USFWS considered listing the species unwarranted at the time, however that decision was later reversed and the owl was officially listed as threatened under the Federal ESA in 1990.

Since that time a DRAFT Recovery Plan was released (USDI 1992), and the Northwest Forest Plan was implemented (1994) and subsequently amended (USDA et al. 2001, 2004) in efforts to most appropriately manage Federal land within the range of the northern spotted owl with the welfare of this and other late-successional species in mind.

Habitat and Ecology: The northern spotted owl is a species strongly associated with old-growth forests containing a component of large diameter Douglas-fir. These forest stands commonly provide a variety of structural features such as large diameter trees having central cavities, dense canopies with a high level of vertical and horizontal diversity, and an abundance of snags and down logs (Thomas et al. 1990). Stands with all these characteristics provide the best suitable (nesting, roosting, foraging) habitat for spotted owls. However, all of the above characteristics may not need to be present for spotted owls to make use of an area as nesting, roosting or foraging habitat. The owl's affinity to old-growth forest types may result from adaptation and niche partitioning of this species to foraging on prey commonly present in such stands under lack of predation pressure and interspecies competition typical of more open areas (USDI 1992). Nevertheless, spotted owls have been known to forage short distances into harvested openings from a forested edge if a prey is available (Carey 2004).

Dispersal-only habitat for the northern spotted owl generally consists of mid seral stage stands between 40 and 80 years of age with canopy closures of 40 percent or greater and trees with a mean diameter of 11 inches or greater. Older stands lacking structural development that supports nesting may be considered dispersal habitat, however in some cases may provide roosting or foraging opportunities for the species. Spotted owls generally use dispersal habitat to move between blocks of suitable habitat or, for juveniles, to disperse from natal territories (Forsman et al. 2002, USDI 2004a).

The reader is referred to the following documents for a more comprehensive and account of the biology, ecology, and status of the northern spotted owl: A Conservation Strategy for the Northern Spotted Owl (Thomas et al. 1990); Recovery Plan for the Northern Spotted Owl - (USDI 1992); Northern Spotted Owl Five-year Review Summary and Evaluation (USDI 2004a); Status and trends in demography of northern spotted owls, 1985 – 2003 (Anthony et al. 2004); Scientific evaluation of the status of the northern spotted owl - SEI Report (Courtney et al. 2004).

Pre-field Review: This project is consistent with current standards established for projects that could affect the northern spotted owl. These standards were established for the Willamette Province and are listed in both the Programmatic Biological Assessment (BA) (USDA Forest Service 2008) and the subsequent USFWS Letter of Concurrence (LOC) (USDI 2008) for projects which may disturb the northern spotted owl or designated critical habitat.

Effects not specifically discussed in this document pertaining to new threats to the spotted owl (USDI 2004a, Anthony et al. 2004, Courtney et al. 2004) such as wildfire, west Nile virus, and barred owls are of a cumulative nature considered beyond the scope of this individual project.

Field Reconnaissance: Past surveys for spotted owls have documented ten spotted owl activity centers within 1.2 miles of project units. All ten spotted owl activity centers have established, 100-acre late successional reserves. No project units are within Late Successional Reserves. No units are proposed within a designated Critical Habitat Unit. Post treatment stand conditions with the proposed Alternative B will maintain an average 40% canopy cover and functionality of dispersal habitat.

No suitable breeding habitat is proposed for removal with the Ball Park Thin project. Noise-generating activities from harvest and prescribed burning with this project that may disturb spotted owls during the critical breeding season (March 1 – July 15) will be restricted from occurring.

Risk Assessment:
Project Effects: There are no recognized direct or indirect effects to suitable spotted owl habitat from activities associated with this project as proposed. Effects to individual spotted owls that may be present in adjacent suitable habitat are limited to some potential for disturbance from noise-generating activities during the non-critical portion of the breeding season.

Cumulative Effects: The changing trend in timber management occurring within the past decade, and projected for the future, should positively influence occupancy of suitable habitat for northern spotted owls as previously harvested stands within the Deer Creek and other adjacent watersheds redevelops, and as more emphasis is placed on recruitment of key structural components missing from harvested stands as well as retention of key structural components present in unharvested stands and restoration/maintenance of special habitats as key components of biodiversity at a landscape level.

Current Standards and Guidelines governing management of the surrounding landscape provide direction that should provide for long-term maintenance of amount and distribution of suitable spotted owl habitat. Because of the location of harvest and non-harvest allocations, it is unlikely that cumulative effects would influence the ability of local populations to persist, or become established, by eliminating demographic linkages beyond the species' dispersal capabilities.

Analysis of Significance: The Ball Park Thin project does not propose any activity that would remove suitable spotted owl habitat. However this project does propose stand treatment activities that would remove dispersal habitat within ten known spotted owl home ranges, and four of these are located within 0.5 miles. Of these, three sites have less than optimal suitable habitat. The stands proposed for treatment in these home ranges are even-aged, previously managed stands which currently function as dispersal habitat. Since habitat functionality will be maintained, this treatment ***may affect, but is not likely to adversely affect*** spotted owls due to habitat modification. It is determined that implementing the Action Alternative **may affect, but is not likely to adversely affect northern spotted owls or its designated critical habitat.**

Communication with U.S. Fish and Wildlife Service: Informal consultation for effects from proposed activities was submitted in a BA dated February 29, 2008. A Letter of Concurrence dated April 4, 2008 was received from the U.S. Fish and Wildlife Service (FWS *reference*: 13420-2007-I-0038).

Recommendations: Impose seasonal restriction on project activities in close proximity to known locations of spotted owls that could generate above-ambient noise levels during the spotted owl critical nesting period between March 1 and July 15.

2) Harlequin Duck (*Histrionicus histrionicus*)
Status Federal: Sensitive)
State: Sensitive

Determination: No impact to Harlequin Ducks or their habitat.

Status Background: The majority of documented harlequin duck use on the McKenzie River Ranger District occurs in the McKenzie River floodplain and its Class 1 tributaries. Surveys have been conducted on the McKenzie River yearly since 1992. Nests are extremely difficult to find without the use of radio telemetry. No nests or sightings have been documented on Deer Creek within the project area, however, habitat is suitable.

<u>Habitat:</u> During nesting (April-June) adults require fast-flowing water with midstream loafing sites nearby, dense shrub or timber/shrub mosaic vegetation on the bank, and an absence of human disturbance. Nests are typically found on the ground under the shelter of vegetation, rocks, or large woody material in close proximity to water. Broods prefer low gradient streams with adequate macro invertebrate abundance.

<u>Pre-field review</u>: Habitat quality for harlequin ducks in this area is expected to be moderate to high. ere are no threats to water quality in Deer Creek or its tributaries. Human disturbance in riparian habitat may occur and could disturb harlequin ducks that may use the area.

<u>Field reconnaissance</u>: Breeding and foraging habitat are known to occur along portions of the Main stem and South Fork of the McKenzie River, as well as on Lookout Creek.

<u>Risk Assessment</u>:
Project Effects: No suitable harlequin duck nesting habitat will be modified by this project. Due to the location and timing of proposed activities there should be no direct or indirect effects to harlequin ducks from disturbance that would influence breeding, foraging, or dispersal behavior.

<u>Cumulative Effects</u>:
Current Standards and Guidelines governing management of the landscape in watersheds surrounding the project area provide direction that should provide for long-term maintenance of amount and distribution of suitable habitat for Harlequin ducks. Riparian buffers and seasonal restrictions as needed will ensure protection for potential nest sites.

<u>Analysis of Significance:</u> The Ball Park Thin Project does not propose any activity that would modify suitable harlequin duck nesting habitat, and activities that could result in disturbance to harlequin ducks by influencing either breeding or foraging behavior are not expected to occur due to spatial and temporal factors. It is therefore determined this projct should have **no impact on harlequin ducks and their habitat.**

<u>Communication with U.S. Fish and Wildlife Service:</u> Not required.

<u>Recommendations:</u> A seasonal operating restriction is recommended for logging and burning within the lower 150 feet of unit 130 due to proximity to potential harlequin duck habitat that cannot be effectively surveyed.

3) American Peregrine Falcon (*Falco peregrinus anatum*)
Status Federal: None (Delisted 8/99)
State: Endangered
FS R-6: Sensitive, Identified as Management Indicator Species (MIS)

Determination: No impact to peregrine falcons or their habitat.

<u>Status Background:</u> Following a global population depression and the near total disappearance of the American peregrine falcon (*Falco peregrinus anatum*) from habitat throughout much of the United

States, largely as a result of environmental contamination and widespread use of DDT (Cade et al. 1988, USFWS 2003), the peregrine was listed as endangered in 1970 under the Endangered Species Conservation Act of 1969 (precursor to the ESA) and subsequently listed under the ESA in 1973. After meeting a variety of objectives listed in regional recovery plans, the peregrine was removed from the ESA list of endangered species on August 25, 1999. Since that time monitoring results suggest that population growth has continued throughout the lower 48 states (USFWS 2003).

Habitat: In the Pacific states, preferred peregrine falcon nesting sites are sheer cliffs 150 ft. or more in height with horizontal ledges (USFWS 1982). On the Willamette National Forest, cliffs with potential for nesting by peregrine falcons include those that are at least 75 feet high, have horizontal ledges, ledges with overhangs or cave-like openings, sheer faces inaccessible to ground predators and within ½ mile of riparian habitat (USDA 2000). Peregrine falcons feed almost exclusively on birds, many of which may be associated with riparian zones, large bodies of water or an abundance of snag habitat. Peregrine falcons feed on small birds that are present in drier, open areas, particularly where hardwood shrubs and trees are abundant. Some avian prey species select for closed coniferous forest. Peregrine falcons can forage widely for prey and will hunt over closed coniferous forest canopies as well as in open areas and over hardwood patches - wherever prey is abundant (Cade et al. 1988).

Pre-field review: Some high quality suitable peregrine nesting habitat exists within the Ball Park Thin Project area near Bunchgrass Mountain. Other lower suitable habitat quality cliffs are in the lower part of the drainage. within or immediately adjacent to the project area. The Ball Park Thin project area is within 3 miles of a known peregrine nest site, and it includes part of the tertiary management zone for that site (OE-82).

Additional highly suitable peregrine falcon habitat is present at Wolf Rock just to the west of the Ball Park Thin Project area. Peregrine falcons have been seen here various times since the late 1990s and numerous protocol surveys have been conducted, sometimes using more than one observer. No nests have ever been detected.

As a result of annual site monitoring, adult and young peregrines from the nearby nest site are known to forage for avian prey in and near the project area. Young peregrines may linger in the project area while dispersing from a nest site. The Ball Park Thin project would not modify or disturb any suitable peregrine nesting habitat. All proposed activities would occur at a sufficient distance from nesting habitat such that any disturbance potential would be avoided (Pagel 1992, USDA 2002).

Field reconnaissance: The peregrine nest site nearest to the project area has been monitored annually throughout the breeding season since its discovery in 2000. This site has been occupied annually since that time, and has successfully fledged young during half of these years. One protocol survey of potential peregrine nesting habitat at Bunchgrass Mountain within the Ball Park Thin project area was conducted in 2007 and no peregrine falcons were detected.

Formal breeding bird surveys have not been conducted within the planning area. The complete range of avian prey species for peregrine falcons that may currently occur in habitat throughout the project area is unknown, but is expected to be typical for habitat associated with this area (O’Neil et al. 2001).

Risk Assessment:
Project Effects: No suitable peregrine nesting habitat would be modified with this project. Due to the location and timing of proposed activities there should be no direct or indirect effects to peregrines from disturbance that would influence breeding, foraging, or dispersal behavior.

Removal of trees and prescribed burning may modify or disturb habitat suitable for use by some potential peregrine prey species. Tree cutting and prescribed burning would typically occur outside the breeding seasons for most prey species that could be using affected habitat. Modification or disturbance activities are considered relatively insignificant considering the overall amount of foraging habitat within management zones established for known peregrine nest sites (approximately 26,000 acres).

Cumulative Effects: This project reflects an overall focus on previously clearcut areas that are now being thinned to improve forest stand structural diversity. Current management standards are placing more emphasis on recruitment of key structural components missing from harvested stands which is expected to benefit peregrine falcon prey habitat. Fire that will occur both after thinning and as proposed in mature unmanaged stands is expected to increase both large snag and large down wood habitat that would benefit peregrine falcon prey habitat, as well as overall landscape level biodiversity.

Analysis of Significance: The Ball Park Thin Project does not propose any activity that would modify suitable peregrine falcon nesting habitat. It is therefore determined this projct should have **no impact on peregrine falcons and their habitat.**

Communication with U.S. Fish and Wildlife Service: Not required.
Recommendations: None warranted.

4) Baird's Shrew (*Sorex bairdii permiliensis)*

Status Federal: None
State: None
FS R-6: Sensitive

Determination: The proposed Ball Park Thin Project is not expected to impact Baird's shrew or its' habitat.

Habitat: This species of shrew has been found in traps set in an open Douglas-fir forested area with numerous rotting logs (Verts and Carraway 1998). More specific habitat requirements are lacking. They are active diurnally.

Pre-field review: Baird's Shrew is endemic to Oregon (Verts and Carraway 1998). This species occurs in the Coast Range from Portland south to Lane County. It also occurs along the west slope of the Cascade Range from the Columbia River south to central Lane County.

Field reconnaissance: No locations of Baird's Shrew are known from the Ball Park Thin Project area. Habitat for Baird's Shrew occurs in abundance.

Risk Assessment: Project Effects: Implementation of the Ball Park Thin project does not pose a risk to long-term viability of Baird's Shrew populations. If this species of shrew depends on dead wood, the management recommendations to leave greater than 240 lineal feet of large down wood per acre would ensure habitat requirements of this shrew are met.
Cumulative effects: None

Analysis of Significance: The Ball Park Thin project would improve down wood habitat conditions and may thus provide a minor benefit to the Baird's Shrew, if it occurs in the area.

Recommendations: Leave large down woody material as prescribed. If it is not present after logging is completed, trees should be falled until the prescription has been met.

Communications with U.S. Fish and Wildlife Service: Not required

5) Pacific Shrew (*Sorex pacificus cascadensis*)

Status Federal: None
State: None
FS R-6: Sensitive

Determination: The proposed Ball Park Thin Project is not expected to impact the Pacific Shrew or its' habitat.

Habitat: This species of shrew is often found in moist forested areas with fallen decaying logs and brushy vegetation (Verts and Carraway 1998)(Ingles 1965).

Pre-field review: This species of shrew is endemic to Oregon (Verts and Carraway 1998). It is distributed as two distinct populations: one in the Coast Range from Cascade Head, Tillamook Co., south to Coos Bay, and the other in the Cascade Range from northeastern Linn Co. to southern Jackson Co. Pacific shrews appear to be adapted for capturing, killing, and eviscerating hard-bodied insects (Verts and Carraway 1998). Internal organs of insects composed 28.6% by volume of the diet (Verts and Carraway 1998). Other prey items are unidentified insect larvae, slugs and snails, beetle larvae, and unidentified invertebrates. Numerous dead specimens of the insect *Omus audouini* (Coleoptera) were considered to have been cached by Pacific shrews.

Field reconnaissance: No locations of the Pacific Shrew are known from the Trapper Project area. Habitat for this shrew occurs in abundance.

Risk Assessment: Project Effects: Implementation of the Ball Park Thin project does not pose a risk to long-term viability of Pacific Shrew populations. If this species of shrew depends on dead wood, the management recommendations to leave greater than 240 lineal feet of large down wood per acre would ensure habitat requirements of this shrew are met.
Cumulative effects: None

Analysis of Significance: The Ball Park Thin project would improve down wood habitat conditions and may thus provide a minor benefit to the Pacific Shrew, if it occurs in the area.

Recommendations: Leave large down woody material as prescribed. If it is not present after logging is completed, trees should be falled until the prescription has been met.

Communications with U.S. Fish and Wildlife Service: Not required

6) Wolverine (*Gulo gulo*)

Status: Federal: None
State: Threatened

FS R-6: Sensitive

Determination: No impact to wolverine or its' habitat.

Status Background: The Ball Park Thin Project is recognized historic and current range for the wolverine (*Gulo gulo (luscus)*) which was petitioned for federal listing under the Endangered Species Act (ESA) in July 2000. On October 21, 2003 the U.S. Fish and Wildlife Service (FWS) issued a 90-day Finding for a Petition To List as Endangered or Threatened Wolverine in the Contiguous United States. In that finding it was determined that the petition did "not provide substantial information indicating that listing may be warranted". An earlier (1994) petition to list the wolverine was found to be "not warranted" by FWS.

Taxonomy can lead to confusion when assessing the status of this species and its historic or current potential occurrence in these watersheds. Sighting records frequently include the name "California Wolverine". However, the validity of such a nominal subspecies has been questioned or is not recognized throughout much of the published literature devoted to addressing this species (Banci 1994, Johnson and O'Neil 2001, NatureServe 2005, Verts and Carraway 1998). Therefore further references to wolverine in this document are intended to be interpreted as *Gulo gulo*.

Records show that the wolverine has been listed on the Regional Forester's Sensitive Animal List for at least the past fifteen years. The wolverine was one of the original species classified as threatened by the Oregon Fish and Wildlife Commission in 1975. The status of the species was reviewed in 1988 (Marshall 1988) and as a result of that review wolverine are currently listed as threatened under the Oregon Endangered Species Act.

Habitat and Ecology: A large block of literature has been published in the past decade pertaining to the biology, ecology, and management of wolverine (Banci 1994, Claar et al. 1999, Copeland 1996, Heinemeyer et al. 2001, O'Neil et al. 2001, Verts and Carraway 1998). This is not meant to suggest that all aspects of the ecological relationships between this species and its environment are well understood. On the contrary, some relationships such as responses to human disturbance are just beginning to be understood based on a scientific rather than anecdotal context (Joslin and Youmans 1999; Rowland et al. 2003). The following is a gross summary of wolverine ecology considered pertinent to the presence of this species in vicinity of the project area. The reader is strongly encouraged to refer to the literature for a more thorough understanding of this species.

The wolverine has been referenced as the largest-bodied terrestrial mustlelid (Banci 1994) with a body weight three to four times greater than the fisher despite having a similar overall body length. Its' robust appearance allows adults to be described as resembling a small bear.

O'Neil et al. (2001) list the wolverine in Oregon as associated with 26 forest structural conditions, 11 habitat types, 17 habitat elements, and as serving 5 key ecological functions within the identified associations. Overall data do not support any statistical association between the species and a particular vegetative community – a fact reflected by O'Neil in attaching a low confidence to all associations listed for structural conditions and habitat types. Forested habitats used by wolverines appear to vary geographically and seasonally in areas where they have been studied (Claar et al. 1999). Habitat preferences have been linked to areas based on the availability of food and low human occurrence. The most specific habitat need of wolverines may be for female denning habitat secure from human disturbance (Copeland 1996) throughout the breeding season, which can range from November through April (Banci 1994).

The current definition and subsequent identification of suitable wolverine habitat has evolved largely from Copeland's (1996) study of a wolverine population in central Idaho. Because of a widely published concern regarding the sensitivity of wolverines to human disturbance at natal den sites (Banci 1994, Claar et al. 1999, Copeland 1996, Krebs and Lewis 1999, Lyon et al. 1994, Youmans 1999a), there seems to be scientific consensus that identification of female denning habitat is key to managing for this species where it is likely (or known) to occur. Following that logic the Willamette National Forest created a GIS layer in 1998 based on criteria provided by the Regional Office in an effort to identify potential denning habitat. Habitat generally described as areas having a northerly aspect for higher elevation cirque landscape features with a large boulder/talus component and a relatively open canopy was mapped across the Forest.

Wolverines are generally described as opportunistic omnivores in summer and primarily scavengers in winter with extremely large home ranges in proportion to their body size. Adult wolverine home range sizes average 148mi^2 for females and 610mi^2 for males (Copeland 1996). They are capable of foraging widely (30-40 km) on a daily basis, and do not significantly use young, dense stands of timber or clearcuts (Banci 1994). Virtually all studies that have investigated food habits for the species have shown wolverine to be closely associated with a dependency upon the availability of large mammal carrion to balance its energy budget during critical periods of its lifecycle.

<u>Pre-field Review:</u> Habitat conditions during the reference era in watersheds surrounding the project area favored the likelihood of occupancy by wolverine as it is located well within the historic range for this species, and would have been relatively free from human disturbance – especially during the breeding season. Then, as now, population densities would be expected to have been low given our current understanding of wolverine ecology.

The USDA Forest Service Fiscal Year 1958 Annual Wildlife Statistical Report for the Willamette National Forest lists the wolverine as having occasional abundance and a stationary population trend. Suitable denning habitat existed within a wolverine's daily movement range at numerous locations surrounding the project area, and if wolverine were indeed present during that time the species would likely have occupied habitat in the area. Then, as now, the function of habitat associated with this project would have been to support year-round foraging and dispersal activities.

Maj and Garton (1994) mapped observation records for wolverine from 1961 through 1982, which show a cluster of sightings located within easy dispersal range of the Ball Park Project area. They also mapped records from 1983 through 1993, which show a sharp decline for sightings in the same location. Occurrence and breeding status data presented by O'Neil et al. (2001) show that wolverine both occurs and breeds in Oregon. A review of reported wolverine sightings on the Willamette National Forest conducted in May 2001 revealed 33 records of sightings between 1965 and 1999 on or adjacent to the Forest boundary, including sightings in watersheds where this project is located. There is no current verification that this species occupies habitat in the area, and late-winter aerial surveys around denning habitat conducted from 1998 through 2001 did not detect wolverines within any adjacent watershed.

An issue regarding the reliability of current and historical presence of species such as the wolverine based on anecdotal records considered to be unverifiable has been raised (Aubry and Lewis 2003; McKelvey et al. 2002; McKelvey et al. 2000). The issue is associated with using such observational data combined with verifiable records to arrive at conservation actions and management recommendations. While some investigators believe combining such occurrence records results in scientific and legal vulnerability, others apparently do not (Rowland et al. 2003). Based on historic and current information, this analysis assumes the potential for wolverine to use habitat associated with this project for one or more of its' biological requirements.

Field Reconnaissance: The Ball Park Thin project is located adjacent to prominent landscape features providing a westerly extension of upper elevation habitat connected to a vast remote area of the Western Oregon Cascades. Rocky outcrops associated with some potential habitat are visible from various locations within the project area. Most potential denning habitat is considered to be relatively free of human disturbance from winter recreation activities throughout much of the breeding season. However, inter activities such as cross country skiing and snowmobiling can be expected to occur periodically in surrounding areas. Although currently small in scale, these types of winter recreation do have potential to disturb wolverine – particularly a female that may be using nearby denning habitat. This project or surrounding areas are open to a variety of human recreation activities throughout the remainder of the year. Activities such as hunting, hiking, horse back riding, and pleasure driving are considered to have less potential to disturb any wolverine that may be simply foraging or dispersing through nearby habitat.

The project area is recognized for its importance in providing habitat supporting local big game populations. Deer and elk are frequently observed during field visits to the project area. Improved forage habitat for big game would be created under this project's Action Alternative. Refer to this project's EA and wildlife report for a further discussion of potential effects to big game habitat.

Habitat directly associated with the Ball Park Thin Project is considered to be suitable as foraging and dispersal habitat for wolverine.

Risk Assessment:
Project Effects: This project proposes no activities that would result in modification or disturbance of potential natal denning habitat. Project activities that are proposed should not compromise foraging or dispersal opportunities for any individual to any estimable extent. For these reasons there are no recognized direct or indirect effects to this species associated with the project proposal.

Cumulative Effects: If security of natal denning habitat from human disturbance is critical for the persistence of wolverine in an area, the ability of this species to occupy otherwise suitable habitat in this area has likely been compromised by activities not associated with this project. Road building has allowed a variety of motorized and non-motorized winter recreation to extend into many areas surrounding the project area, that were not historically readily accessible. Cumulative effects associated with human disturbance in the form of winter recreation have negatively influenced suitability of areas to support denning activity. Past, present, and ongoing winter activities in areas such as the Deer Creek area are examples of areas where suitability may have been compromised.

If access to areas where wolverine may depend on larger mammals as a food source during critical times of the year is another factor influencing the persistence of this species in an area, wolverine have likely benefited from past harvest activity that has resulted in a wider distribution of forage habitat for big game. During the past decade however, harvest practices have changed and this positive contribution is waning rapidly as forage units regenerate into hiding cover.

The cumulative effect of this project on natural forage habitat as it pertains directly to big game and indirectly to wolverine will be positive in the short-term until canopies close back in, but not measurable on a landscape scale.

Analysis of Significance: This project does not propose any activity that would modify or otherwise disturb potential wolverine denning habitat. Considering the wide-ranging nature of daily movements associated with wolverine foraging and/or dispersal behavior along with the low likelihood of occurrence and timing of proposed activities, this project should not result in disturbance to the species. It is therefore determined this project should have **no impact to wolverines or their habitat.**

Communication with U.S. Fish and Wildlife Service: Not required.

Recommendations: None warranted.

7) Fisher (*Martes pennanti*)

Status: Federal: None
State: None
FS R-6: Sensitive

Determination: No impact to individuals or habitat for Pacific Fisher.

Habitat: This species inhabits widespread, continuous-canopy forests at relatively low elevations, and is most abundant in mountainous regions. It is less abundant in foothill regions. Fishers occupy a wide variety of densely forested habitats at low to mid-elevations (100-1800m). Typical habitats include subalpine Pacific fir (26%), western hemlock (54%), and Sitka spruce (20%). Aubry and Lewis (2003) suggest that habitat for Fishers can be enhanced by minimizing forest fragmentation, both in remaining old growth and second growth; maintaining a high degree of forest floor structural diversity in intensively managed plantations; preserving large snags and live trees with dead tops; maintaining continuous canopies in riparian areas; and protecting swamps and other forest wetlands.

Pre-field review: Pacific Fishers inhabit the boreal forest region in the southern half of Canada with extensions into the United States in the Rocky Mountains, Cascade, Coast, and Sierra Nevada Ranges. Of the three specimens on deposit in systematic collections, two are from Lane County. One sighting of medium confidence has occurred on the McKenzie River Ranger District in the French Pete drainage. No Pacific Fishers have ever been documented in the Ball Park Thin Project area.

Field reconnaissance: Habitat for Pacific Fishers exists in the Ball Park Thin Project area to varying degrees. The highest quality habitat with the least amount of human disturbance is found at the higher elevations near Bunchgrass Mountain, as well as the Cadenza Creek 9D Special Wildlife Habitat Area.

Risk Assessment: Project Effects: Implementation of the Ball Park Thin project does not pose a risk to long-term viability of Pacific Fisher populations. The management recommendation to leave greater than 240 lineal feet of large down wood per acre would ensure habitat requirements of this species are met.
Cumulative effects: None

Analysis of Significance: The Ball Park Thin project would improve down wood habitat conditions and may thus provide a minor benefit to Pacific Fishers, if they occur in the area.

Recommendations: Retain down log habitat as described in the prescription. If it is not present after logging is completed, trees should be falled until the prescription has been met. Implement road closures as planned, as soon as possible after logging is completed.

Communications with U.S. Fish and Wildlife Service: Not required

8) Pacific Fringe-tailed Bat (*Myotis thysanodes vespertinu*)

Status: Federal: None
State: None
FS R-6: Sensitive

Determination: May impact individuals and habitat for Pacific Fringe-tailed bats. Also may benefit Pacific Fringe-tailed habitat.

Status Background: The Pacific fringe-tailed bat was added to the Regional Forester's sensitive animal list in November 2000 based on the Natural Heritage Ranking for the species. This species is one of the three named sub-species of fringed myotis (*Myotis thysanodes*), which is among bat species whose specific habitat needs are addressed under a Northwest Forest Plan Standard and Guideline (2001 ROD pp 37-38).

Habitat: This bat is considered a riparian associate species that has been associated with mixed-conifer forests having relatively dry moisture regimes in the Coast Range and southern Cascade Range of Oregon (NatureServe 2005, O'Neil et al. 2001). Other scattered locations occur in the Washington Cascades and into California and the desert Southwest. They may occur from near sea level to above 4000' in Oregon and use a wide range of habitats – from forested to non-forested (Hayes 2003, Verts and Carraway 1998). Foraging behavior specific to this species is poorly documented, however they have been described as aerial foragers and hovering gleaners (O'Neil et al. 2001). Maternity sites, hibernacula, and most documented individual roost sites for fringed myotis occur in rock crevices, caves, or human-made structures. However Weller and Zabel (2001) recently published data that show a significant amount of individual roosting occurring in trees/snags when this species occurs in or near forested habitat. Structures associated with live trees or snags have since been recognized as the primary roost structures for this species when it occurs in/near forested habitat and features associated with caves, mines, bridges or buildings may serve as primary roost structures in non-forested habitat (Hayes 2003). Knowledge of roosting behavior is almost exclusively based on data obtained during the breeding season for this species which likely extends from May through August (O'Neil et al. 2001).

Pre-field Review: Despite an overall lack of survey data and poorly documented habitat requirements and life-history accounts for this species, its presence has been documented on the McKenzie River Ranger District (Ormsbee pers com., Verts and Carraway 1998). Single individuals of the Pacific Fringe-tailed Bat may use available forage and roost habitat throughout the summer and early fall in or adjacent to areas where the proposed Ball Park Thin project would occur.

Field Reconnaissance: Formal bat surveys within the project area have not been conducted. There are no caves, mines, or abandoned wooden bridges and buildings that would serve as suitable hibernacula, nor are there known roost sites associated with other structures within 250 feet that would be affected by proposed activities. Some snags and decadent trees occurring adjacent to proposed treatment areas contain features suitable for roosting use by bats – including *Myotis thysanodes*.

The current composition of habitat throughout the project area consisting of a mixture of older and young forested habitat, as well as open non-forested (meadows and rock outcrops) habitat creates a moderate amount of edge habitat, increasing the potential that individuals may use the area for foraging and either day or night roosting. Bats are known to use edge habitat more frequently than forests or open habitat, which is likely a function of avoiding dense clutter associated with forest habitat and areas where prey abundance may be reduced in open habitat (Hayes 2003).

Risk Assessment: Project Effects: None or only very few potential roosting trees/snags that may be used by bats would be lost within project harvest units, because they currently contain little to no snag habitat. Some individual larger snags may be burned/lost within the proposed fire underburn units. Other larger trees within proposed fire underburn units may be modified such that they eventually would develop into roosting habitat. Loss of hazard trees larger than 12" diameter along the haul route may also impact individual roost trees/snags used by this species. Project activities should not compromise roosting or foraging opportunities for any individuals to any estimable extent, and therefore should not result in any direct effect to Pacific fringe-tailed bats.

Cumulative Effects: Current Standards and Guidelines governing management of the landscape in watersheds surrounding the project area provide direction that should provide for long-term maintenance of the amount and distribution of suitable habitat for *Myotis thysanodes*. Because of the range and location of land allocations in this area, it is unlikely that cumulative effects would influence the ability of local populations to persist, or become established, by eliminating demographic linkages beyond the species' dispersal capabilities. Cumulative effects of this project on roosting or forage habitat as it pertains directly to this species would be immeasurable on a landscape scale.

Analysis of Significance: There is no known threat to hibernacula or maternity roosts from activities proposed under the Ball Park Thin Project. Suitable roosting habitat adjacent to project areas should not be affected by this proposal. Activities that could result in disturbance to this species by influencing either roosting or foraging behavior are expected to be minor when other habitat within the project area is considered. It is therefore determined this project **may impact Pacific fringe-tailed bats and their habitat. Snag creation due to fire underburning or within harvest units may benefit habitat for this species.**

Communication with U.S. Fish and Wildlife Service: Not required.

Recommendations: Protect decadent trees and snags >12"dbh (roosting habitat) adjacent to the project area to the greatest extent feasible while conducting project activities.

9) Oregon Slender Salamander (*Batrachoseps wrighti*))

Status: Federal: None
State: None

FS R-6: Sensitive

Determination: May impact Oregon Slender Salamander and its' habitat.

Status Background: The Oregon Slender Salamander was added to the Regional Forester's sensitive animal list in November 2000 based on the Natural Heritage Ranking for the species.

Habitat: This salamander is found under loose bark and moss in mature and second growth Douglas fir forests. It also burrows under rocks or logs of moist hardwood forests within coniferous forest landscapes. During the fall and spring when conditions are moist, the Oregon slender salamander is found near the surface, but it retreats underground in late spring and summer.

Pre-field Review: This species is found on the west slope of the Cascades from the Columbia River to Southern Lane County. No individuals are known to occur within the Ball Park Thin Project area.

Field Reconnaissance: Formal surveys within the project area have not been conducted. Presence of this species is suspected to occur within mature/old-growth areas of the Ball Park Thin project area where large decayed down wood exists. The older plantations proposed for thinning are judged to be poor quality habitat for Oregon Slender Salamander.

Risk Assessment: Project Effects: Logging associated with the Ball Park Thin project would not remove any existing large down wood. Proposed underburning within some units after logging may decrease habitat suitability. The natural fuels underburn in mature forest stands may impact Oregon Slender Salamander habitat. The prescribed fire is proposed to occur within spring or late fall before rains, and thus, existing large down wood is expected to be only minimally impacted. The patchy nature and higher moisture retention surrounding large logs may allow salamanders that may use this area to survive.

Cumulative Effects: It is expected that habitat connectivity for this species will continue to allow viable local populations to exist. Cumulative effects of this project as it pertains directly to this species would be immeasurable on a landscape scale.

Analysis of Significance: There is no known threat to any known Oregon Slender Salamander individuals from activities proposed under the Ball Park Thin Project. Activities that could result in disturbance to individuals of this species are expected to be minor when other habitat within the project area is considered. It is therefore determined this project **may impact Oregon Slender Salamanders and their habitat.**

Communication with U.S. Fish and Wildlife Service: Not required.

Recommendations: Retain down log habitat as described in the prescription. If it is not present after logging is completed, trees should be falled until the prescription has been met.

10) Cascade Torrent Salamander (*Rhyacotriton cascadae*)
Status: Federal: None
State: None
FS R-6: Sensitive

Determination: No impact to Cascade Torrent Salamander and its' habitat.

Status Background: The Cascade Torrent Salamander was added to the Regional Forester's sensitive animal list in November 2000 based on the Natural Heritage Ranking for the species.

Habitat: The Cascade Torrent Salamander can be found under rocks bathed in a constant flow of cold water, in cool rocky streams, lakes and seeps, usually within conifer or alder forests. It is dependent on nearly continuous access to cold water. During wet weather it can be found moving around in forests away from streams.

Pre-field Review: This salamander inhabits the Cascade mountains of southern Washington and northern Oregon with a disjunct population in the southern Oregon Cascades. No individuals are known to occur within the Ball Park Thin Project area.

Field Reconnaissance: Formal surveys within the project area have not been conducted. Presence of this species is suspected to occur within creeks of the Ball Park Thin project area, as well as within upslope areas during wet weather. Cascade Torrent Salamanders have been found in the adjacent Blue River Watershed, but have not been located in the Ball Park Project Area.

Risk Assessment: Project Effects: Logging associated with the Ball Park Thin project would not remove any existing large down wood. Cascade Torrent Salamanders would not be using areas outside creeks during proposed post-harvest or natural fuels underburning treatments, therefore this project would not impact this species

Cumulative Effects: No cumulative effects are anticipated because this project would not impact this species. It is expected that habitat connectivity for this species will continue to allow viable local populations to exist.

Analysis of Significance: There is no known threat to any known Cascade Torrent Salamander individuals from activities proposed under the Ball Park Thin Project. It is therefore determined this project **will not impact Cascade Torrent Salamanders or their habitat.**

Communication with U.S. Fish and Wildlife Service: Not required.

Recommendations: Retain down log habitat as described in the prescription. If it is not present after logging is completed, trees should be falled until the prescription has been met. Some of this material should be created over or directly adjacent to streams if possible.

11) Crater Lake Tightcoil (*Pristiloma arcticum crateris*)
Status: Federal: None
State: ODFW none / Natural Heritage S1
FS R-6: Sensitive / Survey and Manage Species

Determination: No impact to individuals or habitat for Crater Lake Tightcoil.

Status Background: The Crater Lake tightcoil had been listed as a Survey and Manage species since the 1994 Northwest Forest Plan ROD (USDA, USDI 1994). Under the 2001 ROD (USDA, USDI 2001) it was classified as a Category B species. The species was changed to a Category A species following the 2002 Annual Species Review where it remains considered rare, and for which pre-disturbance surveys are practical if habitat is present. It was added to the Regional Forester's sensitive animal list in July 2004.

The species is endemic to Oregon, and known to occur above 2000 feet elevation throughout the Oregon Cascades from the Mt Hood National Forest south to the Winema National Forest. As of August 2005 specimens had been confirmed at approximately 160 sites from very limited locations across this range (Duncan 2004, NatureServe 2005). In May 2005 a specimen that has since been confirmed to be *Pristiloma arcticum crateris* was collected on the Middle Fork Ranger District which is located south of the McKenzie River Ranger District.

Habitat and Ecology: *Pristiloma arcticum crateris* "may be found in perennially moist situations in mature conifer forests and meadows among rushes, mosses and other surface vegetation or under rocks and woody debris within 10 m. of open water in wetlands, springs, seeps and streams, generally in areas which remain under snow for long periods in the winter. Essential habitat components include uncompacted soil, litter, logs, and other woody debris in a perennially wet environment"(Duncan 2004).

This species is among many organisms functioning as primary and secondary consumers that contribute to soil building and dissemination of spores and microbes. Having very limited dispersal capabilities on their own, they may be assisted in dispersal by other vectors capable of transporting mud that may contain eggs or adults across distances into suitable habitat (Duncan et al. 2004). An example of such dispersal could be individuals in mud transported on the hoof of a deer or elk.

Loss or degradation of suitable wetland habitat has been identified as the major threat to this species.

Pre-field Review: Based on habitat described in an established survey protocol for this species (Duncan et al. 2003) it is considered that suitable habitat for Crater Lake Tightcoil exists within portions of the project area.

Field Reconnaissance: Based on the three evaluation criteria to determine the need to conduct a survey, surveys for Crater Lake Tightcoil are not considered to be required for this project. This consideration is made because each of the three criteria necessary to trigger a survey would not be met for the following reason: perennially wet habitat associated with creeks in portions of the project area will be protected by a 10 meter buffer against all disturbance activities including prescribed burning. For this reason the persistence of the species if present in the project area should not be compromised.

Risk Assessment:

Project Effects: Because measures will be taken to protect suitable habitat for this species against disturbance or modification from effects associated with proposed activities, there are no recognized direct or indirect effects to this species or its habitat from the project.

Cumulative Effects: Because measures will be taken to protect suitable habitat for this species against disturbance or modification from effects associated with proposed activities, there are no recognized cumulative effects to this species or its habitat from the project.

Analysis of Significance: Suitable habitat for the Crater Lake Tightcoil exists throughout the Ball Park Thin Project area, however measures will be taken to protect this habitat where it occurs against disturbance or modification from effects associated with proposed activities, therefore there should be **no impact to Crater Lake Tightcoil or its habitat** from this proposal.

Communication with U.S. Fish and Wildlife Service: Not required.

Recommendations: Ensure that measures identified to prevent habitat disturbance within 10 meters of perennially wet areas are implemented during project activities.

12) Mardon Skipper (*Polites mardon*)

Status: Federal: Candidate
State: ODFW- none/Heritage-S2
FS R-6: Sensitive

Determination: No impact to individuals or habitat for Mardon Skipper.

Status Background: The mardon skipper *(Polites mardon)* was added to the Regional Forester's sensitive animal list in September 2002 based on its status as a candidate species under the federal ESA. The mardon skipper is a butterfly in the family Hesperiidae (skippers) and the subfamily Hesperiinae (grass skippers). It was first described in the late 1800's from specimens taken in Thurston County, Washington (Potter et al. 1999). Subspecific distinctions within *Polites mardon* have recently been considered, resulting in a proposal to rename the Washington population *Polites mardon mardo*n, and the Oregon and California populations, *Polites mardon klamathensi*s (NatureServe 2005, Potter et al. 1999, Pyle 2002).

The mardon skipper is a small, tawny-orange butterfly currently found at only four, small, geographically disjunct areas in Washington, Oregon, and California (USDI 2004b). Grasslands of the Puget Sounds prairies in Washington State, where the species appears to be critically imperiled (NatureServe 2005), and Washington's southern Cascades are believed to support just a few hundred individuals. Much less has been documented for Oregon and California sites, however recent surveys have confirmed presence of mardon skippers at previously unknown locations. The species has been documented at three new sites in southern Oregon and one new site in southern Washington as a result of 2005 surveys (Seitz pers. com.).

Habitat and Ecology: In the southern Washington Cascades, the mardon skipper is found in open, fescue grasslands within Ponderosa pine savanna/woodland habitat at elevations ranging from 1900' to 5100'. South Cascade sites vary in size from small, ½ acre or less, meadows, to large grassland complexes. Site conditions range from dry, open ridgetops, to areas associated with wetlands or riparian habitats. Within these environments a variety of nectar source plants are important. The short, open stature of native fescue bunchgrass stands allows mardon skippers to access nectar and oviposition plants (Potter et al. 2002).

Fire historically played an important role in maintaining grassland plant communities. Mardon skippers were likely more widespread and abundant prior to large-scale loss of their open, fescue dominated,

grassland habitat (NatureServe 2005, USDI 2004b). Much of this type of habitat in National Forests upon which mardon skippers depend are threatened today by forest encroachment along with invasion by native and non-native plants.

Pre-field Review: Mardon skipper butterflies have not been documented at sites on the Willamette National Forest. The species is known to occur within habitat types similar to those associated with this project area (Potter et al. 1999). Based on knowledge of habitat associated with where the species was historically, and is currently known to occur, it can be surmised that suitable habitat for this species exists within the project area as well as surrounding meadows.

Field Reconnaissance: Suitable habitat for Mardon skipper exists within the Ball Park Thin project area in meadow habitat at Bunchgrass Mountain. Protocol surveys were conducted in 2007, however no Mardon skippers were found.

Risk Assessment:
Project Effects: This project does not propose activities in suitable Mardon skipper habitat; therefore there would be no impact.

Cumulative Effects: No cumulative effects are anticipated.

Analysis of Significance: No impacts are anticipated.

Communication with U.S. Fish and Wildlife Service: Not required.

Recommendations: Consider enlisting the expertise of a group such as local Chapter of the Xerces Society or North American Butterfly Association in repeating the surveys for mardon skipper in meadows within the project area.

This document was prepared by: /s/ Ruby Seitz Date: May 14, 2008

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Appendix 1: Literature referenced during this biological evaluation to arrive at determinations regarding potential effects/impacts from proposed projects and activities.

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SUMMARY OF DETERMINATIONS

For reasons addressed later in this document it is considered that activities proposed by the Ball Park Thin Project should not result in any adverse impacts to other rare and uncommon species, MIS, or other terrestrial wildlife species, and long-term effects should be positive as a result of increased overall biodiversity. Taking No Action would have no effect on these species while allowing growth of timber stands to continue.

Cumulative effects of this project in conjunction with other reasonably foreseeable projects in and adjacent to this area are not expected to influence the ability of other rare and uncommon species under the Northwest Forest Plan or as Management Indicator Species on the Willamette National Forest to persist or become established in habitat associated with the project area. Maintenance and/or recovery of late successional habitat serving as current or potential dispersal corridors surrounding the project area will ensure ongoing opportunities for occupancy and movement of terrestrial wildlife species that may occur in vicinity of this project and are dependent on such habitat.

SUMMARY OF SEASONAL RESTRICTIONS/RECOMMENDATIONS

Implementing the following recommendations would ensure effects or impacts on listed species from proposed activities would be no greater than those addressed in this document, and also would mitigate those impacts.

- Avoid habitat disturbance within 10 meters of perennially wet areas. This measure would ensure protection of the Crater Lake Tightcoil which may be present in the area.
- Protect decadent trees and snags >12"dbh adjacent to the project area to the greatest extent feasible during logging and hazard tree removal activities.
- Implement haul route hazard tree felling outside the critical seasonal restriction period for cavity nesters from April 1-June 30.
- Replacement for loss of hazard trees along the haul route is recommended by snag creation within Ball Park units if prescribed fire does not create recommended snag levels of 3/acre. Only those hazard trees along the haul route in a snag or dead top tree condition and greater than 14" dbh would be replaced. Preliminary estimates are that approximately 200 snags or danger trees would need to be felled. Additional snag creation up to the recommended level of 3 snags over 14" dbh/acre may occur to provide habitat for cavity nesters as well as Pacific Fringe-tailed Bats. Snags created as a result of prescribed underburning or natural mortality would be counted towards this recommended total.

- Consider additional activities that improve elk and deer forage habitat throughout summer and winter range within Latiwi, County, Upper Westside, Deer, and Belknap-Paradise Camp Emphasis Areas.

INTRODUCTION

This report serves to document potential impacts to terrestrial wildlife considered as other rare and uncommon species and Management Indicator Species (USDA 1990) plus other wildlife and associated habitat that may occur in or near a project area from activities associated with this project. A separate biological analysis/evaluation (BA/BE) addresses effects to threatened, endangered and sensitive (TES) fauna species.

PROJECT LOCATION AND DESCRIPTION

The McKenzie River Ranger District proposes to conduct activities on approximately 1,160 acres of the Ball Park Project Area. The proposed activity acres include timber harvest (1064), natural fuels underburns (49), and rock quarry/borrow pits use (5). The timber harvest would yield a gross estimate of 13.1 million board feet (MMBF) of wood products. This proposal, represented in Alternative B in this EA, would include canopy thinning on 663 acres, wildlife forage thinning on 129 acres, and riparian thinning on 122 acres. The timber sales from this proposal would likely be sold over a three year time span, beginning in fiscal year 2009.

The Ball Park Thin Project area is within the Deer Creek Subwatershed (6th field) of the Upper McKenzie Watershed (5th field) on the McKenzie River Ranger District. The project area consists of 14,508 acres located northwest of the McKenzie River, east of the HJ Andrews Experimental Forest, and south of the District boundary that is adjacent to the Sweet Home District. Major drainages include Deer Creek, Budworm Creek, Fritz Creek, and Carpenter Creek.

Legal description of the project: T.14S, R.6E, Sec. 20,28-30,32,33; T.15S, R.6E, Sec. 3-6, 8-11, 14-16,22,23; Willamette Meridian; Lane and Linn Counties, Oregon.

The Willamette National Forest Land and Resource Management Plan shows land allocations in the project area as: 4-Research Natural Area, 5a- Special Interest Area, 6d McKenzie River Wild and Scenic, 9c- Wildlife Marten Area, 9d- Special Wildlife Habitat Area, and 14a-General Forest. Northwest Forest Plan land allocations are Late Successional Reserve, Administratively Withdrawn, Congressionally Withdrawn, Adaptive Management Area, and Matrix.

Forested habitat surrounding the project areas is most closely associated with the Westside Lowland Conifer Hardwood Habitat type described by Chappell et al. (2001).

Alternatives:

The Ball Park Thin Project will be analyzed in an Environmental Assessment that reviews three alternatives – a No Action alternative and two Action Alternatives. The Action Alternatives involve activities described above.

Action Alternative: The influence of proposed activities on terrestrial wildlife is considered in the context of whether or not suitable habitat may be modified, or if a species may be present at or near sites where physical disturbance may occur, or be sensitive to and thereby influenced by anthropogenic activities occurring during implementation of this project. Habitat disturbance that may affect some terrestrial wildlife species could occur as a result of this project. That potential is addressed later in this report.

No Action Alternative: There is no rationale to suggest the No Action alternative would affect or impact any terrestrial wildlife species based on their ecological requirements and current habitat conditions in the project area. Considering the No Action Alternative would have no effect/impact on terrestrial wildlife species is based on the following assumption - taking no action would not affect current habitat or wildlife species that may be present as either evolves without human management. The dynamic nature of habitat suitability that may be subject to an unknown frequency and variety of stochastic events is considered beyond the scope of this evaluation. Only potential effects or impacts of the Action Alternative will be discussed further in this document.

WATERSHED ANALYSIS / ADDITIONAL DOCUMENT SUPPORT

Proposed activities respond positively to recommendations made that address vegetation and wildlife in the Upper McKenzie Watershed Analysis.

MANAGEMENT DIRECTION COMPLIANCE

The alternative selected for management of the Willamette National Forest includes a strategy that provides Management Requirements (MRs) exceeding the minimum MRs established for Management Indicator Species (MIS) as presented in the Willamette Forest Plan FEIS Appendices - Volume 1 (USDA 1990, pp B-79 through 82). Maintenance of the MRs ensures the viability of MIS and the species they represent. The MRs have been further enhanced for most MIS species (i.e. those species dependent on old growth and mature conifer habitat, and dead and defective tree habitat) under the Forest Plan S&Gs as amended by the Northwest Forest Plan.

Proposed action associated with this project complies with current forest Standards and Guidelines (S&Gs) pertaining to MIS and other rare and uncommon species management. This proposal also complies with other S&Gs established in the Willamette National Forest Land and Resource Management Plan (1990) as amended by the Northwest Forest Plan Records of Decision (ROD) (1994, 2001, and 2004).

ADJACENT ACTIVITIES / CUMULATIVE EFFECTS

Many years of fire suppression have contained fires to a size of mostly less than one acre, resulting in light to moderate burn intensities. Fire suppression has also contributed to conifer encroachment in meadow habitat in this area.

GENERAL WILDLIFE OVERVIEW

As previously stated, forested habitat surrounding the project areas is most closely associated with the Westside Lowland Conifer Hardwood Habitat type described by Chappell et al. (2001). In this habitat type, plant associations relevant to the project area vary considerably.

Westside Lowland Conifer Hardwood Habitat

Where it occurs in Washington and Oregon, 233 wildlife species have been identified as associated with the Westside Lowland Conifer Hardwood Habitat type described by Chappell et al. (2001). These species includes birds, mammals, amphibians, and reptiles.

Historic sighting records and current inventory data have documented the presence of many species within or near the project area. Effects from project activities will enhance overall biodiversity in the area

Project Effects to General Wildlife: Habitat altering activities proposed by this project should not affect other terrestrial wildlife species such that their ability to persist in the vicinity of the project area or throughout their ranges would be compromised. Project effects to wildlife species are essentially unquantifiable on an individual basis relative to the amount of habitat modified or disturbed against the amount available throughout the surrounding Westside Lowland Conifer Hardwood Habitat type and the affected plant associations within it. Project effects would result in a positive yet marginal overall contribution, with respect to restoring historic habitat and biodiversity, to cumulative effects that have occurred from past actions affecting the project area.

Recommendation Pertaining to General Wildlife: Ensure that measures identified in the proposal to avoid habitat disturbance within 10 meters of perennially wet areas are implemented. This measure would provide refugia in a limited amount of the project area for a variety of wildlife species that may be present and associated with habitat exposed to activities while being implemented.

SNAGS AND DOWN WOOD

The significance of the ecological role of dead wood, i.e. snags and large down wood in influencing ecosystem diversity and productivity is well addressed in the Willamette National Forest Land and Resource Management Plan (1990) and elsewhere (Brown et al. 2003). The importance of dead wood in coniferous forests of the Pacific Northwest is further emphasized by management Standards and Guidelines (S&G) under the Northwest Forest Plan ROD (1994, 2001), as well as elsewhere throughout published literature (Hagar et al. 1996, Hallett et al. 2001, Laudenslayer et al. 2002, Lewis 1998, Muir et al. 2002, Rose et al. 2001).

Under the Willamette Forest Plan as amended by the ROD, snag habitat shall be managed at levels capable of providing for at least 40% or greater potential populations of cavity-nesting species. Current science has not tested the validity of the potential population approach to species management, yet it remains the basis for S&Gs (Standard and Guidelines) involving snag management. Strong support for identifying more appropriate amounts of snag and down wood habitat has resulted in the development of new approaches in addressing these habitat components. One such approach is DecAID - the decayed wood advisor for managing snags, partially dead trees, and down wood for biodiversity in forests of Washington and Oregon (Mellen et al. 2006). DecAID has been created to help managers decide how much dead wood to provide for this part of a species' habitat needs, and is designed to apply to salvage and green tree projects. A benefit of using DecAID during the planning process is that it determines if current dead wood levels are consistent with reference conditions. In addition, DecAID can be applied to identify dead wood management goals for projects that affect dead wood habitat throughout dominant habitat types. Snag and dead wood habitat levels were compared to DecAID recommendations and Forest Plan S&Gs based on population potential for this project.

Interpretation and/or application of advice obtained from DecAID for how the Ball Park Project may affect dead wood habitat is based on referencing information available in DecAID for the Westside Lowland Conifer-Hardwood habitat type in the Western Oregon Cascades with a Small/Medium Tree Vegetation Condition (WLCH_OCA_S). All Ball Park Project stands are within this vegetation condition with the exception of the two proposed natural fire stands, which are in the Large Tree condition. The Ball Park Project planning area (14,508 acres) is considered an appropriate sized area of similar habitat to consider when evaluating current and future levels of dead wood (Mellen et al. 2006).

Snags (Current Condition)

Estimates for current snag size and distribution are displayed in Table 30, and were made based on estimates from a combination of stand exam data, knowledge of previous snag creation activity, and field reconnaissance.

Two approaches were used to assess snag levels for the Ball Park project area:

- Seral stage habitat evaluation
- DecAID tool

Seral stage habitat evaluation:

Natural forest stands in all seral stages will usually contain large downed wood on the forest floor and snags in the overstory. Many stands that are currently in the early and especially mid seral stages, logged prior to about 1987, do not contain snags and large down wood or only very limited amounts. After that time, snag habitat was sometimes retained and generally created at variable levels of 1-4 snags/acre.

The younger early seral stands (<25 years old) generally contain very little large down wood left after the logging operation. Some of the older early seral stands (26-40 years old) contain much higher levels of very large diameter down wood. This remnant down wood is relatively old, and mostly all in the higher decay classes 3-5 (Bartels et al. 1985). Snag and down log information from CVS plots was summarized by vegetation series for natural stands in mature and old-growth stages for the Mid-Willamette LSR Assessment. The following table is extracted from additional information, and shows only big snags (>20", >16') and big logs (>21", >21'). Levels of snags and logs are highly variable among stands.

Table 1. Big Snag and Log Ranges by Vegetation Series Present in the Ball Park Thin Project Area (USDA Willamette National Forest et. al 1998).

Series	Big snags per acre	Big logs per acre
Pacific silver fir	21	19
Mature	(14-29)	(5-13)
Old growth	32 (18-43)	12 (7-16)
Douglas-fir	0	9
Mature	(0-5)	na
Old growth	21 (11-21)	13 (9-22)
Western hemlock	11	11
Mature	(5-21)	(8-25)
Old growth	24 (13-42)	14 (9-21)

Numbers shown in parentheses show within stand variability.

Levels of large snags in the Ball Park Project Area were assessed using the following information:

- Annual USDA Forest Service Region 6 aerial flight information from 1988-2006 which shows recent large tree mortality in unmanaged stands, and categorizes this by mortality agent.
- District records of snag and down wood creation in managed stands after harvest.
- Field observations

Early and early-mid seral plantations (<40 years old): Within 3,953 acres of managed stands, 621 snags were created. An additional 100 snags are assumed to have been left after logging operations = 721 snags or 0.2 snags/acre.

Mid seral plantations (40-79 years old): Of the 1,704 acres in mid seral stages, one snag/acre is assumed. This may be a high estimate based on 2007 field observations in mid seral plantations being proposed for the Ball Park Project.

Old Growth stands: Within 6083 acres classified as old growth or older mature, an average estimate of large snags per acre was determined based on the proportion of each vegetation series and the mean level of large snag occurrence within each vegetation series. This resulted in a gross level assumption of 18 large snags per acre in old-growth stands within the Ball Park Project Area.

Mature stands: Within 1784 acres of mature stands, it is estimated that they contain 50% of the snags that old growth stands contain, which is 9 large snags per acre.

Aerial flight information for unmanaged stands was considered, but was not additive to the above discussed snag totals. Current levels of large tree mortality are not considered to be outside the levels of normally occurring insect and disease mortality. The forest insect and disease detection survey cannot measure older snags in the later decay classes and trees broken by wind, and may not accurately record snag recruitment in the understory due to suppression. Down wood recruitment also cannot be recorded. Future areas of tree mortality due to damage from Balsam woody adelgid were also documented, but are not judged to be significantly outside the normal range of occurrence.

Table 2. Natural Snags Recruited by Aerial Survey Year and Mortality Agent.

Survey Year	Dead Trees by Mortality Agent					
	Douglas-fir beetle	**Fir engraver**	**Mountain pine beetle (lodgepole pine)**	**Silver fir beetle**	**Bear**	**Annual Total**
1988	5.00					5.00
1989		129.42				129.42
1990	15.01			10.01		25.02
1992	280.19	15.01		26.44		321.65
1993	35.02	937.34		15.01		987.37
1995		185.09	20.01			205.10
1996		40.85			5.00	45.86
1998	5.00			50.03		55.03
1999	145.10				50.03	195.13
2000	25.63					25.63
2002	10.01				55.04	65.05
2003					40.03	40.03
2004				739.94		739.94
2005					10.01	10.01
2006			20.01		205.13	205.13
2007	1.83			43.65	43.02	88.50
Grand Total	522.79	1307.71	40.02	885.08	408.26	3143.85

Currently existing large snag levels >20”dbh on the landscape in the Ball Park Project Area are assumed to be 9.6 per acre across all seral stages. For only unmanaged stands, a very general estimate of snag presence is 16 snags per acre. For the 5,657 acres of managed stands ages 0-80 years, snag levels are estimated to be approximately 0.4 per acre. A very rough estimate considering the effects of insect and diseases is assumed to increase this to 0.6 large snags/acre.

Table 3. Snag levels in the Ball Park Project Area.

Unmanaged Stands	**Managed Stands**
• Old Growth stands assumed to have	• In stands with snag creation: 621 wildlife

18 large snags/acre.

- Mature stands assumed to contain 50% of old growth stands or 9 large snags/acre.
- Aerial flights: 0.2/acre in all seral stages

trees created in 1982, 1983, 1986, 1994, and 2001.

- Many managed stands had no snag creation.
- Average for all managed stands combined: 0.4 snags/acre

On a larger scale, dead tree patches have largely been missing in the western Oregon landscape due to fire suppression and post-fire salvaging, at least until the 1991 Warner Creek Fire on the Willamette National Forest, which was not salvaged. Additional large-scale snag habitat was created by the 2003 B&B Complex Fire, although most of this burned on the eastside Deschutes National Forest. Large landscape-scale snag patches, especially in high elevation wilderness, last only a few decades before forest succession reclaims them. About 30 percent of snags less than 40 inches dbh fall down within the first decade (Mellen et al. 2006) and 50 percent of Douglas-fir less than 16 inches dbh fall within the first 15 years (Everett et al. 1999). Larger diameter trees usually remain standing for much longer periods.

In 2002, there were roughly 29 concentrations of large snag patches greater than 10 acres per patch which are currently scattered across the landscape within the Oregon Western Cascade Province (Davis 2003). The average distance between snag patches is about 4.2 miles. This is the average, shortest distance from one cluster of patches to another. Considering this is the best, most concentrated snag habitat, with moderate and lower quality habitat in between, it is expected that this should allow for fairly good connectivity of high quality snag-dependent bird habitat.

DecAID: Snag levels within the project area were compared against those listed in DecAID for Westside Lowland Conifer-Hardwood habitat type, in the Western Oregon Cascades, with a Small/Medium Tree Vegetation Condition (WLCH_OCA_S). Current snag levels throughout the planning area are above average values of the 50% tolerance range representative for snags in unharvested areas in this habitat type and condition.

Table 4. Current Condition (Alt. A) and Estimated levels of Snag Habitat in Comparison with DecAID

		DecAID	
Snag Size	**Current Snags per Acre***	Un-harvested inventory plots (un-thinned managed stands)	All inventory plots (previously thinned and un-thinned managed stands)
≥10” dbh	≥13 snags/acre	66th percentile	85th percentile
≥20” dbh	≥9.6 snags/acre	67th percentile	83rd percentile

* are in approximate numbers

The majority of large standing snags are Douglas-fir. The majority of smaller snags throughout the area is also Douglas-fir, and is a result of mortality from growth competition. Snag distribution across the project area can be considered patchy and variable, and would be affected equally under either Action Alternative.

Down Wood:

Down wood estimates for current size and distribution were made based on reasoned estimates using inventory and stand exams from unthinned managed stands throughout the planning area. Tree mortality largely associated with self-thinning competition, cull logs from previous harvest activity, and localized breakout from snow loading has resulted in down wood levels as shown in Table 5.

Smaller logs are generally in decay class I and II, while larger logs are in decay class II and III. Many of the largest pieces of down wood (cull logs from initial harvest activity) exist in decay class III. Existing down wood occurs in a patchy rather than even distribution across the planning area.

Table 5. Current Condition (Alt. A) and Estimated levels of Down Wood in Comparison with DecAID

Down wood Size	Stand Type	Tons/Acre
≥6” diameter	Thinned managed stands	22.7
≥20” diameter		18.4
Down wood Size	**Stand Type**	**Tons/Acre**
≥6” diameter	Unthinned managed stands	38.1
≥20” diameter		24.8

In addition to dead wood levels associated with down logs, it is estimated that decaying wood habitat associated with stumps ≥20” diameter would cover less than 1% of areas treated under either Action Alternative. The amount is considered to be equal under either of these alternatives. Use of stumps throughout a range of decay classes has been documented for a wide variety of organisms (O’Neil et al. 2001, NatureServe 2006, Rose et al. 2001, Zabel and Anthony 2003). This type of dead wood provides a valuable, long-lasting habitat component that supplements the potential to maintain native biodiversity throughout the project area.

Down wood levels for this project were compared against those listed in DecAID for Westside Lowland Conifer-Hardwood habitat type, in the Western Oregon Cascades, with a Small/Medium Tree Vegetation Condition (WLCH_OCA_S). A review of DecAID data discloses current down wood levels throughout the planning area are above average values (within the 50% tolerance range) representative for dead wood in both harvested and unharvested areas within this habitat type and condition. How down wood levels in the Ball Park Project planning area compare to DecAID data is displayed in Table 5.

Table 6. Current Condition (Alt. A) and Estimated levels of Down Wood in Comparison with DecAID

	DecAID	
Down Wood Size	Unharvested inventory plots (unthinned managed stands)	All inventory plots (thinned and unthinned managed stands)

≥6” dbh	71st percentile	67th percentile
≥20” dbh	82nd percentile	78th percentile

Normal processes that influence these changes are highly variable in their ability to affect change (Rose et al. 2001). The natural fire interval for the Ball Park project area has been estimated at less than 50 years to 200 years with a mixed fire regime, depending on the area (Lantz, personal communication 2008). Insects and pathogens continually contribute to successional development; however, traditionally this occurs at a small scale relative to the overall landscape. The area is not prone to flooding or landslides which may also affect changes on a small scale. Windthrow is yet another normal process that has occurred, and would continue to occur unpredictably, to influence stand dynamics in this area on a small scale. Because the overall condition of the project area is largely influenced by previous management activities that have simplified stand and landscape structure and diversity, additional stand management may be seen as a method to assist in restoring some landscape conditions, such as stand dynamics associated with creating more normal levels of snags and down wood. Snag creation between 1988 through 2006 has already contributed 621 additional large snags to current stands less than 40 years old. Most of these snags were topped and should develop into useable snag habitat within ~5 years.

With current fire suppression efforts, not many wildfires can burn to create the diversity of snag and large down wood habitat on the landscape

A number of events throughout the watershed, as well as within the project area, have occurred to increase dead wood levels across the landscape. District fire records reveal that from 1970 to 2007, 36 small wildfires averaging less than one acre each have contributed to additional levels of dead wood in a patchy distribution throughout the project area. Any tree mortality associated with fires > 40 years ago likely created down wood habitat. Mortality from fires within the past 40 years may have created snag habitat. Wildfire intensity probably ranged from light to moderate. Salvage is not known to have occurred associated with any of these fire events, and it was likely from windthrow.

In addition to dead wood levels increasing related to effects from wildfire, effects from insects, disease, and other natural events have further increased this habitat component across the landscape surrounding the Ball Park Thin Project area. Annual aerial insect and disease detection surveys from 1988 through 2007 have documented several sites across the watershed (including locations within the planning area) where snag habitat, which will provide future large down wood habitat, is increasing in a patchy distribution from effects of these mortality agents (USDA 2008).

Reference information extrapolated from DecAID suggests current size, abundance, and distribution of snags and down wood exceeds average historic levels (50% tolerance) across the project area considering habitat type and vegetation condition. It should be noted that with respect to snags or down wood, the objective of the Ball Park Project is more directed at managing for an average historic dead wood habitat condition rather than focusing on specific dead wood requirements for individual wildlife species.

Alternative A—Direct, Indirect, and Cumulative Effects

Alternative A does not propose management activities at this time and therefore would not alter snag and down wood densities. Existing vegetation conditions would continue to follow natural successional pathways, with snags and down wood responding accordingly. Snags and large down wood would continue to be created by the various natural mortality agents: insects and diseases, wildfire, windthrow, snowthrow, bear damage, as well as suppression mortality. Alternative A would have no direct, indirect, or cumulative effects on snag and down wood in the project area.

Alternatives B and C—Direct and Indirect Effects

Commercial thinning: Some loss of existing snag habitat would occur under either Action Alternative, due to safety issues. The highest loss of the largest snags, and currently injured trees which may become future snags, would occur as snags are felled along the Ball Park haul route for safety reasons. Most of these are concentrated at higher elevations above 2500 feet. Some existing snags in proximity to harvest activities would present a serious safety risk to workers involved with implementing the silvicultural prescription. Current snag levels within Ball Park harvest units are low to almost none, so loss within thinning units is judged to be minor. Snag loss would be greatest among sizes <10"dbh, intermediate for snags ≥10-20" dbh, and very low among snags ≥20"dbh. All felled snags would be left as down wood. Depending on decay class and burning conditions, some felled snags may be fully or partially consumed during subsequent fuels reduction of underburning.

This project would thin units down to 40% canopy closure, resulting in retention of 77-444 trees per acre >7"dbh, depending on the specific unit. Alternative C would thin trees down to 30% canopy closure within six units with the same trees per acre retention ranges. Some of the retained green trees may have defects that would provide future dead wood habitat.

Post-harvest fuels treatments: Underburning many of the thinned stands may produce additional snag habitat, but is not judged to provide much due to the moister spring-like conditions this type of burning would occur in. Tree mortality of up to 10% would be acceptable, but in the past, many underburns have not reached 10%. Underburning may reduce existing large down wood habitat in specific areas when logs are in the older decay classes III or IV. Stands that are not underburned would have pile burning treatments to reduce fine fuels. Existing large down wood would not be impacted because burn piles are not placed over large existing down wood of any decay class. Pile burning treatments are unlikely to result in tree mortality directly adjacent to burn piles. Any such mortality would add to an existing patchy distribution of snag habitat throughout the planning area.

Natural Fuels Underburn: Implementing a natural fuels underburn on two units may slightly increase snag habitat and is not expected to impact large down wood habitat except in a minor way. The fire prescription calls for 10% live tree mortality (with an acceptable range of 5-20%), which in a mature forest stand translates to approximately 8-10 snags/acre being created on the 49 acres where this treatment is prescribed.

Within stand variability throughout the planning area influences current snag distribution. This variability would also influence the location of replacement snags, which would be provided for in a patchy rather than even distribution across the area. This prescription is common to each Action Alternative and would assure compliance with Northwest Forest Plan guidance to maintain 40% of potential populations of cavity nesting species (USDA, USDI 1994 page C-42).

Post harvest and fire treatment snag sizes and quantities would be consistent within the range of average levels recently provided from plot data from unharvested stands in a Western hemlock vegetation series such as those influencing habitat throughout most of the project area (McCain 2002). These data are presented in terms of tolerance levels as described in DecAID. They reveal that 50% of individuals in all populations of species using snags in Pacific Silver Fir and Western hemlock vegetation series types can be expected to occur where greater than 8 snags per acre ≥ 20" dbh exist. Although this data applies to unharvested tree condition class stands, snag habitat throughout the Ball Park project area would fall within this range.

Based on current stand structure, composition, and habitat type there is generally sufficient site-specific potential to support application of the Northwest Forest Plan Standard and Guideline (USDA, USDI 1994 page C-40) to leave an average of 240 linear feet of logs per acre greater than or equal to 20 inches in diameter or material of the largest diameter class available across areas treated by the Ball Park Project under either Action Alternative.

Alternatives B and C—Cumulative Effects

The cumulative effects analysis area was the Ball Park project area. As mentioned above the project area (14,508 acres) is considered an appropriate sized area of similar habitat to consider when evaluating current and future levels of dead wood (Mellen et al. 2006). Approximately 8%, or 1,205 acres, of these Forest Service lands have been managed for timber production .

Past management actions related to timber harvest activity are generally responsible for the current condition of dead wood habitat throughout the planning area. These actions have affected the overall amount and distribution of dead wood habitat by reducing the amount of old-growth habitat and increasing the amount of mid seral habitat. There are no foreseeable actions that would affect dead wood habitat in this area. Current science and the changing trend in timber management that has occurred within the past decade, and is projected for the future, should positively influence management of decaying wood as previously harvested stands redevelop, and more emphasis is placed on retention of key structural components in harvested stands.

Data analysis reveals the amount and distribution of snag and down wood habitat would essentially remain unchanged or experience a slight increase under either Action Alternative. Commercial thinning as proposed under either Action Alternative for the Ball Park Project is therefore likely to have little or no cumulative effect on dead wood habitat throughout the planning area. The action alternatives would allow trees to grow larger and faster, and to develop characteristics such as large limbs and crowns. The increased health and resistance of the thinned forest stands to future insect infestations and disease would make natural snag development less likely for the next 10-20 years. Whether or not the natural fuels underburn stands show increased or decreased snag development after the first round of tree mortality post-fire is unknown.

Dead wood habitat should exist in a sufficient amount and distribution to support the local wildlife community, including MIS such as pileated woodpecker, marten, and cavity nesters such that their ability to persist or become established would not be limited by this habitat component important to most members of the wildlife community in this area.

Alternatives B and C—Conclusions

Under either Action Alternative the Ball Park Project proposes commercial thinning in approximately 53% of mid-seral (stem exclusion) habitat throughout the planning area. This relates to approximately 6% of the entire planning area. There is essentially no difference between Action Alternatives and their effect on dead wood.

The silvicultural prescription calls for protection of existing snags and down logs. However, some amount of loss or disturbance of snags and down wood is inevitable as a result of safety and logging feasibility issues. Measures are identified to address this loss or disturbance. Effects analysis reveals that proposed activities in conjunction with mitigation measures would result in a stable or slight increase in dead wood levels associated with areas treated. Direct and indirect effects would be limited to an undetermined number of snags and logs that may be unavoidably affected or created within harvest units and the prescribed natural fire stands.

DecAID relies on data from unharvested plots to assist managers in setting objectives aimed at mimicking natural conditions. Considering current conditions of snag and down wood habitat along with the information presented above, it is expected that dead wood levels throughout the Ball Park planning area should remain above average in the natural range considered for similar habitat following thinning, subsequent fuels reduction, and prescribed natural fire.

On a smaller stand scale, dead wood levels would be on the low end of the natural range as shown in DecAID and the Willamette Province LSR Assessment. For this reason, snag creation at the level of three per acre at a minimum of 14" dbh is recommended as an enhancement to the project area throughout all units if monitoring following logging and fire activities shows the area to be deficient. Large down wood creation is recommended if monitoring following all logging and fire activities shows levels to be below 240 linear feet/acre with a minimum dbh of 14".

The Ball Park Project would maintain dead wood habitat throughout a managed forest that typifies the planning area at levels that would ensure its' ongoing central role in the ecological processes affecting this type of forested habitat (Rose et al. 2001). The project would comply with S&Gs for snag and down wood management.

Project Effects to Snags and Down Wood:
Data analysis reveals the amount and distribution of snag and down wood habitat would essentially remain unchanged or experience a slight increase under either Action Alternative. Commercial thinning as proposed under either Action Alternative for the Ball Park Thin Project may result in a very slight increase in dead wood habitat throughout the planning area. Hazard tree removal along the haul route is expected to result in a very slight decrease in snag habitat within the planning area. The action alternatives would provide ecological benefits to wildlife by allowing trees to grow larger and faster, and to develop other desirable tree habitat characteristics such as large limbs and crowns.

Recommendations pertaining to snags and down wood:
- Protect decadent trees and snags >12"dbh adjacent to the project area to the greatest extent feasible during logging and hazard tree removal activities.
- Implement haul route hazard tree felling outside the critical seasonal restriction period for cavity nesters from April 1-June 30.
- Replacement for loss of hazard trees along the haul route is recommended by snag creation within Ball Park units if prescribed fire and other mortality factors do not create recommended snag levels of 3 per acre. Only those hazard trees along the haul route in a snag or dead top tree condition and greater than 14" dbh would be replaced. Preliminary estimates are that approximately 200 snags or danger trees would need to be felled. Additional snag creation up to the recommended level of 3 snags over 14" dbh/acre may occur to provide habitat for cavity nesters as well as Pacific Fringe-tailed Bats. Snags created as a result of prescribed underburning or natural mortality would be counted towards this recommended total.
- Large down woody material: At least 240 lineal feet per acre of decay class I and II material greater than 18" diameter would be retained within all harvest units. Full tree length down wood material is preferable to maximize wildlife habitat value; lengths less than 20 feet would not count towards this total. Where the preferred size of material is not available, 240 lineal feet per acre of the largest diameter leave trees would be retained. Some of this material should be created

over or directly adjacent to streams if possible. If post-harvest monitoring does not show large down woody material to be present at the recommended levels, falling would take place to create up to one half the amount. Additional large down wood would be assumed to blow down within several years of the logging activity. The intent of this mitigation measure is to maintain currently existing levels, as well as the short-term future input that would be expected within these ~40 year old stands.

OTHER RARE OR UNCOMMON WILDLIFE SPECIES

Species listed below in Table 2 were compiled from the 2001 and 2003 Annual Species Reviews and incorporate those vertebrate species whose known or suspected range includes the Willamette National Forest according to the following documents: Survey Protocol for the Great Gray Owl within the range of the Northwest Forest Plan v3.0 (Quintana-Coyer 2004), January 12, 2004 and Survey Protocol for the Red Tree Vole v2.1, October2002.

Table 7: Other Rare or Uncommon Wildlife Species Known on the Willamette National Forest.

	Survey Triggers			Survey Results			
	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?	Site Management
Vertebrates							
Great Gray Owl (*Strix nebulosa*)	Yes	No	No	No	NA[1]	NA	NA
Red Tree Vole (*Arborimus longicaudus*)	Yes[2]	Yes	Yes	Yes	7/2007 and 10/2007	No	NA

[1] N/A = Not Applicable

Red tree vole (*Arborimus longicaudus*):

This project is within the Northern Mesic Zone where the red tree vole is uncommon, and pre-disturbance surveys are considered practical. Surveys for red tree voles were conducted in suitable habitat. Although potential nests were found, no active red tree vole nests were detected.

Other ROD Species/Habitat:

Cavity-nesting birds - White-headed woodpecker, black-backed woodpecker, pygmy nuthatch, and flammulated owl: The white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, and flammulated owl will not be sufficiently aided by applying mitigation measures for riparian habitat protection or other elements of the Northwest Forest Plan (USDA, USDI 2001 and 2004). These four species occur primarily on the periphery of the range of the northern spotted owl on the east slope of the Cascade Range in Washington and Oregon however, they are not likely to occur in the project area.

To ensure the distribution and numbers of all four species do not decline on BLM Districts and National Forests within the range of the northern spotted owl, adequate numbers of large snags and green-tree replacements for future snags in appropriate forest types within the range of these four species will be maintained in sufficient numbers to maintain 100 percent of potential population levels of these four species (USDA, USDI 2001 and 2004).

A discussion of how proposed activities may impact this habitat component is conducted in the Snags and Down Wood section of this document.

The influence of this project on these species is considered either neutral or beneficial. Proposed activities would generally occur outside the breeding season, and the likelihood that they occur in the project area is considered low. Beneficial influences are associated with a potential to improve foraging habitat and overall biodiversity that may attract their presence in the area.

Bat roosts – caves, mines, and abandoned wooden bridges and buildings: There are no caves, mines, abandoned wooden bridges or buildings within the project area that would need to be protected from activities associated with this project.

<u>Project Effects and Cumulative Effects to Other Rare or Uncommon Species, and Other ROD Species</u>: Activities proposed by this project include measures that maintain and protect habitat components important to support potential use by other rare or uncommon species, and other ROD Species. 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

Current S&Gs governing management of this area provide direction that should ensure the long-term maintenance of amount and distribution of suitable habitat for this group of species. With respect to restoring historic habitat and biodiversity that may benefit these species, project effects may result in a positive yet marginal overall contribution to cumulative effects that have occurred from past actions within the project area.

Ensure that perennially wet habitat associated with springs in portions of Ball Park Thin Project area are protected by a 10-meter buffer against disturbance from proposed activities including prescribed burning.

Apply previous recommendations made in this report pertaining to snags and other dead wood habitat.

MANAGEMENT INDICATOR SPECIES (USDA 1990)

Background and Effects Summary: The Willamette Forest Plan 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. These management indicator species (MIS) include spotted owl, bald eagle, peregrine falcon, cavity excavators, pileated woodpecker, deer, elk, and marten. Spotted owls, bald eagles, and peregrine falcons are addressed in a separate Biological Assessment and Biological Evaluation. The other MIS have potential to occur in or near the project area and are addressed below. Activity associated with the proposed action is consistent with, or exceeds Willamette Forest Plan Standards and Guidelines as they pertain to MIS management.

Habitat for terrestrial MIS modified by activities associated with the proposed Ball Park Thin Project would be limited to foraging use by these species. Activities could result in disturbance to MIS that may be present in or adjacent to proposed treatment sites. However, any modification or disturbance that may occur associated with this project is not of a scale that would threaten the viability of any MIS to persist within the project area or throughout the range of these species.

Pileated Woodpecker:

Current, as well as historic, composition and structure associated with habitat type and plant associations surrounding the project area favor nesting and foraging use by pileated woodpeckers (Csuti et al. 1997, Marshall et al. 2003, NatureServe 2008, O'Neil et al. 2001).

Effects from proposed activities previously addressed in this report pertaining to snags and down wood as habitat important to cavity nesting birds, are also relevant to how this restoration project may affect this MIS.

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 the changing trend in timber management that has occurred within the past decade, and is 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, USDI 1994).

Marten:

Marten occupy a narrow range of habitat types found in or near coniferous forests. More specifically, they associate closely with late-successional stands of mesic conifers – especially those with complex physical structures near the ground such as large low snags and down wood (Chapin et al. 1997, NatureServe 2008, Ruggiero et al. 1994, Verts and Carraway 1998, Zielinski et al. 2001). Current habitat surrounding the planning area does include these characteristics. Marten are known to occur within the project watershed, and despite lack of documented presence in the immediate vicinity it should be assumed the species is likely a member of the local faunal community.

In the General Wildlife Overview section of this report the marten was identified as a species closely associated with habitat in and adjacent to this project area. Effects identified pertinent to general wildlife, as well as to snags and down wood, apply to this MIS. Because marten prefer a more interior setting, large snags or down logs that could function as denning habitat would not be affected by this project. Foraging habitat for marten would likely improve as a result of beneficial habitat changes for prey species known to be favored by marten such as voles, rabbits, squirrels, and mountain beaver (Csuti et al. 1997).

Currently the ONHP, TNC, and the ODFW show the status of this species to be secure or not immediately imperiled, which suggests species viability may be assured as long as adequate protection measures such as Standards and Guidelines governing activities proposed by this type of project continue to be implemented. 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 for marten as previously harvested stands redevelop, and more emphasis is placed on recruitment of key structural components missing from harvested stands and retention of key structural components present in unharvested stands.

<u>Cavity Excavators</u>:
The significance of snags as one component characterizing both old-growth and younger timber stands, and the dependence of primary cavity excavators on this component as MIS that provide nesting and denning habitat for numerous additional species of birds and mammals (secondary cavity nesters) is thoroughly addressed in the Willamette National Forest Land and Resource Management Plan (1990). The significance of this relationship is further emphasized by management S&Gs under the Northwest Forest Plan ROD (1994, 2001, 2004) and elsewhere throughout published literature (Hagar et al. 1996, Hallett et al. 2001, Lewis 1998, Muir et al. 2002, Olson et al. 2001, Rose et al. 2001).

All species of primary cavity excavators used as ecological indicators in the Willamette Forest Plan (USDA 1990) have current and/or future potential to occupy habitat surrounding the project area based on recognized associations with the Westside Lowland Conifer Hardwood Forest Habitat type (O'Neil et al. 2001).

Effects from proposed activities previously addressed in this report pertaining to snags as habitat important to cavity nesting birds, are also relevant to how this project may affect this group of MIS cavity excavators. This project does propose modification of current nesting habitat and could result in disturbance during the breeding season for this group of species. The number of small and larger diameter snags identified as a safety hazard to work areas that may be felled or that could be affected by thinning and prescribed burning is considered inconsequential relative to this type of habitat component in the surrounding landscape where fire is recognized as the major natural disturbance (Chappell et al. 2001).

Activities proposed by this project include measures that maintain and protect habitat components important to support use by the group of cavity excavators listed as MIS. 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 range. Current Standards and Guidelines governing management of this area provide direction that promotes long-term maintenance of amount and distribution of suitable habitat for this group of species. With respect to restoring historic habitat and biodiversity that may benefit these species or their prey, project effects should result in a positive yet marginal overall contribution to cumulative effects that have occurred from past actions affecting the project area.

Elk/Deer (Big Game):

Current Condition – Big Game Habitat

The geographic scale used to assess direct, indirect and cumulative effects for Elk Habitat includes the project activity units and five Emphasis Areas within which management activities would occur. These emphasis areas were used for the scope of analysis because of established ratings for elk habitat that are described in the Willamette National Forest Plan Standards and Guidelines. These Emphasis Areas do not include private lands.

Affected Environment—Elk Habitat

Management objectives for deer and elk habitat apply to specific mapped "Emphasis Areas" within the Willamette National Forest. Each emphasis area has been assigned a rating of high, moderate, or low. Standards and Guidelines for management of these areas were developed in cooperation with the Oregon Department of Fish and Wildlife.

The Ball Park planning area includes portions of five designated emphasis areas: Latiwi, County, Upper Westside, Deer, and Belknap-Paradise Camp. These areas are managed for elk habitat under guidance from the Willamette Forest Plan Standards and guidelines (FW-137) with the assumption that providing high quality elk habitat would adequately address needs for black-tailed deer.

Elk Model for Ball Park Project Area

A Model to Evaluate Elk Habitat in Western Oregon (Wisdom 1986) is used to estimate habitat effectiveness (HE), which is defined as the proportion of achievement relative to an optimum condition. The management intent is to maintain effectiveness within a range of values with the optimum value being 1.0. HE incorporates and qualifies four key habitat attributes: size and spacing of forage (HEs), quality of forage (HEf), cover areas (HEc), and open road density through elk habitat (HEr). Each habitat variable is calculated individually and allows for a comparison by variable or as a whole (HEI). The elk model considers past and ongoing activities and results in an evaluation of the cumulative impacts on habitat from the past, present, and foreseeable future actions in the Emphasis areas.

Maintaining a balance between cover and forage areas is a key component of elk habitat management in the Wisdom model. Using tightly controlled experimental conditions, Cook et al.(1998) found that thermal cover did not enhance elk survival and production, and was not required by elk where food was not limiting, and could not compensate for inadequate forage conditions. Further research has shown that high summer and fall forage quality is critical to elk reproduction, survival, and population growth and stability (Cook et al. 2004). The increased importance of available forage abundance and quality compared to thermal cover has also been supported by nutritional and physiological studies of black-tailed deer (Parker et al. 1999).

The Wisdom model was developed to evaluate landscape areas where quality forage areas were provided primarily by clear cutting and associated post-harvest burning and fertilization. With the dramatic decline in regeneration timber harvest under the Northwest Forest Plan, there has been a corresponding decline in high-quality elk forage habitat. This trend, coupled with recent studies, has increased the importance of providing foraging habitat for elk. A drawback of the Wisdom model is that forage is evaluated based on the *average value* of defined forage areas and does not consider the amount of forage provided. Areas that provide meaningful forage are not considered in the forage effectiveness calculations. For example, providing substantial acres of temporarily improved elk and deer forage conditions by moderate commercial thinning may result in a lower forage score in the Wisdom model if these acres lower the average value for forage areas in the landscape. Published research supports the idea that increasing the amount of available forage by commercial thinning should improve overall habitat conditions for elk and deer within the analysis area regardless of the average forage value derived from the Wisdom model.

Another example for which the model does not effectively show results due to the averaging nature of the values is for cover values. If thermal habitat is thinned and temporarily loses its' thermal value, the model increases the cover value because a greater amount of remaining cover may be optimal thermal (compare Tables 9 and 10 below).

Table 8 displays the condition of habitat values for patch size and spacing (HEs), open road density (HEr), cover quality (HEc), forage quality (HEf), and overall habitat quality (HEI) that existed for big game habitat when the Upper McKenzie Watershed Analysis was conducted in 1995. Table 9 displays the current condition that existed in 2008.

Table 8. HEI Analysis for Elk Habitat in the Ball Park Project Area, 1995.

Emphasis Area Name	Emphasis Rating	Results for Each Model Variable				
		HEs	HEr	HEc	HEf	Overall HEI
Upper Westside/Upper Westside McKenzie*	High	0.82	**0.49**	**0.47**	**0.42**	**0.53**
Latiwi	Moderate	0.83	**0.38**	0.40	0.52	0.51
County/Deer*	Moderate	0.90	0.48	0.41	0.48	0.51
Belknap-Paradise Camp	Moderate	0.52	0.54	0.45	0.45	0.48

*Upper Westside was analyzed with Upper Westside McKenzie which is not within the Ball Park Project Area. The County Emphasis Area was analyzed with the Deer Emphasis Area.
Values shown in bold are below recommended minimum threshold levels in the Willamette NF Land Management Plan. Target Levels:
High Emphasis Area Individual Index: >0.5 Overall index: >0.6
Moderate Emphasis Area Individual Index: >0.4 Overall Index: >0.5
Low Emphasis Area Individual Index: >0.2 Overall index: increase any variable <0.2

Table 9. HEI Analysis for Elk Habitat in the Ball Park Project Area, 2008. Current condition and No Action Alternative A.

Emphasis Area Name	Emphasis Rating	Results for Each Model Variable				
		HEs	HEr	HEc	HEf	Overall HEI
Upper Westside/Upper Westside McKenzie*	High	0.71	**0.32**	0.64	**0.39**	**0.49**
Latiwi	Moderate	0.79	**0.33**	0.58	0.55	0.54
County/Deer*	Moderate	0.88	0.44	0.53	0.44	0.55
Belknap-Paradise Camp	Moderate	0.82	0.54	0.65	0.45	0.60

Summary of Existing Elk Model Variables for the Ball Park Project Analysis Area
• **Size and Spacing of Forage**: The size and spacing habitat effectiveness rating (HEs) for forage and cover in all four elk emphasis areas is excellent. Management goals for size and spacing are currently being met.
• **Road Density:** Road densities in two areas are currently adequate with HEr values of County/Deer (0.44) and Belknap-Paradise Camp (0.54). Road densities in the Upper Westside (0.32) and Latiwi (0.33) areas are currently below Forest standards.
• **Cover:** The habitat effectiveness value for cover (HEc) in all four elk emphasis areas are excellent and meeting Forest Plan standards.
• **Forage:** Forage quality habitat effectiveness ratings (HEf) for Latiwi (0.55), County/Deer (0.44), and Belknap-Paradise Camp (0.45) areas are currently meeting Forest Plan standards. The Upper Westside (0.39) emphasis area is currently below Forest Plan standards.
• **Habitat Effectiveness Index (HEI):** The overall ratings of (HEI) indicate that three emphasis areas are currently above Forest plan standards: Latiwi (0.54), County/Deer (0.55), and Belknap-Paradise Camp (0.60). The overall HEI rating for Upper Westside (0.49) is currently below Forest Plan standards.

Table 10. HEI Analysis for Elk Habitat in the Ball Park Project Area, Alternative B. Values for Alternative C are identical, and are only shown as a second value if different.

Emphasis Area Name	Emphasis Rating	Results for Each Model Variable				
		HEs	HEr	HEc	HEf	Overall HEI
Upper Westside/Upper Westside McKenzie*	High	0.74/0.73	**0.32**	0.65	**0.37/0.40**	**0.48/0.49**
Latiwi	Moderate	0.93	**0.33**	0.60	**0.27**	**0.47**
County/Deer*	Moderate	0.92	0.44	0.55	**0.33/0.37**	0.52/0.53
Belknap-Paradise Camp	Moderate	0.85	0.54	0.65	0.41	0.59

Forage, Hiding, Thermal, Optimal Thermal Habitat, and Road Densities

Past harvest activities have shaped the landscape in terms of the juxtaposition and types of elk habitat. Harvest treatments were primarily regeneration, including clearcuts and shelterwoods. These harvested units once provided a wealth of quality forage for elk but have since grown into hiding and thermal cover. No specific data are available for the local elk/deer population within the five Emphasis Areas that this project overlaps.

Current ODFW biological data are not sufficient to provide an accurate estimate of the black-tailed deer population in western Oregon (ODFW 2002). Recent ODFW elk population estimates show that the state management unit in vicinity of the project area (McKenzie) has elk herds with population numbers near their current management objectives (Bill Castillo pers com; ODFW 2005).

Environmental Consequences—Elk Habitat

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

Current trends of elk habitat development would continue to occur naturally over time with Alternative A. Existing elk foraging habitat within open plantations may continue growing denser into hiding cover and then to thermal cover. Some of the current foraging habitat areas are in higher elevation frost pockets that may be maintained in a long-term foraging habitat condition. Meadow habitats may undergo slight levels of tree encroachment that is not judged to be severe at this time. Thermal cover would continue to slowly grow towards optimal thermal cover during the next 50-100 years. While thermal habitat quality would not be temporarily reduced which is the case with Alternatives B and C, at approximately 10 years post-thinning the rate of thermal habitat improvement would be lower compared to stands which had thinning treatments. With Alternative A, the current elk effectiveness ratings would not change significantly within the next few decades.

In ten years, some forage availability would be expected to decrease in this area as current harvest openings grow into hiding cover. In the absence of additional harvest or wildfire, no new foraging areas would be created. The current optimal and thermal cover would not significantly change.

In 50 years, approximately 30% of the existing thermal cover would shift into optimal thermal cover. Hiding cover would succeed into thermal cover. Road density and big game security would not change. Overall habitat quality may decrease from the loss of forage. No foreseeable timber or fuels management activities are scheduled to occur in the analysis area that could contribute to incremental cumulative effects on elk habitat.

Alternative B —Direct and Indirect Effects

The proposed thinning (915 acres) for the Ball Park Project would change the function of elk habitat from thermal cover to mostly lower quality thermal cover that contains small inclusions of forage areas. Opening of the canopy is expected to temporarily improve understory shrub and forb development by increasing sunlight within stands. Small one-acre gaps within thinning units would provide small forage openings totalling 129 acres scattered across all proposed thinning units. Forage quality would be highest within the gap centers where the most sunlight would encourage forb and shrub development. Forage quality along gap perimeters would be lower due to increased shade. Thermal habitat quality in these 40 year old plantations is currently moderately low due to the young age of the stands. After thinning to an average of 40% canopy closure thermal habitat quality would be low for several years, and is expected to fully recover when the canopy again closes in approximately 7-10 years. At this time, thermal habitat quality would be improved slightly compared to before thinning since trees would have been released and grown taller and larger canopies. Additional understory development would also benefit thermal habitat quality.

Elk Model results for Alternative B show an improvement in cover values for all but the Belknap-Paradise Camp elk emphasis area. In the short-term, this is not what would actually occur. However, after approximately 10 years the thermal cover value would improve over the current condition when canopies close back in, tree diameters increase, and understory structure improves.

Forage values with Alternative B show a reduction in all four emphasis areas due to the averaging nature of the model. In reality, forage values would temporarily increase due to increased sunlight from canopy thinning. Gap forage values may remain higher longer, depending on tree regeneration within created gaps.

Alternative C—Direct and Indirect Effects

With Alternative C, effects will be similar to Alternative B. The difference is in a higher acreage of forage gaps totaling 151 acres which will better benefit elk and other species that depend on early seral habitats. Gap sizes will range from one to three acres. Within the larger gaps early seral habitat will develop slightly better than within a one acre gap because more area will be open to sunlight which will improve herbaceous and forb forage development. Flowering shrubs, berries, and grasses will show improved growth benefiting species that use them such as hummingbirds and black bears. In addition, six units totaling 217 acres will have more intensive thinning treatments resulting in 30% average canopy cover. These units were selected based on the excellent potential they offer for improved understory forage development.

Elk Model results for Alternative C show a small improvement in forage values for both the Upper Westside and County/Deer emphasis areas compared to Alternative B (Table 28). This slightly increases overall HEI scores by 0.01 for both the Upper Westside and County/Deer emphasis areas. In addition, the Size and Spacing variable in the Upper Westside emphasis area shows a decrease from 0.74 to 0.73. Other values within the elk model for Alternative C are identical to those for Alternative B.

Alternatives B and C—Direct and Indirect Effects

The proposed road decommissioning of 0.53 miles may benefit elk and other wildlife species susceptible to human disturbance by more permanently blocking off access. Both roads (2654795 and 2654812) are currently bermed and not driveable. Decommissioning will reduce or eliminate soil compaction to better allow establishment of herbaceous forage until trees colonize the former road surface. Road densities and potential disturbance to elk and other wildlife species in the Ball Park Project area would temporarily increase during implementation of this project with 3 additional miles of temporary native surface roads and increased traffic to access thinning stands. However, all these roads would be closed once the project is completed which is expected to be 10 years after the decision notice. Elk Model road densities would not change.

The proposed prescribed burning of two stands totaling 91 acres would slightly reduce thermal cover quality for several years due to opening of the canopy and expected tree mortality. Within approximately 10 years post-burning the mature overstory trees and smaller understory trees and shrubs will be released, at which time these two stands would have slightly improved thermal habitat conditions. In addition, burning may create small understory forage patches of high value to elk and other early seral wildlife species. This would slightly improve forage habitat quality in the County/Deer Emphasis Area.

Alternatives B and C—Cumulative Effects

Past management activities initially resulted in an abundance of forage habitat with the many acres of regeneration harvesting that occurred. The more recent lack of regeneration harvest has allowed these forests to grow into hiding and thermal cover to create the current condition represented by the no action alternative in Table 27. The overall impact of the proposed action is that thermal cover in treated stands would be changed to lower quality thermal cover, or hiding cover or forage. There are no foreseeable actions that would modify habitat in these Elk Emphasis Areas.

Alternatives B and C—Conclusions

Proposed activities would increase habitat quality for elk and deer in all five Emphasis Areas. Open road densities would not change in the long-term. Forage quality would noticeably increase on the 129 gap acres in Alternative B and 151 gap acres and 217 acres of 30% thinning in Alternative C. Beneficial effects to elk and other early seral species' forage from thinning and prescribed burning proposed by this project are not expected to be reflected in individual or overall habitat effectiveness values in the elk model given that the majority of acres would remain in a thermal cover classification under both Alternatives B and C. A limited number of animals would benefit from the small-sized openings that would be created by the project, so there would be little potential for any noticeable population response as a result of the proposed actions.

Project effects to elk and deer are essentially unquantifiable on an individual basis relative to the amount of habitat modified or disturbed against the amount available to these species on a daily basis in the affected Emphasis Areas. Direct and indirect effects are largely limited to potential temporary displacement of individuals during implementation of proposed activities. Short and long-term increases in forage habitat would be evident within the project area. In the context of the Emphasis Areas and adjacent 5th field watersheds, project effects would result in a minor contribution to cumulative effects that have already occurred from past management actions surrounding the project area. Given what is currently known about local deer and elk populations, the future viability of these species is assured as long as habitat restoration opportunities continue to be implemented – especially when conducted at an appropriate scale.

MIS summary:

Although proposed activities would modify some suitable habitat, and likely disturb some individual terrestrial MIS that may be present, they should not threaten the capability of any local population of these species to persist or become established in the project area. Any project effect considered negative in this regard would be short-term and minimal compared to the amount of habitat available in the surrounding landscape. Cumulative effects to MIS from proposed activities would be small in scale yet generally beneficial, as they contribute to long-term improvements in the overall diversity of habitat in the Ball Park Thin Project area.

Current available data or reports on the status of the above MIS, and additional information on the status and management of these MIS may be found on the following websites:

http://oregonstate.edu/ornhic/ORNHP.html

http://www.heritage.tnc.org/nhp/us/or/

http://www.dfw.state.or.us/ODFWhtml/InfoCntrWild/InfoCntrWild.html

Recommendations Pertaining To MIS: For cavity excavators (including pileated woodpecker and secondary cavity nesters) and marten - recognize previous recommendations made in this report pertaining to snags and other dead wood habitat.

For Elk/Deer: Consider additional activities that improve forage habitat throughout summer and winter range within Latiwi, County, Upper Westside, Deer, and Belknap-Paradise Camp Emphasis Areas.

MIGRATORY LAND BIRDS

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). The current amount of 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). However effects from past management practices – specifically fire suppression – have resulted in simplification of habitat throughout this area as forest encroachment progresses on meadow habitat.

Altman and Hagar (2007) identify 93 bird species in the Pacific Northwest that regularly breed in conifer forests less than 60 years of age. Over half of these species are experiencing population declines. Thinning generally does not change habitat conditions so dramatically that bird species can no longer use the stand, but often temporarily increases or decreases bird abundance depending on species. Altman and Hagar (2007) summarize studies showing 21 species of migratory birds whose range overlaps the project area increasing in abundance following forest thinning treatments. Seventeen migratory bird species did not change in abundance or had mixed responses in thinned forests, while 7 species generally decreased in abundance, at least temporarily, after thinning. Silvicultural treatments that promote understory shrub development, trees species diversity, deciduous trees, and the growth of larger trees; maintain snags and downed logs; and create gaps in the stand generally improve avian biodiversity. Thinning has not been shown to have long term effects on any sensitive bird species or species of special concern.

Alternative A (No Action)—Direct, Indirect, and Cumulative Effects

Alternative A does not propose management activities at this time and therefore would not alter habitat conditions for migratory landbirds. Existing vegetation conditions would continue to follow natural successional pathways, and bird populations would respond accordingly. While no snag habitat used by certain species of migratory land birds would be lost due to roadside hazard tree removal, no snag habitat would be created within forest stands where it is currently at extremely low densities, or non-existent. Additional snag habitat would be created through natural mortality in forest stands which are currently at low densities. Alternative A would have no direct, indirect, or cumulative effects on habitat of migratory landbirds in the project area.

Alternatives B and C—Direct and Indirect Effects

Felling of trees within ~40 year old plantations or along roadsides associated with this project may unintentionally affect habitat for individual migratory birds, but is not expected to have a measurable effect on their overall habitat or populations because of the limited extent of habitat removal. Thinning in young stands and prescribed fire in mature stands may impact habitat for certain species such as Hutton’s vireo, golden-crowned kinglet, hermit thrush, and Swainson's thrush by reducing suitable habitat. There would be areas of no harvest, such as buffers of special plant habitats or specific riparian areas, within some of the proposed stands providing potentially less impact.

Species that use early seral stages, such as the winter wren, American robin, and grouse, may benefit from thinning harvest treatments, especially the small gaps. Species which would increase in number as a result of thinning include Dark-eyed junco, Warbling vireo, American robin, Hairy woodpecker, Townsend's solitaire, Evening grosbeak, Western tanager, and Hammond's flycatcher (Hayes et al. 2003).

Snag habitat which may be used by migratory land birds such as western bluebirds or swallows, would be lost due to roadside hazard tree removal under Alternatives B and C. However, snags would be created in some thinning units from the post-harvest burn, as well as throughout the 92 acres of prescribed fire within two mature forest stands. It may take approximately ten or more years before these created snags become functional, although increased insects on these dead trees may increase bird foraging habitat within only a few years.

The low intensity forest underburns after thinning within some units may occur in spring. The natural fuels underburn in the two selected mature stands may occur in the fall. Spring burning may impact nesting land bird species by leading to nest failure or individual mortality. Species most affected would be those birds which nest relatively low to the ground such as hummingbirds, flycatchers, warblers, sparrows, and thrushes. Most migratory land birds generally fledge in June or July, although this can be later when second nest attempts are made. Juveniles of some species may not be able to fly long distances until late summer, however, many species are independent much earlier and would be able to escape a fire and smoke situation that could harm them.

Alternative B—Direct and Indirect Effects

Alternative B would impact migratory land bird habitat by thinning 915 acres of young forest plantations. No thinning would reduce final canopy closure to less than an average of 40%. Those species that would be less affected as a result of moderate thinning, compared to a more intensive canopy thinning, include Pacific-slope flycatcher, Hutton's vireo, and brown creeper (Hayes et al. 2003).

Alternative C—Direct and Indirect Effects

Alternative C would impact migratory landbirds by thinning 915 acres of young forest plantations of approximately 40 years of age. This Alternative would create slightly more gap habitat within stands (151 acres compared to 129 acres with Alternative B) which would benefit early seral land bird species. In addition, Alternative C would thin to 30% remaining canopy closure on 217 acres, also benefiting those species that more prefer open stand conditions (Rufous hummingbird, Anna's hummingbird, California quail, long- and short-eared owls, Vaux's swift). While those land bird species benefit, others would be impacted more as a result of a canopy thinning leaving 30% cover. Species that would respond negatively include Pacific-slope flycatcher, Hutton's vireo, and brown creeper (Hayes et al. 2003). Habitat for these latter bird species would improve once canopies close back in 8-10 years.

Alternatives B and C—Cumulative Effects

Past management activities within the Ball Park Project area have resulted in changes to the seral stage composition across the landscape altering habitat conditions for land birds. Different species occupy different seral stage habitats and therefore the effects to habitat for each species depend on the specific type of change that occurred. Effects from the proposed thinning and underburning activities of the Ball Park Project would be an increase in the acres of small openings created across the landscape, which may impact some landbird habitat by reducing suitable, dense nesting habitat in very young trees. The more open nature of the remaining young trees may make nests more available to landbird nest predators, i.e. Stellar's jays or common ravens. There are no other reasonably foreseeable future timber harvest or prescribed fire activities planned for the project area.

Conclusion: The number of individuals and/or species potentially affected by proposed activities is unknown and considered unquantifiable without reliable survey data. Habitat changes proposed by 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.

Both short and long-term suitability of open forest, meadow, and edge habitat in and near proposed treatment areas should improve for the majority of bird species that are likely to forage and nest in this area – albeit on a small scale compared to the surrounding landscape.

Project effects to Migratory Land Birds are of no measurable consequence on an individual basis relative to the amount of habitat modified or disturbed against the amount available throughout the surrounding Westside Lowland Conifer Hardwood Habitat type and the affected plant associations within it. Project effects would result in a positive yet marginal overall contribution, with respect to restoring historic habitat and biodiversity, to cumulative effects that have occurred from past actions affecting the project area.

Recommendations pertaining to Migratory Land Birds: Apply recommendations

pertaining to snag habitat discussed above.

This document was prepared by: /s/ Ruby Seitz Date: June 25, 2008

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Appendix 1: Literature referenced during preparation of this report to arrive at determinations regarding potential influence of the proposal on terrestrial wildlife species and habitat.

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Landscape-level Snag Habitat Patches on the McKenzie River Ranger District.

COVER INFORMATION

Reply To: 2550 Soil Management
2520 Watershed Protection and Management

Subject: SOIL AND GEOLOGY REPORT
Ballpark Environmental Assessment

To: District Ranger, McKenzie River Ranger District

By: Douglas C. Shank, Forest Geologist

Date: December 3, 2007

I. INTRODUCTION

A. PURPOSE AND NEED FOR PROJECT

The District Ranger of the McKenzie River Ranger District of the Willamette National Forest has determined that a need exists to commercially thin about 1500 acres of managed stands in the Upper McKenzie River Watershed. The purpose of the project is to:

1) Improve the growth of various plantation timber stands and promote forest health by reducing current stocking levels to enhance growth and vigor of the remaining trees and to reduce future losses from fire, insects, disease, and from snow breakage; 2) Manage activity-created and natural fuels as needed to meet Forest Plan Standards and the historical fire regime processes by underburning, machine piling, hand piling and burning; 3) Maintain or reduce the existing road system as much as is practical; and 4) Provide a sustainable supply of commercial wood products.

In summary, the purpose of this project is to improve timber stand health and vigor, enhance tree growth, maintain roads, and provide wood products from previously managed stands. An additional aim of the project is to enhance conditions in riparian areas to meet Aquatic Conservation Strategy Objectives. By enhancing tree growth, larger trees will better provide more shade for streams, moderate microclimate, improve overall structural diversity, and contribute future sources of coarse woody debris for streams.

B. PROPOSED ACTION AND CONNECTED ACTIONS

The District Ranger for the McKenzie River Ranger District of the Willamette National Forest proposes to implement the following actions during the next five years within previously managed stands in various management allocations in the Upper McKenzie watershed. The Ball Park Thin Project is within the Deer Creek Subwatershed (6^{th} field) of the Upper McKenzie Watershed (5^{th} field). The Upper McKenzie River Watershed Analysis, completed in 1995, includes descriptions of present conditions, relevant processes, likely future conditions, concerns, and restoration needs to help with project development. The Ballpark project includes the following proposed actions:

1. Commercially thin approximately 1500 to 1600 acres of 30 to 60 year old stands with ground based, sky line, or helicopter yarding systems, as appropriate.

2. Construction of temporary roads or reconstruction and maintenance of older system roads to provide access for various management activities.

3. Precommercially thin up to several hundred acres of adjacent managed plantations, and fertilize these stands if funds are available.

4. Reduce management created fuels or natural fuel accumulations through various methods such as hand and machine piling and pile burning or broadcast under-burning to lessen the fire hazard; or broadcast burn or underburn various natural stands and meadows to return the role of fire as a natural disturbance process in the ecosystem.

5. Manage or expand development in the Boulder or Upper Boulder, Dogwood, Westside or Latiwi Rock Sources, as needed, to provide a variety of rock products for various management activities.

II. SUMMARY

A. RESOURCES CONSIDERED

This report documents the existing conditions and potential impacts to the soil and geology resource. The major short-term impacts to soil productivity from harvest activity, as discussed in the Willamette National Forest Final Environmental Impact Statement (FEIS 1990), include displacement, compaction, nutrient loss, and instability. In most situations, preventing soil impacts is the most effective and feasible way of ensuring long-term soil productivity.

B. METHODS

The information for this report was obtained by intensive field reconnaissance of proposed units as well as the terrain surrounding the units. In most units, where ground based harvest methods were proposed, transects were walked and information taken to determine the numerical extent of existing compaction, as a percentage of the transect distance.

C. RESULTS

Unsuited landtypes, both unregenerable and unstable, were mapped and will be deleted from proposed harvest units (as appropriate). Unit 390 has a large band of rocks and cliffs, Landtype 310-610, running through the southern portion of the unit. This unsuited area will be deleted during layout. Skyline corridors running through this unsuited rocky area (or as applicable in other units) are acceptable to access suited portions of the unit. Trees in the unsuited area that need to be cut to maintain the integrity of the sky line corridor will generally be left for down woody debris (unless other wise agreed to by Forest Service personnel). Some of the non-harvest fire related units contain large unsuited areas. This is acceptable as no harvest is proposed and the objective is to return fire to areas that naturally burned relatively frequently.

Anticipated direct effects to the soils resource will be within Willamette National Forest Standards and Guidelines. Recommended suspension requirements will control the potential for unacceptable displacement. Ground based yarding systems are recommended for those units or portions of units with side slopes gentle enough to support mechanized equipment. Skyline yarding with one end suspension will be recommended for units or portions of units with side slopes greater that 30% to avoid excessive disturbance from heavy equipment. Potential nutrient loss will be controlled by duff retention standards. Long term slope stability is being mainteined by recommending the deletion of portions of units with actively unstable or potentially highly unstable side slopes. Consequetly, slope instability is not considered a concern for any unit in this project area. Compaction will be controlled by designated skid or forwarder roads, the use of existing roads as much as possible, and subsoiling.
The field investigation indicated that none of the units as a whole exceeded the Willamette National Forest FW-081 Standard of 20% of an activity area impacted by compaction. Some units, like Unit 140 or Unit 150, had high individual transect values that approach the standard. Usually, these were transects that crossed old landing sites. However, these units as well as the others were, on average, sufficiently below or well below the threshold not to be considered a concern. One of the goals with entry into all these units is to provide the opportunity to subsoil the existing skid roads as much as is practical in order to reduce compaction to lower levels. With entry into any ground-based unit, evident skid or haul roads will be utilized before any new skid road is approved. It is possible with this proposed action that cumulative compaction in some portions of some units may exceed the threshold at the completion of harvest activities. Consequently, subsoiling is recommended enhancement to insure that cumulative levels remain below the 20% standard. In total all these units together would generate around 30 acres of enhancement subsoiling at an approximately cost of $10,500. If some of these units are not included for harvest or if sufficient enhancement funds are not present for all units, then the dollars that are available will be distributed on a priority basis to the units with the greatest level of initial compaction, receiving the most attention.

D. CONCLUSIONS

The soil protection measures are designed to maintain long term soil productivity and provide a level of erosion control that is consistent with the standards and guidelines of the Willamette National Forest's

Land and Resource Management Plan (1990) and Oregon State Department of Environmental Quality guidelines. All prescriptions or mitigation measures discussed in this report are designed to meet or exceed the requirements outlined in the General Water Quality Best Management Practices Handbook (Pacific Northwest Region, November 1988). Prescriptions for soil protection and watershed considerations take into account past and predicted future land management activities. Standard contract language should provide sufficient erosion control measures during timber sale operations (BMP T-13). Revegetation of areas disturbed by harvest activities (such as landings, temporary roads, and equipment storage areas) is required with an appropriate seed mix (BMP T-14, T-15, and T-16).

III. REGULATORY FRAMEWORK

A. LAWS AND REGULATIONS -- 36 C.F.R. 219.14(a) directs the Forest Service to classify lands under their jurisdiction as not suited for timber production if they fall into any of four categories:

a. Non-forest;
b. Irreversible soil or watershed damage (from NFMA 6(g)(3)(E)(i));
c. No assurance of reforestation within five years;
d. Legislatively or administratively withdrawn.

This report considers the first three categories of land. On the Willamette National Forest these areas are defined by landtype, which will be explained in much greater detail in the Procedures and Methodology Section.

B. REGIONAL GUIDELINES -- Forest Service Manual R-6 Supplement No. 2500.98-1 (Title 2520 Watershed Protection and Management) clarifies direction for planning and implementing activities in areas where soil quality standards are exceeded from prior activities; redefines soil displacement; provides guidance for managing soil organic matter and moisture regimes. In addition, the USDA FS Pacific Northwest Region handbook on General Water Quality Best Management Practices (November, 1988) provides a guide on practices which are applicable in conducting land management activities to achieve water quality standards to ensure compliance with the Clean Water Act, as amended, and Oregon Administrative Rules.

C. FOREST PLAN -- Chapter IV of the Willamette Forest Plan states the Forest-wide Standards and Guidelines for a variety of resources and activities. Soil and Water Quality protection are addressed in the section from FW-079 to FW-114. Based on direction in the Forest Wide Standards and Guides, FW-079 and FW-080 and BMP T-1, T-2 and T-3, the following activities were performed as part of the planning process: verifying the present SRI land type boundaries; determining the location of unsuited and unmanageable landtypes; prescribing slash treatment and suspension objectives for the possible units; and evaluating potential watershed impacts from management.

IV. DESIRED FUTURE CONDITION

The major short-term impacts to soil productivity from harvest activity, as discussed in the Willamette National Forest Final Environmental Impact Statement (FEIS 1990), include displacement, compaction, nutrient loss, and instability. In most situations, preventing soil impacts is the most effective and feasible way of ensuring long-term soil productivity. The total area of cumulative detrimental soil conditions should not exceed 20% of the total acreage within the activity area, including roads and landings.

A. DISPLACEMENT --Displacement is defined as the removal of more than 50% of the topsoil or humus enriched soil horizons from an area of 100 square feet which is at least 5 feet in width. Displacement can occur with timber management during road or landing construction, yarding, or the mechanical treatment of slash, such as machine piling. Contract requirements which reduce or eliminate displacement are the primary way to minimize this concern.

B. COMPACTION -- Compaction is defined as an increase in soil bulk density of 15% or more and/or by a reduction of macropore space of 50% over the undisturbed soil. Excessive soil compaction from heavy, mechanized equipment used during logging can decrease soil productivity by restricting root growth, reducing rainfall infiltration rates, and increasing over land flow and run off. Prior management on some units, conducted before any requirements were established, created compaction conditions which may now approach or exceed the currently accepted standards and guidelines. Activities which minimize further compaction such as skyline logging, utilize existing compacted areas as much as possible, or reduce existing compaction through mechanical means (subsoiling) are recommended.

C. NUTRIENT LOSS --The primary mechanism for excessive nutrient loss is uncontrolled wild fire at high fuel loadings, low fuel moistures, and adverse weather conditions. Fire recurrence intervals of 100 to 200 years are apparent in the natural system, with shorter intervals in some critical high lightning areas or with suspected aboriginal burning. The actual thinning or harvest of these units is not as much concern for long term soil productivity as the concomitant slash accumulation and the potential for wild fire. On the other hand, NO ACTION IS NOT considered beneficial for long-term soil productivity either. Overstocked stands will rapidly see density increase, growth slow, and mortality rise. Fuel accumulations from blow down, snow down, and bug kill provide an ever increasing amount of fuel loading. Activities, which reduce stocking levels, improve stand vigor, and eliminate excessive fuel loading are favored.

D. INSTABILITY -- Slope instability is also a natural ecological component of the Cascade Range ecosystem. Debris chute failure recurrence is generally associated with more episodic large fire and / or flood events. Slump / earth flow instability is more steady state and may extend for centuries. Slope failures of either type carry large wood and rock to stream systems. This material is needed to both create suitable structure for sediment storage and provide the gravels required for fish and other aquatic habitat. On the other hand, numerous failures, without the associated boulder or log structure, can overload a system with sediment and destroy functioning habitat. Activities which do not exacerbate existing unstable areas or promote long-term stability are favored.

V. ANALYSIS METHODS

Field work was specifically conducted for Ball Park timber sale environmental assessment through the spring and summer of 2007. During that period, I conducted a field reconnaissance of potential harvest units and surrounding areas for a planned timber sale in order to help implement Willamette National Forest program direction. Specific field days included March 29, April 26, May 1 and 11, June 28, July 24, and August 13, 2007. Considerable additional field work was conducted in 2004 in this same area and was also utilized in this report (approximately 13 days - May 21, 26, and 27, June 28, July 9 and 26, and September 7, 9, 22, 23, 27, 28, and 29, 2004, were involved in field exploration and investigation for that previous project.)

A. FIELD INVESTIGATION STANDARDS

A major portion of the field investigation was directed at distinguishing the various identifiable landtype components within the study area and mapping them on the photo overlays. Much of the landtype analysis referenced in this report was originally conducted for previous timber sale planning activities. In general, the field investigation confirmed some of the original 1973 SRI designations and the previously mapped work. The major portion of the field work involved site specific evaluation of existing conditions within each of the units. My field investigation of landtypes and the determination of the impacts from prior management activities formed the basis for the site-specific recommendations and mitigations that follow in this report.

B. LANDTYPES -- Description and discussion

1. Unsuited and unmanageable landtypes have been delineated within the project area as part of the landtype mapping process (FW-180). Unsuited and unmanageable landtypes occur in two basic categories - those acres that are un-regenerable and those where harvest will cause irreversible impacts. Those landtypes that are considered to have regeneration difficulties (BMP T-20) could include 1, 2, 3, 4, 5, 6, 7, 62, 210, 310, 610, and 710 or combinations of these landtypes. Almost all have numerous rock outcrops and cliffs, shallow gravelly soils with rock fragment content generally greater than 70%, and talus. Landtypes 6 and 7 are wet and dry meadows, respectively, and most areas of Landtype 6 are considered "wetlands" (BMP T-17 and W-3). All are currently considered noncommercial forestland or non-reforestable in the five-year time frame. Officially, 210, 310, and 610 are defined as marginally reforestable at least to extensive levels on easterly and northerly aspects, and non-reforestable in the five-year time frame on southerly and westerly aspects. However, almost no successful timber management has ever occurred on any aspect related to these specific landtypes on the McKenzie River Ranger District. Consequently, the north and east aspects of 210, 310, and 610 are considered unmanageable (no sufficient assurance of regeneration within the five year time frame) land in this report.

2. Landtypes considered unsuited because harvest will result in irreversible resource damage are primarily those that are actively unstable or potentially highly unstable (FW-105, BMP T-6). They could include the primary Landtypes 25 and 35, and the complexes of 255 (25 plus 35), 256, and 356. Landtypes 256 and 356 have actively unstable areas very closely associated and generally in direct contact with stream riparian areas or stream courses. These areas all commonly display slump type topography and include such features as tension cracks, bare soil scarps, leaning and fallen trees, sags and depressions, seeps, and disrupted drainages. Failure depths are such that root strength probably has little effect. However, the instability problem can be aggravated by timber harvest, as removing the trees tends to raise ground water levels due to the loss of evapotranspiration. This in turn reduces the soil strength and can cause increased or renewed instability. On the other hand, thinning these areas can create thriftier stands that have greater root strength and increased evaporation over time. Other landtype complexes that contain elements of 25 or 35, such as 225, 235, 251, 252, 253, 254 and 353 need to be evaluated on a case-by-case basis as management activities are proposed.

3. Landtype complexes, such as 55-162-164, 443-554, or 16-55 have elements of both or all landtypes that were either not differentiable at the photo scale, or sufficient field time was not available to distinguish the various components.

4. The remaining landtypes are adequately discussed in the Willamette National Forest Soils Resource Inventory. This document, first developed in 1973 and updated in 1990, was made to provide some basic soil, bedrock and landform information for management interpretations in order to assist forestland managers in applying multiple use principles. The 1973 text and descriptions are used here. A copy is on file with the Natural Resources Staff group at the McKenzie River Ranger District.

C. BASIS FOR EVALUATING EFFECTS

For the soil resource the scale of analysis for both direct / indirect effects and cumulative effects is almost always the “unit”, i.e. the stand polygon proposed for silvicultural treatment. The unit of measure for evaluating those effects is generally considered the percent of the “unit” affected. The summing of acres for various units, such as the total acres of skyline logging in a given alternative, is not an evaluation criterion for soils impacts. Impacts are evaluated on a unit-by-unit basis, and are generally the same in any given unit for all action alternatives, unless otherwise noted.

VI. EXISTING CONDTION AND ENVIRONMENTAL CONSEQUENCES

A. INTRODUCTION

Deer Creek is part of the Mckenzie River Basin, which is located on the western slope of the Cascade Range. The Cascade Range extends for over 625 miles from northern California well into British Columbia in Canada. The general physiography of the Cascades is dominated by a string of potentially active volcanic peaks. These relatively recent craggy summits overlie a complex geological sequence of older volcanic and sedimentary rocks. The over all form of the north - south trending Cascades reflects the line of subduction of the Pacific oceanic plates as they move under the North American continental plate. This plate commotion has modified the Cascades by basin and range faulting to the east, and episodic mountain building and volcanism throughout their history and extent. The surface expression of these rock sequences has been altered through time by the numerous rivers that drain the wet western flanks and by intensive periods of mountain glaciation.

Deer Creek straddles the time between the older Western Cascades sequences of Oligocene and lower Miocene volcanic and volcaniclastic rocks more common to the north and west, and the younger High Cascade volcanic units of Upper Pleistocene and Quaternary age to the east. Considered part of the Western Cascade physiographic region, the Deer Creek study area is composed primarily of upper Miocene basaltic andesite and andesite flows and flow breccias, lahars, and volcanic conglomerates. These rocks range in age from about 17 million years ago to about 10 million years old (Tfc of Walker and Duncan, 1989). Over lying this strata on most ridges are 4 to about 10 million year old olivine basalt, basaltic andesite and dacite lava flows (Tb of Walker and Duncan, 1989). Some ridge capping flows of this time period are lithologically similar to flow rocks of the oldest flows of the High Cascade volcanic sequence, and some are more like flows that in the past have been mapped as part of the Sardine Formation in the Western Cascade Province (Walker and Duncan, 1989).

The surface expression of these rock formations has been extensively modified by erosion since late Miocene time, especially from Pleistocene through Holocene with glacial activity. Glacial forms are common in the study area, and ice cap glaciers probably covered the High Cascade platform to the east several times during the Pleistocene. Valley glaciers likely traveled both down and up Deer Creek as it acted both as a valley glacier and as an outlet for excess ice accumulation to the east from the High Cascade platform. Small cirque basins, hanging valleys, and assorted morainal deposits all reside on the landscape, but some have been extensively altered by stream erosion and slope instability. Locally, some of the bedrock materials tend to weather to form deep colluvial and residual soils that can give rise to unstable terrain with both rotational and translational failures. This complex geologic history has produced a myriad of diverse landforms and soils. A geomorphically complex terrain with a distinctive and diverse topographic expression, landforms range from highly glaciated upland benches and flats with extensive ground moraine (such as Conroy Creek), to steep rocky canyons and crags of Frissell, to the large scale stabilized slump / earthflow complexes and associated glacial deposits of Carpenter Creek, to the flat stable river terraces and outwash plains along the main stem of the McKenzie River at the confluence of with Frissell and Deer Creeks.

Soils developed from both the volcanic and glacial deposits, even on the steeper side slopes, are usually stable and productive. The various soils associated with the numerous land types are generally well drained where permeability is rapid in the surface soil and moderately rapid in the subsoil. Because of high infiltration rates, overland flow is generally uncommon except during periods of high rainfall and snow melt. In the proposed units, side slopes range from near zero to about 30% on the gentler slopes to 40 to 80% on the steeper terrain. Offsite erosion is generally not a concern because of the vegetative ground cover, the high infiltration rates, and the gentle to moderate side slopes for many units.

Most of this project area was burnt by either natural or aboriginal fires that were likely prevalent and carried through much of the project area in the last several hundred years. Many areas may have been under burnt instead of stand replacement. Consequently, natural accumulations of down woody debris may not have been prevalent in many parts of this project area. These conditions would vary across the landscape, depending on aspect, elevation, and slope position.

B. ALTERNATIVES

All action alternatives and the no-action alternative will be evaluated for impacts to the soil resource. In this analysis, all the action alternatives have the same basic effects and the same soil protection measures, as described on a <u>unit-by-unit</u> basis, and will be considered similarly. Evaluating impacts and their potential significance between or among alternatives requires discussing the duration and intensity of those impacts. Often various words are utilized to describe those conditions. The following definitions apply to impacts described in this report.

1. Duration

- Short-term: The effects last for a few weeks to one or two years;
- Intermediate: The effects last from one or two years to about a decade:
- Long-term: The effects last from about 10 years to several score years or longer.

2. Intensity

- Low, negligible, little or no, minimal, minor: The impacts are essentially zero, at the lowest levels of detection, or very slight but still noticeable.
- Moderate, reasonable: The impacts are readily apparent, but meet standards and guides.
- Excessive, substantive, major, critical: The impact is moderately severe and likely approaches the upper limits of standards and guides.
- Significant, unacceptable: The impacts are severe, and likely exceed standards and guides or do not meet Best Management Practices.

3. Basis for Evaluation.

For the soils resource the scale of analysis for both direct / indirect effects and cumulative effects is almost always the “unit”, i.e. the stand polygon proposed for silvicultural treatment. The unit of measure for evaluating those effects is generally considered the percent of the “unit” affected. Impacts are evaluated on a unit-by-unit basis, and are generally the same in any given unit for all action alternatives.

C. DIRECT AND INDIRECT EFFECTS

The major short-term, intermediate, or long-term impacts to soil productivity from harvest activity, as discussed in the Willamette National Forest Final Environmental Impact Statement (FEIS 1990), include displacement, compaction, nutrient loss, and instability. In most situations, preventing soil impacts is the most effective and feasible way of ensuring long-term soil productivity. The following sections discuss in more detail (1) how the proposed action may affect the soil resource or (2) mitigations that can be utilized to avoid potentially undesirable effects.

1. No Action Alternative

Stands will continue to develop. Many of the stands proposed for thinning currently have little understory vegetation because of the lack of sunlight to the forest floor. Intermediate and suppressed trees would slowly be removed from the stand through mortality and decay. In areas of heavy stocking, stands would stagnate. Blow down and snow down would continue to add fuel to the fuel loading. In general, plant diversity would diminish as well as soil biota because of the lack of sunlight. Evidence of compaction from previous entries is still present in most ground-based units. In areas already compacted or disturbed by the initial entries, the soil building process will continue to return the soil to near preharvest conditions in the longer term. Short-term to intermediate term impacts from harvest, such as soil disturbance, dust or mud, slash accumulation and disposal, and longer term impacts such as compaction and nutrient loss would not occur. Slope instability is not generally a geologic process that is active in any of the proposed units. Actively unstable or potentially highly unstable soils were deleted in the action alternatives. Consequently, in the short or intermediate term, no effects to slope instability are anticipated whether the units are managed or not. However, in the longer term, avoidance of any timber management in the actively unstable or potentially highly unstable areas could lead to increased instability as these stands tend to suppress. The potential loss of large wood or increased tree mortality will create conditions where slope failures could become more prevalent or excessive.

2. All Action Alternatives

All action alternatives have the same basic effects and the same soil protection measures, as described on a unit-by-unit basis. Some units may be evaluated that do not end up being considered in any action alternative.

A. Displacement

a) Existing Condition

Displacement occurs with three separate timber harvest activities: yarding, slash treatment, and road building and maintenance. Yarding activities on the existing plantations have for the most part occurred with the appropriate suspension requirements. Slash treatments usually maintained some amount of duff, though the current duff retention standards may not have been achieved. Some of the oldest managed stands may have been tractor piled. Tractor piling can result in both excessive disturbance and excessive compaction. Whether these two activities resulted in moderate to major detrimental impacts to productivity in some units is difficult to determine. Tractor piling has NOT been considered acceptable as a management tool for over 20 years on the Willamette National Forest. Stand, shrub and brush growth, as well as duff accumulation over the decades has provided an effective ground cover. At the point in time, little physical evidence can be found in any unit to indicate whether these two timber management activities resulted in significant, long-term detrimental soil displacement, off-site soil movement, or substantive loss of productivity.

Road development in this project area is extensive, and most large blocks of forest have been accessed. Most major road systems were constructed in the 1960s and 1970s with older road construction standards, though many roads are located on stable benches, flats or ridges. The amount of new road construction slowed considerably in the late 1980s, and with subsequent entries reconstruction began to dominant. Newer roads, when required, were constructed to different and better standards. Road grades were steepened and pitched to better fit roads to the terrain. Cuts and fills were minimized, and drainage controls were added to promote long term slope stability. Most road cuts and fills have naturally vegetated over the years. Because the side slopes are relatively gentle and overland flow is limited throughout this project, erosion from roads is not generally considered a concern, except in a few localized areas.

I specifically walked proposed spur routes in Unit 20 and Unit 150. Both routes are located on gentle, stable side slopes in common material.

b) Environmental consequences

The logging suspension requirement for a proposed unit is mandated in the Land and Resource Management Plan to protect the soil from excessive disturbance or displacement

(FW-107 and BMP T-12). The area near tail trees and landings is generally excluded from this suspension constraint. Unless otherwise stated or mitigated, all designated streams require full suspension or yarding away from the stream course during the yarding process (MA-15-27). To adequately protect the soil resource, the primary yarding objective for all units will be either ground based systems with predesignated skid roads and directional falling as appropriate, or skyline yarding with one end suspension, except at tail trees and landings. The primary factor differentiating these two yarding systems will be side slope.

Ground-based yarding systems may be employed on those acres in each unit where slopes are gentle enough (generally 30% or less) for ground-based systems. Ground based yarding systems, such as processor / forwarder, conventional line pulling with skidder, or shovel could be utilized in many proposed units. All areas where ground based yarding might occur, are well away from active drainages, or skid roads will cross ephemeral swales only during dry periods and at right angles. All ground based yarding will require the B6.422 contract clause be strictly adhered to, and/or line pulling and directional falling will be implemented, as appropriate. In all cases, existing skid or haul roads will be utilized before any additional new skid or forwarder roads are developed.

Skyline yarding with one end suspension will be recommended for units or portions of units with side slopes greater that 30% to avoid excessive disturbance from heavy equipment.

In conclusion, disturbance from yarding will be well within the Regional and Forest standard and significant adverse impacts are not anticipated. With appropriate suspension during logging, soil disturbance is minimal and off site erosion is essentially non-existent. During harvest, the retention of stream adjacent trees and the requirement of full suspension yarding over or away from stream courses will minimize or eliminate off-site erosion.

NOTE: A more complete discussion of yarding suspension requirements and effects follows in the compaction section, just ahead, and can also be found in the unit summary tables.

B. Compaction

a) Existing Condition

The major source of compaction (and also much disturbance) is ground based skidding equipment. <u>Unrestricted</u> tractor yarding and tractor piling are <u>not</u> considered an option on those landtypes where sideslopes are gentle enough (generally less that 30%) to support tractor usage (BMP T-9 and VM-1, and FW-107). The silty nature of the fine-grained soils, and evidence that significant soil moisture is available most of the year indicate that any type of unrestricted tractor yarding and piling (even low ground pressure) would lead to excessive soil compaction and/or disturbance. Restricted tractor yarding from predesignated skid roads (B6.422 contract clause) is considered an option if the adversely affected area remains less than 20% of the activity area (BMP T-11). With tractor yarding, skid roads are predesignated, approved in advance of use by the Timber Sale Officer and generally 150 to 200 feet apart. With a processor/forwarder system the skid roads are still preapproved and usually only about 50 to 60 feet apart, but the number of trips for each individual road are substantially less than with skidding.

Extensive monitoring over many years has also shown that when designated skid roads are properly utilized in conjunction with line pulling and directional falling, compaction from ground-based tractor operations generally remains at about 9 to 13%. Residual compaction from the original harvest of these plantations needs to be considered.

Reducing the effective weight of the tractors and reducing the number of trips over a piece of ground are other means to reduce the risk of soil compaction and displacement. Yarding over frozen ground or over a deep, solid snow pack (24 inches of dense snow **or equivalent**) also substantively reduces soil disturbance and compaction (BMP VM-4). Over-the-snow yarding is encouraged for any of these units, as long as other resource objectives can be achieved, and sufficient snow accumulation is available. Monitoring of previous over-the-snow operations on various Districts has shown that essentially no displacement or compaction occurs, when it is properly implemented.

b) Environmental consequences

Evidence of compaction from previous entries is still present. Field reconnaissance through almost all the proposed units show some level of existing compaction. Oriented transects were walked through most all the larger portions of possible tractor units. Transects were usually about 500 to 1000 feet in length, though both shorter and longer transects were walked. The results of the field investigation follow this paragraph. In no case was compaction measured directly. Heavily disturbed skid roads, landings or other areas where equipment tracks were evident are considered adversely compacted. Transects measure the amount of compacted ground along a line within a proposed unit. They were generally oriented to obtain information on management activities. They are not random, nor statistically representative of a particular unit. However, they do provide a strong indication of the degree of concern for the unit under investigation. In some cases multiple transects were walked in some units in different directions in order to provide more information, or to monitor and evaluate the initial results for accuracy. Ranges indicate some degree of uncertainty in the presence of compacted skid roads because of brush or other factors.

Unit No. Percent compacted along an individual transect.

90	12 to13
120	10, and 10 to 15, very brushy
130	7 to 8, and 4
140	10 to 12, and 16 to 18
150	20 (includes large landing), and 13
160	11, 7 to 8, 4 to 5, and 14
170	15, and 12 to 15
200	4
210	2
220	9, and 10 to 15 (very brushy)
230	8 to 10
240	0 to 2, 3 to 4, and 10
260	4 to 5, and 10
270	6 to 7

290	1 to 2, and 1 to 2
300	0 to 2, 0 to 2, and 7 to 9

The field investigation indicated that none of the units as a whole exceeded the Willamette National Forest FW-081 Standard of 20% of an activity area impacted by compaction. Some units, like Unit 140 or Unit 150, had a high individual transect value, which approached the standard. Usually, these were transects that crossed old landing sites. However, these units, as well as the others were, on average, sufficiently below to well below the threshold not to be considered a concern. One of the goals with entry into all these units is to provide the opportunity to subsoil the existing skid roads as much as is practical in order to reduce compaction to lower levels. With entry into any ground-based unit, evident skid or haul roads will be utilized before any new skid road is approved. It is possible with this proposed action that cumulative compaction in some portions of some units may exceed the threshold at the completion of harvest activities. Consequently, subsoiling is recommended enhancement to insure that cumulative levels remain below the 20% standard. Based on previous experience, this effort should be successful. For example in previous activities with other units with past subsoiling, the overall compaction was reduced by about 5 to10% from initial levels.

Consequently, at the completion of harvest activities, some subsoiling is recommended for most ground based units in order to reduce compaction levels and improve overall productivity. Almost all the units investigated were either ground based in total or could contain some ground based logging. The total ground based area could approach 600 acres. Assuming approximately 5% reduction in compaction at the completion of harvest activities, the equivalent of 30 acres could be subsoiled. At about $350 per subsoiled acre, this totals to about $10,500 of recommended enhancement subsoiling. If some of these units are not included for harvest or if sufficient enhancement funds are not present for all units, then the dollars that are available will be distributed on a priority basis to the units with the greatest level of initial compaction, receiving the most attention. In summary, with the use of designated skid roads, the reuse of the existing skid road system, and the subsoiling of primary landings and skid roads, compaction is not anticipated to exceed the 20% value in any unit and should be below the 15% level (or lower) in most units. Therefore it is not cumulatively significant. Subsoiling may be curtailed in some areas in order to reduce the amount of root pruning of leave trees and to avoid excessive amounts of exposed soil.

Skyline operations in thinning units with small wood and intermediate supports usually impacts less than 1% of the unit area. Similar to what was discussed above, most units also had side slopes that were too steep for ground based equipment. Consequently, these areas were recommended for skyline yarding with partial suspension because of side slope constraints. Skyline landings are primarily planned at old existing landings, road turnouts, and road junctions. Little new spur road will be required, and where needed, new spur roads are located on gentle, stable side slopes. New or reused spur roads are proposed for decommissioning after completion of harvest activities. Consequently, cumulative effects from existing compaction and skyline yarding are not anticipated.

C. Nutrient Loss

a) Existing Condition

Many of the stands in this project area may have had an active fire history in the last 100 to 500 years or so, primarily with natural or aboriginal under burning. As a result, large expanses never had much down woody debris, or all of the accumulating down woody debris was removed by the fires. Many of the managed stands also had the initial harvests when PUM standards were in effect. This required that larger waste material (usually 8 inches wide and 10 feet long or greater) be removed from the units to reduce fire intensity. On the other hand, some of the oldest stands were harvested when utilization standards were low or absent, and this resulted in concentrations of large woody debris in some locations. In addition, most managed stands were broadcast burned which removed additional amounts of above ground organic matter. Consequently across numerous older managed stands, management generated, down woody debris or slash is at low levels, likely replicating the natural condition in many areas. Conversely, some localized areas have substantive accumulations. Younger plantations retained much more slash and large woody debris as was the current Forest plan direction. As a result, a wide range in the above ground tonnage of decomposing organic matter exists with amounts generally varying management history and fire intensity. The variety exists both between and within units.

b) Environmental consequences

Duff Retention objectives were specifically developed decades ago by the Willamette National Forest to apply to clear cut harvest prescriptions with broadcast burns on various landtypes with differing surface soil erosion potentials. Duff retention is the amount of duff thickness remaining after management activities are completed. For example, if average premanagement duff thickness was one inch, and approximately one half inch remained after broad cast burning, then duff retention would be 50%. When these standards were developed, duff retention on partial cut harvest prescriptions was not a significant issue, and none were formulated. Monitoring and field reconnaissance in recent years has shown that the duff retention percentages for under burns in partial cuts, thinnings, or fuels reduction within unmanaged stands, which maintain an intact live root mat and live canopy cover over most of the unit, could be less (to much less) and still achieve adequate soil protection. Having said that, actual duff retention measurements on under burns (both natural and management directed) on various Districts in the last few years indicate that the "broadcast burn" standards for duff retention are generally approached or achieved, even if they are not specifically required. Consequently, they serve as a good goal and are recommended as a desired objective for the units in this report.

In the unit summary section, objectives for duff retention will be specified for each unit.

For all action alternatives, within the managed plantations, slash will either be scattered in the units, piled and burned, or perhaps broadcast or under burned. Piling may occur by hand or with a grapple machine. Grapple piling occurs with a grapple not with a dozer brush rake. Grapple piling requires only one pass of the machine across the landscape, and the machine works while sitting on slash. Extensive monitoring of grapple machine piling operations indicates that little or no additional compaction or displacement occurs. On typical thinning, hand piles number about 40 per acre and occupy about 20 square feet per pile for a total of about 800 square feet per acre or about 1.8% per acre. Machine piles are substantively less in number, but correspondingly larger in size so that the 1.8 to 2% figure is maintained. In many cases only a few acres of any particular unit are hand piled or machine piled. Burning the piled slash may develop sufficient heat to affect the underlying soil. However, pile burning is usually done in the fall or winter months when duff and soil moistures are higher, and this helps reduce the downward heat effects to the soil. Consequently, pile burning is considered a minor effect and not cumulative because of the limited overall acreage involved.

Another aspect of long term nutrient availability and ectomycorrhizal formation is the amount of larger woody material retained on site. Management activities will be planned to maintain enough large woody debris (dead and down) to provide for a healthy forest ecosystem and ensure adequate nutrient cycling (FW-085). At this time, site specific needs will be considered commensurate with wildlife objectives as outlined in FW-212a and FW-213a (as amended). In addition, it is recommended that, with the ground based harvest systems, the logger should avoid disturbance to the existing large down woody debris concentrations created by the initial entry as much as practical.

In summary, duff retention objectives will be provided on a unit-by-unit basis in the unit summary table. Concentrations of larger down logs that were produced naturally with the initial harvest should be left undisturbed as much as possible. Consequently, with the retention of adequate duff and woody debris, potential adverse impacts to long-term soil productivity are not anticipated.

D. Instability

a) Existing Condition

As was stated previously, Deer Creek is not considered highly unstable as compared to other drainages on other Districts on the Willamette National Forest. However, several actively unstable and potentially highly unstable landtypes do occur in this project area. The timber on some of these areas may have been cut in the past, prior to the establishment of any standards. The recent intense rainstorms from 1996 to 2000 did generate debris chute type soil failures in some areas, as well as in the western portion of Unit 70 and the northern portion of Unit 90, both of which also had several older failure sequences. Actively or potentially highly unstable terrain is associated with Units 70, 90, 150, 180 and 220.

b) Environmental Consequences

For Units 70 and 90, the unstable areas will be deleted from the units at layout. Unit 180 contains an active earthflow along the north boundary and within the unit. However, this entire unit was dropped from consideration in any action alternative because of the limited volume available in most of this plantation. Units 150 and 220 have unstable areas adjacent to, but outside of the managed stands. Because of drainage geometry and slope position, harvest in remaining portion of Unit 90 will have no affect on the actively unstable area. Harvest in Units 70, 150, and 220 could have some affect to the unstable areas, as they are down slope of potential harvest areas. The removal of trees from these units will in the short to intermediate term reduce evapotranspiration as compared to the current condition. This could result in slight increases in the ground water level, which might affect slope instability. However, this is not considered a concern for two reasons: 1) these changes are anticipated to be within levels that similar to natural rainfall amounts at one to five year storm events; and 2) if no action occurs, suppression will result in the stands loosing trees or growth with a similar loss in evapotraspiration in approximate the same time frames. With thinning the stand will return to current levels of water usage within a few years, and this rate will be maintained or increase for decades into the future as the stand matures. Consequently, potential slope instability with proposed management in any unit is not considered a concern. No specific mitigation is proposed for these units, as none is needed.

E. Transportation Development

Some units may require temporary roads to access suitable landing sites for either ground based or skyline yarding systems. In all cases, these temporary roads are located on gentle stable side slopes in common material.. For the most part, no active drainages are crossed. Some units are accessed by opening old logging roads constructed many decades ago. In most cases, use of these old roads will allow for drainage structure improvements and fill stabilization. Some units are accessed by using newer Forest Service roads that now require some additional work to maintain adequate road drainage and surface integrity. In summary, development of the transportation system for this sale will maintain slope stability, will produce little or no off site erosion, and will provide opportunity to rehabilitate old road courses.

I specifically walked proposed spur routes in Unit 20 and Unit 150. Both routes are located on gentle, stable side slopes in common material.

F. Unsuited lands

Unsuited landtypes, both unregenerable and unstable will be deleted from proposed harvest units. The unstable areas were previously discussed. Several units have wetlands or rocky areas along the boundaries or within the proposed units. Generally, these areas will be deleted from harvest as is appropriate. Unit 390 has a large band of rocks and cliffs, Landtype 310-610, running through the southern portion of the unit. This unsuited area will be deleted during layout. Skyline corridors running through this unsuited rocky area (or as applicable in other units) are acceptable to access suited portions of the unit. Trees in the unsuited area that need to be cut to maintain the integrity of the sky line corridor will generally be left for down woody debris (unless other wise agreed to by Forest Service personnel). Partial suspension is the logging requirement over rocky areas. Wetlands, as with all riparian zones, require full suspension with the skyline corridors. Some of the non-harvest fire related units, specifically 2000 and the Meadow contain areas, unsuited for timber management. As was stated, no harvest is planned in these areas. Burning this terrain is not a considered a concern as the proposal is to return fire to areas that naturally burned relatively frequently.

D. CUMULATIVE EFFECTS ASSESSMENT

For the soils resource the scale of analysis for both direct / indirect effects and cumulative effects is almost always the “unit”, i.e. the stand polygon proposed for silvicultural treatment. The unit of measure for evaluating those effects is generally considered the percent of the “unit” affected. The major short-term impacts to soil productivity from harvest activity include displacement, compaction, nutrient loss, and instability. Forest-wide Standards and Guidelines FW – 081, Detrimental Soil Conditions, state that the total area of cumulative detrimental soil conditions should not exceed 20% of the total acreage within the activity area, including roads and landings. In most situations, preventing soil impacts is the most effective and feasible way of reducing cumulative effects and ensuring long-term soil productivity.

The primary previous impact to the soil resource from management is compaction, the effects of which can remain apparent for decades. Potential cumulative effects from displacement, nutrient loss, and instability with previous management were not observed in the field reconnaissance, or were deleted from the proposed units. Existing compaction levels have been documented and discussed for the various units. The impacts are evaluated on a unit-by-unit basis, and are generally the same in any given unit for all action alternatives, unless otherwise noted. The soils mitigation measures are designed to limit the amount of additional compaction, and the subsoiling is intended to reduce compaction where levels would exceed standards and guides. It is possible that some portions of some ground based units may approach the 20% standard at the completion of yarding, grapple piling, and pile burning. No unit is anticipated to exceed the 20% standard in total, and units will be prioritized so that limited enhancement dollars will be expended on those units with the greatest anticipated cumulative effects from management. The objective is to remain below the 20% cumulative level, maintain long term soil productivity, and provide a level of erosion control that is consistent with State guidelines.

All prescriptions or mitigation measures discussed in this report are designed to meet or exceed the requirements outlined in the General Water Quality Best Management Practices Handbook (Pacific Northwest Region, November 1988). Prescriptions for soil protection and watershed considerations take into account past and predicted future land management activities.

At this time, no single unit measure of long-term soil productivity is widely used. Information on the survival and growth of planted seedlings may indicate short-term changes in site productivity. However, the relationship of short-term changes to long-term productivity is not fully understood at present. Experience indicates that the potential impacts on soils are best evaluated on a site specific, project-by-project basis. The major soils concerns – displacement, compaction, nutrient loss, and instability - are most effectively reviewed, for both short and long-term effects, at the project level. With proper project implementation, as specified by my recommendations that immediately follow in the next section on mitigation measures and design standards, unacceptable cumulative effects on the soils resource are not anticipated from any of the action alternatives (BMP W-5). Consequently, the utilization of soil protection measures and best management practices as defined in this report will generally preclude the need for additional cumulative effects analysis. Deviations from the standards and guidelines would be the primary trigger for a cumulative effects review, and no deviations are planned.

E. MITIGATION MEASURES, by unit and common to all action alternatives

The various proposed units are located on productive soils as localized unsuited areas of rocks and cliffs or potentially unstable areas were generally avoided, unless otherwise listed. Recent thinning on similar landtypes on this and other Ranger Districts has shown that 1) By avoiding sensitive landtypes, slope stability has been maintained after harvest; 2) With appropriate suspension during logging, soil disturbance was minimal and off-site erosion was essentially non existent; and 3) With appropriate contract language and enforcement, excessive compaction which results from unrestricted tractor yarding did not occur.

1. Soil Protection Measures

The following table discusses mitigations that would be necessary on a unit-by-unit basis. The information and recommendations were developed based on A) direction in the Forest Wide Standards and Guides (primarily FW-079, FW-090 and FW-179) to maintain or enhance soil productivity and stability, B) the field reconnaissance, and C) experience gained from extensive monitoring of similar projects. This data table addresses both suspension requirements and duff retention objectives, as well as pertinent specific comments for particular units (where necessary). The second list, that follows this table, has implementation mitigation measures that would also be applied to all units in any action alternative.

Unit	SRI	Suspension	Duff Retent. %	Comments
10	19, 194	Partial, Ground	40-60	Yarding method depends on side slope. Implement B6.442 on ground based portions.
20	134-135, 214, 554	Partial, Ground	30-50	Yarding method depends on sideslope. Implement B6.442 on ground based portions.
30	44, 441, 13, 19	Partial, Ground	40-60	Yarding method depends on sideslope. Implement B6.442 on ground based portions.
40	55-162164, 201-212-214, 443, 55	Partial, Ground	40-60	Yarding method depends on side slope. Implement B6.442 on ground based portions. Small wetlands at NE, SW and south boundaries.
50	443-554, 55	Partial, Ground	40-60	Yarding method depends on side slope. Implement B6.442 on ground based portions.
60	443-554	Partial, Ground	40-60	Yarding method depends on side slope. Implement B6.442 on ground based portions.
70	441, 443-554, 55	Partial, Ground	40-60	Wet area (Landtype 6-55) along north boundary. Potentially unstable, rocky area with small cliffs (Landtype 204-251) along west boundary; delete below sharp slope break.
80	55, 554	Partial, Ground	20-40	Yarding method depends on side slope. Implement B6.442 on ground based portions.
90	212-231, 55, 441	Partial, Ground	40-60	Yarding method depends on side slope. Implement B6.442 on ground based portions. Potentially highly unstable and actively unstable along north boundary.
100	443, 19-194, 75	Partial,Ground	50-70	Yarding method depends on side slope. Implement B6.442 on ground based portions. Dry meadow along NW boundary. Some Mt. Hemlock plant community.
110	44, 16, 554	Partial, Ground	40-60	Yarding method depends on side slope.

				Implement B6.442 on ground based portions.
120	55	Ground	20-40	Implement B6.442 on ground based portions. Wetland along N bndry.
130	16-55	Ground	20-40	Wetland & dry meadows along S bndry.
140	16-55,44	Partial, Ground	30-50	Wetland along NW boundary. Dry brushy meadow interior.
150	554, 44, 164	Partial, Ground	30-50	Actively unstable along SW boundary, outside of unit.
16 0	55	Ground	60-80	
170	19	Partial , Ground	30-50	Wetland interior at north side of unit.
180	13	Partial, Ground	50-70	Actively unstable along north boundary and within unit. Unit dropped – low vol.
190	19, 13	Partial, Ground	30-50	Yarding method depends on side slope. Implement B6.422 on ground based areas. Wetland at south boundary.
200	554	Ground	20-40	Implement B6.422.
210	554	Ground	20-40	Implement B6.422.
220	13, 13-16	Partial, Ground	20-40	Yarding method depends on side slope. Implement B6.422 on ground based areas.Unstable along W boundary.
230	554	Ground	20-40	Implement B6.422. Dogwood Rock Source at south boundary.
240	55	Ground	20-40	Implement B6.422
250	19, 194	Partial, Ground	30-50	
260	55	Ground	20-40	Implement B6.44. Small dry meadow at south boundary.
270	55	Ground	20-40	
280	201-204, 301, 304	Partial	60-80	
290	55, 44	Partial, Ground	40-60	
300	55	Ground	20-40	Implement B6.422
310	55, 301-304	Partial, Ground	60-80	Rocks at SE boundary – low volume. Yarding method depends on side slope. Implement B6.422 on ground based areas.
320	55	Ground	20-40	Old growth unit – dropped
330	214-234	Partial	50-70	
340	44, 194-554	Partial, Ground	50-70	Yarding method depends on side slope. Implement B6.422 on ground based areas.
350	441	Partial	50-70	
360	15-16	Ground	20-40	
370	55, 441-443	Partial, Ground	30-50	
380	15-16, 301, 204-303	Partial, Ground	60-80	Yarding method depends on side slope. Implement B6.422 on ground based areas. Occasional small rocky areas.
390	441-443, 310-610, 204-303, 164	Partial	60-80	Rocky unsuited band within interior of unit – delete during layout.
400	44, 194	Partial, Ground	30-50	Small rocky area along road at SE boundary. Yarding method depends on

				side slope. Implement B6.422 on ground based areas.
1001	202	Partial	60-80	Non harvest, fire unit.
1002	55	Ground	20-40	Non harvest fire unit.
1003	554	Partial, Ground	40-60	Non harvest fire unit.
1004	194	Partial, Ground	40-60	Non harvest fire unit.
2000	201, 203, 204, 13-16-135, 310, 3-610	Partial	60-80	Non harvest fire unit. Areas of unsuited rocks and cliffs.
Mea-dow	3-7-710		40-60	Unsuited dry meadow, rocks and cliffs. Proposed burn area.

NOTES:

A) **Some units (or portions there of) that were reviewed in the field reconnaissance and discussed in this report and the unit summary section may not be included in any action alternative, or have been combined with other units. They are included to document the work that was accomplished.**

B) Partial means skyline logging with one end suspension and full suspension over wet draws, drainage courses, or wetlands, unless specific mitigation measures such as bump logs are implemented. The area at tail trees and landings is excluded. Ground means a ground based system such as tractor, skidder, shovel or processor / forwarder.

C) These Duff Retention objectives were specifically developed to apply to clear cut harvest prescriptions on these particular landtypes. The percentages for partial cuts, thinnings, or underburns of unmanaged stands, which maintain an intact live root mat and live canopy cover over most of the unit, could be less (to much less) and still achieve adequate soil protection. Duff retention monitoring in the last few years on underburns on various Districts indicates that these levels of duff retention are generally approached, even if they are not specifically required.

D) Some units could be planned for harvest with helicopter yarding. This is done to reduce the development of a transportation system that would be needed for conventional logging and is not required for adequate soil protection.

2. Site Specific Mitigation Measures -- common to all action alternatives

a) Ground-based equipment should generally operate in the dry season, usually considered from May through October, unless otherwise restricted by other resource concerns or waived by Forest Service personnel.

b) Where operable, harvested trees should be topped and limbed in the units in order to provide small limbs and needles for nutrient recycling. This objective has to be tempered with the need to reduce fuel loading to control potential wild fires, and to meet site specific standards for slash loadings.

c) Horses and ground -based equipment are usually limited to side slopes less than 30%, unless otherwise directed by Forest Service personnel, in order to reduce soil disturbance.

d) Ground-based skidding equipment shall stay on designated skid trails. Ground-based skid trails will be predesignated and preapproved before use (B6.422). Existing skid roads should always be used before new skid road locations are approved. They should not usually exceed 15 feet in width, and the objective is to maintain a 10 to 12 foot width throughout the length. Where practical the skidder, cat, shovel or forwarder should travel on slash. Traveling on slash has been shown to reduce off site soil erosion or lessen soil compaction. Skid roads will generally be 100 to 200 feet apart with conventional line pulling operations, and 40 to 60 feet apart with processor / forwarder operations.

e) Partial or one end suspension is required on skyline units, except at tail trees and landings. Given the gentle to moderate slope of the terrain, small sections of ground lead may occur in some areas, and this is acceptable.

f) The reopening of temporary, unclassified roads should usually occur in the dry season, generally considered May through October to avoid surface erosion from exposed soil (unless directed otherwise by Forest Service personnel). Open roads should be storm proofed if they have to set through extended periods of wet weather.

g) Where practical, at the completion of harvest activities, limbs and woody debris should be placed on areas of exposed soil to reduce the potential for off site soil erosion.

h) Unclassified or temporary roads used outside the standard operating season, should generally be rocked, snow covered, or frozen to reduce the potential for erosion, unless other mitigating or extenuating circumstances are present.

i) Cable corridors spacing should be set to both minimize damage to standing timber, as well as the under lying vegetation and soil.

j) Trees, not designated for harvest in riparian buffers that need to be cut to facilitate harvest operations, should be dropped into the stream if possible, to aid in woody debris recruitment.

k) Avoid disturbance to the existing large down woody debris concentrations created by the initial entry as much as practical.

l) At the completion of harvest activities, spur roads, tractor skid roads or forwarder roads should be water barred and scarified, as is necessary. Where possible, skid roads and landings should be subsoiled in order to reduce compaction and return the site to near original productivity. Subsoiling needs to be considered in light of the potential for root pruning, damage to existing regeneration, and the increased amount of soil disturbance.

F. MONITORING REQUIREMENTS

As the proposed project is carried out, it will be monitored to evaluate implementation efficiency, prescription adequacy, and to update sale area rehabilitation needs or protection. Primary implementation monitoring will be conducted at the contract administration phase of the project by the Timber Sale Officer. The logger will be required to maintain adequate suspension during the harvest process, to remain on designated skid roads and landings with equipment, and to limit the number and extent of skid road utilized. In addition, a host of other contract requirements dealing with such items as erosion control, hazardous material use, fire restrictions, etc. will be enforced. Duff retention will be monitored as part of any post sale activity that may affect the soil resource, such as spot or pile burning, grapple piling, or broadcast burning.

VII. CONSISTENCY WITH DIRECTION AND REGULATIONS

A. STANDARDS AND GUIDELINES

Prescriptions for soil protection, watershed considerations and riparian needs of the sub-basin take into account past and predicted future land management activities. The soils mitigation measures are designed to provide a level of protection and erosion control that is consistent with the standards and guidelines of the Willamette National Forest's Land and Resource Management Plan (1990). On site sedimentation is anticipated to be within National Forest and Oregon State Guidelines. All prescriptions or mitigation measures discussed in this report are designed to meet or exceed the requirements outlined in the General Water Quality Best Management Practices Handbook (Pacific Northwest Region, November 1988). Standard contract language should provide for sufficient erosion control measures during timber sale operations (BMP T-13). Revegetation of areas disturbed by harvest activities (such as landings, temporary roads, and equipment storage areas) is required with an appropriate seed mix (BMP T-14, T-15, and T-16).

Other applicable Standards and Guides and/or Best Management Practices may exist which were not directly referenced in this document. Their exclusion does not indicate that they were overlooked or are inapplicable. As project development proceeds, appropriate constraints or mitigations may be added or changed in order to better meet the intent of adequate resource protection or enhancement as directed in the 1990 Willamette National Forest Land and Resource Management Plan and Final Environmental Impact Statement.

B. IDENTIFICATION OF IRREVERSIBLE OR IRRETRIEVABLEE RESOURCES

No irreversible and /or irretrievable use of the soils or geology resource is anticipated, beyond that which has been previously identified in the Willamette National Forest Land and Resource Management Plan, as amended. Road or landing aggregate, either crushed or pit run, that might be required for this sale could come from various rock sources. Development could occur within the Boulder or Upper Boulder, Dogwood, Westside or Latiwi Rock Sources, as needed, to provide a variety of rock products for road maintenance and road reconstruction associated with the harvest and haul needs. Minor clearing, generally of less than one acre for any individual pit could be associated with the development of any of these rock sources. Clearing could include managed stand trees in plantations or brush, or adjacent snags and danger trees. Dogwood Rock Source is located at the south end of Unit 230.

C. CONSULTATION WITH OTHERS - Logging systems work was done on several units in conjunction with Dan Fleming, Logging Systems Specialist on the McKenzie River Ranger District.

VIII. REFERENCES CITED

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Respectfully submitted,

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Fire and Fuels Analysis
for
Ball Park Thin EA
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Mei Lin Lantz

I. Introduction

This document describes the Fire and Fuels direct, indirect and cumulative effects for the Ball Park Thin EA Proposed Actions on the McKenzie River Ranger District, Willamette National Forest. The Ball Park Thin EA Purpose and Need describes improving stand conditions in terms of species composition, density, and structure over the long term in previously managed stands up to 60 years of age and in fire regenerated stands generally up to 120 years of age. The amended Willamette Forest Plan includes goals and objectives for managing stands with silviculture techniques and fire, to maintain stand health and vigor and provide multiple use benefits, moving the project area toward the desired future conditions. Therefore, actions are needed within the project area to:

- Restore structural diversity in stem exclusion stands to enhance wildlife habitat;
- Accelerate restoration of late-successional conditions for stands within riparian reserves;
- Protect and enhance aquatic resources;
- Restore degraded roads infrastructure;
- Reduce hazardous fuels and return the role of fire to the ecosystem as a natural disturbance process;
- Provide a sustainable supply of wood in support of the local and regional economy;

The Purpose and Need list specific actions to be evaluated for fire and fuels. This document will express the direct, indirect and cumulative effects from the following actions:

- Manage activity-created fuels by underburning, piling and burning machine and hand piles to meet the Forest Plan Standards and to restore natural fire regime processes;
- Underburn natural fuels stands to make steps toward improving the historic fire regime and seral stage diversity in the watershed.

Global climate change is a non-significant issue that involves fire and fuels. Forests are considered sinks for carbon and many references refer to the potential of large wildfires to be detrimental to our global climate (JFSP, 2007). The scale of analysis is large for climate change and many of the factors are still being researched and evaluated. The reduction of hazardous fuels and the reintroduction of fire help reduce the severity or size of future wildfires which could aid in reducing the combustion of sequestered carbon in trees. Following is the section from Chapter IV of the Willamette FEIS for the Forest Plan. The effects of the alternatives are not significant when compared against regional or global levels of carbon storage or acres of deforestation. However, long-term monitoring and research is needed to evaluate the effects of management activities on climate, particularly in light of the increasing concerns about global warming.

II. Summary

This analysis shows the direct, indirect, and cumulative effects of using prescribed fire and reducing hazardous fuels. The use of prescribed fire underburns will aid in returning the disturbance process historically present in this ecosystem and increase forest health. Additionally, this analysis explains how the fuels treatments (reducing fuels) through underburning, piling and burning, or chipping following commercial harvests will reduce the potential for wildfire effects in and near the area treated. Fuels treatments will reduce the hazardous fuels on the vertical and horizontal profile at the stand level and across the project area, thus reducing the potential wildfire severity. Treating fuels following harvest and underburning in natural fuels stands aim to provide safety for firefighters in suppression efforts. Fuels treatments will meet Forest Plan Standard and Guidelines to reduce hazardous fuel loading while meeting air quality regulations.

III. Regulatory Framework / Management Direction

1. Willamette National Forest Land and Resource Management Plan (Forest Plan) FEIS and Record of Decision (ROD) establishes Management Standards and Guidelines (S&G) for treatment, maintenance, or reduction of hazardous fuels to achieve the desired future condition.
2. The Oregon Smoke Management Plan and the State Implementation Plan regulate the standards set by the 1990 Clean Air Act and 1977 Clean Air Act and its amendments. The Willamette National Forest closely follows this plan to maintain air quality standards during prescribed fire treatments and wildfire.
3. Wilderness Act established policies in the Forest Plan for reducing particulate matter intrusions from July 1 – September 30 each year. These S&G are managed in prescribed fire planning to reduce intrusions into the Wilderness especially during this time frame and work with Smoke Management Forecasters prior to burning.
4. The National Fire Plan (NFP), developed in August 2000, identifies five key points and two apply to this project: *Key point 3 – Hazardous Fuel Reduction* and *Key point 4 – Providing Community Assistance.*
5. McKenzie River Ranger District follows The Northwest Oregon Fire Management Plan – an interagency plan established to provide additional guidelines for prescribed and wildfire activities.
6. A detailed, nationally approved Interagency Prescribed Fire Burn Plan is a requirement for any activity involving prescribed fire. This plan identifies management objectives specific to the Forest Plan, details about the stand to be burned, prescription parameters, contingency, safety hazards and mitigations, and public notification. The District or Forest Line Office is required to sign and approve the burn plans before implementation.

IV. Sequential flow of information and analysis

The McKenzie River Ranger District Interdisciplinary Team (IDT) identified and analyzed the Purpose and Need and Proposed Actions. Information from the IDT was used to support modeling and analysis for predicted fuel loading. Fire behavior, Fire Regime Condition Class, and air quality particulate emissions were then calculated using models at landscape (6^{th} and 5^{th} field watersheds) and project level scales.

V. Desired Future Conditions (DFC)

Forest Plan Standards and Guides (S&G) establish levels of allowable woody material following timber harvest. Two specific guidelines related to fire and fuels are Forest Wide (FW) 212 and 252 which state 7-11 tons/acre of 0-3" diameter fuels in stands post-harvest. These guidelines are to enable better control of wildfire, performed safely by firefighters, because conditions limit flame length and thus fire behavior. The DFC in Ball Park Thin Project Area also aims to return the natural role of fire as a disturbance process on the landscape. Over time implementing proposed fuels treatments, especially underburns will make steps toward changing Fire Regime Condition Class (FRCC) from FRCC 3 and 2 to a desired FRCC 1.

VI. Analysis Methods

For terminology and descriptions please refer to Attachment F1.

A. Models and Data

The following is a list of models and analysis techniques used for this report:

- ArcMap/GIS – program to utilize spatial data for fuel models, vegetation, FRCC, alternatives, etc. Data was gathered on the ground or from Willamette NF, FSVeg, LANDFIRE, and NW Oregon FRCC corporate GIS layers.
- BehavePlus 3.0 – program to determine a range of fire behavior characteristics including surface fire and passive or active crown fire to show how desired treatments change or reduce the intensity and severity of wildfire; change or reduce the effects from wildfire.
- Fire Behavior Prediction System Fuel Models (FBPS) – photo and data reference for identifying fuel models. Forty new fuel models are also available (Scott and Burgan 2005) but this analysis used the Standard 13.
- Fire Regime Condition Class (FRCC) – Northwest Oregon GIS coverage (from LANDFIRE) that determines stand characteristics and historical/current fire regimes. The current vegetation is from a combination of GIS vegetation queries, aerial photos, and local knowledge.
- FOFEM – program used to determine the range of fire effects, including effects on soil, trees mortality, smoke emissions, etc.
- LANDFIRE – Nationally consistent data of fuel models, FRCC, etc. that can be altered to fit a particular area.
- Photo Series for Natural Forest Residue for PNW– used to identify current fuel loading in Ball Park Thin Project Area. (Maxwell, et.al. 1980).
- PredictDAS – local spreadsheet formulated by Darryl Ashcraft, a retired FS employee, using calculations from Handbook to Predicting Residue Weights of Pacific Northwest Conifers (Snell & Brown 1980) to predict post-harvest fuel loading.

B. Basis for characterizing conditions

Fuel loading on the vertical and horizontal profile is the basis for characterizing the fire behavior across the landscape. Fire behavior is analyzed at the stand level and expanded across the landscape based on topography, weather, and fuels. Changes in FRCC show the reintroduction of fire as a disturbance process across the landscape. FRCC allows for fire to be evaluated across an area it may naturally occur (without suppression efforts).

Stratum FRCC is evaluated first and then stand FRCC is evaluated more at a field level using relationships between current seral stages. Stand FRCC allows assessment of treatments at a specific level so that proposed treatment can be evaluated at the smaller scale (Kertis et al. 2007 and Hann et al. 2001). Air quality measures are based on particulate matter emissions during the fuels treatments and potential intrusions into populated areas or Wilderness.

C. Basis for evaluating effects

The key measures used to analyze fire and fuels effects are: fuel loading in 1, 10, and 100 hour fuels size classes, crown base height (CBH), and fuel continuity horizontally and vertically across the landscape. Measurements are consistent with the Forest Plan S&G. For pre-harvest fuel loading field exams were used to identify tonnage of fuel currently in each stand. For post-harvest fuel loading silviculture stand exams and fuel loading exams were used with the *PredictDAS* spreadsheet model. Prior to fuels treatments fuels will be identified on the ground using transects and/or photo series to gather specific fuel loading. Air quality analysis is based on the guidelines the Willamette NF follows. Particulate matter (PM) is evaluated with the potential fuel loadings post harvest. Prior to work on the ground PM will again be modeled and reported to assure compliance with Air Quality regulations.

D. Scale of Analysis

This report identifies direct, indirect effects within the proposed treatment areas of 1,154 acres. Cumulative effects are analyzed the Ball Park Thin Project Area of 14,508 acres. The project lies within the Deer Creek Subwatershed (6^{th} field) within the Upper McKenzie River Watershed (5^{th} field). Specific field data within the Project Area was gathered as stated above. Models were used that included project data and data from large landscape level due to the character of fire as a disturbance and how it moves across the landscape. To identify specific effects of fuels treatments, models zoomed into the area using field information and landscape level data.

VII. Existing Condition

A.1. Existing Condition - Fire on the Landscape

Fire has and will continue to play an active and vital role in our forest ecology. Treatments in this project would help to return the ecological role of fire disturbance. Historically, across the Willamette National Forest, fire created mosaic patterns within the vegetation as it occurred at different times in the year or locations which affected the intensity and severity of the fire. Fires were often caused by lightning, and there are references and stories of Indigenous people using fire for managing resources, the land, and travel routes (Teensma 1987, Kay 2007). Fire affects forest ecology in multiple ways through such items as: distribution of fungus, changes in understory vegetation and distribution of canopy cover, and diversifying areas for wildlife. The influences of human actions (development and resources) over the past couple centuries warrant management activities to aid in maintaining, providing, and reducing hazards. Improving the role of fire is needed to decrease the potential of large, high severity wildfires, and to move the ecosystem closer to the natural disturbance process. Teensma studied fire history in an area near Ball Park Thin Project Area. The MRFI (mean fire return interval) he analyzed ranged from <100 years to 166 years.

Kay (2007) describes low intensity fire occurred regularly and intentionally by Indigenous people across the Americas, as well as in the Willamette Valley. Trees species that are shade intolerant (*Pinus lambertina)* are found in many of the lower elevations on the McKenzie River RD and also known Indigenous travel routes and communities reveal Indigenous people inhabited the area. This suggests fire played an important role in developing the forest vegetation. Teensma's Dissertation (1987) shows how the natural fire rotation changed from times during Indigenous use, Anglo-settlement, and current fire suppression.

- 1772-1830 at 78 years
- 1851-1909 at 87 years
- 1910-1987 at 77 years

VII.A.2 Existing Condition - Past Management

Past management activities that have changed the fuel profile or fire behavior are grazing, timber harvesting, fuels treatments following timber harvests, and fire suppression. In 1920 management in National Forests began suppressing fires and managing for resource products which altered the natural regimes of fire. Over the past 36 years from 1970-2007 31 fires occurred in the Ball Park Thin Project Area. All fires were suppressed and most were contained to less than one acre. Lightning accounted for about 70% of the fires in the Project Area and the others were human-caused. Based on the recorded data from Willamette National Forest, the fire frequency is 1.7 fires every two years which implies that fire is a disturbance process in this ecosystem.

Many of the proposed Ball Park Thin units have been previously managed. Earlier commercial harvest, mostly regeneration harvests, left non-merchantable large woody material and fuels were not treated. Later harvest methods included yarding merchantable material and broadcast burning. Prior to the 1970's, the scale of acres treated was much larger than the more recent practices. No natural fuels prescribed fire (prescribed fire without timber harvest) has occurred in the Ball Park Thin Project Area in the past 50 years.

VII.A.3. Existing Condition - Fire Regime Condition Class

Fire Regimes describe the natural frequency fire occurs across the landscape pre-settlement and includes the historic aboriginal use (Agee 1993). Five Fire Regimes are used at the national level Fire Regime I, II, III, IV, and V (Hann et al. 2003). Within the Ball Park Thin Project Area the following Pacific Northwest Region 6 Fire Regimes have been classified:

- Fire Regime I – < 0-35 year fire return interval; low severity
- Fire Regime IIIa – < 50 year fire return interval; mixed severity
- Fire Regime IIIb – 50-100 year fire return interval; mixed severity
- Fire Regime IIIc – 100-200 year fire return interval; mixed severity
- Fire Regime V – 150+ year fire return interval; high severity

Fire Regimes use the description of mixed severity. This term on the Willamette NF explains the varying degrees of fire intensity that can occur given the topography, vegetation, and the ability of larger trees to withstand the intensity creating different levels of mortality. Mixed severity fires range from low intensity (low mortality) ground fires to higher severity fires where canopy fires kill most of the trees, thus mixed severity creates a mosaic of different mortality and seral stage classes across the landscape (Hann et al. 2004). For example a light intensity burn would not leave fire scars or cat-face on larger trees. Due to this light intensity fire understory vegetation would change, but evidence that a fire occurred would be difficult to find through tree scarring. No tree scarring does not discount that fire occurred across the landscape and played an important role ecologically (Kertis discussion 2008).

In addition to the frequency and severity, fire disturbance is categorized into Fire Regime Condition Class (FRCC). FRCC describes the degree of departure of current vegetation from the historic fire regime and helps to establish reference and evaluate risks to the ecosystem (Hann, et.al. 2001). FRCC 1, 2, and 3 rank the degree of departure:

- FRCC 1
    - Fire regimes near historic range (departure is no more than one return interval)
    - A low risk of losing key ecosystem components
    - Vegetation attributes are functioning within historical range
- FRCC 2
    - Fire regimes have been moderately altered from historical range; moderate changes in fire size and intensity has resulted
    - Moderate risk of losing key ecosystem components
    - Vegetation attributes have been moderately altered
- FRCC 3
    - Fire regimes have been significantly altered from their historical range; dramatic changes in fire size and severity has resulted
    - Severe loss of ecosystem components
    - Vegetation attributes have been significantly altered

As stated in documention from the NW Oregon FRCC workgroup in 2004, FRCC evaluation is conducted by identifying the plant communities (biophysical settings, BpS) that would exist given the soils, climate, topography, and the natural disturbance regime. This is followed by identifying current vegetation in five seral stage categories (early, mid-closed, mid-open, late-open, late-closed). The percentage change in each seral stage across the stratum (4-6th field watershed) shows the change or departure from historical seral stages that existed in the natural fire regime. The stratum FRCC categorizes fire as a landscape level disturbance and is evaluated across an area it may naturally occur. Stratum FRCC was first evaluated and secondly changes in the seral stages with the percent difference of change from past BpS account for the stand level FRCC. Stand FRCC was evaluated more at a field level using relationships between current seral stages and past (Kertis et al. 2007 and Hann et al. 2004). Much of the Ball Park area currently exists as seral stages of early, mid-closed, or late-closed with very few in the mid-open or late-open. This lack of seral stage variety is a main reason for departure from the historic.

Fig. 25: Fire Regimes

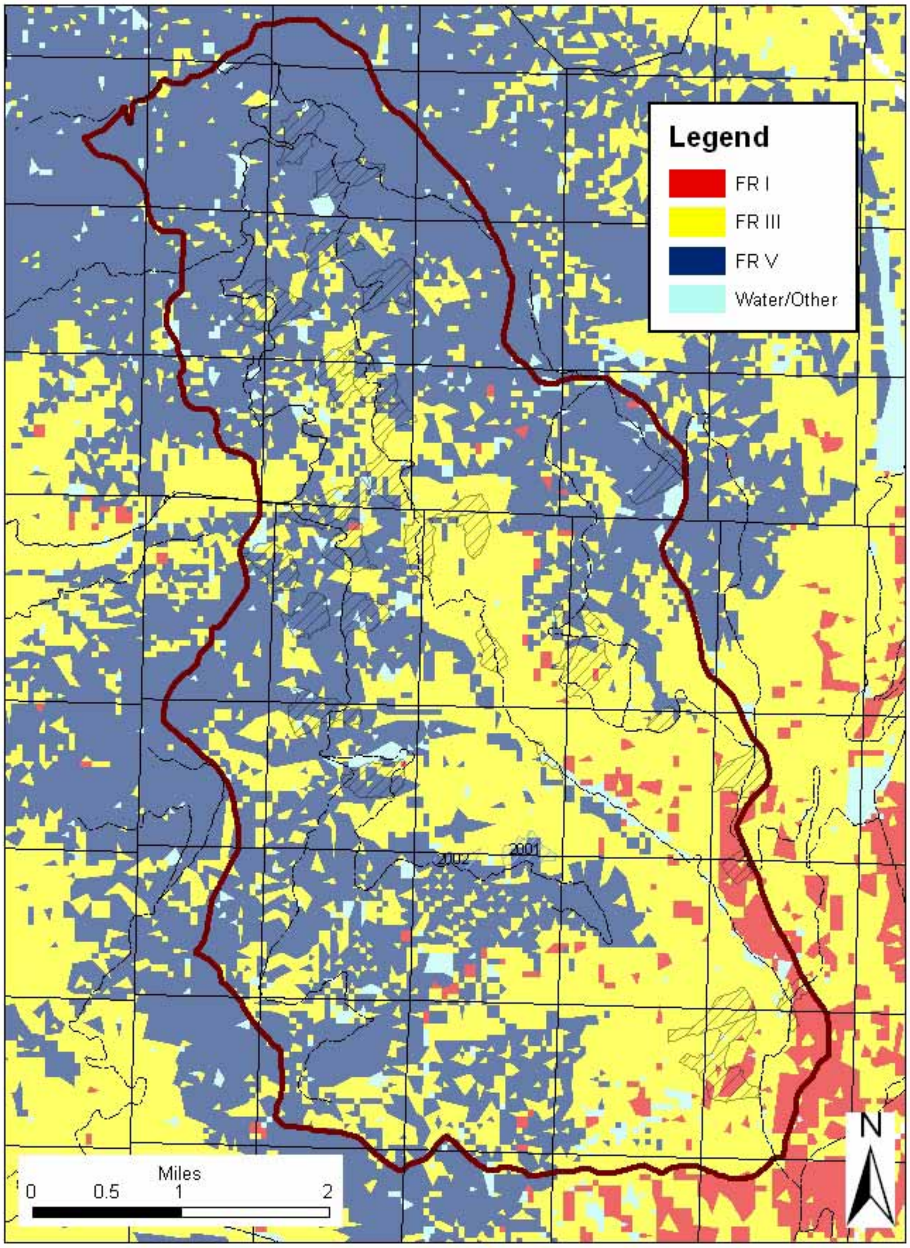
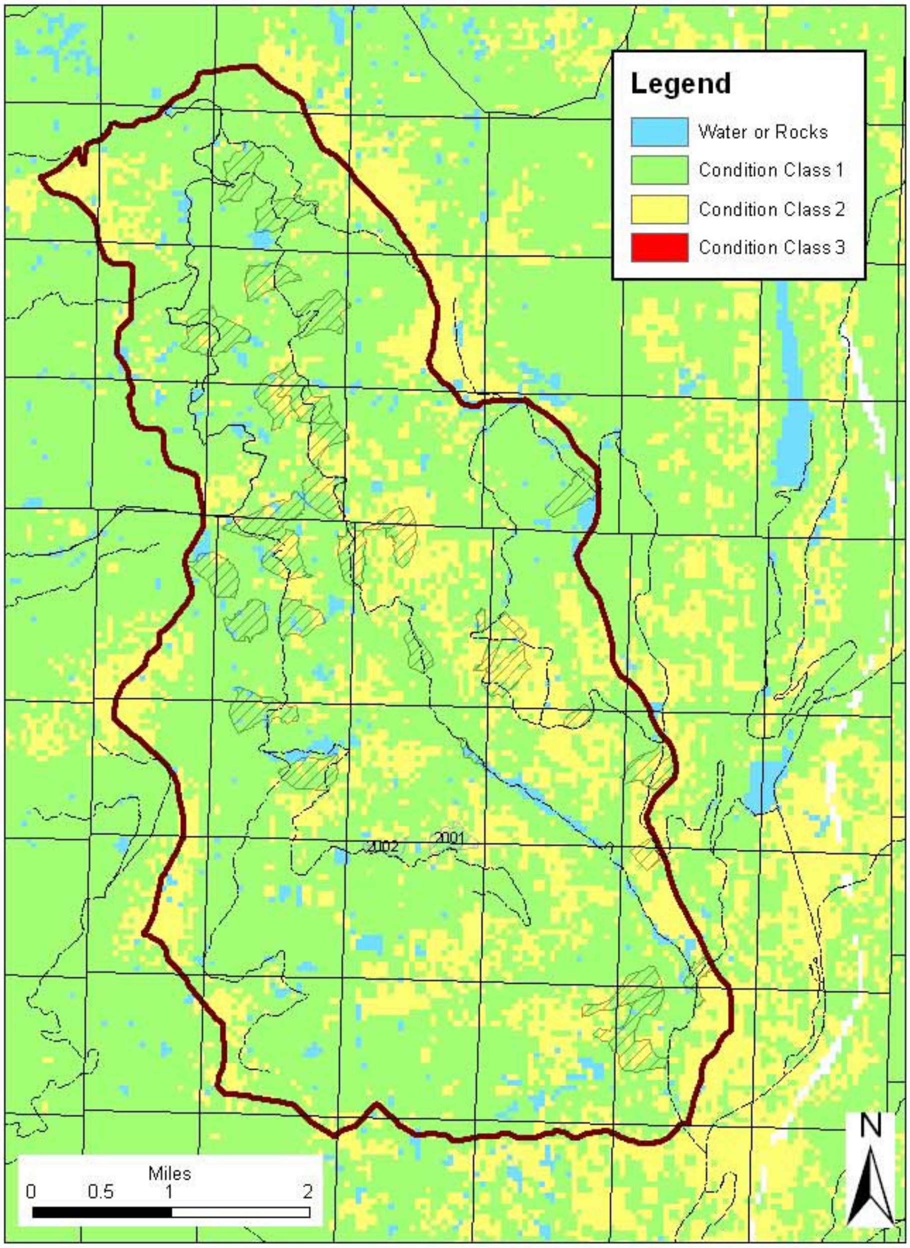


Fig. 26a: Stratum FRCC



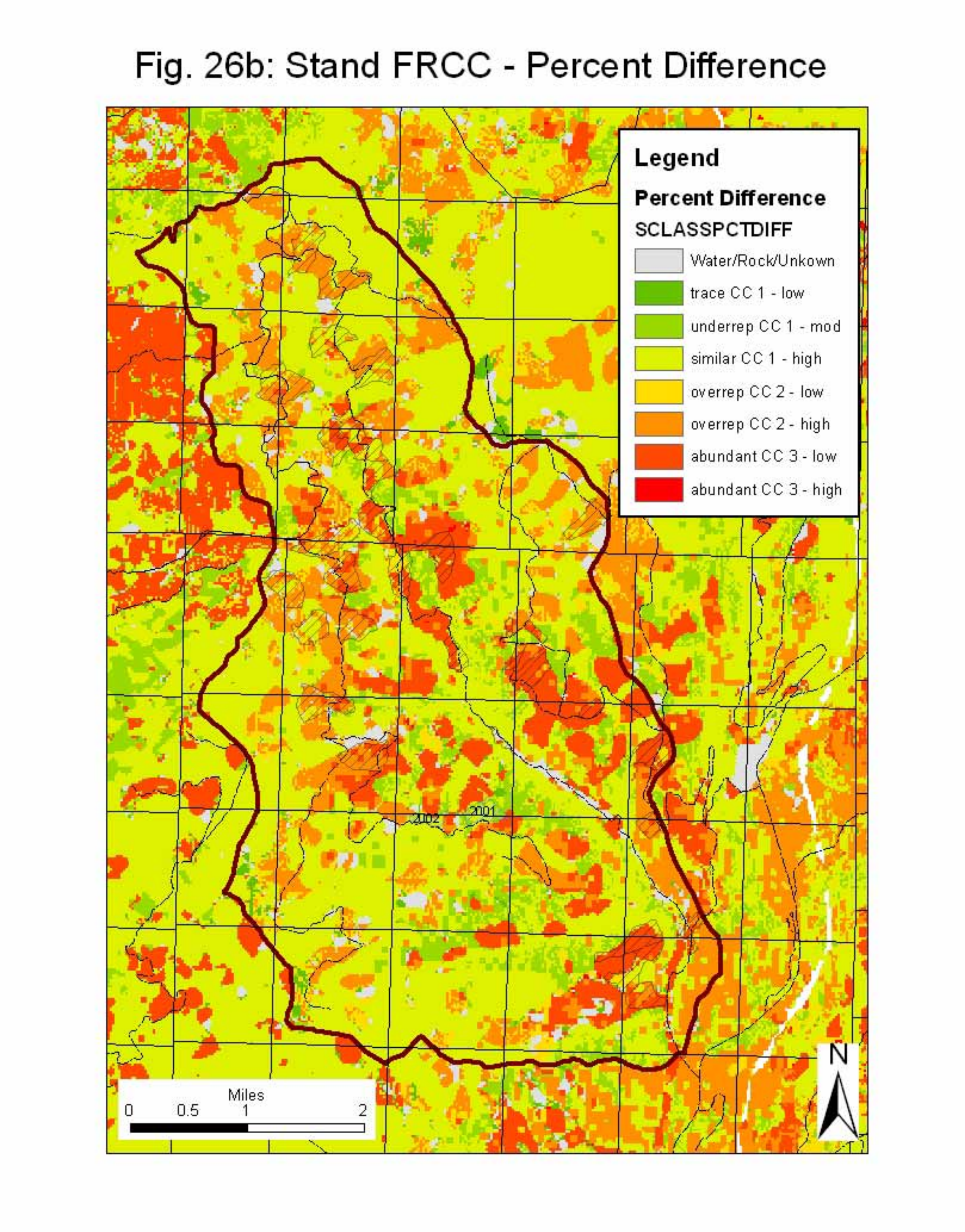


Fig. 26b: Stand FRCC - Percent Difference
Legend
Percent Difference
SCLASSPCTDIFF
Water/Rock/Unkown
trace CC 1 - low
underrep CC 1 - mod
similar CC 1 - high
overrep CC 2 - low
overrep CC 2 - high
abundant CC 3 - low
abundant CC 3 - high
2002
2001
Miles
0
0.5
1
2
N

Given the difference in seral stages – from historic to current – the Ball Park Thin Project Area ranges through all three FRCC levels and on average concludes the area is moderately altered from the historical range of variability for fire interval. A moderate change in potential fire intensity and severity has resulted (Kertis et al. 2007 and Hann et al. 2001). Additionally, susceptibility to fire and an elevated risk of high severity of fire within the Ball Park Thin Project Area should be tempered with the current continuous horizontal and vertical fuel profile and the main highway travel route. These factors and fire suppression create more of a potential for unnatural, severe fire and hazards to public and fire fighters.

VII.A.4. Existing Condition - Fuel Profile

Fuel models describe the fuel profile in the Ball Park Thin Project Area. Fuel models are a quantitative way to describe surface fuel loading (amount of fuel in tons/acre), arrangement, structure, and calculate predicted fire behavior. The primary fuel that carries the fire is the general classification in fuel models, i.e. grass, brush, timber litter, or timber slash. Fuel loading and depth correlate to the fire intensity and rate of spread. Horizontal fuels refer to ground or surface fuels, while vertical fuels refer to standing trees and ladder fuels such as limbs on the bole of trees, crown base height (CBH), regeneration, and brush.

Fuel loading and fuel models are described below. Both are used to calculate and predict expected fire behavior. Fuel loading is measured using size of fuel that relates to time frames based on how the fuel responds to moisture (how long it takes to dry and become consumable) and are then quantified using tons/acre. Measurements for fuel loading are:

- 0” – .24” diameter or 1 hour fuels
- .25” – .99” diameter or 10 hour fuels
- 1.0” – 2.99” diameter or 100 hour fuels
- ≥3.0” diameter or 1000 hour fuels

The Ball Park Thin Project Area is composed of the following natural fuel models (FM):

- **FM 1**– Representative of grass meadows or openings. Fuel loading in the 0-3 inch diameter fuels is less than 1.5 tons/acre. Less than one-third of the area contains trees or shrubs. Fire spreads quickly in this fine fuel when it is cured or nearly cured. *Example – Bunchgrass Meadow*.
- **FM 5 –** Representative of timber plantations and natural regeneration between two and 10 feet tall. *Ceanothus velutinus* is the common understory brush. Shrubs or grass in the understory can carry the fire. Fuel loading in the 0-3 inch diameter for live and dead fuel is less than 3.5 tons/acre. *Example – second growth units under 30 years old that have trees ≤35’ tall and a shrub component along the 2654 Road*.
- **FM 8 –** Mature short-needle conifer stands with light fuel loading in the 0-3 inch diameter fuels. This profile can be found in stands that were or were not previously harvested. Fire spread is generally slow with low flame lengths. Heavy fuel concentrations (jackpots) can flare up. Fuel loading in the 0-3” diameter for

live and dead fuel is less than 5 tons/acre. *Example – area along 2654 Road with few understory shrubs or regeneration.*

- **FM 10 –** Representative of mixed conifer stands with heavy concentrations of large down wood, > 9" diameter. Fuel loading in the 0-3 inch diameter for live and dead fuel is less than 12 tons/acre. Ground fire behavior is higher in intensity than fuel models 8 because of the heavier fuel loading and the ladder fuels. Torching of trees (fire in the crowns of trees) occurs more frequently. *Example – areas along the 2654 about 4 miles up the road on the east side of the road.*

Post harvest units are categorized as FM11 and 12:

- **FM 11 –** Light slash load resulting from light to moderate partial cuts or harvests which yard tops of trees attached to the last log. Fuel loading in the 0-3" diameter for live and dead fuel is <12 tons/acre. The continuity of the slash can increase fire behavior.
- **FM 12 –** Moderate slash loads resulting from moderate or heavy partial cuts. Fuel loading in the 0-3" diameter for live and dead fuel is < 35.6 tons/acre. Fire behavior can be rapidly spreading, especially with red needles still on the branch wood.

Table F1 below summarizes the acres of each Fuel Model on National Forest Land using the FSVeg data.

Table F1: Existing Condition - Fuel Model within Ball Park Thin Project Area

	FM 5	FM 8	FM 10
Acres within Ball Park Thin Project Area	3561 Ac	4530 Ac.	5941 Ac.

The term hazardous fuel is used in current publications, such as the National Fire Plan, and describes the current and potential hazardous fuels in the Ball Park Thin Project Area:

- fine fuels (1, 10, and portions of 100 hour) generated following timber harvest and in forested areas that have been excluded from disturbance processes;
- vegetation structure with fine fuels on the ground, shrubs and small trees in the understory, lichen on larger trees, and tight canopy closure all contributing to rapid horizontal and vertical movement of fire;

VII.A.5. Existing Condition - Fire Behavior

The Ball Park Thin Project Area has a fire frequency of 1.7 fires every two years. This shows that fire continues to occur naturally in this area. Fire behavior is a result of the fuels, topography, and weather conditions. Fire behavior was modeled using BehavePlus3 with fuels and topography inputs that correspond to the Ball Park Thin Project Area and summer fire weather data representing the hot, dry fire weather (97th percentile) similar to 2003 and 2006 is used to represent conditions where fires can escape initial attack, threaten resources, and have high severity/mortality. Areas with light fuel loading, such as FM 8, exhibit lower intensity fires with lower severity (low mortality of dominant vegetation). Fuel Model 10 exhibits high fire intensity and high severity including crown fire with mortality. Fuel Model 5 is also high fire severity and exhibits fast rates of spread. FM10 and 5 are difficult to contain because:

- flame lengths exceed the range of conditions for hand tooled firefighters (flame lengths over 4 feet in height require mechanized equipment, air resources, or indirect attack);
- rates of spread over 6 chains/hour (1 chain = 66 feet) exceeds direct attack cability of a 20 person crew.

Larger fuels, > 9" diameter, are not often considered the carrier of fire. Large 1000 hour fuel will create longer lasting intensity, higher flame lengths and enable crown and high severity fires to progress. Standard fire suppression operations would require mechanized suppression resources when flame lengths reach heights over four feet. Firefighters are not able to safely suppress fires directly if the flame lengths exceed four feet.

VII.B. Proposed Actions - Fire and Fuels

The proposed fire/fuels treatments for Alternative B and C are shown on Table F2 below. The treatments are based on the type of stand, age and size of trees (dbh), topography, and location. These factors create the parameters to implement the treatment.

- Natural Fuels UB – Underburn in Units 2001 and 2002
    - No commercial harvest but fuels and vegetation will be treated through an underburn with mortality up to 20%. Hazardous fuels will be reduced to S&G. Mop up will follow directly after ignition.
- UB – Underburn in activity slash units
    - Post harvest fuels on the ground will be underburned. Treatment will be done in spring-like conditions when 1000 hour fuels and duff are still moist, mortality of residual trees will be ≤10% because majority of the trees will be >15" DBH. Hazardous fuels will be reduced to S&G levels. Mop-up follows directly after the unit is ignited.
- UB-buffers – Buffers next to Units 1000, 1001, 1002, and 1003
    - These units are attached to units 270, 330, 240, and 210, respectively. The UB-buffer units are to provide a different method of holding fire within the UB unit. Due to safety concerns and ecological constraints, the UB-buffer units will reduce the need for handline and also create safer implementation for firefighters during the UB.
- UB* - Underburn *
    - Following the harvest the stand will be evaluated again to measure the residual tree DBH. If the majority of trees are 14" DBH they will be more resistant to a light/moderate underburn and the mortality of ≤10% can be maintained. If a unit has the majority of trees 12" DBH, mortality in an underburn may be difficult to hold at 10% or less due to the thin bark of the smaller trees. The treatments below will be the alternative.
- GP – Grapple pile
    - Within units or in parts of units that are logged with ground equipment, create and cover piles post harvest and then burn the piles in the winter to reduce hazardous fuels to S&G.
- HP – Hand pile

    - Within the unit where concentrations of slash exist or along the road to reinforce the road as a safer fire break and cover post harvest and then burn piles in winter to reduce hazardous fuels to S&G.
- GS – Group selection with broadcast burning
    - One acre (Alt. B) to three acre (Alt. C) acre gaps will be created during the timber harvest. Units 10, 20, 40, 60, and 400 will be underburned and gaps will be burned at the same time. Units 110, 120, 170, 220, 280, 290, 310, 330, and 390 may be underburn, if the DBH does not allow then only the gaps will be broadcast burned. If the GS is <5 acres per unit, the GS will not be broadcast burned. Other units with GP or HP treatments and GS >5 acres, will be broadcast burned within the groups selection given sufficient funding.

Table F2 shows the fuels treatment, fuel loading following timber harvest proposed for each unit and alternative.

Table F2: Fuels treatments and fuel loading for Alternatives B and C

Unit	Acres	Fuels Alt. B and C	Fuel Loading
			0-3"
10	42	UB	13.6
20	42	BB	12.6
30	52	HP	11.9
40	40	UB	10.1
50	6	GP	20.8
60	52	UB	17.1
70	39	GP/HP	27
80	34	GP	18.2
110	44	UB*/HP	12.9
120	57	UB*/GP/HP	14.9
130	18	GP/HP	13.5
140	29	GP/HP	13.6
150	44	GP/HP	15.6
160	46	GP/HP	13.8
170	47	UB*/GP/HP	9.7
190	39	GP/HP	9.9
200	5	GP	11
Unit	**Acres**	**Fuels Alt. B and C**	**Fuel Loading**
210	10	GP	11.5
220	24	UB*/GP	15.1
230	11	GP	15.4
240	43	GP	11.6
270	14	GP	11.8
280	9	UB*/HP	26.1
290	51	UB*/GP/HP	13
310	52	UB*/GP/HP	8.6
330	18	UB*/HP	15.3
360	19	GP/HP	21.3
370	48	HP	19.1
390	82	UB*/HP	9.5
400	48	UB	14.8
1000	2	buffer	4
1001	16	buffer	4
1002	7	buffer	4
1003	17	buffer	4
2001	34	NFUB	4
2002	15	NFUB	4

VII.C. Environmental Consequences

VII.C.1. Effects of Alternative A – No Action

1.a. Direct, Indirect and Cumulative

In the Ball Park Thin Project Area the No Action Alternative would not support returning fire as a natural disturbance process to the ecosystem due to fire suppression responsibilities and life, property, and resource priorities. Through time, fuel loading would continue to increase and vegetation would continue through successional pathways. Stands would continue to grow increasing fuel loading on the ground and canopy closure thus escalating the potential wildfire behavior. In the absence of prescribed fire and treatments, ladder fuels and canopy closure would be high, thus providing propellants for severe, high intensity wildfires. FRCC would not be reduced or maintained at a FRCC1, again reducing the natural forest resiliency and changes to fire. No Action would not create the DFC, return fire as an ecosystem process, reduce firefighting risks, or be cost effective due to suppression of all wildland fires.

VII.C.2. Effects Common to Alternatives B and C

2.a Direct and Indirect Effects

Harvests increase fuel loading in a unit which increases the wildfire behavior potential. Following the harvests hazardous fuels increase and can exist for up to 5 years because of the red needle slash and loftiness of the fuels. This slash has high ignition and spread potential. The hazard would be reduced with fuels treatments 1-2 years post harvest. Across the landscape the lack of variability in the horizontal and vertical fuel profile also increases the spread potential and intensity of wildfire. The proposed fire and fuels Actions in Alternative B and C would change the fire and fuels environment by:

- returning the natural disturbance process of fire with prescribed fire UB treatments;
- reducing hazardous fuels to S&G and create variations in the horizontal and vertical fuel profile;
- creating a mosaic and distribution of seral stages present in a mixed severity fire regime taking steps towards changing FRCC3 →FRCC2 → FRCC1;
- increasing fire tolerant, shade intolerant conifers and reducing shade tolerant conifers;
- creating safe and cost effective protection of life, structures, and resources through reducing the risk of potential high severity fires.

All prescribed fire underburns would create variability across the landscape and return a vital disturbance process to the ecosystem. The distribution of seral stages that determine the FRCC would not completely change the Ball Park Thin Project Area from a FRCC3 or 2 to a FRCC1. However, the treatments would begin the steps towards reaching the FRCC1, displaying more variation of seral stages which occurred under historic fire events. Changes to seral class have occurred for over 100 years. Future treatments would need to take place in order to reach that goal and create mid open and late open seral stage distribution that is needed under a FRCC1.

The proposed timber harvests will create varying amounts of timber activity fuels (slash) in each unit (see Table F2). The increased fine fuel loading may reduce the success of initial attack suppression operations due to the faster rate of spread and the flame lengths >4 feet. Activity fuels treatments would reduce the amount of fuel created from the harvests to the S&G fuel loading of 7-11 tons/acre for 0-3” diameter fuel. Fuels treatments are proposed to be within 1-2 years after the harvest. The reduction in fuel loading would reduce the potential wildfire behavior.

Table F3 displays the changes in fire behavior within the unit of treatment for existing, post harvest, and post fuels treatment conditions. Fire behavior that exceeds 4 foot flame lengths require machinery or aerial support to reduce the risks to tooled firefighters.

Table F3: Existing fire behavior

	Rate of spread (chains/hour)	Flame length (feet)	Crown fire with % mortality	Spotting potential (miles)
FM5	117 ch/hr	13 feet	Active w/ 99% mort	Yes at 0.6 miles
FM10	38 ch/hr	11 feet	Active w/ 37% mort	Yes at 1.5 miles
FM12	37 ch/hr	13 feet	Active w/ 97% mort	Yes at 0.6 miles
Post Fuels Treatment	5 ch/hr	2 feet	Active w/ 12% mort	Yes at 0.6 miles

- Crown fire activity is displayed as *Active*, which means that fire is present in both the surface fuels and canopy fuels.
- FM12 examines the fire behavior of a post harvest unit. FM10 represents the natural fuels UB units.
- Post fuels treatment examines the fire behavior as FM8 because units will have lower fuel loading, higher CBH, and varying canopy density.

In all the units where fuels treatments take place the following S&G would be met.

- reducing fuel loading of 7-11 tons/acre for 0-3” diameter fuel;
- maintaining effective ground cover of 85% or more;
- weight of equipment and machinery would be within range;
- large woody debris at a minimum of 240 linear feet of representative DBH;
- IDT decision to keep overstory mortality at 10% or less.

The proposed treatment of Unit 2001 and 2002 would be a natural fuels underburn. This unit is along 1500705 Road. A natural fuels underburn is completed without harvests in the unit prior to burning. The UB would provide a reduction in fuel loading on the ground, reduce ladder fuels and vertical continuity, and create variations in the canopy closure through tree mortality. Mortality in these stands would be around 20% or less. The units would change from FM10 to a FM8 post UB. The fire behavior post burn aims to reduce the severity of wildfire behavior by reducing the spread potential of ground fire to crown fire, as well as reducing the severity of wildfire. Underburning is a preferred method of treatment not only to reduce hazardous fuels but to return fire to the ecosystem.

Underburns would take place during the spring or spring-like conditions where the soil and duff moisture are damp and fuel moisture in the large woody debri is high. These conditions slow or stop consumption which helps to retain sustainable levels of duff, soil coverage, and large woody debris often used by wildlife. Additionally, mortality of residual overstory trees can be controlled because of high live fuel moistures.

Underburns or broadcast burns may require handlines constructed around the perimeter. These are created prior to the burn and aid in containing the prescribed fire within the unit boundaries. Handlines are created by scraping fuel back to an 18” mineral soil line and scattering fuels that lie within 10 feet of the proposed line. If units are located on a steep slope waterbars are created within the fireline to reduce erosion.

On Units 270, 330, 240, 210 UB-buffers will be used if the unit is treated with an UB. This is to mitigate the need for handline along the unit boundary. Using the shaded and unharvested stand outside of the unit, fire would not be able to move quickly or with much intensity. The fire should not continue to move through the shaded area, thus a natural fire break or natural fire line is used instead of constructing handline. The UB-buffers are small and they fill in the distance from the harvest unit to the road. If fire does move up into the canopy in the shaded area, firefighters will aim to reduce the intensity in the unharvested stand.

Hand, grapple, and landing piles are covered with regulatory plastic following construction. This creates a drier pocket of fuel in the middle of the pile and enables them to be burned in the late fall or early winter when there is very low risk of the piles spreading into other fuels. Removing the plastic before burning is suggested in order to aid in reducing emissions from the plastic.

VII.C.2.*b Cumulative Effects Common to Alternatives B and C*

Cumulative effects are based on management activities that have or would occur in the Ball Park Thin Project Area. The area analyzed displays the direct and indirect effects of fire on the treated units which translate to the variation of fuel profiles over the subwatershed landscape. Proposed fuel treatments, in concert with harvest activities, would help to diversify the fuel profile across the landscape. Future wildfire suppression actions will continue, however the proposed treatments aid in returning the natural disturbance to the landscape. Other future fire/fuels activities may be meadow burns. Bunchgrass Meadow was reviewed for prescribed fire due to the encroaching conifers and the potential loss of the open meadow in the future. Fire could be a proposal for meadow restoration in the next five years. This action would not create any negative effects as S&G would be maintained. No other foreseeable actions are planned within Ball Park Thin Project Area that would contribute incrementally to the cumulative effects from past or currently proposed activities. No adverse effects on the fuel profile or on fire behavior would result from the proposed fuel treatments.

VII.C.2.*c Conclusion to Effects of Alternative B and C*

Alternatives B and C fuels treatments would be conducted following S&G. FRCC 3 and 2 would move closer to FRCC 1. And all prescribed fire UB treatments would reintroduce the disturbance process of fire to the ecosystem.

VII.*D.1. Existing Condition – Air Quality*

The State of Oregon has been delegated authority for attainment standards set by the 1990 Clean Air Act and the 1977 Clean Air Act and its amendments. To regulate these standards, the state developed the Oregon Smoke Management Plan and the State Implementation Plan. These are guidelines and regulations for prescribed fire smoke emissions in Oregon. The Willamette National Forest has adopted this plan for emission control in Oregon (LRMP, 1990).

Designated Areas and Class I Airsheds are priority areas regulated in order to protect air quality. The Willamette Valley (at the eastern side, Leaburg), Oakridge, and Sisters are the closest Designated Areas to Ball Park Thin Project Area (xx, xx, and 33 miles respectively). Mt. Washington, Menagerie, and Three Sisters Wilderness are the closest Class I Airsheds to the Ball Park Thin Project Area (5, 9, and 10 miles respectively). Class I Airsheds are recommended to be protected from visibility impairment July 1 through September 15.

VII.D.2 ***Environmental Consequences – Air Quality***

2.a Direct, Indirect and Cumulative Effects of Alternative A – No Action

If no management actions take place in the Ball Park Thin Project Area no air quality impacts would occur in a scheduled timeframe. However, the risk of wildfire would still exist. In the event of a wildfire, air quality impacts are considerably higher than prescribed fire. Smoke emissions are not short term and can often last for many weeks or months, as witnessed during the Puzzle Fire in 2006 and GW Fires in 2007. Smoke emissions from wildfire are more likely to heavily impact communities and contribute to harmful, concentrated levels of PM 2.5 and PM 10 micrometers. Particulate Matter (PM) is hazardous to our health because the particles are small enough to penetrate through our throat and nose and enter our lungs (http://www.epa.gov/particles/). These are usually from industries, automobiles and fire smoke. Table F3 displays emissions are considerably higher than prescribed fire emissions, posing risk to community residents, forest users, and firefighters. Acreage used for the above wildfire calculation was 1,112 acres, the number of harvest and treated acres in Alternative B.

VII.D.2.*b Effects Common to Alternative B and C*

Prescribed fire of activity fuels in the Ball Park Thin Project Area would comply with Oregon Smoke Management Plan regulations. Smoke emissions would be mitigated based on the timing of the burns, seasonality, forecasted transport wind direction, and weather. Regulations from the Oregon Smoke Management enforce specific days which are suitable to burn in relation to other land owners burning or weather forecasts. Prescribed fire would most likely be avoided between July 1 and September 15 in order to protect visibility standards for Class I Airsheds.

Recreationists and some local residents near Ball Park Thin Project Area may be temporarily impacted by smoke from the prescribed fire underburns or pile burning. In the Oregon Smoke Management Plan, non-harmful concentrations of drift smoke are considered nuisance smoke (Oregon SMP 1995). Mitigation measures, such as signing along the road or near the treatment area, would be taken in order to reduce the amount of nuisance smoke and notifications to the public would be made prior to burning.

Smoke emissions were predicted using the estimates from the debris prediction tables and FOFEM (First Order Fire Effects Model version 5.0). This model calculates particulate matter emitted based on the amount of fuel consumed. Fuel inputs were from the predicted post harvest data and based on a percentage of fuels that would most likely be consumed given the prescribed fire window. That is, weather and fuels dryness would be measured to achieve the objective of reducing the fuel profile across the unit. From past experience, fuels treatments often consume an average of 80% of the fine fuels (0-1 inch diameter), 60% of the 1-3 inch fuels and only about 20% of the 3-9 inch. LWD >9 inches is most often too wet to be consumed. FOFEM however consumes 100% of 1, 10, and 100 hour fuels in spring-like conditions. Table F3 summarizes particulate matter predicted for fuels treatment activities.

Table F3: Summary of particulate matter emissions for Ball Park Thin Project Area for all treatments

	Alternative A – Wildfire	Alternatives B and C

PM 2.5 total	3122 tons/acre	704 tons
PM 10 total	3683 tons/acre	934 tons

It is important to note these emissions levels do not occur at one time. Additionally the model is assuming the ground fuels on the entire unit will be burned, but his is not likely due to GP and HP will not collect all the fuels and may not be through the entire unit. Usually prescribed fires take place one unit at a time, and most likely one per day. For example, Unit 60 of 52 acres is predicted to have 17.1 tons/acre of 0-3" diameter fuel post-harvest. During the underburn, emissions are estimated at 11.4 tons/unit of PM2.5 and 13.1 tons/unit of PM10.

VII.D.2.*c Cumulative Effects of Alternative B and C*

No adverse effects on the air quality would result from the proposed fuel treatments. The area defined for cumulative effects is the Ball Park Thin Project Area, as well as the larger landscape where smoke emissions can travel. These are the locations of the Designated Areas and Class I Airsheds. Neither would be affected from the treatments. Smoke emissions would be short duration and mitigation measures would reduce the quantity of emissions during prescribed burns. Past management activities do not cumulatively add to air quality impacts from the proposed treatments. No other foreseeable management activities that would affect air quality are scheduled to occur in the Ball Park Thin Project Area.

VII.D.2.*d Conclusion of Effects of Alternative B and C*

Mitigation measures to reduce quantity of smoke emissions from burns would be to conduct UB in spring-like conditions (as stated in the fuels treatment section). Pile burning will be done in the winter where fires will burn dry material due to the covering and be highly unlikely to spread past the pile perimeter. All treatments should meet the S&G and Air Quality Regulations.

VIII. Cost of Project Treatments

The expected cost used in this analysis was developed for the McKenzie River RD in 2007 for all areas non-wilderness. Treatment costs were established as follows:

- Underburning - $850/acre (this includes prep, burning, and mop-up)
- Hand piling - $900/acre (this includes construction, covering and burning)
- Grapple piling - $600/acre (this includes construction, covering and burning)

Many complex objectives on each unit increase planning, preparation, and implementation time, thereby increasing the cost per acre. All treatment costs are less than the expected loss of resources and/or structures to wildland fire. Returning fire back into the ecosystem through the proposed actions would meet objectives defined in the Purpose and Need. Fuels treatments are selected on effectiveness at meeting resource objectiveness.

Table F4 below estimates the costs on the high end for Alternative B and C. The UB acres are for the maximum number of acres that could be underburned. The resultant

DBH in each unit post harvest would determine if the unit is UB or piled. Some units would receive both grapple piling and hand piling treatments depending on topography. These units are calculated using the GP costs.

Table F4: Estimated Treatment Costs By Alternatives

Treatment	Cost/ac	Acres B/C	Cost B/C
UB	$850	614	$521,900
HP/burn	$900	100	$90,000
GP/burn	$600	357	$214,200
Total Est. Cost			$826,100

IX. Monitoring

Fuels treatments would be monitored prior to treatments and also post treatments. Fuel loading would be evaluated, documented, and used in models to compose burn plans and also learn from treatments. Digital photos should be taken pre and post treatment in order to have a visible image of the changes that occur on the unit.

Attachment F1

Terminology

- Broadcast burn – prescribed fire with little or no standing tree vegetation

- Crown Base Height – the lowest canopy branches to the ground. Also it can be the fuel ladder from the height of ground fuel, through the next layer of shrubs or trees, up to the branches of the tallest trees.

- Fuel Loading – refers to the amount of fuel present in terms of weight per unit area. Fuels are expressed by size and hours required to dry.
    - 0” – .24” or 1 hour fuels
    - .25” – .99” or 10 hour fuels
    - 1.0” – 2.99” or 100 hour fuels
    - ⩾3.0” or 1000 hour fuels

- Fuel Models – quantify surface fuel loading, arrangement, structure. The primary fuel that carries the fire is the general classification key for fuel models, i.e. grass, timber litter, brush or timber slash.

- Fire Regime – describes the historic role of fire on the landscape. Fire regimes for Oregon and Washington are from the 1999 National Fire Strategy and are redefined for Region 6 based on common severity type, and the frequency of that expression on the landscape.

Fire regime group for R6	Frequency (Fire return interval)	Severity
I	0-35 years	Low severity (underburn)
II	0-35 years	High severity (stand-replacing)
III A	< 50 years	Mixed severity
III B	50-100 years	Mixed severity
III C	100-200 years	Mixed severity
IV A	35-100 years	High severity (stand-replacement), juxtaposed
IV B	100+ years	High severity (stand-replacing), patchy arrangement
IV C	100-200 years	High severity (stand-replacement)
V. A	200-400 years	High severity (stand-replacing)
V B	400+ years	High severity (stand-replacing)
V C	No Fire	
V D	Non-forest	

- Fire Regime Condition Class (FRCC) describes the degree of departure of current vegetation from the historic fire regime (Hann, et.al. 2004). FRCC 1, 2, and 3 ranks the degree of departure with the following:
    - FRCC 1
        - Fire regimes near historic range (departure is no more than one return interval)
        - A low risk of losing key ecosystem components
        - Vegetation attributes are functioning within historical range
    - FRCC 2

        - Fire regimes have been moderately altered from historical range; moderate changes in fire size and intensity has resulted
        - Moderate risk of losing key ecosystem components
        - Vegetation attributes have been moderately altered
    - FRCC 3
        - Fire regimes have been significantly altered from their historical range; dramatic changes in fire size and severity has resulted
        - Severe loss of ecosystem components
        - Vegetation attributes have been significantly altered
- FRCC is mapped and calculated using three steps:
    - determination of vegetation-fuel condition class
    - determination of fire frequency/severity condition class
    - determination of stratum fire regime condition class

Attachment F2

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Heritage Resources
Specialist Report

Ball Park Timber Sale Thinning Project

Willamette National Forest
McKenzie River Ranger District

Linn and Lane County, Oregon

/s/ Cara M. Kelly
May 5, 2008
Cara M. Kelly
Archaeologist

HERITAGE RESOURCES

Ball Park Timber Sale Thinning Project EA
Willamette National Forest
McKenzie River Ranger District
December 14, 2007

Introduction

The purpose of this report is to analyze the effects of Timber Sale Harvest activities proposed under the Ball Park Timber Sale Thinning Environmental Analysis (EA) on cultural resources. Heritage resources are fragile and irreplaceable resource that chronicles the history of people utilizing the forested environment.

Regulatory Framework

The legal framework that mandates the Forest Service to consider the effects of its actions of heritage resources is wide-ranging. In this case, Section 106 of the National Historic Preservation Act (NHPA) of 1966 (amended in 1976, 1980, and 1992) is the foremost legislation governing the treatment of cultural resources during project planning and implementation.

Implementing regulations that clarify and expand upon the NHPA include 36 CFR800 (Protection of Historic Properties), 36 CFR 63 (Determination of Eligibility to the National Register of Historic Places), and 36 CFR 296 (Protection of Archaeological Resources), the 1994 Programmatic Agreement (PA) (amended in 2004) among the USDA Forest Service PNW, the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Officer Regarding Cultural Resource Management in the State of Oregon by the USDA Forest Service.

The National Environmental Policy Act is also a cultural resource management directive, as it calls for agencies to analyze the effects of their action of social-cultural elements of the environment. Laws such as the National Forest Management Act (NFMA) of 1976, the Archaeological Resources Protection Act (ARPA) of 1979, the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, and Executive Order 13007 (Indian Sacred Sites) also guide the Forest Service decision making as it related to heritage resources.

The Willamette National Forest Land and Resource Management Plan tiers to the previously mentioned laws and corresponding Forest Service manual direction as it sets forth standards and guidelines that specify procedures for complying with all mandates for Federal Laws, acts, executive order and Federal regulations. Forest-wide management standards that are pertinent for this heritage resource effects analysis include:

- A cultural resource inventory shall be conducted for each proposed ground-disturbing activity and administered by a qualified archaeologist. The results of the inventory will be documented in a report which will serve as a planning document.

- The Forest's survey design strategy for cultural resource inventories shall be used to guide the inventory.

- Properties that may be affected by project activities will be evaluated using the criteria for eligibility to the National Register of Historic places.

- Measures shall be developed to protect significant sites from adverse effects due to ground disturbing and other activities.

Analysis Methods

The field methods were developed in accordance with the guidelines set forth by the Oregon State Historic Preservation Office and the Willamette National Forest Inventory Plan.

The objective of the Ball Park planning area survey is to identify all heritage sites within the area of potential effect of the project. Monitoring of previously identified sites within the project planning area is also performed, where feasible. The survey design included all areas of potential effect. This included identified harvest units and accompanying impact zones (e.g., landings, and road work). In accordance with the Willamette National Forest's Inventory Plan, 100 percent survey coverage of high probability areas and at least 20 percent coverage of low probability areas shall be performed. Utilization of information from prior surveys and the identification of known site locations were incorporated into the research design.

Description of Field Surveys

The archaeological survey of the Ball Park Thinning Timber Sale was conducted in order to comply with the above stated laws and regulations (see regulatory framework). A systematic surface pedestrian search is the principal manner for implementing the mandated goals.

Ground surveys for the proposed Ball Park timber sale occurred between August 20 and September 11, 2007. Surveys were conducted under contract by Warm Springs Geo Visions Cultural Resources Department for the Willamette National Forest. Pedestrian transects with 15 to 20 meter spaced intervals followed a specific orientation based on factors that included the shapes of units and landforms and the possible presence of historic Indian or Euro-American travel routes. One-by-one meter shovel scrapes made with entrenching tools exposed mineral soil every 20 to 30 meters in areas where dense vegetation limited ground visibility. Bearing orientations were followed to the best of abilities, but adjustments in orientation, spacing intervals, and shovel scrape spacing were made in order to avoid dangerous or unreasonable conditions (e.g., exceptionally steep slopes or impenetrable vegetation). The surveyor's utilized Garmin Etrex Summit™ Global Positioning System units to record transect routes for accuracy of coverage and compass and tape techniques were also utilized (Gauthier et al. 2007). A total of 872 acres were survey consisting of 737 high probability and 135 low probability acres.

Existing Condition

The prehistory and history of the McKenzie River drainage have previously been summarized in Cultural Resource Overview for the Willamette National Forest, Western Oregon (Minor and Pecor 1977) the ten-year update of the above overview (Minor 1987) Prehistory and History of B. L. M. Lands in West-Central Oregon: A Cultural Resource Overview (Beckham, Minor, and Toepel 1981) Archaeology of Oregon (2nd Edition) (Aikens 1986), Cultural Resources Survey Report for the Ball Park Project Planning Area (Gauthier et al. 2007) and numerous other publications. These documents provide adequate detail of ethnographic and historic background for this report.

Ethnographic research has indicated that pre-contact and early historic aboriginal groups, probably the Molala, Kalapuya, and their ancestors used the general area for the main purpose of seasonal hunting, fishing, and plant gathering. In 1855 the surviving Molala and Kalapuya people signed the Dayton Treaty, which gave up all rights to land in the western Cascades and led to their removal to the Grand Ronde Reservation. By the end of the nineteenth century, the Kalapuya were reduced to less than 20% of their original numbers and only 31 Molalas remained.

Pre-contact resources include chipped obsidian lithic scatters and obsidian lithic isolates, representing tool use, modification, or manufacture related to hunting and gathering. Ongoing stone tool analysis, both by agency archaeologist and contractors, suggests that this portion of the Cascades was occupied primarily by people indigenous to the Cascades. Those people were probably ancestral to the Molala people that were involved in early but unratified treaties of the 1850s.

Ethnographic evidence suggests that several highly mobile groups indigenous to the western Cascade Mountains lived during the winter along low elevation streams, accessing the uplands during the summer and fall to hunt game and gather berries and other important plant resources. The Molala are linguistically related to Willamette Valley groups, but are thought to be a montane-based band that were living in the western Oregon Cascades during the historic period. The Molala generally are known to be split into two subgroups: the Northern Molala located in the vicinity of Mount Hood's drainage systems and the Southern Molala located west of the Klamath Lake area. Little is known of a third group, referred to as the Upper Santiam/Santiam band of Molala know to have occupied Linn and Lane counties in areas between the Northern and Southern groups. The Molala are also often culturally grouped with the Kalapuya who were based in the Willamette Valley but probably made seasonal forays to the Cascades for large game and berries. Many of the Molala and Kalapuya were removed to the Grand Ronde Reservation in western Oregon after the signing of the Dayton and Molalla Treaties of 1855) Other Molala shifted to the Siletz Reservation along the Oregon coast, the Klamath reservation the to the south and east into Central Oregon where they were absorbed into the Confederated Tribes of Warm Springs Reservation of Oregon.

Extensive trail networks were important for traversing the Cascade Mountains, linking the Molala Indians with each other, surrounding tribes and important resource procurement and trade centers.

Plant food resources commonly used by Native Americans in the Ball Park project area include of sword and bracken fern, western red cedar, oceanspray, Oregon grape, huckleberry, strawberry, thimbleberry, hazelnut and sedges.

Historic accounts document the presence of horse-mounted Warm Springs Indian traveling into and through the area in the late 1800s and early 1900s (Williams 1988); these seasonal travels were motivated by the need for forage for horses, huckleberry gathering, inter-tribal contacts and visiting, hunting, fishing, trading with white settlers, and travel to seasonal cash employment, such as picking hops in the Willamette Valley (Bergland 1992).

The earliest recorded permanent Euoamerican settler in the vicinity was John Templeton Craig, who homesteaded at Craig's Pasture (now McKenzie Bridge) in the 1860s. The prospect of a toll road over the McKenzie Pass began to draw settlers into the area after 900 cattle and nine wagons made it over the pass on a rough track (the Scott Wagon Road) in the fall of 1862.

The Town of Blue River was founded in 1886. Subsistence hunting, farming, and stock raising were the primary lifestyles of the early settlers. A greater influx of people into the area was encouraged by the passage of the Forest Homestead Act in 1906, which allowed homesteaders to claim land set aside as national forest.

The first sawmill in the region was opened on the lower McKenzie in 1851 however systematic logging of huge forest did not occur until the 1890s. Hwy 126 was constructed by the CCC in the 1930s the Belknap CCC camp formerly occupied the site of the McKenzie River RD.

Historic use Administrative use appears in the form of trails and early logging activity. The Santiam NF Maps (1913, 1931) and the Cascade National Forest 1925 map depict several historic or prehistoric trails crossing through the project area. These include the Castle Rock Trails and trails to Deathball Rock and Thors Hammer. Several historic structure clustering around the Blue River, McKenzie Bridge, and Rainbow areas are visible on Forest Service maps dating back to the 1920s. A historic ranger Station at McKenzie Bridge, along with the paradise and blue River Guard stations, is also noted on Forest Service maps between 1913 and 1931. The Belknap CCC camp was located at the present site of the McKenzie River ranger Station (Gauthier et al. 2007).

Environmental Consequences

The site types recorded within the Ball Park project area include lithic scatters and lithic isolated finds. The sites are considered potentially eligible to the National Register of Historic Places (NRHP) and must be protected from project activities or evaluated to determine their eligibility to the NRHP. The proposed Ball Park Thin Timber Sale has the potential to affect one of the known cultural sites 06180100586.

Direct and Indirect Effect Alternative 1(No Action)

Implementation of the no action alternative would not directly nor indirectly affect cultural resources since there would be no change to the integrity of heritage resource sites.

Direct and Indirect Effect-Alternative B and C

Implementation both of these alternatives would result in ground disturbance on 915 acres of timber harvest, less than 3.0 miles of temporary spur road construction, .53 miles of road decommissioning, 43.9 miles of road maintenance and 91 acres of natural fuels underburn. Since appropriate and approved surveys and cultural site protection measures are already in place for this project (see Mitigation Measures Chapter 2), then potential direct effects would be in the form on inadvertent damage to the integrity of cultural resources which were not discovered during initial survey. Any sites uncovered during implementation of the project would require the application of Design Measures described in Chapter 2.

Cumulative Effects
Cumulative Effects Common to All Alternatives

It is not anticipated that there would be cumulative effects to the potentially eligible cultural resources in the Ball Park Timber Sale Project Area from any of the proposed actions as long as the Heritage mitigation and Design Criteria are implemented prior to timber harvest and associated activities

State Historic Preservation Office consultation has been completed under the terms of the 1995 Programmatic Agreement (amended 2004).

Mitigation Measures and Design Criteria

The proposed mitigation measures for the Ball Park Thin Timber Sale are listed below and cover all alternatives. They are based on the results of the field inventory and information gleaned form the District's cultural resource files. **<u>Information specific to heritage resource location and content is exempt from disclosure under the Freedom</u>**

Information act (FSM 6271.2). In order to facilitate the decision-maker, the information will be made available to him.

Mitigation Measures

- A 150 foot buffer and directional falling of trees away from the buffer will adequately protect site 06180400586 (TSO and Layout crew need to work with the Archaeologist to insure proper buffer width).

- The zone archaeologist will conduct post-harvest monitoring to document the condition of the above listed cultural site.

Design Criteria

- All NRHP eligible sites and potentially eligible sites must be avoided during all project activities.

- Changes to the current unit configurations and/or the addition of any new units, will require consultation with the District Archaeologist in order to protect known and unknown heritage resources.

- Project activities planned outside of the area defined in the heritage resource inventory schema must be coordinated with the district archaeologist prior to initiation. This includes the establishment of harvest landings, helicopter landings, guy-line equipment anchors, slash burning, removal of roadside danger trees, and ripping of temporary spur roads.

- Although no other surface or subsurface evidence of cultural resources was found in the proposed project, there remains the possibility that buried prehistoric or historic cultural resources area present and could be uncovered during project activities. If cultural resources are encountered during the course of this project, earth-disturbing activities in the vicinity of the find must be suspended, in accordance with federal regulations, and the zone archaeologist notified to evaluate the discovery and recommend subsequent course of action. Therefore, contract clause BT6.24 must be included in all project prospecti and contracts. The contract clause outlines the procedures to follow in the event heritage resources are discovered during timber sale operations.

Consistency with Direction and Regulations

Cultural site 06180100586, 06180700034 are potentially eligible for inclusion to the NHRP. All sites that have been evaluated as eligible or potentially eligible will be strictly avoided during ground-disturbing activities. Log landings or other ground disturbing activities will not be permitted near the eligible or potentially eligible historic properties.

Irreversible/Irretrievable Commitments

There are no irreversible and irretrievable commitments that would affect heritage resource by implementing any of the proposed alternatives.

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