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Environmental Assessment

Two Bee Landscape Management Project

**McKenzie River Ranger District
Willamette National Forest
Lane and Linn Counties, Oregon**

**Legal Locations: Within T.13S, R.6E, T.13S, R.7E, T.14S, R.6E, T.14S, R.7E, and
T.15S, R.6E; Willamette Meridian.**

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Figure 1

**Willamette National Forest
McKenzie River Ranger District
Two Bee Project Area**

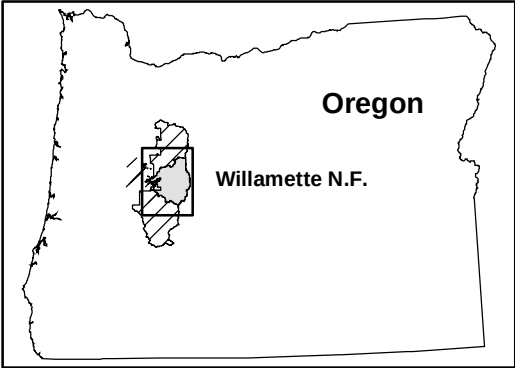
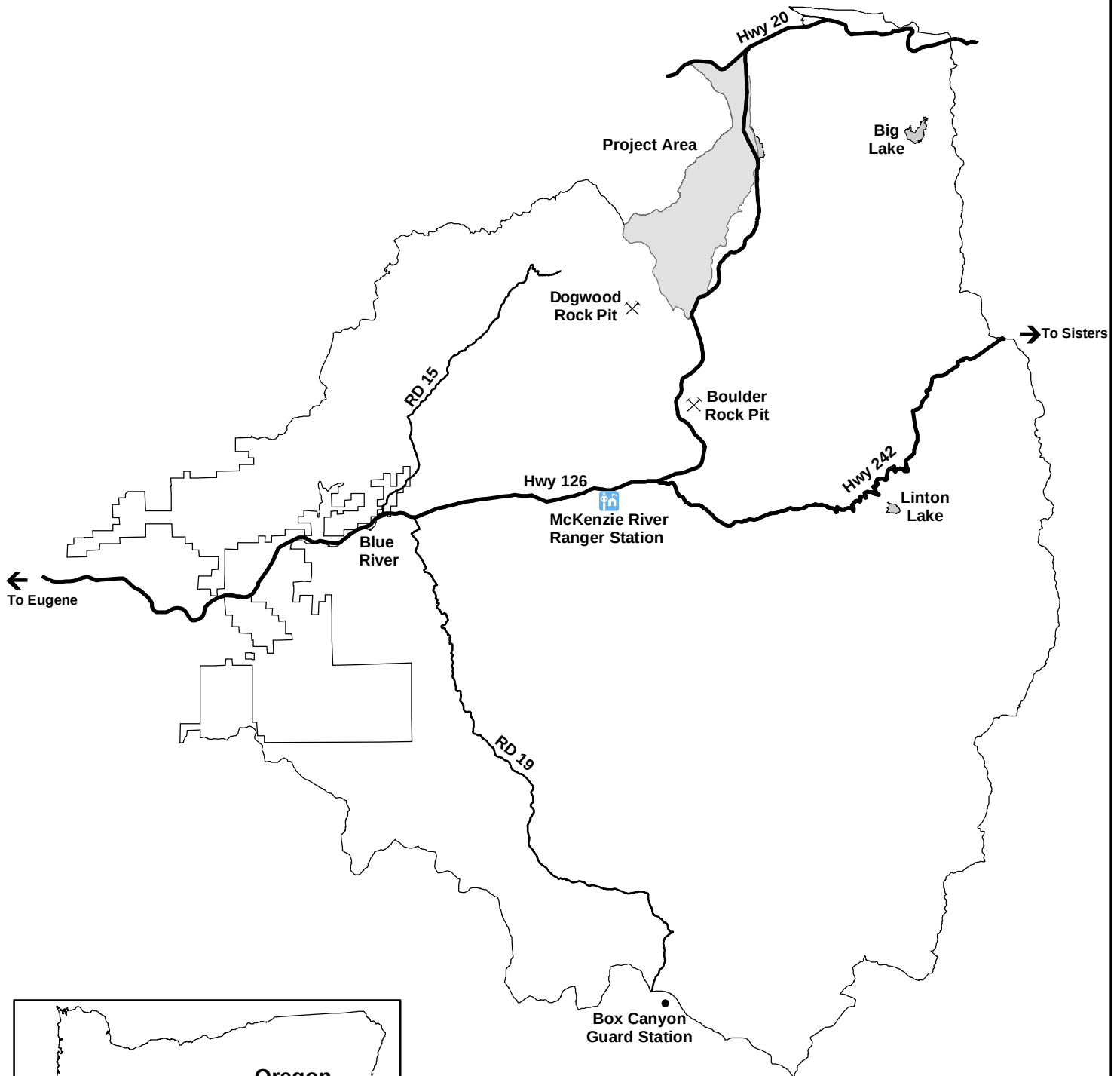


Table of Acronyms:

ACS	Aquatic Conservation Standards
ARP	Aggregate Recovery Percentage (hydrologic recovery)
dbh	Diameter breast height
DN/FONSI	Decision Notice/Finding of No Significant Impact
EA	Environmental Assessment
EIS	Environmental Impact Statement
EWEB	Eugene Water And Electric Board
FEIS	Final Environmental Impact Statement
IDT	Inter-disciplinary Team
MIS	Management Indicator Species
MRRD	McKenzie River Ranger District
MMBF	Million Board Feet
NEPA	National Environmental Policy Act
NFS	National Forest System
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
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 parts:

- **Purpose and Need:** The 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.
- **Comparison of Alternatives, including the Proposed Action:** This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- **Environmental Consequences:** This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by first disclosing the effects on significant issues, followed by the other issues addressed during scoping. Within each section, the affected environment is described first, followed by the effects from the proposed action (Alternative B), Alternatives A and C, and finally the effects of Alternative D – No Action, which provides a baseline for evaluation and comparison.
- **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.

Introduction

The Two Bee Landscape Management Project occurs within the Upper McKenzie River Watershed on the McKenzie River Ranger District. Proposed actions would generally be located on the McKenzie River Ranger District, within the 12,456-acre project area that lies west of the McKenzie River, north of Trail Bridge Reservoir, and to the District boundaries west and north. Major drainages include in the Hackleman Creek, Smith River, and Bunchgrass Creek. Elevations in the project area range from 2,300 ft. at Trail Bridge Reservoir to 5,200 ft. at Bunchgrass Mountain.

Legal description of the project: T.13S, R.6E, Sections 25 and 26; T.13S, R.7E, Sections 29-31, and 32; T.14S, R.6E, Sections 12-14, 22-28, and 33-36; T.14S., R.7E., Sections 5-8, 17-20, 30, and 31; T.15S., R.6E., Sections 1-3, 11, 12, and 36; Willamette Meridian; Lane and Linn Counties, Oregon.

Purpose and Need for Action

The purpose of this proposal is to contribute timber products to meet the harvest level allocated to the McKenzie River Ranger District, to manage the stands in the Two Bee Project Area to achieve the desired conditions described in the Two Bee Landscape Analysis (Appendix J), and to respond to findings and recommendations from the Upper McKenzie Watershed Analysis (USDA Forest Service. 1995).

Actions are needed to:

- Provide approximately 11 million board feet (MMBF) of timber products from young and mid-seral stands in the General Forest/Matrix management area, which will help meet the allocated timber harvest levels for the McKenzie River District for fiscal year 2007.
- Manage the forested landscape to achieve the target landscapes described in the Two Bee Landscape Analysis. Stand treatments would enhance growth and vigor while providing critical forest habitat components for big game, and other wildlife and aquatic species.
- Implement findings and recommendations in the Upper McKenzie Watershed Analysis applicable to Landform Block 2B to meet Aquatic Conservation Strategy objectives. Actions include reinitiating disturbance to the landscape with stand treatments prescribed fire, implement road restoration projects to improve hydrologic conditions and reduce the miles of road in the watershed, thinning young stands, and through partial cutting in riparian reserves to enhance growth for development of large trees.

Provide Timber Products from the National Forest

This project is located predominately within the Matrix Management Area allocation, as designated in the 1990 Willamette National Forest Land and Resource Management Plan, as amended (Willamette Forest Plan or Forest Plan) (USDA Forest Service. 1990). There is need to manage the project area to

provide multiple-use benefits, as directed 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), which led to the Record of Decision and 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).

Achieve the Target Landscapes from the Two Bee Landscape Analysis

In early 1999, and prior to initial public scoping on the proposed action, the McKenzie River District Interdisciplinary Team (IDT) prepared a landscape analysis for the analysis area. The landscape analysis presented landform delineations based on fire regimes for the entire 30,667-acre landscape that includes most of Landform Block 2B from the Upper McKenzie Watershed Analysis (USDA Forest Service. 1995). The boundary for the landscape analysis area includes lands administered by both McKenzie River and Sweet Home Ranger Districts.

The results provided the interdisciplinary team a way to understand and define how disturbances such as fire and floods affected this landscape historically. The frequency and intensity of disturbances influenced the capability of the landscape to grow and maintain certain habitat types over time. However, fire as a disturbance has been generally missing from this landscape for several decades due to fire suppression. Timber harvest has replaced fire as the primary disturbance since the 1950s.

The landscape analysis led to the development of “target landscape” descriptions that became subsets of the larger landscape, often defined by smaller scale geographic influences. The target landscapes describe the pattern of forests and non-forest habitats in terms of their types, shapes, sizes, and arrangement on the landscape. Human expectations and values were also considered for the landscape within the Willamette Forest Plan, as amended. The landscape analysis which describes the current conditions and target landscapes can be found in Appendix J.

Proposed actions to modify current stand conditions in Fire Regimes 2B-1 and 2B-2 would maintain or develop conditions on the landscape that reflect the desired conditions within these Target Landscapes. The current condition of these two Fire Regimes is described as a mosaic of early, mid, and late serial forest resulting from timber harvest and fire suppression. The landscape is dominated by large patches of even-aged, mature forested stands with scattered individual and clumps of larger remnant trees. Fire Regime 2B-1 is dominated by Pacific silver fir plant communities, and Fire Regime 2B-2 is dominated by western hemlock plant communities.

This project is designed to achieve the target landscapes in the project area, by retaining large patches of even-aged, forested stands, and commercially thinning or partial cutting early and mid-seral forested stands to improve growth of the larger trees while adding fine scale disturbance to the landscape.

Respond to Watershed Analysis Findings and Recommendations

The Aquatic Conservation Strategy in the 1994 Northwest Forest Plan included a requirement to prepare comprehensive watershed analyses for all fifth field watersheds. Watershed Analysis documents (WAs) were then completed for most watersheds on the Forest in the succeeding two to four years following release of the Northwest Forest Plan in 1994. The Upper McKenzie WA was completed in August 1995. A portion of the watershed within this project area has been designated “Key Watershed”. (Appendix E, Key Watershed Map – Upper McKenzie Watershed.)

The March 2004, Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy (USDA Forest Service and USDI Bureau of Land Management. 2004), requires that “a project record for a project with Riparian Reserves must: (1) describe the existing condition, including the important physical and biological components of the fifth field watersheds in which the project area lies; (2) describe the effect of the project on the existing condition; and (3) demonstrate that in designing and assessing the project the decision maker considered and used, as appropriate, any relevant information from applicable watershed analysis.” The proposed action in the Two Bee Project Area includes Riparian Reserves, and descriptions and disclosure of effects can be found in Chapters 2 and 3, along with Appendix B, Fisheries Biological Assessment).

Below are examples of how this project responds to a wide range of findings and recommendations in the Upper McKenzie WA:

- Stand treatments to maintain or enhance riparian reserves is included. Treatments would specify recommended protection measures from the Upper McKenzie WA to remain consistent with Aquatic Conservation Strategy objectives.
- Disturbance is reinitiated at various levels with this proposal. Prescribed fire is used to reduce activity generated slash. One alternative would apply natural fuels prescribed fire to the landscape.
- Alternatives include regeneration timber harvest, which are designed to mimic past fire effects by varying the size and shape of openings and modifying the complexity of structure. Stand treatments would result in a mosaic of large and small patches.
- Early seral habitat is managed to provide structure in future mid seral stands by proposing stocking control through pre-commercial and commercial thinning.
- Blocks of late successional habitat is maintained within the Matrix to interconnect with corridors, stepping stones, or permeable mid seral habitat to provide for late successional habitat dependent species.
- Road restoration work is included in all action alternatives.

Proposed Action

The District Ranger on the McKenzie River Ranger District proposes to harvest timber on 825 acres of the Two Bee Project Area, which would yield approximately 10.8 million board feet (MMBF) of wood products. This proposal, represented in Alternative B in this EA, would include moderate partial cutting on 591 acres, moderate partial cutting with multi-story objectives on 121 acres, commercial thinning on 87 acres, and salvage on 26 acres. The timber sale from this proposal would likely to occur over a four year time span, beginning in fiscal year 2007.

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

Yarding Systems: Ground-based yarding systems would be used on approximately 578 acres, skyline yarding would occur on 176 acres, and helicopter yarding on 71 acres. Two helicopter landings would be located along Forest roads 2676-655 and 2676-681. Each landing would be approximately .5 acres in size.

Road Closures and Decommissioning: Activities are proposed to close Forest roads in the project area to reduce erosion and improve wildlife habitat. The proposed action would close a total of 7.5 miles of currently open roads. Gates would be installed on 3.8 miles and earthen berms would be built to close 3.3 miles. Decommissioning is planned for 0.4 miles of open roads in addition to 2.7 miles of currently closed roads.

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 21.6 miles of Forest roads during operations and upon completion of sale activities. Another 4.4 miles of road would be maintained for rock haul. The culvert at the Ikenick Creek crossing on road 2672-675 would be improved to pass 100-year flows, also allowing passage for aquatic wildlife species. Stream crossings on road 2672 and 2672-655 would be redesigned to prevent overtopping when beaver activity impairs culvert function.

Logging Slash Treatment: Slash would be treated with underburning, and by burning landing piles, hand piles, and machine piles after harvest. These treatments would reduce the slash fuels created by timber harvesting and re-introduce fire to the landscape within the harvest units. Yarding the tops attached to the last log and limbing at landings would also prepare fuels for slash burning at landings.

Rock Pit Development: The proposed action requires the connected action of expanding two nearby rock pits. The Boulder Rock Pit is located on Forest Road 2653-704 and the Dogwood Rock Pit is located on Forest Road 2655-507. The development of the rock pits is needed to supply crushed rock and rip rap for maintenance work of roads accessing the Two Bee Project area. It is estimated that less than 10,000 cubic yards of crushed rock and riprap would be needed.

Post Sale Resource Enhancement Projects: Post-sale activities include aerial fertilization of timber stands, pre-commercial thinning, conifer pruning, noxious weed control, browse cutback, diversity thinning, forage seeding, pond habitat improvement, snag and down wood creation, native seed application, and the re-vegetation at water source #1724. (Chapter 2, pages 48 and 49.)

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 actions benefit the public and are in their best interest.

With these assurances the Responsible Official must decide:

- Whether or not to accept 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 Forest Plan, 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, and all subsequent NEPA analysis for amendments, including 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 is also 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 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 where timber production is a management goal.

Table 1 displays Management Area acres as designated in the amended Willamette Forest Plan for the project area. The table also includes the overlying land allocations from the 1994 Northwest Forest Plan. Six of the Northwest Forest Plan allocations are present and consist of Congressionally Reserved, 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 Willamette Forest Plan Management Area acres. Riparian Reserves within harvest units are displayed in Chapter 3, in the Water Quality/Aquatic Resources section. Maps of management areas corresponding to both the Willamette Forest Plan and the Northwest Forest Plan can be found in Appendix E.

Table 1: Management Areas.

Willamette Forest Plan Management Areas	Northwest Forest Plan Land Allocations	Acres
4 – Research Natural Areas	<i>Administratively Withdrawn</i>	3
5a – Special Interest Areas	<i>Administratively Withdrawn</i>	731
6d – McKenzie River Wild & Scenic River (Rec)	<i>Congressionally Reserved</i>	1,189
7 – Old Growth Groves	<i>Administratively Withdrawn</i>	80
9d – Wildlife Habitat-Special Areas	<i>Administratively Withdrawn</i>	957
10b – Dispersed Recreation, Semiprimitive Motorized	<i>Administratively Withdrawn</i>	54
11a – Scenic-Modification Middleground	<i>Matrix</i>	3
11c – Scenic-Partial Retention Middleground	<i>Matrix</i>	2,260
11e – Scenic – Retention Middleground	<i>Matrix</i>	120
11f – Scenic – Retention Foreground	<i>Matrix</i>	607
13a – Special Use Permit Areas	<i>Administratively Withdrawn</i>	3
14a – General Forest	<i>Matrix</i>	4,923
16b – 100-acre Late Successional Reserves	<i>Late Successional Reserves</i>	418
Adaptive Management Area	<i>Adaptive Management Area</i>	1,108
Total Acres		12,456

The following briefly discusses the goals of the Forest Plan Management Areas where harvest units or other management actions are included in action alternatives. Harvest unit prescriptions may vary by alternative. See Chapter 2, Tables 2, 6, and 10, for prescriptions by alternative.

MA-6d, Designated Wild and Scenic River – McKenzie River**Timber harvest unit 3 is within MA-6d.**

The McKenzie River is designated as a Wild and Scenic River within the project area. This designation has a “Recreation” River Class because it possesses numerous outstandingly remarkable values such as *prominent recreational opportunities, spectacular scenery, unique geological attributes, and diverse fish populations and habitat*. In 1993, the Upper McKenzie River Environmental Assessment and Management Plan was completed to comply with laws from the 1968 National Wild and Scenic Rivers Act. This comprehensive River Management Plan tiered to the 1990 FEIS and ROD for the Willamette Forest Plan. The Wild and Scenic River Environmental Assessment and Plan implement several amendments to Willamette Forest Plan Standards and Guidelines. Amendment number 7 removes Management Area MA-6c and establishes MA-6d. This change adjusts the management area boundary and allows for programmed timber harvest within the river corridor.

The Upper McKenzie River is divided into WSR segments A, B, and C. This project proposes approximately 41 acres of timber harvest in unit 3, a moderate partial cut. The unit occurs on the upper slopes in Segment B, and has been designed to meet the Visual Quality Objective of Partial Retention in the viewable area within and above the Wild and Scenic River corridor. This unit is consistent with current Willamette Forest Plan standards and guidelines for MA-6d. .

Oregon State Scenic Waterway – Segments of the upper McKenzie River within this project area are also in portions of the Oregon State Scenic Waterway, which is administered by the Oregon State Parks and Recreation Commission. No timber harvest or any other management actions are proposed within the State Scenic Waterway. See Chapter 3, page 148, – Compliance with Other Laws, Regulations and Policies, State Laws.

MA-9d, Wildlife Habitat – Special Areas**Timber harvest unit 18 is within MA-9d.**

The goal of this management area is to protect or enhance unique wildlife habitats and botanical sites that are important components of healthy, biologically diverse ecosystems. No programmed timber harvest shall be scheduled. Vegetative treatments, including commercial harvests, should be permitted if necessary to meet established wildlife objectives. Sustained timber production is not a Management Area objective.

A Special Wildlife Habitat Area (SWHA) Management Plan has been completed for the Smith Ridge SWHA. The prescription for unit 18 follows recommendations from the SWHA for developing late successional characteristics into the future in the proposed action. Culvert replacement projects are also proposed in MA-9d to provide aquatic wildlife passage for road crossings over Ikenick Creek.

MA-11c, Scenic, Partial Retention Middleground

Timber harvest units 33, 34, and 39 are within MA-11c on the slopes above Smith Reservoir.

Natural fuels prescribed burning units 90 and 91 are also in MA-11c.

The goals for this visually sensitive management area are to maintain a moderate level of scenic quality, and also to manage for other resource goals including wildlife habitat, recreation, watershed, and timber production. Timber harvest in MA-11c is scheduled to occur at a rate of 10% for the first 10 years, or a 100-year rotation.

This allocation is located along the mid-slopes of the McKenzie River valley and is also within the Upper McKenzie Wild and Scenic River, MA-6d, in the Two Bee project area. It consists of the middleground viewshed along State Highway 126 and above Smith Reservoir. State Highway 126 is a major state transportation route and is included in the McKenzie-Santiam Pass National Scenic Byway system.

MA-11f, Scenic – Retention Foreground

A portion of timber harvest unit 1 occurs within MA-11f.

The goal of this management area is to create and maintain desired visual characteristics of the forest landscape through time and space. Visually sensitive landscapes will be managed for a high visual quality. This area may be managed for other resource goals including maintenance of wildlife habitats, recreation opportunities, watershed protection, and timber production. The maximum area in a disturbed condition should not exceed 10% of the acres available and suited for timber harvest in the management area.

The area located along State Highway 126 and within the foreground of the National Scenic Byway system is in MA-11f. Unit 1 is located on the west side of State Highway 126 near the Clear Lake Lodge entrance road.

MA-14a, General Forest

Timber harvest units 1, 2, 4, 6, 7, 10, 11, 13, 21, 22, 23, 24, 27, 29, 30, 31, 40, and 41 are 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 widely distributed over the Two Bee project area. Temporary roads, which are within units 6, 7, and in the upper portion of unit 3, would all be built in MA-14. Restoration projects in MA-14a include road maintenance on roads to access harvest units, road closures, and decommissioning.

MA-15, Riparian Reserves

Timber harvest units which include riparian reserves are listed in Chapter 2, Table 18.

Riparian Reserves are one of the six 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 usually include at least the water body, inner gorges, all riparian vegetation, 100-year floodplain, landslides, and landslide-prone areas. Reserve widths are based on some multiple of a 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. An assessment on how all alternatives meet the ACS can be found in Appendix A.

With the exception of Units 2, 8, 11, 13, 21 and 40, all stand treatment units include MA-15 in the proposed action (Alternative B). See Chapter 2, Table 17, Riparian Reserve Management for riparian reserve treatment guidelines. Maintenance and reconstruction of existing timber haul roads, including stream-crossing improvements for roads crossing Ikenick Creek, would occur in MA-15.

All action alternatives have management activities that occur in Riparian Reserves, such as thinning, partial cutting, activity fuels treatments, natural fuels prescribed underburning, post-sale resource enhancement, and road restoration projects, and are consistent with ACS objectives (Appendix A).

Other Ownership

The project area includes National Forest System (NFS) lands only.

Public 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 Two Bee Landscape Management Project under the current proposed action in June 2005. On June 10, 2005, the McKenzie River Ranger District sent a public scoping letter with preliminary information about this EA to a project mailing list of 41 interested individuals, agencies, tribal governments, and elected representatives. The scoping letter described the proposed action to implement timber harvest in even-aged mature and mid-seral timber stands, to close and decommission roads, and to develop rock pits to meet the needs of road maintenance. The letter also provided a purpose and need for action, a summary of the proposed action, a brief summary of early issues, and alternatives actions. The Two Bee Project has been listed in the Forest Focus – the

quarterly schedule of proposed actions (SOPA) for the Willamette National Forest, since Summer 1999.

An earlier environmental assessment was released for public review and comment in February 2003. A Decision Notice followed on August 11, 2003, but was withdrawn after considering issues that were raised in an administrative appeal. The EA was revised and released for public comment on two other occasions, in December 2003 and again in April 2004. Subsequent decision notices following each of these releases were also withdrawn.

This revised proposed action is very similar to the proposals released in EAs in 2003 and 2004, proposing timber harvest and restoration activities, but it proposes fewer treatment acres across the sale area, and in particular, the McKenzie River Wild and Scenic River corridor.

In response to the June 2005 scoping letter, the McKenzie River Ranger District received five comment letters. Eugene Water and Electric Board (EWEB) expressed concerns with using Forest roads within the Carmen-Smith Hydroelectric project area, impacts of timber harvest on recreation facilities, impacts to soil and potential input of logs and slash into EWEB reservoirs (Carmen, Smith, and Trail Bridge Reservoirs). Other commenters had similar concerns with the effects of timber harvest on the reservoirs. Three commenters suggested the use of variable density thinning in the harvest of young plantations, and urged that only plantation thinning be considered. Both Oregon Natural Resources Council and Cascadia Wildlands Project had concerns with managing timber in areas considered unroaded, within the Wild and Scenic River corridor, and with the impacts of timber harvest on habitat for the northern spotted owl. An analysis of these comment letters is provided in Appendix H.

Considering the comments from EWEB and the public, the ID team developed a list of project issues based in part, on some of these concerns.

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 Tables 22, 23 and 24 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 also 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 include spawning and early rearing habitat for bull trout and spring Chinook salmon, and use as public drinking water for the City of Eugene at the Hayden Bridge intake.

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

- The quality and availability of riparian and in-stream large wood.
- The amount of riparian area receiving treatment, and the effects of the treatment on riparian stand composition.
- Changes in available stream shade and potential to increase stream and lake water temperatures.
- Changes in risk of altered peak flows as expressed by Aggregate Recovery Percentage (ARP).
- Estimated project effect on transport of sediment from project area roads.

Issue 2. Threatened Northern Spotted Owl

The northern spotted owl, a Threatened species in terms of the Endangered Species Act (ESA), has specific requirements under the ESA with regard to protection of habitat. Protection includes consultation or conferencing with the US Fish and Wildlife Service (USFWS) on activities that alter habitat or cause disturbance. Northern spotted owl habitat can be classified as nesting, roosting,

foraging, or dispersal habitat. Management activities may change the quality or quantity of current and future northern spotted owl habitat.

The effects of the alternatives on this issue will be measured by the acres of northern spotted owl habitat degraded, downgraded, or removed as addressed in Chapter 2 for each alternative.

Issue 3. Elk Habitat

Elk Emphasis Areas are those areas managed for elk Habitat Effectiveness (i.e. habitat quality) under guidance from the Willamette Forest Plan. There are three High Emphasis Elk Areas within the Two Bee project area. Proposed actions could alter elk habitat by changing the amounts of foraging, hiding, thermal, or optimal thermal habitat as well as changing the open road densities.

The effects of the alternatives on this issue will be measured by the changes in available elk habitat as reflected in Habitat Effectiveness values as calculated using the Elk Model.

Non-Significant Issues and Concerns

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 the use of variable density thinning in the managed stands for this proposal, or in harvest units 13 and 41. 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 tree spacing of between 15 and 30 feet. In addition, some natural variation already exists in units 13 and 41. Moderate commercial thinning prescriptions would result in much the same variation in stand density after treatment as suggested by the commenters. (see Silvicultural Descriptions, Moderate Commercial Thinning, page 62.)

Threatened, Endangered, Sensitive, or Other Terrestrial Species of Concern

Activities that remove or degrade forest habitats might possibly affect a variety of wildlife and botanical 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 effects on listed species. Activities that generate noise above ambient levels near nest sites of threatened or endangered or sensitive wildlife species would be seasonally restricted. Design measures and mitigation measures address this issue in Chapter 2. The effects of the proposed action and the other alternatives on TES species are addressed in Chapter 3.

Migratory Land Birds

This project could affect Neotropical Migratory Birds and their habitat, which varies broadly for this large group of species. Required-protection for these species is outlined in Executive Order 13186 on January 11, 2001, titled “Responsibilities of Federal Agencies to Protect Migratory Birds.”

This issue was not considered significant because the felling of trees associated with this project, which may unintentionally affect individual migratory birds, is not expected to have a measurable negative effect of bird populations because of the limited extent of the habitat removal. 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, elk, deer, cavity excavators, bald eagle, and peregrine falcon; along with anadromous fish species spring Chinook salmon and resident fish species 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 action alternatives from this project meet applicable Standards and Guidelines from the Willamette Forest Plan, and are designed to protect these species. The effects of the proposed action and other alternatives on MIS are addressed in Chapter 3.

Fire and Fuels

Management actions may increase or reduce the severity of the effects from wildfires that could occur within the project area. Prescribed fire, to reduce activity fuels or naturally occurring fuels, could be used to lessen the impact and severity of future wildfires in the project area by reducing the continuity of fuels across the landscape. 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 the arrangement of fuel over the landscape. Air quality may also be affected during prescribed burning,

given the close proximity of the Class I airsheds (Mt. Jefferson, Mt. Washington and Three Sisters Wilderness).

This issue was not considered significant because design measures and accepted procedures for fuels treatments and air quality would follow the Willamette Forest Plan Standards and Guidelines. See Chapter 3 – Fire and Fuels analysis.

Noxious Weeds

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

Six noxious weeds and twenty-six non-native plant species occur in the watershed. The noxious weed spotted knapweed (*Centaurea maculosa*) is the most serious threat to native plant populations within the watershed. Spotted knapweed has a broad ecological tolerance, prolific growth, and abundant seed production. It is spread primarily by vehicular traffic and has quickly become established along State Highways 126 and U.S. Highway 20.

This issue was not considered significant because prevention measures, such as washing of equipment and requiring weed-free seeds for erosion control would be used for all action alternatives to prevent expansion of existing populations and minimize establishment of new invaders. (See Mitigation Measures and Design Measures detailed in Chapter 2.)

Transportation Systems

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 may provide opportunities to improve current conditions on roads needed for haul. Existing roads that pose potential adverse affects to riparian resources may 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. The affects of the proposed action and other alternatives on roads and access are discussed in Chapter 3.

Roadless and Unroaded Areas

Comments were received during scoping from Oregon Natural Resources Council (ONRC) and Cascadia Wildlands Project (CWP) that expressed concerns about timber harvesting within “roadless areas” defined by ONRC, and “uninventoried unroaded areas” defined by the Willamette Roads Analysis. The specific concern from CWP was that logging in these areas has the potential to disturb soil and water, destroy scenic integrity, eliminate reference landscapes, limit primitive recreation, introduce non-native weeds, and disturb cultural resources.

There are no Inventoried Roadless Areas (IRAs) within the Project Area. The proposed action includes harvest units within areas in uninventoried, unroaded areas. However, this issue was not considered significant because even though timber harvest is proposed in these areas, all actions would

meet Forest Plan Standards and Guidelines and would be consistent with agency policy of disclosing the effects of forest management in unroaded areas. Project analysis indicates that timber harvest and other actions would not result in adverse impact to any roadless values that currently exist. The effects of the proposed action and other alternatives on unroaded areas is presented in Chapter 3, Roadless and Unroaded Areas.

Recreation

Ground-based timber harvest and associated activities within and adjacent to unit 1 could affect winter trails associated with Ikenick Sno Park by disturbing or obliterating established trails.

Helicopter yarding and associated activities in units 33, 34, and 39 could affect the recreating public's safety by hauling loads of logs over Smith Reservoir, Lakes End Campground, and conducting helicopter operations at four proposed landing sites.

Design measures common to all action alternatives include rehabilitation of trails after harvest where needed. Mitigation measures listed in Chapter 2 would restrict loaded helicopter flights so they do not fly over the specific areas during harvest to ensure public safety. The proposed action is designed to be consistent with all Willamette Forest Plan standards and guidelines.

Scenic Quality

Proposed actions include timber harvest that may affect visual management allocations in the planning area by creating openings from timber harvest, affecting visual quality. Harvesting activities within unit 1 may be viewed from Highway 126, and the McKenzie-Santiam segment of the West Cascades National Scenic Byway. Harvesting activities within unit 3 may be viewed along the McKenzie River National Recreation Trail, the McKenzie Wild and Scenic River Corridor, and the State Scenic Waterway.

The Outstanding Remarkable Values (recreation, scenic, geologic and hydrologic, water quality, and fish) for which the McKenzie Wild and Scenic River Corridor is designated could be affected by timber harvest using skyline yarding systems and associated activities within unit 3 (the designated river corridor) by displacing recreational activities, changing or degrading the scenic character, altering water quality through increased sedimentation, and disturbing the quality and quantity of fish habitat.

Partial cutting and shelterwood harvest may also alter form and texture, affecting visual quality. The viewshed of the project area contains the Upper McKenzie Wild and Scenic River corridor (MA-6d) and Oregon State Scenic Waterway, which follow the McKenzie River from Trail Bridge Reservoir to Clear Lake. The Smith Reservoir viewshed (MA-11c) is also included in the project area.

This issue was not considered significant because the proposed action is designed to be consistent with Willamette Forest Plan visual quality standards and guidelines for all areas, including the Upper McKenzie Wild and Scenic River corridor management area. Effects of the proposed action and other alternatives on the Outstanding Remarkable Values for which the McKenzie Wild and Scenic River corridor was designated 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. Considering 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 2007), some alternatives may not be economically viable.

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 surveyed and inventoried significant cultural resource sites in the Two Bee project area will be buffered and excluded from resource management activities.

Carmen-Smith Hydroelectric Project

The Eugene Water and Electric Board (EWEB) operates a portion of its Carmen-Smith Hydroelectric Project within this planning area. Major features of the project include the Carmen Reservoir with dam and diversion tunnel; Smith Reservoir, Trail Bridge Reservoir, and the power generation facility at the head of Trail Bridge Reservoir. 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, 2008. All parties to the re-licensing effort are currently reviewing a Draft License Application (DLA), and by November 30, 2006, EWEB will submit it to the Federal Energy Regulatory Commission (FERC) a Final License Application (FLA). During the intervening two years, FERC will conduct an Environmental Analysis of the utility's proposal and subsequently issue a New License with its Articles based on that analysis.

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 will continue into the future for the hydropower project. Comments were received from EWEB managers as mentioned above. Responses can be found in Appendix H. The Smith-Carmen Hydroelectric project and facilities were considered in

project development, as addressed in Chapter 2, Mitigation Measures and Design Measures; and in Chapter 3, within Water Quality and Aquatic Resources, Roads and Access, and Recreation sections.

Chapter 2. Alternatives, Including the Proposed Action

This chapter describes and compares the alternatives considered for the Two Bee Landscape Management 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 the 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).

Actions Considered but 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.

- An alternative was considered early in project development that would have included shelterwood regeneration harvest resulting in less than 40% canopy retention in units 8, 21, 22, 23, and 24. Additionally, four stands in the upper portion of Bunchgrass Creek and in Smith Creek within late-successional habitat were also considered for harvest. The District Ranger chose to not apply shelterwood harvest in units 8, 21, 22, 23, and 24, and to drop the un-numbered units in Bunchgrass Creek and Smith River to avoid altering or removing such a large amount of late-successional spotted owl habitat.
- Earlier proposals released to the public included greater acreage of partial cutting in the McKenzie River Wild and Scenic River (WSR) corridor. In 2005, the District Ranger decided to reduce the impact from timber harvest within the WSR by eliminating a 25 acres portion of unit 2 and all 52 acres of unit 17. These areas were located above the McKenzie River National Scenic Trail, and had the potential to affect the views adjacent to the trail. Modifications were made after considering public scoping comments received in the summer of 2005.
- Units 14 and 26 were also included in earlier proposals but were dropped from consideration by the District Ranger in 2006, after considered new information regarding recent spotted owl activity in the area. The new information affected the priority for these stands to contribute to spotted owl habitat in the project area.

Alternatives Considered in Detail

Alternative A

Alternative A would respond to the purpose and need by implementing timber harvest on 556 acres for approximately 5.7 million board feet (MMBF) of Forest products. Harvest treatments include 96 acres of light partial cutting, 249 acres of moderate partial cutting, 117 acres of shelterwood with heavy reserves, 7 acres of salvage at Lake's End Campground, and 87 acres of commercial thinning. The 117 acres of shelterwood units would be planted with Douglas-fir, western white pine, western hemlock, and sugar pine. Stand conditions and silvicultural prescriptions for the units in this alternative can be found on pages 59 - 66.

Alternative A would implement harvest with approximately 391 acres of ground based yarding, 158 acres using skyline yarding systems, and 7 acres of helicopter yarding. This alternative allows for two helicopter landings located along Forest roads 2655-655 and 2655-681. The clearing for each landing would be approximately .5 acres in size.

At 64 acres, Shelterwood/HR Unit 31 exceeds the 60-acre limit for created openings from regeneration timber harvest, as established by the Forest Service R6 Regional Office. If selected, this alternative would require a waiver of this limitation from the Regional Forester.

All units in Alternative A would receive fuel treatments to reduce logging slash. Treatments include yarding of trees with the top attached to the last log (YTA) and limbing at landing, with underburning (UB) of harvest activity fuels under a residual overstory, and the piling and burning of landing, hand (HP), or grapple/machine piles (GP). See Table 2 for stand treatment by unit.

All units with harvest activities would have landing piles burned following harvest. Units with hand piling treatments would be focused along the roadsides 100 ft. into 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.

Prescribed fire 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:

- Fuels 3" and greater in diameter (1,000 hour fuels) have fuels moistures of 25% or greater,
- Soil moistures and duff moistures are damp, at levels where duff consumption could be limited to less than 15% across the unit, and
- When mortality of overstory trees would be low.

Alternatives A as it Responds to the Significant Issues:

Water Quality/Aquatic Resources

Alternative A includes 18 specific Best Management Practices (BMPs) that provide for the protection of soil, water, and fisheries resources, as required project mitigation. The riparian reserve 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.

Alternative A proposes to partial cut 9 acres and underburn 65 acres of riparian reserve – not tributary to bull trout habitat. These activities are expected to create stand conditions that favor the

accelerated development of future large wood and other late successional stand characteristics. This alternative would also provide greater immediate diversity of patches and openings, and would create conditions that result in greater plant species richness in the riparian reserves.

Alternative A improves passage for aquatic wildlife species on road 2672-675 and improves stream crossings on roads 2672 and 2672-655. It includes road maintenance and reconstruction on 28.4 miles of road. This alternative also closes 7.5 miles of currently open roads. Approximately 3.1 miles of currently unneeded roads would also be decommissioned. Storm-proofing measures would be applied to 2.0 miles of road.

Threatened Northern Spotted Owl

All the sites at risk from disturbance are protected through seasonal restrictions. No occupied breeding habitat is altered under this alternative. Effects to non-breeding habitat are in compliance with standards and guidelines from the Willamette Forest Plan and USFWS guidance. Habitat for 10 spotted owl sites within known owl home ranges is affected, for a total of 469 acres of habitat. High quality nesting habitat would be protected. Over time, pre-commercial thinning would increase the diversity and potential use of forests that are currently not providing spotted owl habitat. Owl sites would benefit by reduced disturbance associated with road closures.

Elk Habitat

This alternative would have the least amount of partial cutting in high quality thermal cover used by elk for thermoregulation and foraging. Light and moderate partial cutting reduces the quality of existing thermal habitat, but it should promote the development of higher quality thermal cover in the future. Shelterwood harvesting in units 29, 30 and 31 improves the availability of forage areas, but reduces the availability of thermal cover. The short-term degradation and loss of thermal cover would occur within critical winter range areas. Commercial thinning would increase the potential use of young forests in the area for foraging and hiding cover. With the road closures, a reduced open road network would increase the amount of habitat secure from disturbance.

Table 2. Alternative A Harvest Units.

Unit	Acres	Harvest Prescription	Logging Systems	Feet of Temp. Roads	Fuels Treatment	Estimated Timber Volume (MBF / CCF)	
1	81	Moderate Partial Cut	Ground-based		UB/YTA	320	607
2	22	Light Partial Cut	Ground-based		UB/YTA	156	296
3	41	Moderate Partial Cut	Skyline	300'	UB	800	1,517
4	21	Moderate Partial Cut	Ground-based		UB	206	391
6	74	Light Partial Cut	Ground-based	900'	UB	596	1,130
8	12	Moderate Partial Cut	Ground-based		UB	16	30
13	40	Commercial Thinning	Ground-based		YTA--40 ac. HP—16 ac.	120	228
21	21	Moderate Partial Cut	Ground-based		UB	87	165

Unit	Acres	Harvest Prescription	Logging Systems	Feet of Temp. Roads	Fuels Treatment	Estimated Timber Volume (MBF / CCF)	
22	22	Moderate Partial Cut	Ground-based		UB	31	59
23	39	Moderate Partial Cut	Ground-based		UB	204	387
24	12	Moderate Partial Cut	Ground-based		UB	100	190
29	12	Shelterwood/HR	Skyline		UB	220	417
30	41	Shelterwood/HR	Skyline		UB	410	776
31	64	Shelterwood/HR	Skyline		UB	2,000	3,793
39	7	Salvage	Helicopter		HP--7 ac	10	19
41	47	Commercial Thinning	Ground-based		YTA--47 ac. HP--10 ac.	420	797
Total	556			1,200'		5,696	10,802

HP- Hand Pile (and burn)

MBF- Thousand Board Feet

YTA-Yard Tops Attached

CCF- Hundred Cubic Feet

GP - Grapple Pile

UB - Underburn

Road Projects

For Alternative A, approximately 24.0 miles of existing forest roads would be maintained or improved to allow access to harvest areas for timber haul and to reduce adverse impacts to resources. Another 4.4 miles of road used only for rock haul from rock pits would receive spot rocking and other road maintenance, for a total of 28.4 miles of road maintenance. Road maintenance activities would include felling hazard trees, clearing and grubbing, replacing drainage structures, reconstructing ditches, and placement of aggregate surfacing. Passage for aquatic wildlife species would be restored when a culvert is improved at the Ikenick Creek crossing on road 2672-675 to pass 100-year flows. Stream crossings on road 2672 and 2672-655 would be redesigned to prevent overtopping when beaver activity impairs culvert function.

Existing open roads would be reduced by a total of 7.5 miles with gate or berm closure on 7.1 miles, and by decommissioning 0.4 miles of unneeded roads. Additionally, 2.7 miles of existing closed roads would be decommissioned.

Alternative A would also construct about 1,200 feet of temporary roads to allow access to harvest. Upon completion of sale activities, the temporary roads would be decommissioned.

Table 3: Road Treatments for Alternative A.

Road Number	Existing Condition	Proposed Road Treatment	Description of Associated Maintenance Activities	Miles Affected
2000-150	Open	Close	Berm entrance	0.6
2000-155	Open	Close	Berm on 2000-150	0.6
2000-156	Open	Close	Berm on 2000-150	0.5

Road Number	Existing Condition	Proposed Road Treatment	Description of Associated Maintenance Activities	Miles Affected
2000-157	Open	Close	Berm on 2000-150	0.2
2600-726	Open	Close	Berm entrance	0.8
2600-786	Open	Close	Berm entrance	0.6
2655-505	Open	Close	Install gate at entrance	1.2
2655-515	Open	Close	Replace existing damaged gate, maintain existing drainage structures	1.7
2655-517	Open	Close	Gate on 2655-505	0.5
2655-535	Open	Close	Gate on 2655-505	0.4
Total				7.1

Table 4: Decommissioning for Alternative A.

Road Number	Existing Condition	Proposed Road Treatment	Description of Associated Treatment Activities	Miles Affected
2672-637	Closed	Decommission	Berm entrance, maintain drainage *	0.9
2672-640	Closed	Decommission	Berm entrance, maintain drainage *	0.2
2672-642	Closed	Decommission	Berm entrance, maintain drainage *	0.6
2672-643	Closed	Decommission	Berm entrance, maintain drainage *	0.1
2672-647	Closed	Decommission	Berm entrance, maintain drainage *	0.2
2672-657	Closed	Decommission	Berm entrance, maintain drainage *	0.2
2672-667	Closed	Decommission past Unit 8	Berm entrance, maintain drainage *	0.5
2672-681	Open	Decommission	Haul Route - berm entrance following project use, then seed	0.2
2672-682	Open	Decommission	Berm entrance, maintain drainage *	0.2
Total				3.1

* Some segments are presently in stable condition and may not require physical treatment to stabilize before re-classifying to “decommissioned.”

Wildlife Habitat Treatments

Alternative A would include leaving live green trees within each of the proposed units for future snag and down wood creation (see Table 5). The treatment would occur within 4 to 5 years following harvest activities, and would help meet the need for enhancing terrestrial habitat diversity for wildlife by improving stand structure. In the proposed regeneration units, mortality of some of the remaining trees is expected to occur following broadcast burning for slash removal and site preparation. Follow-up snag and down wood creation would occur to meet prescribed post harvest levels for snags and down wood.

Snags: Prescribed snag creation from green trees would benefit Pacific fringe-tailed bats and peregrine falcons that may be present in the area, as well as cavity nesting species by improving or protecting habitat quality for them or their prey. Existing snags greater than 18 inches dbh in decay classes I and II would be left standing in units unless hazardous to logging operations. In addition to any existing snags, from 2 to 8 live green trees per acre would be left in all units for future snag creation.

Down Wood: Existing down wood pieces greater than 20 feet long and 18 inches diameter may currently exist in some units. In addition to any current down wood, from 3 to 5 live trees per acre would be left in all units for future down wood creation. Pieces should be left as full tree lengths to maximize ecological benefits and should reflect the size and species mix of the stand.

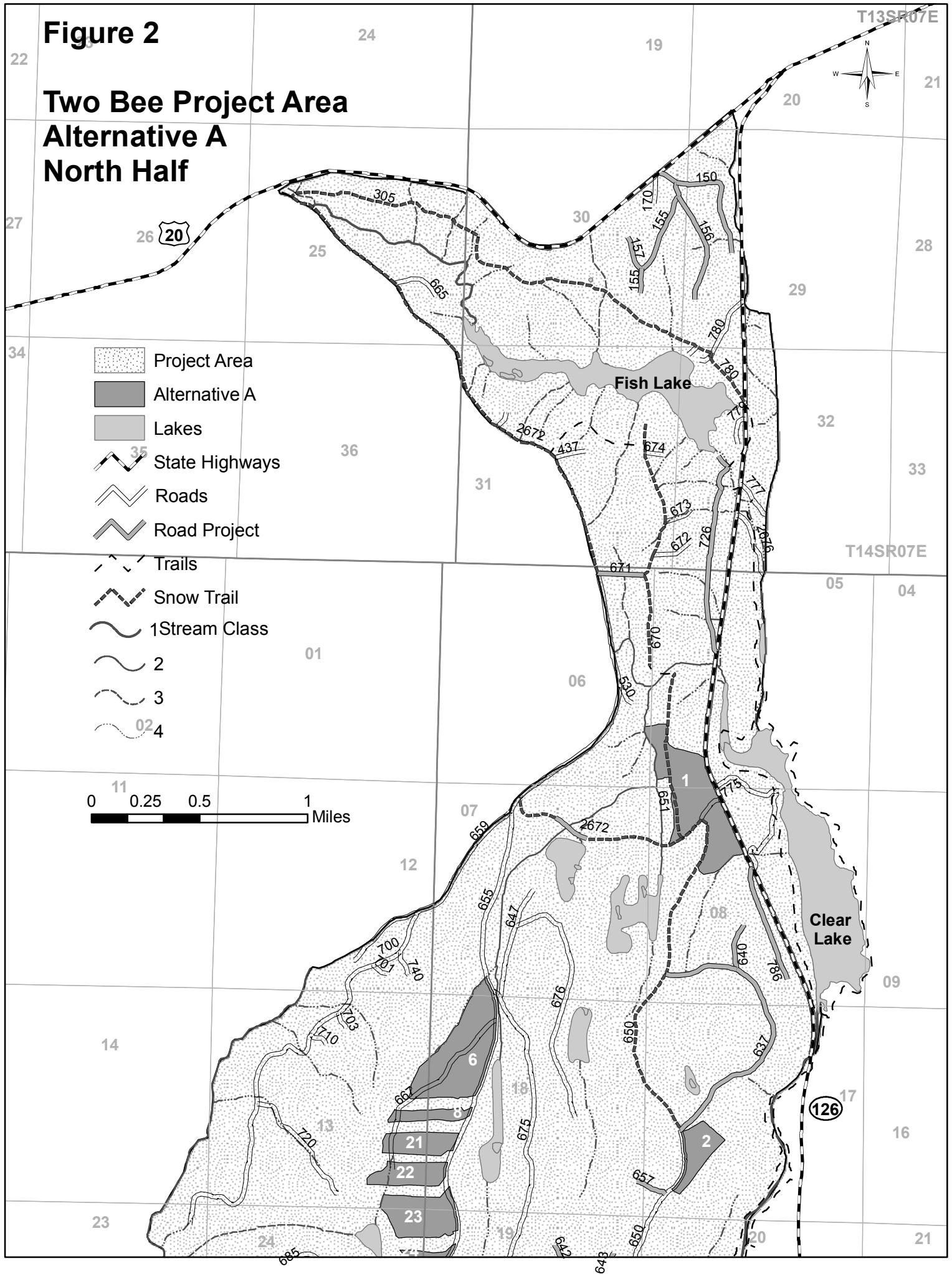
Table 5: Alternative A, Live Green Trees Left for Snags and Down Wood.

Unit	Acres	Current Large Snags Per Acre (>18" dbh)	Live Green Trees Per Acre, Left for Snags or Down Wood
1	81	4	4
2	22	4	4
3	41	4	5
4	21	9	2
6	74	4	6
8	12	7	4
13	40	0 (Young stand commercial thinning)	4
21	21	9	4
22	22	8	4
23	39	6	5
24	12	1	8
29	12	3	8
30	41	5	8
31	64	10	8
39	7	Salvage	N/A
41	47	0 (Young stand commercial thinning)	4

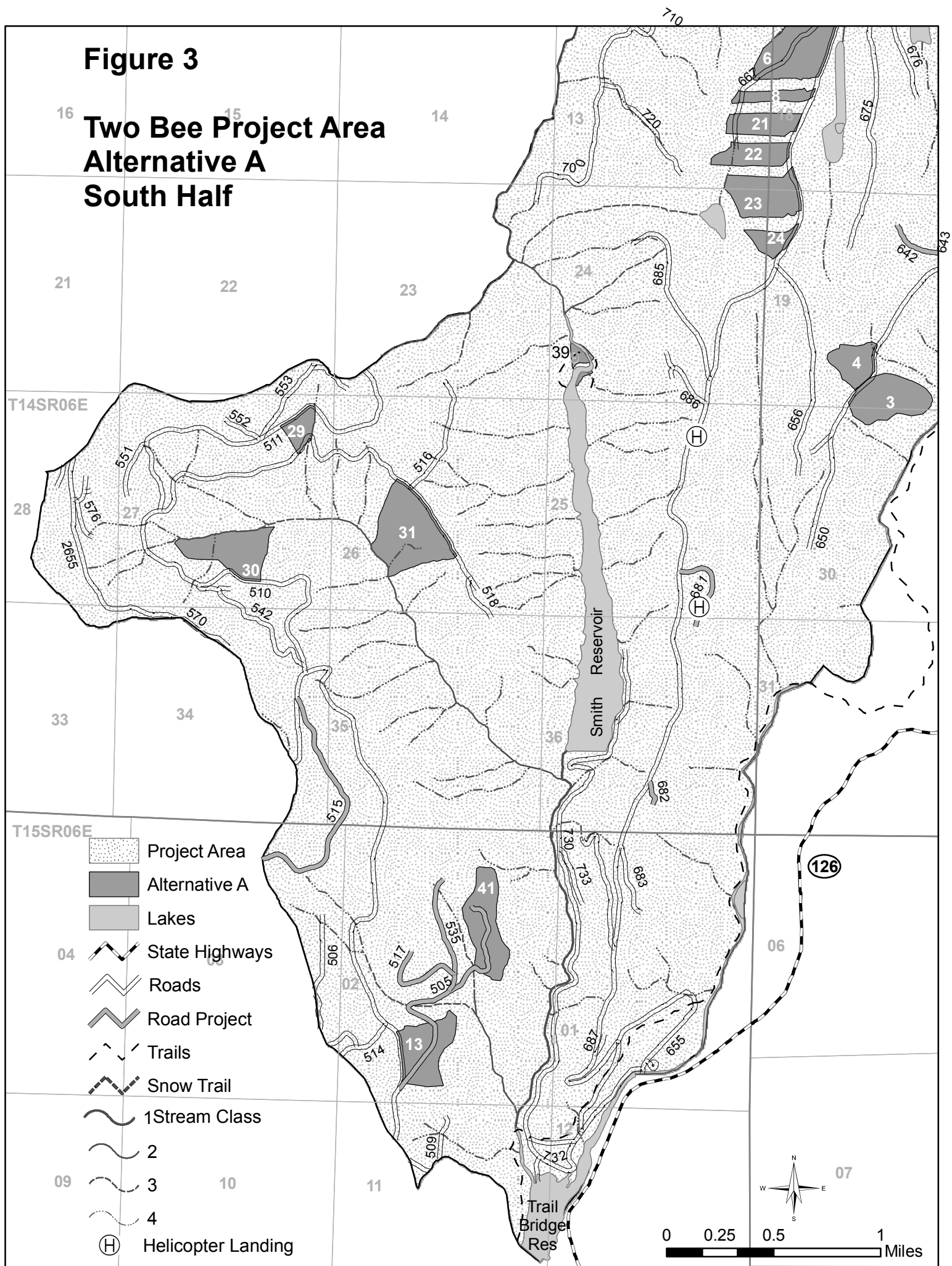
Green Tree Retention Areas: Green Tree Retention Areas (GTRs) would be located within the regeneration units. GTRs are scattered no-harvest patches of various size making up at least 15% of the stand, that would provide diversity and future snags and large down wood.

Figure 2

**Two Bee Project Area
Alternative A
North Half**



Two Bee Project Area Alternative A South Half



Alternative B – The Proposed Action

Alternative B, the proposed action, would respond to the purpose and need by implementing 825 acres of timber harvest for approximately 10.8 MMBF of timber products. Harvest treatments include 591 acres of moderate partial cutting, 121 acres of moderate partial cutting with multi-story objectives, 26 acres of salvage, and 87 acres of commercial thinning. Stand conditions and silvicultural prescriptions for the units in this alternative can be found on pages 59 - 66. Alternative B would implement harvest with approximately 578 acres of ground based yarding, 176 acres of skyline yarding, and 71 acres of helicopter yarding. This alternative allows for two helicopter landings located along Forest road 2676-655 and 2676-681. The clearing for each landing would be approximately .5 acres in size.

All units in Alternative B would receive fuel treatments to reduce logging slash. Treatments include yarding of trees with the top attached to the last log (YTA) with limbing to be done at the landing, underburning (UB) of harvest activity fuels under a residual overstory, and the piling and burning of landing, hand, and machine/grapple piles (GP). See Table 6 for stand treatments by unit.

All units with harvest activities would have landing piles burned following harvest. Units with hand piling treatments would be focused along the roadsides 100 ft. into 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.

Prescribed fire to treat logging slash would take place during the spring season, or when weather and fuels are in spring-like conditions. Spring conditions are defined as:

- Fuels 3" and greater in diameter (1,000 hour fuels) have fuels moistures of 25% or greater,
- Soil moistures and duff moistures are damp, at levels where duff consumption could be limited to less than 15% across the unit, and
- When mortality of overstory trees would be low.

Alternatives B as it Responds to the Significant Issues:

Water Quality/Aquatic Resources

Alternative B includes 18 specific Best Management Practices (BMPs) that provide for the protection of soil, water, and fisheries resources, as required project mitigation. The riparian reserve 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 treatments and prescribed fire activity in riparian reserves of streams that are tributary to bull trout habitat are avoided altogether.

Alternative B proposes to partial cut 130 acres and underburn 157 acres of riparian reserve that is not tributary to bull trout habitat. These activities are expected to create stand conditions that favor the accelerated development of future large wood and other late successional stand characteristics. This alternative would also provide greater immediate diversity of patches and openings, and would create conditions that result in greater plant species richness in the riparian reserves.

Alternative B improves passage for 100-year flows that also benefits aquatic wildlife species on road 2672-675. It also improves stream crossings on roads 2672 and 2672-655. It includes road

maintenance and reconstruction on 26.0 miles of road. This alternative also closes 7.5 miles of currently open roads. Approximately 3.1 miles of currently unneeded roads would also be decommissioned. Storm-proofing measures would be applied to 2.0 miles of road.

Threatened Northern Spotted Owl

All the sites at risk from disturbance are protected through seasonal restrictions. No occupied breeding habitat is altered under this alternative. Effects to non-breeding habitat are in compliance with standards and guidelines from the Willamette Forest Plan and U.S. Fish and Wildlife Service guidance. Habitat for 10 spotted owl sites within known owl home ranges is affected, for a total of 738 acres of habitat. High quality nesting habitat would be protected. Precommercial thinning would increase the diversity and potential use of forests that are currently not providing spotted owl habitat. Owl sites would benefit by reduced disturbance associated with road closures.

Elk Habitat

This alternative would have the greatest amount of partial cutting of thermal cover used by elk for thermo-regulation and foraging. Moderate partial cutting reduces the quality of existing thermal habitat, but should recover quickly and promote the development of higher quality thermal cover in the future. The short-term degradation of thermal cover would occur within critical winter range areas. No regeneration harvest is included that would improve the availability of forage areas. Commercial thinning would increase the potential use of young forests in the area for foraging and hiding cover. With the road closures, a reduced open road network would increase the amount of habitat secure from disturbance.

Table 6: Alternative B Harvest Units.

Unit	Acres	Harvest Prescription	Logging Systems	Feet of Temp. Roads	Fuels Treatment	Estimated Timber Volume (MBF / CCF)	
1	81	Moderate Partial Cut	Ground-based		UB/YTA	320	607
2	22	Moderate Partial Cut	Ground-based		UB/YTA	226	429
3	41	Moderate Partial Cut	Skyline	300'	UB	800	1,517
4	21	Moderate Partial Cut	Ground-based		UB	206	391
6	74	Moderate Partial Cut	Ground-based	900'	UB	1,169	2,217
7	173	Moderate Partial Cut	Ground-based	3,000	UB	2,342	4,442
11	19	Salvage	Ground-based		HP--8 ac.	30	57
13	40	Commercial Thinning	Ground-based		YTA--40 ac. HP--16 ac.	120	228
18	121	Moderate Partial Cut for Multistory Development	Skyline (20 ac.)		YTA/GP	1,936	3,672
			Ground-based (101 ac.)				
27	38	Moderate Partial Cut	Skyline		UB	1,140	2,162
33	50	Moderate Partial Cut	Helicopter		UB	612	1,161
	91	Moderate Partial Cut	Skyline (77 ac.)		UB	1,456	2,761

Unit	Acres	Harvest Prescription	Logging Systems	Feet of Temp. Roads	Fuels Treatment	Estimated Timber Volume (MBF / CCF)	
34	91	Moderate Partial Cut	Skyline (77 ac.)		UB	1,456	2,761
			Helicopter (14 ac.)				
39	7	Salvage	Helicopter		HP--7 ac.	10	19
41	47	Commercial Thinning	Ground-based		YTA--47 ac. HP--10 ac.	420	797
Total	825					10,787	20,460

HP- Hand Pile (and burn)

MBF- Thousand Board Feet

YTA-Yard Tops Attached

CCF- Hundred Cubic Feet

GP - Machine/Grapple Pile

UB - Underburn

Road Projects

For Alternative B, approximately 21.6 miles of existing forest roads would be maintained or improved to allow access to harvest areas for timber haul and to reduce adverse impacts to resources, and another 4.4 miles of road used only for rock haul from rock pits would receive spot rocking and other road maintenance, for a total of 26.0 miles of road maintenance. Road maintenance activities would include felling hazard trees, clearing and grubbing, replacing drainage structures, reconstructing ditches, and placement of aggregate surfacing. Passage of aquatic wildlife species and 100-year flood events would be restored at the Ikenick Creek crossing on road 2672-675. Stream crossings on road 2672 and 2672-655 would be redesigned to prevent overtopping when beaver activity impairs culvert function.

Existing open roads would be reduced by a total of 7.5 miles with gate or berm closure on 7.1 miles, and by decommissioning 0.4 miles of unneeded roads. Additionally, 2.7 miles of existing closed roads would be decommissioned.

Alternative B would also construct about 4,200 feet of temporary roads to allow access to harvest. Upon completion of sale activities, the temporary roads would be decommissioned.

Table 7: Road Treatments for Alternative B.

Road Number	Existing Condition	Proposed Road Treatment	Description of Associated Maintenance Activities	Miles Affected
2000-150	Open	Close	Berm entrance	0.6
2000-155	Open	Close	Berm on 2000-150	0.6
2000-156	Open	Close	Berm on 2000-150	0.5
2000-157	Open	Close	Berm on 2000-150	0.2
2600-726	Open	Close	Berm entrance	0.8
2600-786	Open	Close	Berm entrance	0.6
2655-505	Open	Close	Install gate at entrance	1.2

Road Number	Existing Condition	Proposed Road Treatment	Description of Associated Maintenance Activities	Miles Affected
2655-515	Open	Close	Replace existing damaged gate, maintain existing drainage structures	1.7
2655-517	Open	Close	Gate on 2655-505	0.5
2655-535	Open	Close	Gate on 2655-505	0.4
Total				7.1

Table 8: Roads Decommissioning for Alternative B.

Road Number	Existing Condition	Proposed Road Treatment	Description of Associated Treatment Activities	Miles Affected
2672-637	Closed	Decommission	Berm entrance, maintain drainage *	0.9
2672-640	Closed	Decommission	Berm entrance, maintain drainage *	0.2
2672-642	Closed	Decommission	Berm entrance, maintain drainage *	0.6
2672-643	Closed	Decommission	Berm entrance, maintain drainage *	0.1
2672-647	Closed	Decommission	Berm entrance, maintain drainage *	0.2
2672-657	Closed	Decommission	Berm entrance, maintain drainage *	0.2
2672-667	Closed	Decommission past Unit 8	Berm entrance, maintain drainage *	0.5
2672-681	Open	Decommission	Haul Route - berm entrance following project use, then seed	0.2
2672-682	Open	Decommission	Berm entrance, maintain drainage *	0.2
Total				3.1

* Some segments are presently in stable condition and may not require physical treatment to stabilize before re-classifying to “decommissioned.”

Wildlife Habitat Treatments

Alternative B would include leaving live green trees within each of the proposed units for future snag and down wood creation (see Table 9). The treatment would occur approximately 4 to 5 years following harvest activities and would help meet the need for enhancing terrestrial habitat diversity for wildlife by improving stand structure. In the proposed regeneration units, mortality of some of the remaining trees is expected to occur following broadcast burning for slash removal and site preparation. Follow-up snag and down wood creation would occur to meet prescribed post harvest levels for snags and down wood.

Snags: Prescribed snag creation from green trees would benefit Pacific fringe-tailed bats and peregrine falcons that may be present in the area, as well as cavity nesting species, by improving or protecting habitat quality for them or their prey. Existing snags greater than 18 inches diameter breast height (dbh) in decay classes I and II would be left standing in units unless hazardous to logging

operations. In addition to any existing snags, 2 to 8 live green trees per acre would be left in all units for future snag creation.

Down Wood: Existing down wood pieces greater than 20 feet long and 18 inches diameter may currently exist in some units. In addition to any current down wood, from 3 to 5 live trees per acre would be left in all units for future down wood creation. Pieces should be left as full tree lengths to maximize ecological benefits and should reflect the size and species mix of the stand.

Table 9: Alternative B, Live Green Trees Left for Snags and Down Wood.

Unit	Acres	Current Large Snags Per Acre (> 18" dbh)	Live Green Trees Per Acre, Left for Snags or Down Wood
1	81	4	4
2	22	4	4
3	41	4	5
4	21	9	2
6	74	4	6
7	173	12	7
11	19	Salvage	N/A
13	40	0 (Young stand commercial thinning)	4
18	121	8	5
27	38	4	8
33	50	3	3
34	91	3	3
39	7	Salvage	N/A
41	47	0 (Young stand commercial thinning)	4

Green Tree Retention Areas: No regeneration units are included in Alternative B, so GTRs are not designated.

Figure 4

**Two Bee Project Area
Alternative B
North Half**

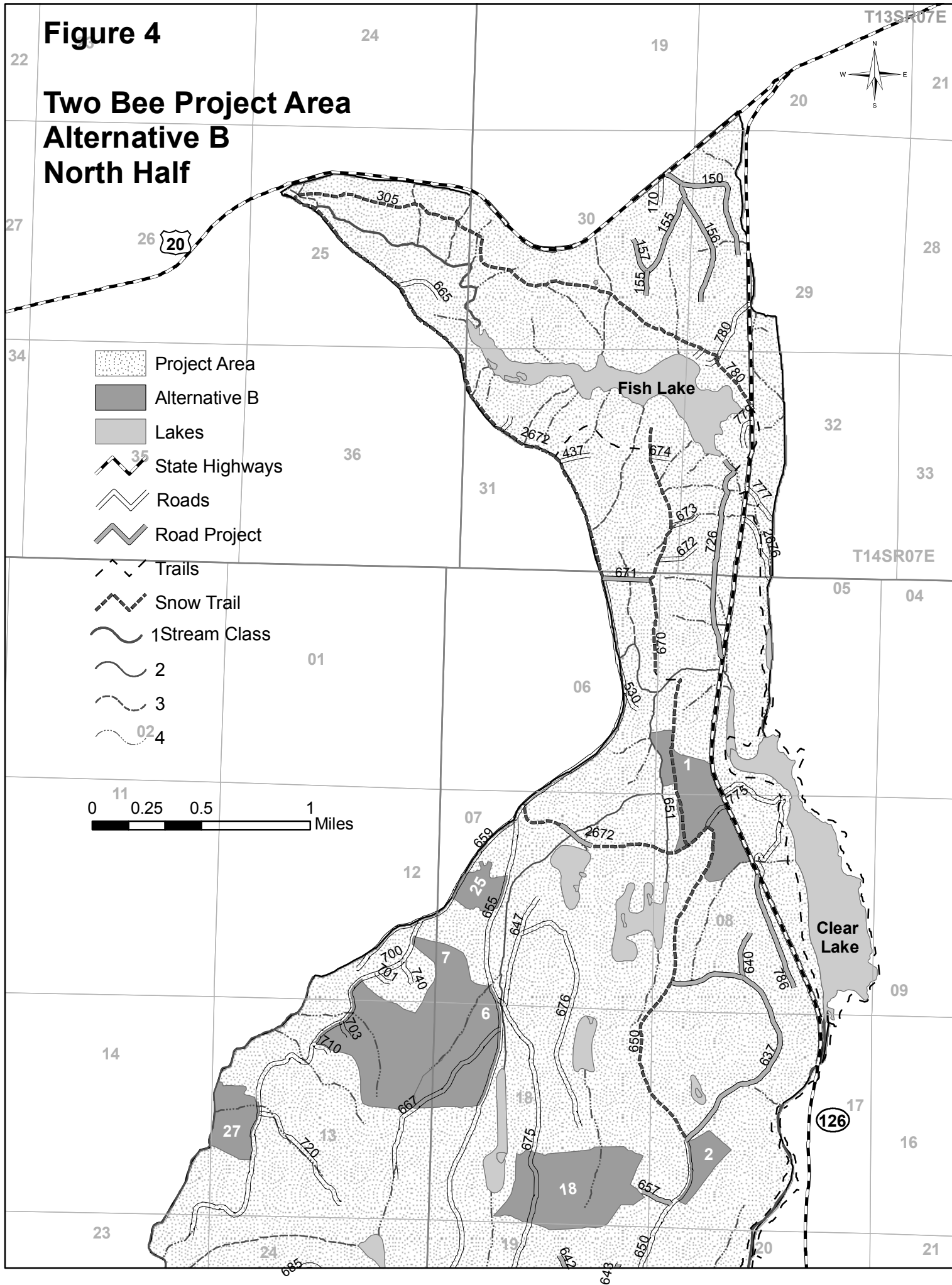
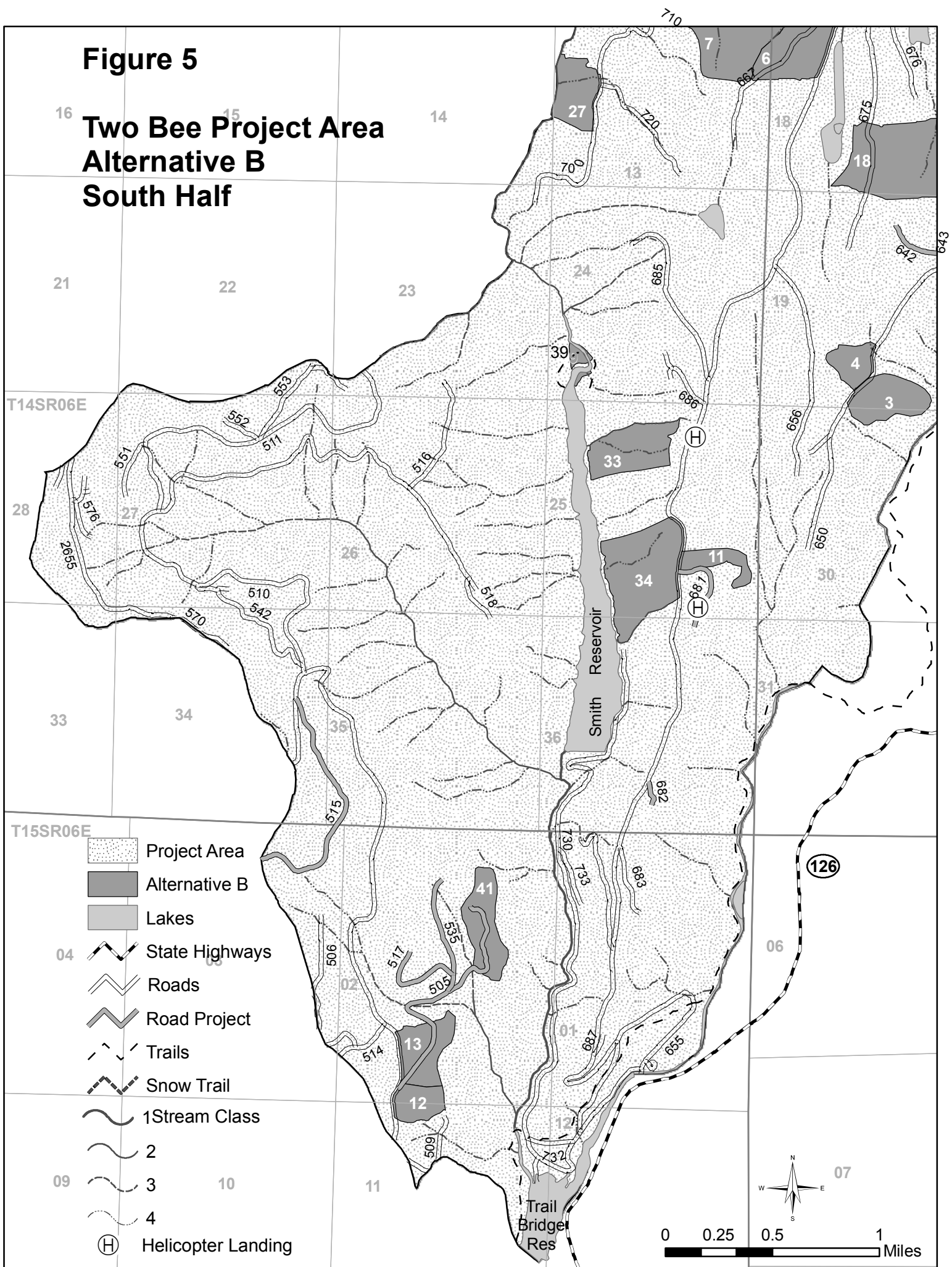


Figure 5

Two Bee Project Area Alternative B South Half



Alternative C

Alternative C would respond to the purpose and need by implementing 1,054 acres of timber harvest for approximately 24.3 MMBF of timber products. Harvest treatments include 212 acres of moderate partial cutting, 175 acres of heavy partial cutting, 573 acres of shelterwood harvest with heavy reserves, 7 acres of salvage at Lake's End Campground, and 87 acres of commercial thinning. Alternative C would implement harvest with approximately 674 acres of ground based yarding, 293 acres of skyline yarding, and 87 acres of helicopter yarding. This alternative allows for two helicopter landings located along Forest roads 2676-655 and 2676-681. The clearing for each landing would be approximately .5 acres in size.

The 573 acres of shelterwood harvest would be planted with Douglas-fir, western white pine, western hemlock, and sugar pine. Alternative C also implements natural fuels prescribed burning on 149 acres on east slopes above Smith Reservoir (units 90 and 91). Stand conditions and silvicultural prescriptions for the units in this alternative can be found on pages 59 - 66.

Shelterwood/HR Units 6, 7, 31, and 34 all exceed the 60-acre limit for created openings from regeneration harvest systems, established by the Forest Service R6 Regional Office. If selected, this alternative would require a waiver of the 60-acre limitation from the Regional Forester.

All units in Alternative C would receive fuel treatments to reduce logging slash. Fuels treatments include yarding of trees with the top attached to the last log (YTA) with limbing done at landing, underburning (UB) of harvest activity fuels under a residual overstory, and the piling and burning of landing, hand, and machine/grapple piles (GP). See Tables 10 and 11 for treatments by unit.

All units with harvest activities would have landing piles burned following harvest. Units with hand piling treatments would be focused along the roadsides 100 ft. into 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.

Prescribed fire to treat logging slash would take place during the spring season, or when weather and fuels are in spring-like conditions. Spring conditions are defined as:

- Fuels 3" and greater in diameter (1000 hour fuels) have fuels moistures of 25% or greater,
- Soil moistures and duff moistures are damp, at levels where duff consumption could be limited to less than 15% across the unit, and
- When mortality of overstory trees would be low.

Alternatives C as it Responds to the Significant Issues:

Water Quality/Aquatic Resources

Alternative C includes 18 specific Best Management Practices (BMPs) that provide for the protection of soil, water, and fisheries resources, as required project mitigation. The riparian reserve 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 cut units. Silvicultural treatments and prescribed fire activity in riparian reserves of streams that are tributary to bull trout habitat are avoided altogether.

Alternative C also proposes to partial cut 44 acres and underburn 246 acres of riparian reserve that is not tributary to bull trout habitat. These activities are expected to create stand conditions that favor the accelerated development of future large wood and other late successional stand characteristics. This alternative would also provide greater immediate diversity of patches and openings, and would create conditions that result in greater plant species richness in the riparian reserves.

Alternative C improves passage for aquatic wildlife species on road 2672-675 and improves stream crossings on roads 2672 and 2672-655. It includes road maintenance and reconstruction on 33.2 miles of road. This alternative also closes 7.5 miles of currently open roads. Approximately 3.1 miles of currently unneeded roads would also be decommissioned. Storm-proofing measures would be applied to 2.0 miles of road.

Threatened Northern Spotted Owl

All the sites at risk from disturbance are protected through seasonal restrictions. No occupied breeding habitat is altered under this alternative. Effects to non-breeding habitat are in compliance with standards and guidelines from the Willamette Forest Plan and U.S. Fish and Wildlife Service guidance. Habitat for 11 spotted owl sites within known owl home ranges is affected, for a total of 1,116 acres of habitat. High quality nesting habitat would be protected. Precommercial thinning would increase the diversity and potential use of forests that are currently not providing spotted owl habitat. Owl sites would benefit by reduced disturbance associated with road closures.

Elk Habitat

This alternative would partial cut the second greatest amount of high quality thermal cover used by elk for thermoregulation and foraging. Moderate and heavy partial cutting reduces the quality of existing thermal habitat, but should promote the development of higher quality thermal cover in the future. This alternative creates the greatest amount of forage through shelterwood harvesting, but it reduces the greatest amount of available thermal cover. The short-term degradation and loss of thermal cover would occur within critical winter range areas. Commercial thinning would increase the potential use of young forests in the area for foraging and hiding cover. With the road closures, a reduced open road network would increase the amount of habitat secure from disturbance.

Table 10: Alternative C Harvest Units.

Unit	Acres	Harvest Prescription	Logging Systems	Feet of Temp. Roads	Fuels Treatment	Estimated Timber Volume (MBF / CCF)	
1	81	Heavy Partial Cut	Ground-based		UB/YTA	739	1,402
2	22	Moderate Partial Cut	Ground-based		UB/YTA	226	429
3	41	Moderate Partial Cut	Skyline	300'	UB	800	1,517
4	21	Shelterwood/HR	Ground-based		UB	500	948
6	74	Shelterwood/HR	Ground-based	900'	UB	3,100	5,879
7	173	Shelterwood/HR	Ground-based	3,000	UB	6,000	11,379
8	12	Heavy Partial Cut	Ground-based		UB	91	173

Unit	Acres	Harvest Prescription	Logging Systems	Feet of Temp. Roads	Fuels Treatment	Estimated Timber Volume (MBF / CCF)	
10	16	Moderate Partial Cut	Helicopter		UB	100	190
13	40	Commercial Thinning	Ground-based		YTA--40 ac. HP--16 ac.	120	228
18	121	Moderate Partial Cut	Skyline (20 ac.)		YTA/GP	857	1,625
			Ground-based (101 ac.)				
21	21	Heavy Partial Cut	Ground-based		UB	351	666
22	22	Heavy Partial Cut	Ground-based		UB	230	436
23	39	Heavy Partial Cut	Ground-based		UB	489	927
24	12	Moderate Partial Cut	Ground-based		UB	100	190
27	38	Shelterwood/HR	Skyline		UB	1,690	3,205
29	12	Shelterwood/HR	Skyline		UB	220	417
30	41	Shelterwood/HR	Skyline		UB	410	778
31	64	Shelterwood/HR	Skyline		UB	2,000	3,793
33	50	Shelterwood/HR	Helicopter		UB	1,000	1,897
34	91	Shelterwood/HR	Skyline (77 ac.)		UB	4,090	7,757
			Helicopter (14 ac.)				
39	7	Salvage	Helicopter		HP--7 ac.	10	19
40	9	Shelterwood/HR	Ground-based		UB	800	1,517
41	47	Commercial Thinning	Ground-based		YTA--47 ac. HP--10 ac.	420	797
Total	1,054					24,343	46,169

HP- Hand Pile (and burn)

MBF- Thousand Board Feet

YTA-Yard Tops Attached

CCF- Hundred Cubic Feet

GP - Machine/Grapple Pile

UB - Underburn

Natural Fuels Prescribed Fire

Alternative C includes 149 acres of prescribed fire in naturally occurring natural stands in units 90 (69 acres) and 91 (80 acres). No mechanical harvest activity would take place within the two treatment areas prior to the prescribed underburning. This prescription re-introduces fire to the landscape by simulating a low intensity fire that would resemble the more frequent cycle of low intensity, historic fire occurrences in the area. Underburning is aimed to help reduce fuel loading and change fuel arrangement. The underburn would reduce existing fuel loads both horizontally and vertically of fuels on the ground, and of brush and small trees in the understory.

Fire severity, which corresponds to the mortality of the dominant overstory in the stand, would be low, and in general, mortality would be expected to occur in the smaller diameter size classes (saplings to 15" dbh) and in less than 20% of the larger diameter trees. Mortality would be focused on the species other than Douglas-fir. Minor mortality of dominant and co-dominant trees in the overstory

could also occur.

Road Projects

For Alternative C, approximately 28.8 miles of existing forest roads would be maintained or improved to allow access to harvest areas for timber haul and to reduce adverse impacts to resources, and another 4.4 miles of road used only for rock haul from rock pits would receive spot rocking and other road maintenance, for a total of 33.2 miles of road maintenance. Road maintenance activities would include felling hazard trees, clearing and grubbing, replacing drainage structures, reconstructing ditches, and placement of aggregate surfacing. Passage of aquatic wildlife species and 100-year flood events would be restored at the Ikenick Creek crossing on road 2672-675. Stream crossings on road 2672 and 2672-655 would be redesigned to prevent overtopping when beaver activity impairs culvert function.

Existing open roads would be reduced by a total of 7.5 miles with gate or berm closure on 7.1 miles, and by decommissioning 0.4 miles of unneeded roads. Additionally, 2.7 miles of existing closed roads would be decommissioned.

Alternative C would also construct about 4,200 feet of temporary roads to allow access to harvest. Upon completion of sale activities, the temporary roads would be decommissioned.

Table 11: Road Treatments for Alternative C.

Road Number	Existing Condition	Proposed Road Treatment	Description of Associated Maintenance Activities	Miles Affected
2000-150	Open	Close	Berm entrance	0.6
2000-155	Open	Close	Berm on 2000-150	0.6
2000-156	Open	Close	Berm on 2000-150	0.5
2000-157	Open	Close	Berm on 2000-150	0.2
2600-726	Open	Close	Berm entrance	0.8
2600-786	Open	Close	Berm entrance	0.6
2655-505	Open	Close	Install gate at entrance	1.2
2655-515	Open	Close	Replace existing damaged gate, maintain existing drainage structures	1.7
2655-517	Open	Close	Gate on 2655-505	0.5
2655-535	Open	Close	Gate on 2655-505	0.4
Total				7.1

Table 12: Roads Decommissioning for Alternative C.

Road Number	Existing Condition	Proposed Road Treatment	Description of Associated Treatment Activities	Miles Affected
2672-637	Closed	Decommission	Berm entrance, maintain drainage *	0.9
2672-640	Closed	Decommission	Berm entrance, maintain drainage *	0.2
2672-642	Closed	Decommission	Berm entrance, maintain drainage *	0.6
2672-643	Closed	Decommission	Berm entrance, maintain drainage *	0.1
2672-647	Closed	Decommission	Berm entrance, maintain drainage *	0.2
2672-657	Closed	Decommission	Berm entrance, maintain drainage *	0.2
2672-667	Closed	Decommission past Unit 8	Berm entrance, maintain drainage *	0.5
2672-681	Open	Decommission	Haul Route - berm entrance following project use, then seed	0.2
2672-682	Open	Decommission	Berm entrance, maintain drainage *	0.2
Total				3.1

* Some segments are presently in stable condition and may not require physical treatment to stabilize before re-classifying to “decommissioned.”

Wildlife Habitat Treatments

Alternative C would include leaving live green trees within each of the proposed units for future snag and down wood creation (see Table 13). The treatment would occur approximately 4 to 5 years following harvest activities and would help meet the need for enhancing terrestrial habitat diversity for wildlife by improving stand structure. In the proposed regeneration units, mortality of some of the remaining trees is expected to occur following broadcast burning for slash removal and site preparation. Follow-up snag and down wood creation would occur to meet prescribed post harvest levels for snags and down wood.

Snags: Prescribed snag creation from green trees would benefit Pacific fringe-tailed bats, and peregrine falcons that may be present in the area, as well as cavity nesting species, by improving or protecting habitat quality for them or their prey. Existing snags greater than 18 inches diameter breast height (dbh) in decay classes I and II would be left standing in units unless hazardous to logging operations. In addition to any existing snags, 2 to 8 live green trees per acre would be left in all units for future snag creation.

Down Wood: Existing down wood pieces greater than 20 feet long and 18 inches diameter may currently exist in some units. In addition to any current down wood, from 3 to 5 live trees per acre would be left in all units for future down wood creation. Pieces should be left as full tree lengths to maximize ecological benefits and should reflect the size and species mix of the stand.

Table 13: Alternative C, Live Green Trees Left for Snags and Down Wood.

Unit	Acres	Current Large Snags Per Acre (> 18" dbh)	Live Green Trees Per Acre, Left for Snags or Down Wood
1	81	4	4
2	22	4	4
3	41	4	5
4	21	9	2
6	74	4	6
7	173	12	7
8	12	7	4
10	16	3	4
13	40	0 (Young stand commercial thinning)	4
18	121	8	5
21	21	9	4
22	22	8	4
23	39	6	5
24	12	1	8
27	38	4	7
29	12	8	8
30	41	5	8
31	64	10	8
33	50	3	3
34	91	3	3
39	7	Salvage	N/A
40	9	9	8
41	47	0 (Young stand commercial thinning)	4

Green Tree Retention Areas: Green Tree Retention Areas (GTRs) would be located within the regeneration units. GTRs are scattered no-harvest patches of various size making up at least 15% of the stand, that would provide diversity and future snags and large down wood.

Figure 6

**Two Bee Project Area
Alternative C
North Half**

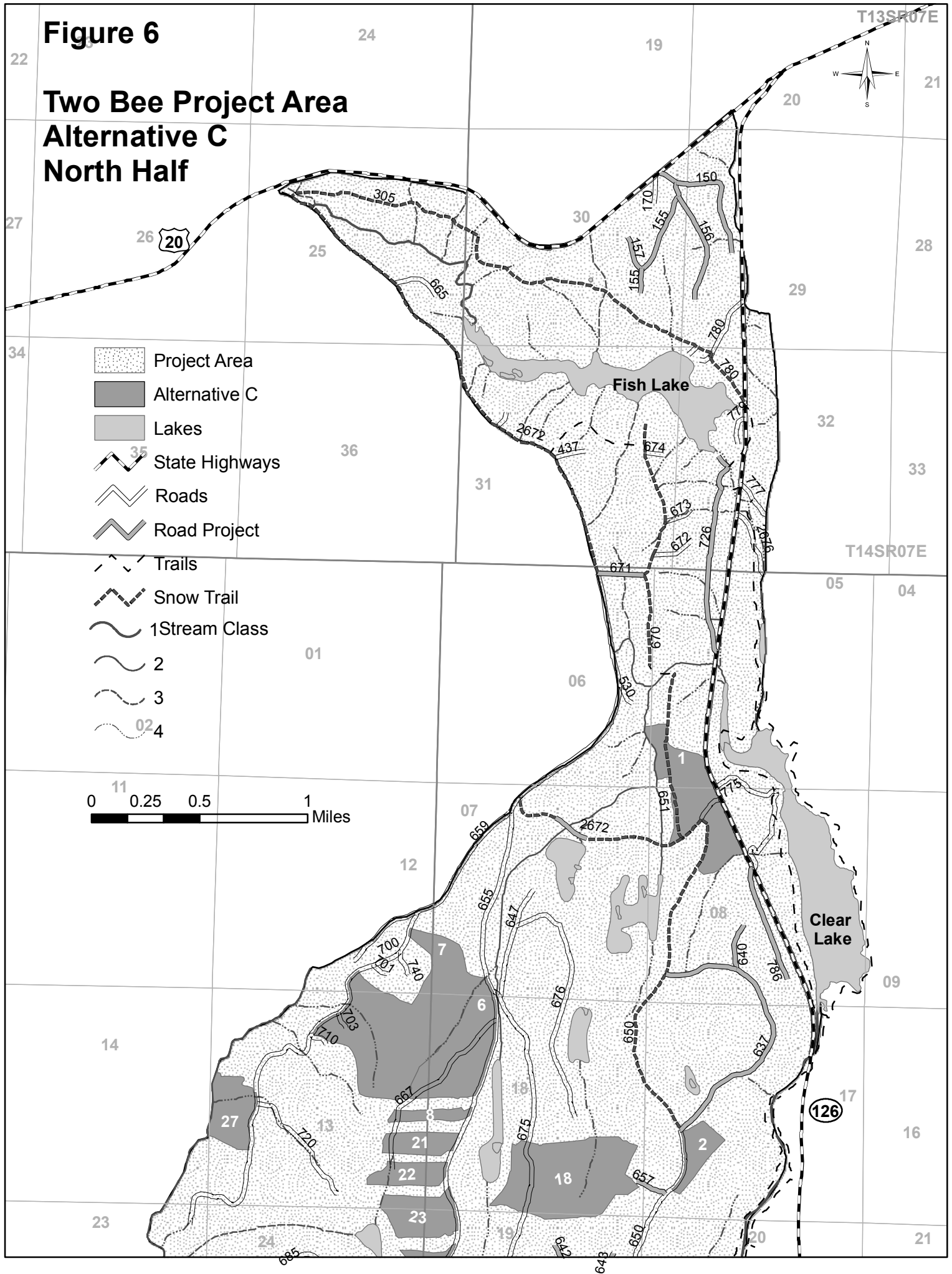
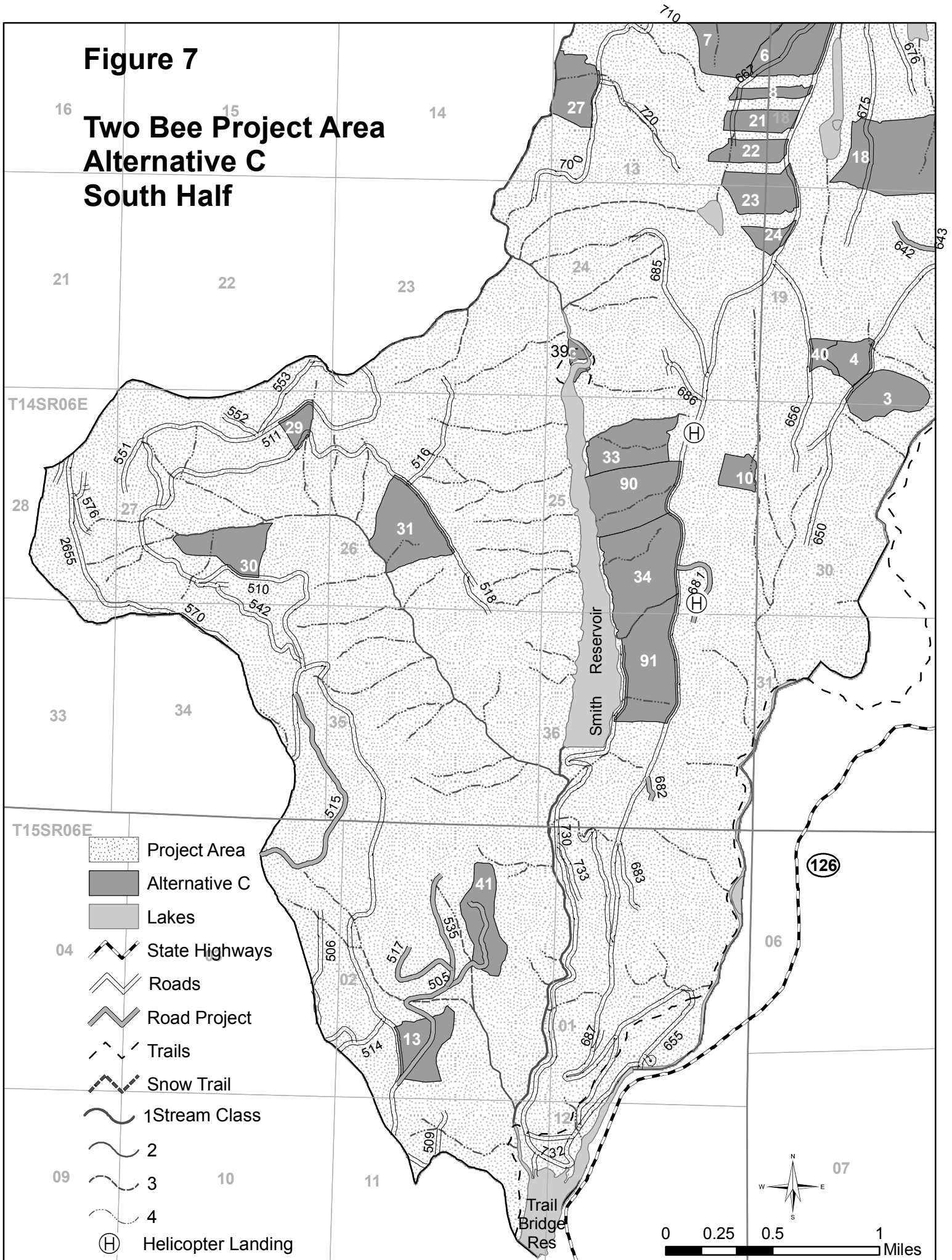


Figure 7

Two Bee Project Area Alternative C South Half



Alternative D – the No Action Alternative

Alternative D 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.

No timber stand treatments would take place as a result of this project. Only those management activities planned and implemented under previous decisions would continue in the project area. Stands that are currently at a moderately high stand density and experiencing a declining rate of growth would continue along current growth trends. Stand conditions that can favor the spread of bark beetle and root rot in proposed harvest units would continue unabated.

Since no timber harvest would occur at this time, this alternative would not meet the purpose and need for action, including managing the project area to provide an output of timber products at the optimum level to meet the long-term sustained yield capacity as prescribed in the Willamette Forest Plan. Since no timber stand treatments are included in Alternative D, it would not meet the need of moving the Two Bee Landscape toward target landscapes from the Two Bee Landscape Analysis. Alternative D would not respond to findings and recommendations from Upper McKenzie WA by implementing road and watershed restoration projects, and it fails to meet the need to reduce the miles of road within the project area to restore hydrologic conditions within the watershed. It would not reduce disturbance to elk and other wildlife species from open roads or enhance important wildlife habitat components for big game.

The existing network of roads would remain unchanged. Normal scheduled road maintenance, such as brushing, culvert cleaning, and surface blading would continue in accordance with annual maintenance plans.

Control of invasive plants would continue as currently programmed and funded.

Alternatives D (No Action) as it Responds to the Significant Issues:

Water Quality/Aquatic Resources

Alternative D proposes no activities that would create new risks to soil and water resources. However, the alternative allows existing road problems to persist, such as erosion from roads now in poor condition and with road structures that are barriers aquatic passage.

Threatened Northern Spotted Owl

Alternative D proposes no activities that would change current trends of development of long-term sustainable habitat for the threatened spotted owl in the project area.

Elk Habitat

Alternative D proposes no activities that would change current trends of development of long-term sustainable habitat for elk in the project area.

Other Connected Actions and Similar Actions Common to All Action Alternatives

Replacement of Culverts

Culvert replacement projects listed in Table 14 would occur on existing roads designated for haul in this project. All action alternatives would include stream-crossing improvements intended to accommodate 100-year flood events and to alleviate beaver-related impacts to culverts at Ikenick Creek on Forest road 2672, and at an unnamed creek crossing on Forest road 2672-655.

Alternatives B and C would install a culvert on Forest road 2672-675, which is designed pass a 100-year flow while also allowing aquatic wildlife passage.

Table 14: Stream Crossing Culvert Replacement.

Road Number	Existing Condition	Proposed Road Treatment	Description of Associated Maintenance Activities
2672	Open	Reconstruction	Redesign Ikenick Creek crossing to safely accommodate over topping when beaver activity impairs culvert function.
2672-655	Open	Reconstruction	Redesign unnamed creek crossing to safely accommodate over topping when beaver activity impairs culvert function.
2672-675	Closed	Reconstruction	Redesign Ikenick Creek crossing to improve existing drainage to pass 100 year peak flows, and allow amphibian passage.

Rock Pit Development at Boulder Creek and Dogwood Rock Pits

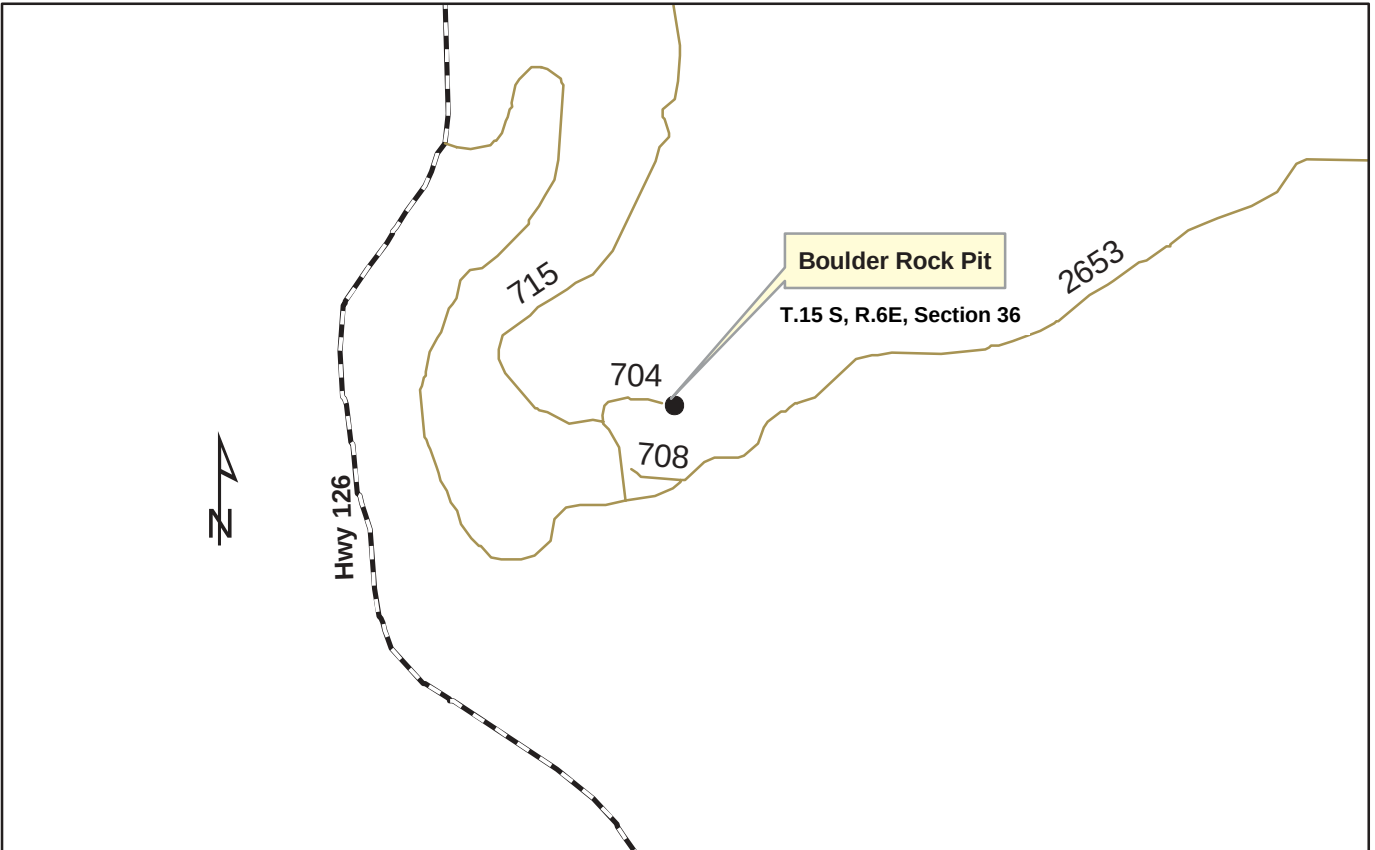
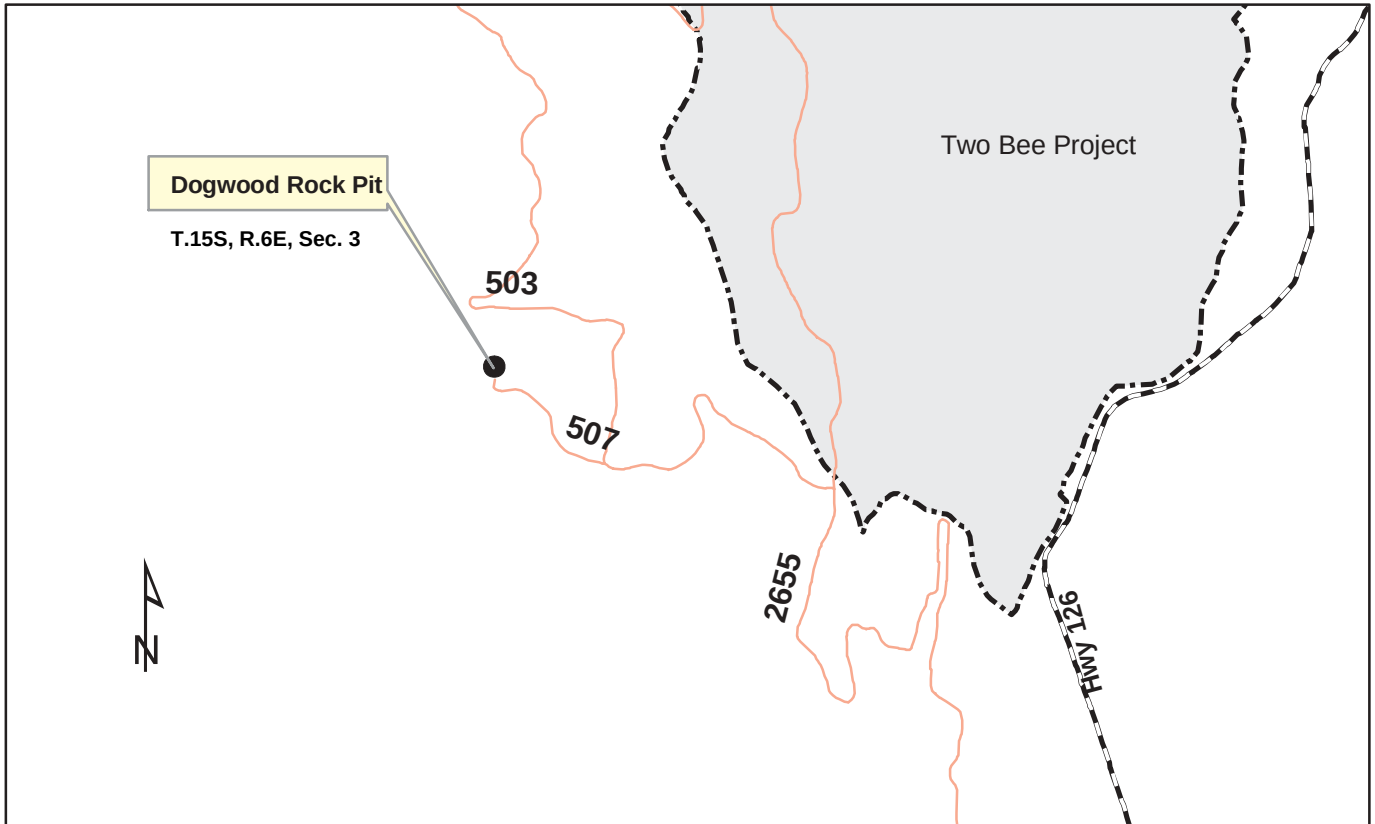
The existing Boulder Creek and Dogwood rock pits would be further developed to produce crushed aggregate, pit run aggregate, and riprap for road maintenance needs (see Figure 8). Development at both these pits includes clearing and grubbing trees, removal of soil overburden, drilling and blasting, reducing existing oversize material, and eventual rehabilitation of the site.

Development at these pits will conform to requirements in the respective pit development plans, which are included in the project analysis file. The anticipated volume of material needed for road maintenance is less than 10,000 cubic yards, and the development plans will specify the location and dimensions of the excavation to produce the estimated volume.

Both rock pits are greater than 0.25 miles from any known spotted owl activity center. Seasonal restrictions on blasting and rock crushing would be in place from March 1 to September 30 to avoid potential disturbance to spotted owls.

Figure 8

Two Bee Project Area
Rock Pits



Temporary Roads

Temporary roads have been identified to facilitate harvest activities. In Alternative A, a total of 1,200 feet of new temporary roads are needed to access landings in Units 3 and 6. In Alternatives B and C, a total of 4,200 feet of new temporary roads are needed in Units 3, 6, and 7. These roads would be located on stable, gently rolling terrain. The temporary roads do not include stream crossings and are not located in any riparian reserves. The location of these temporary roads facilitate the use of yarding systems that can protect resources by minimizing soils displacement and reducing impacts to leave trees within the units. Temporary roads would be decommissioned after completion of logging operations. (See Mitigation Measures.)

Table 15: Temporary Road Summary – Alternative A.

Unit	Harvest Prescription	Acres	Logging Systems	Temporary Roads (Feet)
3	Moderate Partial Cut	41	Skyline	300
6	Moderate Partial Cut	74	Ground-based	900
Total				1,200

Table 16: Temporary Road Summary – Alternatives B and C.

Unit	Harvest Prescription	Acres	Logging Systems	Temporary Roads (Feet)
3	Moderate Partial Cut	41	Skyline	300
6	Moderate Partial Cut	74	Ground-based	900
7	Moderate Partial Cut	173	Ground-based	3,000
Total				4,200

Figure 9

**TwoBee Unit #3
Temporary Spur Locations**

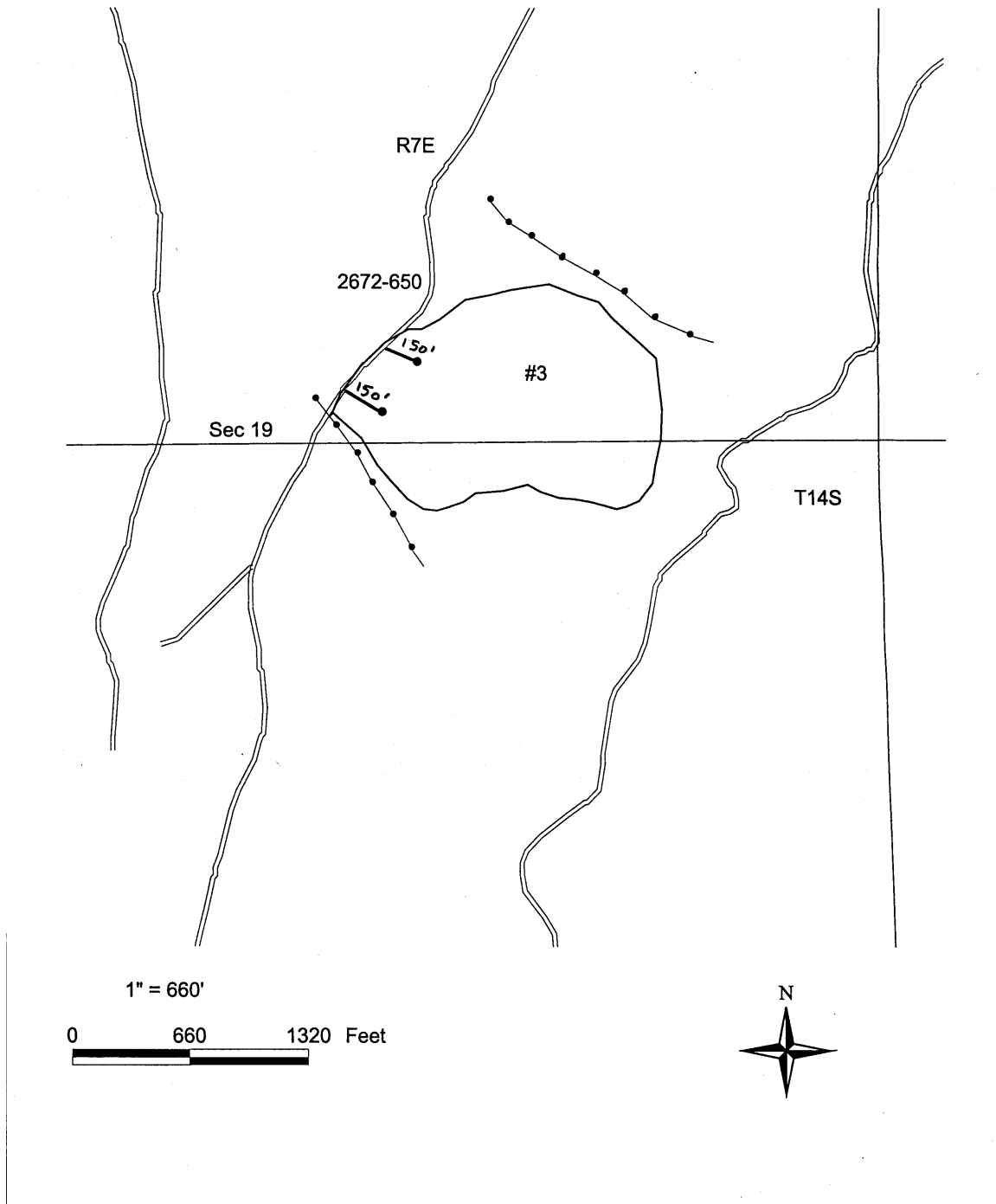
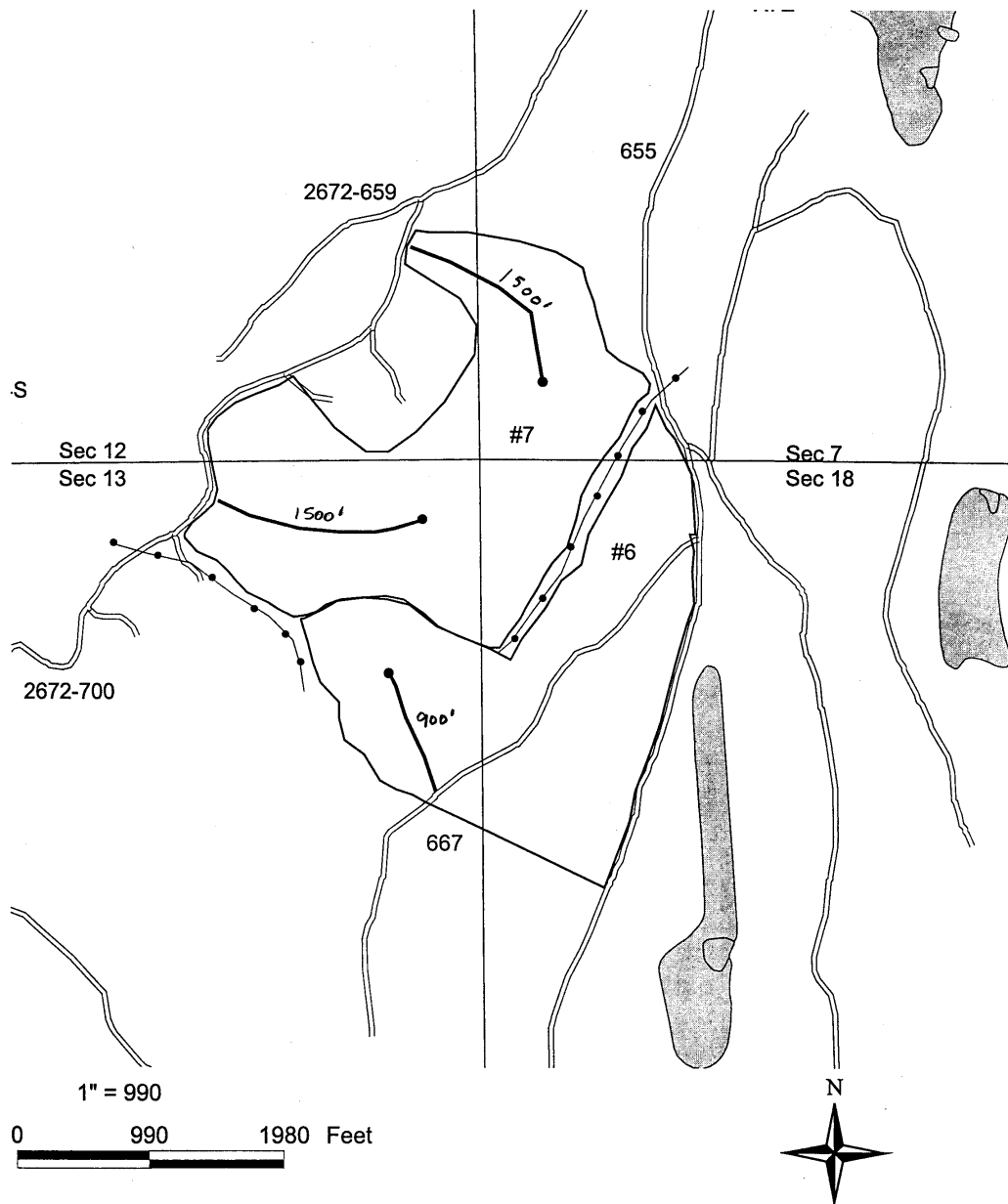


Figure 10.

TwoBee #6, #7
Temporary Spur Locations



Post-Timber Sale Activities

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

Aerial Fertilization – Fifty-eight units of managed stands in the Two Bee project area were analyzed for aerial fertilization, for a total of 1,350 acres. Research and trials have shown that nitrogen fertilizer can significantly increase tree growth and vigor. Stands selected for fertilizer treatment are generally 20 to 40 year old second growth stands that are predominantly Douglas fir. A 100-foot buffer will be maintained along class 1 through 3 streams, and along lakes, ponds or other wet areas. Fertilization may occur in Riparian Reserves of class 4 streams if they are dry at the time of application. However, if streams are flowing water at the time of application, a 100-foot buffer will be maintained. To determine protection measures, any stand selected to undergo aerial fertilizing that contains noble fir shall be surveyed for the Survey and Manage fungus species *Bridgeoporus nobilissimus*. See Appendix F for a list of stands where treatments may occur.

Precommercial Thinning (PCT) – Fifty-five units were analyzed for pre-commercial thinning for a total of 834 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, reach maturity faster, are less vulnerable to wind and snow damage and 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. No-cut thickets may be prescribed in some units for wildlife habitat diversity. Slash pullback and scatter 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 – Five units were analyzed for conifer pruning for a total of 65 acres. Conifer pruning involves removing the lower limbs from 70 to 110 trees per acre on trees from 20 to 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, pruning 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, which thrive in humid environments. Pruning may 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 scatter is required along all forest roads to provide a fuel-break. See Appendix F for a list of stands where treatments may occur.

Reforestation – Reforestation would occur in Shelterwood/HR units with implementation of Alternatives A and C, and in root rot pockets of commercial thinning units for all alternatives. See Silviculture Prescriptions for planting locations.

Noxious Weeds – As described below in Design Measures #7 through #13, noxious weeds would be treated with manual and mechanical methods such as pulling, cutting and mowing. Treatments would occur in all harvested units and the area ¼ mile around these units. Monitoring of the treated sites would occur to determine if multiple treatments are necessary.

Browse Cutback – To enhance deer and elk forage habitat, approximately 60 acres of browse cutback would occur on portions of adjacent harvest units. Browse cutback would cut shrubs with high forage values to encourage sprouting. Areas would be examined for effectiveness in improving deer and elk forage prior to treatment.

Diversity Thinning – Six stands totaling 139 acres are proposed for diversity thinning. Diversity Thinning and enhancement techniques would create and maintain plant species diversity, horizontal and vertical structural diversity, protect sensitive plant habitat, and protect and create wildlife habitat accelerating the late successional characteristics. Pre-commercial thinning using the diversity enhancing techniques such as variable spacing with gaps, leave islands or clumps, open grown trees, cluster trees and special habitat enhancements would accomplish these goals.

Forage Seeding – To enhance deer and elk forage habitat, approximately 70 acres would be seeded with native seed if ground conditions warrant. Seed would be distributed in the smaller areas with bare soil, on slopes less than 40%, and along road edges. Seeding treatment would provide high forage value in summer and fall. Treatment may occur after completion of harvest and site preparation within units.

Pond Habitat Improvement – Ponds adjacent to units 2 and 23 could be restored to enhance amphibian populations. Treatment would include weeds control, planting of berry producing shrubs and willow, seeding with native seed along the perimeter of the ponds and add woody material. Monitoring would be included to determine if treatments are effective in enhancing amphibian populations and habitat.

Snag and Down Wood Creation – Snags and down wood would be created as previously described in the description of each action alternative.

Native Seed Application – As described in Mitigation Measure #14, follow-up application of native seed at 20 pounds per acre would be applied two years after sale activities, when the initial purchaser application of cereal grain to areas of exposed soil is beginning to decline in vigor.

Water Source 1724 Re-vegetation – Mitigation #17 requires re-vegetation and stabilization of the site at Water Source #1724. Since this water source is situated in close proximity to an existing dispersed recreation site, use of the water source would create conditions leading to undesirable expansion of the site. Re-vegetation and stabilization would include planting trees and establishment of traffic obstacles such as rocks or logs to prevent erosion.

Riparian Reserve Management

Table 17: Riparian Reserve Management.

	Regeneration and Shelterwood Removal (Includes treatment of activity fuels)	All Partial Cutting and Commercial Thinning (Includes treatment of activity fuels)	Prescribed Fire
<i>Bull Trout Areas (McKenzie River and tributaries between Trail Bridge Reservoir and Carmen Reservoir) Units 3, 4, 10, 11, and 40</i>	Class 1: 360 ft. NH Class 2: 360 ft. NH Class 3: 180 ft. NH Class 4: 180 ft. NH Lakes: 600 ft. NH Wetlands and Reservoirs: 180 ft. NH	Class 1: 360 ft. NH Class 2: 360 ft. NH Class 3: 180 ft. NH Class 4: 180 ft. NH Lakes: 360 ft. NH and retain a minimum 50% canopy closure in the remainder of the 600 ft. reserve. Wetlands and Reservoirs: 180 ft. NH	Class 1: 360 ft. No Treatment Class 2: 360 ft. No Treatment Class 3 and Class 4: Allow low severity fire if control lines in the riparian reserve are not needed. Lakes: 360 ft. No Treatment and allow low severity fire if control lines in the riparian reserve are not needed in the remainder of the 600 ft. reserve. Wetlands and Reservoirs: 180 ft. No Treatment
<i>Non Bull Trout Areas (McKenzie River and tributaries above Carmen Reservoir, Smith River and tributaries) Units 1, 2, 6, 7, 8, 13, 18, 21, 22, 23, 24, 27, 29, 30, 31, 33, 34, 41, 90, and 91 Unit 39: See text following this table.</i>	Class 1: 360 ft. NH Class 2: 360 ft. NH Class 3: 180 ft. NH Class 4: 50 ft. NH Lakes: 600 ft. NH Wetlands and Reservoirs: 180 ft. NH	Class 1: 360 ft. NH Class 2: 360 ft. NH Class 3: 50 ft. NH and retain a minimum 50% canopy closure in the remainder of the 180 ft. reserve. Class 4: Retain bank stability trees and a minimum 50% canopy closure in the remainder of the 180 ft. reserve. Lakes: 180 ft. NH and retain a minimum 50% canopy closure in the remainder of the 600 ft. reserve. Wetlands > 1 ac.: 180 ft. NH Wetlands < 1 ac and Reservoirs: 50 ft. NH and retain a minimum 50% canopy closure in the remainder of the 180 ft. reserve.	Class 1 and Class 2: 180 ft. No Treatment, and allow low severity fire if control lines in the riparian reserve are not needed in the remainder of the 360 ft. reserve. Class 3 and Class 4: Allow low severity fire if control lines in the riparian reserve are not needed. Lakes: 180 ft. No Treatment, and allow low severity fire in the remainder of the 600 ft. reserve if control lines in the riparian reserve are not needed. Wetlands and Reservoirs: 50 ft. No Treatment, and allow low severity fire in the remainder of the riparian reserve if control lines are not needed.

NH = No Harvest

Note: Minimum canopy closure of 40% would be permitted in units harvested by helicopter to facilitate operational safety requirements.

Unit 39: Salvage harvest intended to eliminate hazard trees in and around Lakes End Campground. This unit is not located in bull trout tributary areas. Removal of these trees after falling is permitted if: 1) more than 240 lineal feet/acre of trees >20 inches dbh and >20 feet minimum piece length, are available, or 2) the felled trees are impeding the normal function of the campground.

Table 18: Stream Class/Riparian Reserve Present in Proposed Units*.

Proposed Unit	Stream Class Present
1	2
2	None
3	4
4	4
6	2, 3, 4, Wetland
7	3, 4, Wetland
8	None
10	4
11	None
13	None
18	3, 4, Wetland
21	None
22	4
23	4, Wetland
24	Wetland
27	2, 4
29	4
30	3, 4, Wetland
31	2, 4
33	4, Reservoir
34	4, Reservoir
39	1, Reservoir
40	None
41	3
90	4, Reservoir
91	4, Reservoir

*Note: Alternatives mapped on Figures 2, 3, 4, 5, 6, and 7 show streams for all classes, but they do not depict Riparian Reserve widths and whether treated or untreated.

Mitigation Measures and Design Measures Common to All Action Alternatives

Mitigation Measures: 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 the impact 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 to provide resource protections that ensure implementation activities remain consistent with Willamette Forest Plan Standards and Guidelines.

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.

Mitigation Measures

Mitigation Measures for Soil, Watershed, and Fisheries Protection:

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. Best Management Practices (BMPs), 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 for hauling during the winter rainy season between November 1 and May 31. The objectives are to maintain water quality and fish habitat.
3. Construction and or maintenance of roads would not be done when soils are saturated or run off occurs, to minimize erosion and sedimentation, and a stable fill would be constructed across all streams.
4. All haul roads would be maintained in stable condition. Winter hauling may be allowable on aggregate surfaced roads when the road surface is either covered with a relatively continuous snow pack or when void of snow when runoff from the road surface is unlikely. Watering the road surface would be used if roads become excessively dusty during the summer.
5. Ground-based yarding systems 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 if rainfall or precipitation results in pooling of water in skid trails or landings.

6. Designated skid trails would be required in all ground based yarding units. 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.
7. 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. Traditional ground based yarding equipment would not be permitted within Riparian Reserves of Class I and Class II (fish bearing) streams. Alternative low disturbance ground based equipment such as shovel yarding would not be permitted within 150 feet of fish bearing streams. Traditional ground based equipment would not be permitted within 50 feet of the stream channel in Class III and Class IV (non-fish bearing) streams. In the remainder of the riparian reserve, traditional 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. Prescription elements designed to accomplish this are detailed in Table 17. Minimum canopy closure of 40% would be permitted in units harvested by helicopter to facilitate operational safety requirements.
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.
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 units with ground based yarding would be scarified to a depth of 3 to 6 inches. Skid trails in regeneration treatments and all landings would be sub-soiled to a depth of 18 to 22 inches.
14. All 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.
15. Temporary roads would be decommissioned after completion of logging operations.
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.
16. In units containing stream channels, all existing large woody debris would be retained within riparian reserves to maintain channel stability; provide nutrients and food for aquatic plants and insects, and to provide buffering so as to filter sediment from runoff and maintain water quality.
17. Water sources used by project operations will be reconstructed or maintained as necessary to protect stream bank stability, riparian vegetation, and water quality.
18. The segment of road 2672-655 south of MP 5.04, from the intersection with road 2672-682 to road Oregon State Highway 126, is not to be used as an alternate haul route. The intent is to protect bull trout and spring Chinook spawning habitat between EWEB facilities and McKenzie River Trailhead from impacts from hauling.

Mitigation Measures for Recreation:

19. Prohibit helicopter flights loaded with logs over Lakes End Campground and Smith Reservoir from units 33, 34, and 39. Temporarily close public access to helicopter landing during periods of work.
20. Post an advance notice of operations at Smith Reservoir boat ramp and temporarily close Lakes End Campground to public use during salvage operations in unit 39.

Mitigation Measures for Wildlife:

21. Snags would be retained or created following harvest to support primary cavity excavators as listed by action alternative in Tables 5, 9, and 13.
22. To secure a visual screen for elk, 50-foot no-harvest buffers would be left within partial cut units along forest service roads 2672 and 2672-655.
23. To reduce potential disturbance to any nesting spotted owls in the area, seasonal restrictions would be imposed on disturbance activities within 0.25 miles of spotted owl activity centers. Similar restrictions would apply for peregrine falcons and bald eagles.
24. Within all regeneration (shelterwood) units, 15% of the harvested area would remain in no-harvest patches and/or scattered individual trees (GTRs).

25. Large woody material: At least 240 lineal feet per acre of decay class I and II material greater than 18" diameter and 20 feet in length would be retained within all harvest units. Where the preferred size of material is not available, 240 lineal feet per acre of the largest diameter harvested would be retained.
26. Hazard trees that are felled within no cut buffers will be left on site for coarse woody debris.
27. A seasonal operating restriction on falling, yarding, heavy equipment operation, helicopter use, burning, snag and log creation is required if shown in the following table. These restrictions may be lifted if surveys are conducted and non-nesting is verified for the year of operation.

Table 19: Seasonal Restrictions Design Measures.

Unit	Seasonal restriction for falling, ground-based yarding, burning, snag/ down log creation and rock pit development without blasting.	Seasonal restriction for helicopter use and blasting at rock pit development.
1	No	
2	No	
3	Yes, January 15 – July 31	
4	Yes, January 15 – July 31	
6	No	
7	Yes, March 1 – July 15	
8	No	
10	No	Yes, January 15 – July 31
11	No	
18	No	
21	No	
22	No	
23	No	
24	No	
27	No	
31	No	
33	Yes, January 1 – August 31	Yes, January 1 – August 31, and March 1 – July 15
34	Yes, January 1 – August 31	Yes, January 1 – August 31, and March 1 – July 15
39	Yes, January 1 – August 31 and March 1 – July 15	Yes, January 1 – August 31, January 15 – July 31, and March 1 – July 15
40	Yes, January 15 – July 31	N/A
41	Yes, March 1- July 15	N/A

Unit	Seasonal restriction for falling, ground-based yarding, burning, snag/ down log creation and rock pit development without blasting.	Seasonal restriction for helicopter use and blasting at rock pit development.
90	Yes, January 1 – August 31 and March 1 – July 15	
91	Yes, January 1 – August 31	
Heli Landing (A) on 2672655	N/A	N/A
Heli Landing (B) on 2672-681	N/A	N/A
Boulder Creek Rock Pit	N/A	Yes, March 1 – September 30
Dogwood Rock Pit	N/A	Yes, March 1 – September 30

28. A 30-foot no-cut roadside screening buffer for elk security will be left on thinning and pruning units that are adjacent to well-traveled roads.

Mitigation Measures for Sensitive Botanical Species and Survey and Manage Species:

29. A no-disturbance buffer would be placed around known occurrences of sensitive plant species and Survey and Manage botanical 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.

Mitigation Measures for Special Habitat Areas:

30. A no-harvest buffer would be placed around special habitats listed in Table 42. Sizes of buffers are listed Appendix C. Trees would be felled away from the no-disturbance buffer.

Other Design Measures

Recreation:

1. Include contract requirements to restore or reconstruct disturbed or obliterated winter trails associated with Ikenick Sno Park after harvesting timber from unit 1.

Wildlife:

2. 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.
3. 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 Contract Provision C6.25 would be implemented.

4. 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 of helicopter landings, additional helicopter use, or blasting.
5. A seasonal operating restriction is required for the Cascade Elk Rifle season, which is typically the third week of October. All vehicle traffic would be restricted on closed roads beginning the Friday before this week through the end of the following Friday.
6. Implement planned road closures as soon as possible after forest products removal operations are completed to benefit Pacific fisher and other wildlife species needing seclusion.

Noxious Weed Control

7. 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. Cleaning methods can utilize compressed, high pressure water, or other specified methods.
8. Start work in non-infested areas and then move to infested areas (FS will provide map).
9. Pre and post harvest survey and control of noxious weeds would be applied to all harvest units and associated roads in the planning area.
10. Clean fill (soil or rock free of slash and debris) should be used for construction of temporary roads. Sources of rock and fill material need to be free of noxious weeds. Rock quarries that may be used will be surveyed for noxious weeds prior to use. If noxious weeds are found, they would be treated as necessary prior to use.
11. Disturbed areas (culverts, road shoulders) would be re-vegetated with weed-free native seed to compete with noxious weed seed. Weed-free mulch would be used if necessary.
12. Roads to be bermed or decommissioned would be treated for noxious and non-native weeds prior to blocking. All roads with disturbed soil would be planted with native plant material to prevent invasion by non-native species.
13. Bermed and decommissioned roads would be monitored for noxious weeds for three years after the road treatment is completed. Identified weed populations would be treated.

Fuels Treatment:

14. Prescribed fire will not be allowed within riparian reserves in spring Chinook and bull trout habitat. In all other 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.

Cultural Resources:

15. When previously unknown cultural resources are discovered during ground-disturbing operations, work would be halted and the cultural resource site in question would be evaluated as to National Register of Historic Places (NRHP) eligibility by a qualified professional archaeologist. If the cultural resource (site) were found to be eligible for listing on the NRHP (and thus significant), the project operation would be modified to avoid impacting the cultural site. Such avoidance may take the form of timber sale unit boundary withdrawal (avoiding direct impact and establishing a safety buffer of 100 feet around the cultural site boundary.) Similarly, a cultural site discovered during road construction may necessitate redesign of the road, protective overburden, or use of an alternative route. Other mitigations that may be utilized include a change in equipment or season of operation. More complex mitigation may require consultation with the State Historic Preservation Office (SHPO) and federally recognized Indian tribes before the project work can resume.

Silviculture Prescriptions

Table 20: Stand Treatment Prescriptions.

Stand Treatment	% Maximum SDI *	% Post-Harvest Canopy Closure **	Alt. A Acres	Alt. B Acres	Alt. C Acres
<i>Light Partial Cut</i>	50 – 55%	65 – 75%	96	0	0
<i>Moderate Partial Cut</i>	40 – 50%	50 – 65%	249	591	212
<i>Moderate Partial Cut with Multi-Storied Objectives</i>	50%	50 – 65%	0	121	0
<i>Heavy Partial Cut</i>	30 – 40%	40 – 50%	0	0	175
<i>Shelterwood – with Heavy Reserves</i>	N/A	20 – 40%	117	0	573
<i>Commercial Thinning in Young, Previously Managed Stands</i>	35 – 40%	40 – 50%	87	87	87
<i>Salvage</i>	N/A	N/A	7	26	7
Total Acreage			556	825	1,054

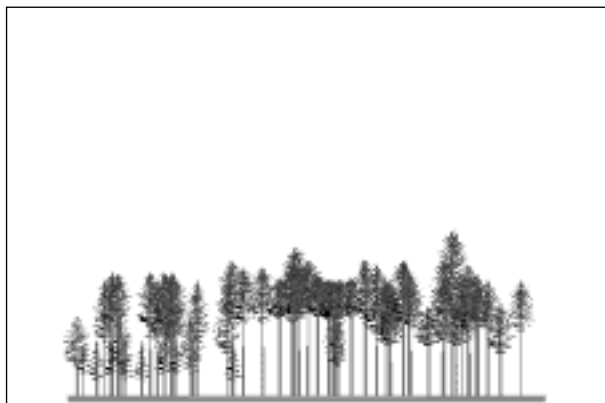
*SDI: Stand Density Index

**Outside of Riparian Reserves

Current Stand Conditions

Previously-managed Stands:

Two Bee Project units 13 and 41 are single-storied 40 year-old stands that were established after clear-cut harvesting in the late 1960s. They are predominantly comprised of Douglas-fir trees at moderate to high density stocking levels. Root rot exists in both stands in scattered areas and at low intensities.

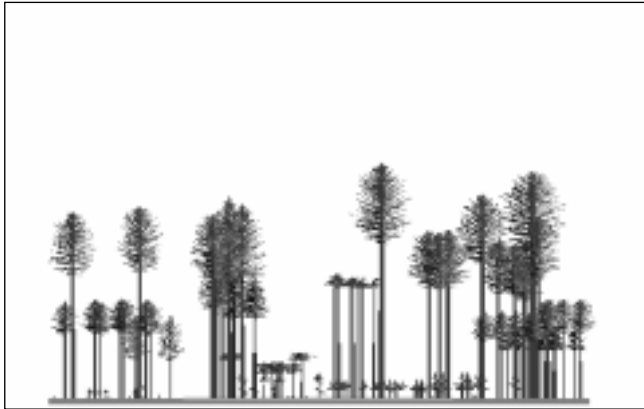


Previously-managed Stands

Even aged stands (100-150 years old)

Most of the units within the project area are even-aged stands 100-150 years old. They include: 1, 2, 3, 4, 11, 18, 27, 29, 31, 33, 34, 40; and prescribed fire units 90 and 91. These stands were established

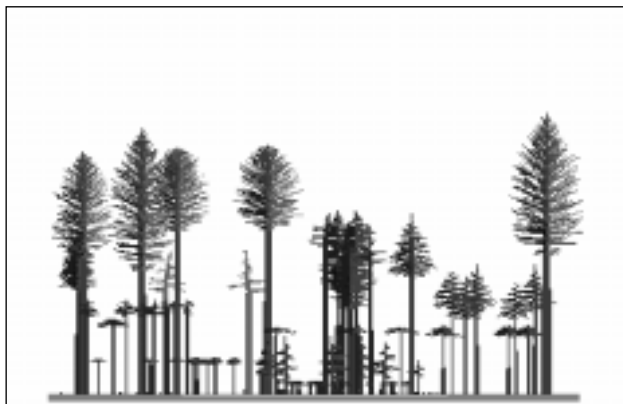
after stand-replacing fires occurred in the 1850s and 1900s. Understory re-initiation of the more shade tolerant species is occurring in these stands while the over-story is primarily Douglas-fir with some grand fir, Pacific silver fir, western hemlock and other various species. A few scattered remnant old growth trees can also be found in most of the units. Root rot pockets and signs of Douglas-fir beetle have been known to exist in some of the stands contributing to the low and moderate levels of downed wood.



Even-Aged Stands

Late Seral (150--200+ years old)

Units 8, 21, 22, 23, 24, and 30 have late-seral conditions, predominately climax species western hemlock in the over-story. There are some scattered Douglas-fir remnants from the stand-replacing fires that established the stands back in the 1800s. All the stands have good multi-layered canopies and good understory development. Most units have been salvage logged in the past and currently have low, moderate, and high levels of downed wood.



Late Seral Stands

Silviculture Descriptions

Shelterwood Regeneration:

Shelterwood Regeneration is an even-aged silvicultural method. This treatment is applied to mature stands when the main objective is to promote regeneration. Even-aged systems provide optimal

seedling environment for the establishment and growth of the shade intolerant species presently on site. The shelterwood is used to provide seed and protection from environmental extremes. A system is called shelterwood when the number of trees retained after harvest becomes great enough to affect site conditions over the whole stand, not just the area around the residual tree. The residual green trees are well-dispersed through the unit to provide a consistent level of protection. Although traditionally the shelterwood includes the removal of the overstory residuals following successful regeneration, the residual trees may be left in the stand for an indefinite period of time.

Thinning

Intermediate cuttings of younger stands that are used for the reduction of stand density or management of species composition are called thinning. The objectives include increasing the overall growth potential of the residual trees while removing trees that would ultimately die from suppression. Thinning from below removes trees from the lower crown classes. The thinning can be applied throughout a range of densities. With a very light or salvage thinning, removals are confined to overtopped or suppressed trees where the canopy remains unbroken or only slightly broken. With the heavier thinning, additional and higher crown classes are removed and the canopy is opened accelerating growth and crown expansion of the remaining trees. The remaining trees also develop into a healthier and more stable stand over time.

Partial Cutting

Tree removal where only part of the stand is cut is called partial cutting. Partial cutting is applied to mature stands in order to improve growth of residual trees while also increasing or enhancing the vegetative diversity. Diversity stems from openings created within the canopy that allow for understory development of tree seedlings as well as other shrub and plant species. The residual densities of partial cutting and range of diameter size classes may vary in order to meet different objectives.

Salvage Logging

Salvage logging is the recovery and use of dead or dying trees resulting from disturbances other than competition between trees, such as insects and disease, fire or weather.

Silviculture Prescriptions

Silvicultural treatments prescribed for the selected units include moderate commercial thinning, light, moderate, moderate for multistory stand development, and heavy partial cutting, shelterwood with heavy reserves, and salvage logging. Natural Fuels Prescribed Fire is also included in Alternative C. This combination of treatments are prescribed by the IDT team in order to meet the various resources objectives imposed by direction from Forest Plan, project-level management direction, and the site specific conditions of the project area.

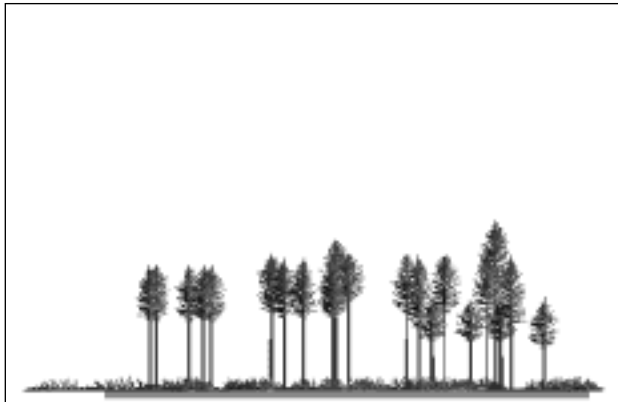
Stand Density Index. The stand treatments developed for the Two Bee project units are based on the Stand Density Index (SDI), which is a relative measure of the stand's density with a maximum SDI that varies for each tree species. At approximately 50% maximum SDI, maximum stand production

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 such as growth for sustainable timber and mean tree growth for various wildlife habitat objectives.

Moderate Commercial Thinning

This prescription is proposed for units 13 and 41 in each of the action alternatives. The stands would be thinned to a maximum SDI of 35% to 40% primarily through the removal of smaller diameter Douglas-fir trees. Approximately 90 to 100 trees per acre would be left as residuals plus 4 trees per acre would be left for future snag and large down wood creation. The spacing would be approximately 15 to 30 feet with variation occurring with the marking prescription as well as natural variation in the stands. Identified laminated root rot pockets may be treated with the removal of susceptible species and planting of resistant species. Some areas would be designated as no harvest as determined by mitigations described earlier in this chapter.

This treatment would maintain or improve overall stand growth and vigor by reducing competition for limiting resources such as light, water, and soil nutrients. Thinning would also increase individual tree stability making them more resistant to wind-throw as they mature. Trees would 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, primarily of shade tolerant species. Residual trees would respond over time with enhanced diameter growth and crown expansion; another commercial thinning would likely be necessary in approximately 15 to 20 years when the maximum SDI levels again exceed 50%.

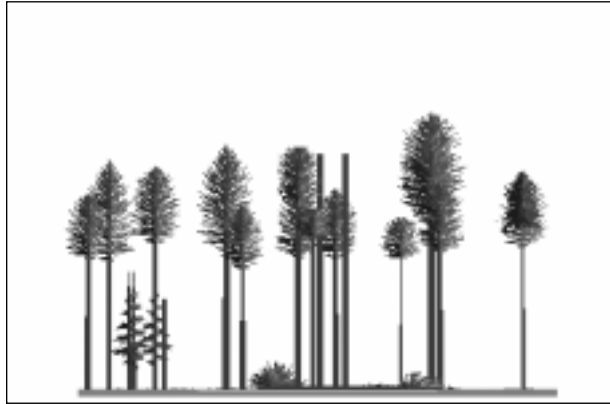


Moderate Commercial Thinning

Light Partial Cutting

This prescription is proposed for units 2 and 6 in Alternative A only. The light partial cutting would treat these older stands by primarily removing the smaller diameter Douglas-fir reducing maximum SDI to about 50%. Emphasis would be on maintaining non/Douglas-fir species. Approximately 60 to 70 trees per acre would be left as residuals including those that would be used for future snag and large down wood creation. The spacing would be approximately 20 to 35 feet, with variation occurring with the marking prescription as well as natural variation in the stands.

The light partial cutting would capture mortality of smaller trees and leave the larger healthier trees maintaining a 65% to 75% canopy closure. The treatment should help maintain or increase overall growth and vigor of the remaining trees, and reduce the future mortality and susceptibility to insects and disease. Fire intensity and possibly severity would be less in a wildfire situation with reduced densities and ladder fuels. Designated no-harvest areas would be left scattered throughout the stands for horizontal structural diversity. Snags would be maintained on site if not a hazard to logging operations as well as current down wood not included in the salvage logging.



Light Partial Cutting

Moderate Partial Cutting

This prescription would be used in most of the older Two Bee units especially with Alternative B. The partial cutting would take mostly smaller diameter trees reducing the maximum SDI to about 40% to 50%. The residual trees for each unit would vary, ranging between 30 and 75 trees per acre including those that would be used for future snag and large down wood creation. Average spacing would vary with the marking prescription and the natural conditions of the stands.

The moderate partial cutting would help maintain or increase overall growth and vigor of the remaining trees and reduce the future mortality and susceptibility to insects and disease. Fire intensity and possibly severity would be less in a wildfire situation with reduced densities and ladder fuels. Canopy closures would be about 50% to 65% allowing for in-growth of seedlings and development of some understory shrubs. Horizontal diversity would be maintained through designated no-harvest areas scattered throughout the stands. Snags would be maintained on site if not a hazard to logging operations as well as current down wood.

Moderate Partial Cutting



Moderate Multi-Story Partial Cutting

This prescription is proposed for unit 18 in Alternative B. This mature stand would be partial cut to a maximum SDI of about 50%. Emphasis would be on maintaining a variety of tree species of various size classes. Approximately 95 to 100 trees per acre would be left resulting in a minimum canopy closure of 50%. Average spacing would be about 21 feet, with variation occurring with the marking prescription as well as natural variation in the stand. Residual trees include those that would be used for future snag and large down wood creation.

This prescription would create a healthy multi-storied stand with vegetative and horizontal diversity over time using multiple partial cut treatments. Resistance to future insect infestations and disease would be increased with the reduced stand levels. Horizontal diversity would be maintained through designated no-harvest areas scattered throughout the stands. Snags would be maintained on site if not a hazard to logging operations as well as current down wood.



Moderate Multi-Story Partial Cutting

Heavy Partial Cutting

This prescription would treat stands by partial cutting mostly the smaller and some larger diameter trees reducing the maximum SDI to about 30% to 40%. Emphasis would be on maintaining non/Douglas-fir species. This prescription would apply to units 1, 8, 21, 22, and 23 in Alternative C.

The residual trees for each unit would vary and range between 25 and 40 trees per acre including those that would be used for future snag and large down wood creation.

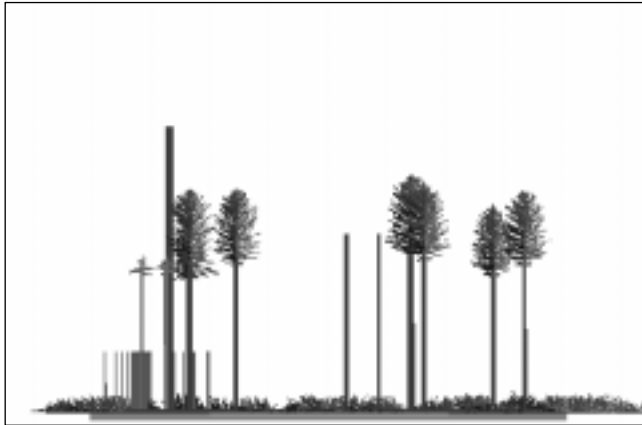
The heavy partial cutting would help maintain or increase overall growth and vigor of the remaining trees and reduce the future mortality and susceptibility to insects and disease. Fire intensity and possibly severity would be less in a wildfire situation with reduced densities and ladder fuels. Canopy closures would be about 40% to 50% allowing for in-growth of seedlings and development of some understory shrubs. Horizontal diversity would be maintained through designated no-harvest areas scattered throughout the stands. Snags would be maintained on site if not a hazard to logging operations as well as current down wood.



Heavy Partial Cutting

Shelterwood with Heavy Reserves

This prescription would be used in many of the Two Bee units in Alternative C as well as units 29, 30, and 31, in Alternative A. The regeneration harvest would open the stands to a minimum 20% canopy closure that leaves approximately 20 to 25 trees per acre, which includes trees used for future snag and large down wood creation. Emphasis would be placed on retaining an even distribution of over-story green trees. The canopy would be composed of the largest trees in the stand, primarily Douglas-fir. At least 15% of each stand would be retained in no-harvest patches to provide diversity and maintain existing snags. The retained patches would be scattered and variable in size. These stands would be treated for fuels reduction with various methods including underburning, and would be planted with a variety of tree species after harvest. Snags and existing down wood would be maintained throughout the stands if not a hazard to logging operations.



Shelterwood with Heavy Reserves

Salvage Logging

Salvage logging would occur in units 11 and 39 Alternative B and only in unit 39 in Alternative A and C. This prescription would remove dead trees that have been blown down during past wind events leaving the recommended 240 lineal feet of down wood per acre.

Natural Fuels Prescribed Fire

Natural fuels prescribed fire would occur in units 90 and 91 of Alternative C. No mechanical harvest activity would take place in these units prior to the underburn. The prescription would re-introduce fire to the landscape by simulating a low intensity fire. This resembles the more frequent cycle of low intensity, historic fire occurrences in the area. The underburn would reduce existing fuel loads horizontally and vertically, directed at fuels on the ground, brush, and small trees in the understory. Some mortality of dominant and co-dominant trees in the overstory would also occur. Fire severity, which refers to the mortality of the dominant overstory in the stand, would be low. The mortality would be in the smaller diameter size classes (saplings to 15 inches dbh) and in less than 20% of the larger diameter trees. Mortality of species other than Douglas-fir is expected to occur more often.

Underburning is aimed at reducing fuel loading and arrangement, and would aid in reducing the severity of future wildfires as well as resistance to control (suppression) of wildfires. The residual trees in the stand would respond to the decrease in densities with increased diameter growth and crown expansion. Openings that are created will provide opportunities for establishment of understory vegetation over time.

Comparison of Alternatives

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

Table 21: Comparison of Alternatives by Activity.

Management Activity	Units of Measure	Alt. A	Alt. B	Alt. C	Alt. D No Action
Harvest Prescription					
Moderate Commercial Thinning	Acres	87	87	87	0
Light Partial Cut	Acres	96	0	0	0
Moderate Partial Cut	Acres	249	591	212	0
Moderate Partial Cut for Multistory	Acres	0	121	0	0
Heavy Partial Cut	Acres	0	0	175	0
Shelterwood w/HR	Acres	117	0	573	0
Salvage Harvest	Acres	7	26	7	0
Total Acres	Acres	556	825	1,054	0
Estimated Timber Volume	(MBF/ CCF)	5,696/ 10,802	10,787/ 20,460	24,343/ 46,169	0/ 0
Natural Fuels Prescribed Fire	Acres	0	0	149	0
Logging System					
Ground-based	Acres	391	578	674	0
Skyline	Acres	158	176	293	0
Helicopter	Acres	7	71	87	0
Roads					
Road Maintenance	Miles	24.0	21.6	28.8	0
Open Roads Closed by Gates, Berms, or Decommissioning	Miles	7.5	7.5	7.5	0
Total Road Decommissioning	Miles	3.1	3.1	3.1	0
Temporary Roads	Feet	1,200'	4,200'	4,200'	0

Comparison of Alternatives by Significant Issues

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

Table 22: Comparison of Alternatives – Aquatics/Riparian Resources.

Aquatics/Riparian Resources					
Issue Measurement	Units of Measure	Alternative A	Alternative B	Alternative C	Alternative D No Action
<i>The quality and availability of riparian and in-stream large wood after riparian treatment.</i>	<i>Average dbh in inches (Larger is better)</i>	24"	29"	28"	23"
<i>The amount of riparian area receiving thinning treatment.</i>	<i>Acres treated</i>	9 ac.	38 ac.	25 ac.	0 ac.
<i>Increase in Stream Water Temperatures</i>	<i>Degrees Celsius</i>	1.5° to 2.0°	1.5° to 2.0°	1.5° to 2.0°	1.5° to 2.0°
<i>Road Sediment stabilized by project activities</i>	<i>Sediment Cubic yards</i>	2,750 yd ³	2,900 yd ³	2,900 yd ³	0 yd ³
<i>Changes in risk of altered peak flows</i>	<i>Aggregate Recovery Percentage (ARP)</i>	89.1%	90.7%	86.9%	90.7%

Table 23: Comparison of Alternatives – Threatened Northern Spotted Owl.

Threatened Northern Spotted Owl					
Issue Measurement	Units of Measure/Owl Habitat Affected	Alternative A	Alternative B	Alternative C	Alternative D No Action
<i>Owl Habitat</i>	<i>Acres Degraded</i>	103 ac.	26 ac.	156 ac.	0 ac.
<i>Owl Habitat</i>	<i>Acres Downgraded</i>	249 ac.	712 ac.	387 ac.	0 ac.
<i>Owl Habitat</i>	<i>Acres Removed</i>	117 ac.	0 ac.	573 ac.	0 ac.

Table 24: Comparison of Alternatives – Elk Habitat.

Elk Habitat					
Issue Measurement	Units of Measure	Alternative A	Alternative B	Alternative C	Alternative D No Action
<i>Road Density</i>	Change in Miles of Open Roads	5.76 mi. decrease	5.76 mi. decrease	5.76 mi. decrease	0 mi.
<i>Elk Habitat</i>	Acres of Change in Forage Habitat	117 ac. increase	0 ac.	573 ac. increase	0 ac.
<i>Elk Habitat</i>	Acres of Change in Hiding Cover	87 ac. increase	87 ac. increase	87 ac. increase	0 ac.
<i>Elk Habitat</i>	Acres of Change in Thermal Cover	453 ac. decrease	892 ac. decrease	1,140 ac. decrease	0 ac.
<i>Elk Habitat</i>	Acres of Change in Sub-thermal Cover	249 ac. decrease	712 ac. decrease	387 ac. decrease	0 ac.

Chapter 3. Environmental Consequences

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

The cumulative effects discussed in this section include an analysis and a concise description of the identifiable present effects of past actions to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have a continuing, additive, and significant relationship to those effects. The cumulative effects of the proposed action and the alternatives in this analysis are primarily based on the aggregate effects of the past, present, and reasonably foreseeable future actions. 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

Affected Environment

The Two Bee Landscape Analysis (Appendix A) considers a 30,667-acre area within Landform Block 2B, from the Upper McKenzie Watershed Analysis, which includes both McKenzie River and Sweet Home Ranger Districts. Timber harvesting has clearly been a dominant disturbance on the forested landscape for the last 50 years impacting approximately 9,895 acres (32%) of the area considered in the landscape analysis. Prescribed burning, wildfires, windthrow, and insect and disease have had much less affect during that time.

The following table provides a summary of timber harvest by decade. Harvest activity is listed by regeneration harvest (clearcutting and shelterwood) and non-regeneration harvest (salvage, thinning, or individual tree selection). Additional information about past timber harvest can be found in Appendix K.

Table 25: Historic Stand Management in the Two Bee Landscape Area.

Decade	Acres of Regeneration Harvest	Acres of Non-regeneration Harvest (salvage, thinning, individual tree selection, etc.)	Acres of Managed Stands
1940-1949	60	0	60
1950-1959	511	0	511
1960-1969	3,083	0	3,083
1970-1979	1,241	243	1,484

Decade	Acres of Regeneration Harvest	Acres of Non-regeneration Harvest (salvage, thinning, individual tree selection, etc.)	Acres of Managed Stands
1980-1989	1,521	1,115	2,636
1990-1999	717	1,217	1,934
2000-2005	39	148	187
Totals	7,172	2,723	9,895

Approximately 7,120 acres of forest (23%) was modified with regeneration-type timber harvest, which is now in plantations 50 years old or less. A few of the existing plantations in the analysis area are now becoming ready for intermediate thinning treatments. However, the next decade will see a dramatic increase in the number of plantations that will be ready for commercial thinning.

Regeneration harvest was the sole method used until the 1970s, when the Forest Service began to treat stands with other methods such as thinning and selection cutting. These non-regeneration methods have modified 2,723 acres (9%) in the analysis area.

The project area consists of a mosaic of managed and natural forests with various stand ages and structure. Most of the stands identified for harvest are natural stands, at least 100 years old with some trees over 200 years old. The current phase of structural development varies with the age of the stand, site conditions, and disturbance history. For the most part, the stands are undergoing understory re-initiation where openings in the forest canopy from self-thinning or disturbance from wind-throw and root rot are promoting regeneration of conifer species. The regeneration is primarily of shade tolerant species.

Natural disturbance from windthrow and disease has also provided various levels of snag and large down wood component that varies in the levels of decay. Most stands have some old remnant Douglas-fir trees that have survived past fires and other natural disturbances. These mature forests have mostly Douglas-fir and western hemlock over-stories with and understory of grand fir, hemlock, and Pacific silver fir. Past management in the older natural stands only included salvage logging.

The stands contain from 80 to 220 overstory trees per acre with average diameters of 10 inches dbh in the young managed stands and 20 to 30 inches dbh in the older stands. Canopy closures are at or above 80%. 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 and are often associated with insects such as bark beetles.

Stands exams were completed in the Two Bee Project area in 1998. The data indicates that tree growth and vigor have been in decline over the years, and would continue with a further increase in stand size and stand density. The measure of Stand Density Index (SDI) for a stand should be below 60% to maximize overall growth. The stands proposed for harvest treatment are above 50%, the level at which individual tree vigor begins to decline (Long, J.N. 1985).

Environmental Consequences

For the following analysis of environmental consequences, the current condition of the forest stands, including measures of SDI and stand development, was modeled using the Westside Cascades variant of the Forest Vegetation Simulator (FVS) (Wykoff, et al. 1982).

Effects of Alternatives A, B and C

Moderate Commercial Thinning

Moderate thinning maintains or improves overall stand growth and vigor by reducing competition for limiting resources such as light, water, and soil nutrients (see *Silviculture Prescriptions*, page 59). Reduced stand densities and competition allows the residual trees to maintain a higher growth rate than would occur with no thinning. All alternatives propose the same amount of acres of moderate commercial thinning in units 13 and 41.

Reduced stand densities and greater diameter growth of residual trees would increase their stability making them more resistant to windthrow as they mature. The residual trees should also be less susceptible to some root diseases such as *armillaria* spp. and associated insects. Resistant and tolerant tree species that may be planted within identified laminated root rot pockets should have a higher chance of survival than would the Douglas-fir.

Moderate thinning creates openings in the canopy allowing for the release of some existing understory trees and shrubs. The canopy closures would be opened up to about 50%, also providing opportunity for the establishment new vegetation and shade tolerant tree seedlings. These openings would therefore, enhance structural diversity throughout the stands and enhance the future creation of large snags and down wood.

The overstory would remain primarily Douglas-fir and respond to the openings with increased crown growth. Eventually the understory vegetation would be suppressed. As canopy closure and stand density increase over the next 15 to 20 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.

Light Partial Cutting

The light partial cutting is proposed in units 2 and 6 in Alternative A. This treatment would capture mortality of smaller trees and leave the larger healthier trees, retaining a 65% to 75% canopy closure, and maintains overall growth and vigor of the remaining trees while reduces future mortality and susceptibility to insects and disease. Fire intensity and severity may also be less in a wildfire situation with reduced stand densities and ladder fuels (see *Silviculture Prescriptions*, page 59). Although overall growth of residual trees would not be as high as a heavier thinning treatment or similar treatment in stands consisting of young trees, a small increase in growth or stabilization of current decreasing growth rate is expected (Latham, P. and J. Tappenier, 2002). The length of time before a growth response to density reduction occurs may take from 5 to 25 years after harvest.

The effects to stand structure would include a reduction in size class distributions with the removal of trees that average 15 inches dbh. The larger size classes which remain would range from 20 inches

to over 40 inches dbh, with an average of 25 inches dbh. The current regeneration in the stands range from 100 to 500 trees per acre; with some mortality expected to occur from logging operations and post logging slash treatment.

Species diversity in the stand would be maintained with the removal of mostly Douglas-fir and leaving most of the existing non-Douglas-fir species. Diversity is also expected to increase over time with the release of the remaining understory seedlings that consist of primarily shade tolerant species.

Structural diversity would increase slightly with the lighter partial cutting treatment. The openings created and the reduction in overall canopy closure would promote the release of some existing understory trees and shrubs until the canopy closure increases to a level that once again prohibits growth. The lighter thinning treatment would allow less sunlight into the understory and for a shorter duration than the other partial cutting treatments. Horizontal structural diversity would be provided by the snag and large down wood components that would increase over time, and with the designated no-harvest areas scattered throughout the stands.

Moderate Partial Cutting

Alternative B, the Proposed Action, has the most acres of moderate partial cutting at 684 acres. Alternative A has 249 acres, and Alternative C has 212 acres.

Moderate partial cutting would remove mostly smaller diameter trees and leave the larger healthier trees, maintaining a 50% to 65% canopy closure. The treatment should help maintain or increase overall growth and vigor of the remaining trees, and reduce the future mortality and susceptibility to insects and disease. Fire intensity and severity should also be less in a wildfire situation with reduced stand densities and ladder fuels. (see *Silviculture Prescriptions*, page 59). Overall growth of residual trees would not be as high or have the duration as the heavy thinning treatment or similar treatment in stands consisting of young trees. However, a small increase in growth or stabilization of current decreasing growth rate is expected (Latham P. and J. Tappenier, 2002). The length of time before growth response to density reduction occurs may take from 5 to 25 years after harvest. The moderate partial cutting should provide a greater duration and increased growth rate for most of the residual trees than in the light partial cutting.

The effects on stand structure from the moderate partial cutting treatment would include a reduction in size class distributions. Most trees ranging in size from about 8 to 18 inches dbh would be removed as well as some trees up to about 30 inches dbh. Most of the larger size classes ranging approximately 25 to over 40 inches dbh would remain. The current regeneration in the stands range from about 100 to 700 trees per acre, with some mortality expected to occur during logging operations or during underburning that is prescribed for some stands after harvest.

Tree species diversity would be maintained with the removal of mostly Douglas-fir leaving most of the existing non-Douglas-fir. Diversity is expected to increase over time with the release of remaining understory seedlings or natural regeneration consisting primarily of shade tolerant species.

In some stands, overall structural diversity may be temporarily reduced following harvest and post-harvest underburning. The initial reduction would be due to a decrease in understory vegetation. There would be an increase over time, however, with the openings created and reduction in canopy

closures. The openings provide opportunity for the establishment of some natural regeneration and for the release of some surviving understory trees and shrubs. The moderate thinning treatment would provide openings that are larger than would the light partial cutting treatments and remain open for a longer duration. The snag and large down wood components would increase over time and the designated no-harvest areas left scattered throughout the stands would provide for added horizontal structural diversity.

Moderate Partial Cutting, Multi-Story

Alternative B is the only alternative that includes moderate partial cutting, multistory with 121 acres.

This moderate partial cutting prescription, designed to develop multi-story stands, would remove a variety of tree species of various size classes maintaining a minimum canopy closure of 50%. The treatment should help maintain or increase overall growth and vigor of the remaining trees, and reduce the future mortality and susceptibility to insects and disease. Fire intensity and severity should also be less in a wildfire situation with reduced stand densities. (see *Silviculture Prescriptions*, page 59). Overall growth of residual trees most likely would not be as high as the heavy partial cutting treatment, or thinning treatment in stands consisting of young trees, however, a small increase in growth or stabilization of current decreasing growth rate is expected (Latham and Tappenier, 2002). The length of time before a growth response to density reduction occurs may take from 5 to 25 years after harvest (Latham P. and J. Tappenier, 2002).

The effects on stand structure from the moderate multi-story partial cutting treatment would include a slight temporary change in current canopy layering. The removal of trees from all size classes would help maintain the current diverse distribution. Trees removed would range between 8 and 30 inches dbh, with most coming from the smaller size classes. The resulting stand would include trees within that range and all trees greater than 30 inches dbh. The current regeneration in the stand is about 500 trees per acre and some mortality is expected to occur during logging operations. The moderate multi-story partial cutting would have the lowest temporary reduction in tree size class distributions compared to other partial cut treatments.

Species diversity would be maintained with the removal of mostly Douglas-fir trees. The current amount of non-Douglas-fir trees within the stand allows for the removal of some while still maintaining a diverse mix. Although this treatment leaves more trees per acre than the moderate partial cutting, some would be of the smaller size classes providing about the same canopy closure overall for the stand, and openings for the release of remaining understory seedlings. Most of the seedlings are shade tolerant species which would provide a further increase in tree species diversity over time.

Created openings and reduction in canopy closure would increase structural diversity by allowing for the release of some existing understory trees and shrubs. The snag and large down wood components that would be increased over time and the designated no-harvest areas left scattered throughout the stands, would provide for added horizontal structural diversity.

Heavy Partial Cutting

Alternative C is the only alternative that includes heavy partial cutting with 175 acres.

Heavy partial cutting would remove mostly smaller but includes some larger diameter trees maintaining a 40% to 50% canopy closure. The treatment should help maintain or increase overall growth and vigor of the remaining trees, and reduce the future mortality and susceptibility to insects and disease. Fire intensity and severity should also be less in a wildfire situation with reduced stand densities and ladder fuels. (see *Silviculture Prescriptions*, page 59). Overall growth of residual trees most likely would not be as high as a similar treatment in stands consisting of young trees, however, a small increase in growth or stabilization of current decreasing growth rate is expected (Latham P. and J. Tappener, 2002). The length of time before a growth response to density reduction occurs may take from 5 to 25 years after harvest. The heavy partial cutting should provide a higher increase in growth rate for a longer duration for most of the residual trees versus the other partial cutting treatments.

The effects on stand structure from the heavy partial cutting treatment would include having the highest reduction in tree size class distributions. Most trees ranging in size from about 8 to 20 inches dbh would be removed as well as some trees up to about 30 inches dbh. Most trees of the larger size classes ranging approximately 30 to over 50 inches dbh would remain. The current regeneration in the stands range from about 200 to 1,000 trees per acre with some mortality expected to occur during logging operations or during underburning prescribed for some stands after harvest.

Tree species diversity would be maintained with the removal of mostly Douglas-fir leaving most of the existing non/Douglas-fir. Diversity is expected to increase over time with the release of remaining understory seedlings consisting of mostly shade tolerant species. Establishment of shade tolerant and some Douglas-fir seedlings from natural regeneration is also expected with the large openings created.

Overall structural diversity may be reduced following harvest and with some stands, a follow-up underburning. The initial reduction would be due to a decrease in understory vegetation. There would be an increase over time, however, with the openings created and reduction in canopy closures. The heavy partial cutting would provide the largest openings, which remain for a longer duration providing for a higher amount of understory establishment and expansion. The snag and large down wood components that would be increased over time and the designated no-harvest areas left scattered throughout the stands, would provide for added horizontal structural diversity.

Shelterwood with Heavy Reserves

Alternative C presents the most acres of shelterwood harvest at 573 acres. Alternative A would include 117 acres. Alternative B, the Proposed Action, does not propose to shelterwood harvest with heavy reserves.

The shelterwood treatment is a regeneration harvest that would open the stands to a minimum 20% canopy closure. The stands would be set back to an early seral condition with the removal of all trees except the largest 20 to 25 trees per acre. The residual trees would be unevenly distributed and consist of the largest diameter Douglas-firs ranging about 35 to over 50 inches dbh (see *Silviculture Prescriptions*, page 59).

There should be an increase in overall growth and vigor of the remaining trees; however, the length of time before a growth response to density reduction occurs may take from 5 to 25 years after harvest (Latham P. and J. Tappenier, 2002).

Structural diversity would be reduced initially, however improving over time as the established regeneration grows into a multistoried stand of trees. The planted trees would be a variety of species including Douglas-fir, adding to the remaining Douglas-fir overstory. Various species of shrubs, herbs, and other plants would come in after harvest and exist until the trees have grown tall enough to suppress their growth. The residual trees, snags, large down wood, GTRs, and other retention areas existing in scattered areas, would all contribute to structural diversity.

Salvage Logging

Salvage logging is prescribed on 7 acres in Alternatives A and C (unit 39 only), and on 26 acres in Alternative B, the Proposed Action. Salvage in unit 39 at Lake's End Campground would only remove trees that are down from past wind events or other disturbances. Growth of the residual trees would not be affected. Current stand structure would remain the same other than the reduction of down wood and potential falling of snags during logging operations.

Natural Fuels Prescribed Fire

Re-introducing fire to the landscape by simulating low intensity fire reduces existing fuel loads on the ground, in the understory, and to a lesser degree, in the overstory. This treatment is presented only in Alternative C as units 90 and 91. Mortality of the smallest trees is expected, as well as a few of the larger diameter trees, and would consist of primarily non/Douglas-fir species. The residual trees should respond to the decrease in densities with an increase in growth and vigor and crown expansion. With low mortality rates in the overstory trees and with a reduction in stand density, a stabilization of current decreases in growth rates, or even a small increase in growth can be expected.

The effects on stand structure from underburning would include a reduction of understory vegetation including conifer regeneration, as well as intermediate trees of small diameter classes. Created openings varying in size and location, provides an opportunity for establishment of more understory vegetation over time, which would create a more diverse stand structure.

Trees species diversity may be reduced initially with a reduction of more of the non/Douglas-fir species. Surviving non/Douglas-fir seedlings and expected natural regeneration would provide an increase in tree species diversity over time.

Very little of the large down wood component is expected to be consumed during the burn. There is potential for current live and standing dead trees to fall during or following burning contributing to the existing down wood levels. Some snags may also be created from live trees either directly from fire or indirectly over time as stressed trees become more susceptible to insects and disease.

Effects of Alternative D (No-Action)

No stand treatments would occur with implementation of Alternative D. Stands with growth rates in decline 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.

Most of the stands proposed for harvesting would continue with understory re-initiation of shade tolerant species such as western hemlock, grand fir, and silver fir.

The overly dense plantations (units 13 and 41) would continue the decline in stand health from density-related causes.

Cumulative Effects

Cumulative effects analysis is based on the entire Two Bee Landscape Analysis Area. As displayed on Table 25, approximately 32% of the landscape has been affected by timber management over the past 50 years, with management distributed evenly throughout the 30,667 acre area. Additional timber harvest within unmanaged stands from this project would increase the total acreage of managed stands on the landscape by 1.5% in Alternative A (partial cutting and regeneration harvest), 3.0% in Alternative B (the proposed action with partial cutting only), and by 3.8% in Alternative C (with partial cutting, regeneration harvest). Alternative C would include natural fuels prescribed fire.

As stated above, there would be a temporary improvement in tree growth in the residual trees in the partial cutting units, which would also lead to development of a more diverse understory. The regeneration harvest contained in both Alternatives A and C would increase the amount of early seral forest stands on the landscape in varying amounts. Early seral forest habitat currently makes up less than 5% of Two Bee landscape for the western hemlock series projected (Upper McKenzie WA, USDA Forest Service. 1995). Timber sale activities would reduce the number of natural snags that exist within the harvest units, but they would be replaced to some extent by post-harvest snag creation projects. There are no other foreseeable future projects that would add to the cumulative effects of past timber harvest and the proposed stand treatments.

Alternative D – No Action

Alternative D – No Action, would not increase the current acres of managed stands on the landscape with additional timber harvest. Forests would continue to grow along natural successional pathways. Mortality from insect and disease infestation would continue naturally as forests increase in density through time.

Soil Productivity and Slope Stability_____

Affected Environment

Geology

The Two Bee project area is dominated by diverse landscapes derived from volcanic and glacial processes. The area has been subjected to several periods of volcanic activity from more than 17 million years ago to as recently as 2,600 years ago (Upper McKenzie Watershed Analyses). The Western Cascades dominate the western two thirds of the planning area and range between 4 and 17 million years of age. The volcanic deposits are comprised of basalt and andesite lava flows inter-

bedded with pyroclastic tuffs and breccias. The basalts constitute some of the most resilient materials. They occupy ridgelines and are inter-bedded along mountain side-slopes. The High Cascades occupy the eastern 1/3 of the planning area and range between 2,600 and 4 million years old. They are primarily basalt lava flows, the most recent of which can be seen along State Highway 126 near Fish Lake and the junction with Hwy. 20.

This volcanic activity has been punctuated by periods of glacial expansion over the last several hundred thousand years, creating much of the landscape that is present today. Several times, perhaps in three or four different episodes, mountain glaciers grew in size and extended miles down the major valleys to create the classic U-shaped cross sections. The steep canyon side slopes are the result of this glacial scouring or the subsequent down cutting during periods of stress relief and elastic rebound following glacial retreat. It was this process that carved the valleys of the McKenzie River and its tributaries. As a result, the analysis area is occupied by a diversity of landforms, including steep mountains sideslopes, large plateaus and ridgelines, broad valleys, and deeply incised canyons.

Soils

Along with the diversity of landforms comes a diversity of soil types that represent some of the most productive forest ecosystems of the Cascade Range. Soils can be alluvial, volcanic or glacial in origin. Deep, well-developed soils occur in river valleys as terraces, alluvial fans or outwash, in toe slope positions from volcanic colluvial deposits, and often along broad ridgelines and plateaus as glacial moraines or till. These soils are typically well-developed, relatively fine-textured, lack rock fragments, and have good moisture holding capability. Soils of lesser productivity, but fully capable of supporting productive healthy forests, occur on the steep canyon and mountain side-slopes. Soils in these areas have gone through relatively little soil development, are often dominated by angular, volcanic rock fragments, are coarse textured, and are often low in moisture holding capability.

Areas dominated by rock outcrop, talus or very shallow rocky soils occur in areas of very high relief along steep canyons and mountain landforms. Some of these areas are not suitable for timber production due to difficulties with regeneration. Other areas may be unsuitable because they could become unstable through timber harvest or road construction. However, in this project area, zones of slope instability are relatively uncommon.

For the most part, the soils of the planning area are in good condition and past management activities have not disrupted their long-term productivity. Previous harvest activities were performed primarily by cable yarding systems and did not result in 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. The Smith Ridge area has relatively shallow slopes accessible by ground based harvest systems. The adverse effects of past ground-based yarding systems (compaction, displacement, loss of litter cover) have generally been within the Willamette National Forest Plan Standards and Guidelines (1990).

Environmental Consequences

Effects of Alternatives A-C

A field review of the project area was completed in 2002 by a Forest Geologist to verify the present SRI land type boundaries, determine the location of unsuited and unmanageable land types, to prescribe slash treatment and suspension objectives for the units, and to evaluate potential watershed impacts from management (see Appendix G).

Road construction and timber harvest are not proposed on potentially unstable slopes in any of the action alternatives. Timber harvest and road construction are not anticipated to cause instability for any unit in any action alternative.

In summary, existing impacts from prior management are minimal, except for Units 13 and 41. For most stands in this project area, this proposal represents an initial stand treatment. Almost no previous entry has occurred. Units 13 and 41 are managed plantations.

The activity most likely to result in adverse effects on soil is yarding of timber with ground-based systems. The proposed action, Alternative B, is proposed to use ground-based yarding systems on 578 acres, or over half of the 825 acres (70%). Alternative A was analyzed using ground-based yarding on approximately 391 acres (70% of the alternative acres), with Alternative C using 674 acres (54% of the alternative 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 all Action Alternatives. In addition, subsoiling is recommended on several ground based units to further reduce compaction levels. Through the use of suspension and duff retention objectives, short-term impacts of the proposed actions or alternative actions would remain within the standards and guidelines. Off-site erosion is not likely. 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, 2001a). 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. It is reasonable to anticipate similar results for the proposed treatment units in the Two Bee Project.

For Alternative D, the No-Action proposal, the soil resource in the near term of a few years would remain relatively unchanged. Stands will 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 will rapidly see density increase, growth slow, and mortality rise. Fuel accumulations from blow down, snow down, and bug kill 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, noise and slash accumulation, would not occur.

Cumulative Effects

Units 13 and 41 are managed stands that were harvested several decades ago with ground-based systems. Transects through these units indicate that existing compaction from skid roads and landings is approximately 14 to 15%. Bare soil areas no longer exist, and excessive disturbance, if it ever was present, is no longer evident. The Forest standard for disturbance and compaction is 20% of the unit area. The potential exists for compaction from this entry to exceed those standards. To minimize the potential for significant, adverse cumulative effect from compaction, all skid road locations will be approved prior to use, and existing skid roads will be utilized as much as possible. After harvest, secondary skid roads will be scarified in order to avoid excessive root pruning. Primary skid roads and landings are proposed for subsoiling to reduce compaction levels. It is estimated that compaction will remain at the 15% level or be slightly reduced over the existing levels at the completion of management activities.

Since the proposed action or any action alternative for the remaining units is considered an initial entry, existing impacts on soils from displacement, compaction, loss of productivity, or instability are minor or do not exist, when considering the effects from past timber harvest and road construction within the planning area. The action alternatives propose activities and impacts which should not exceed 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 ---

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 5th field watersheds 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.

Affected Environment, Stream Shade and Stream Temperature

No streams have been identified as having impaired water quality within the Two Bee project area (Oregon DEQ. 2002. 303(d) List of Impaired Waters). The McKenzie River is listed just downstream from the project area and below Trail Bridge Reservoir, due to summer stream temperatures that exceeded the standard for bull trout spawning and rearing habitat on the 2002. 303(D) list. At the time of listing in 2002, the temperature standard for this reach was 10 degrees Celsius. In December 2003, the temperature standard was revised to 12 degrees Celsius by Oregon DEQ. (Temperature Criteria Rules – OAR 340-041-0028) The highest recorded temperature measured to state criteria in 2004, was 10.2 degrees Celsius, which is well below the new standard of 12 degrees. (McKenzie River Ranger

District, unpublished data) Consequently, the District expects that this portion of the McKenzie River will be removed from the 303(d) list of Impaired Waters during the next assessment cycle.

From June through September of 2004, stream temperature data were collected at four locations in the project area to support project analysis. The summer temperature criteria of 12 degrees C. for bull trout spawning and rearing habitat would apply to all of these streams.

A summary of this data is provided below in Table 26 along with data from French Pete Creek, which is an unmanaged wilderness stream of similar size and basin characteristics exhibited for comparison.

Table 26: Average Stream Temperatures.

Stream Name	Management Status	Geology	Average 7-day average of Maximum Temp. ° Celsius	Date of Maximum Value
<i>McKenzie River above Trail Bridge Dam</i>	Managed	High Cascades	7.2° C	7/25/2004
<i>Smith River above Smith Reservoir</i>	Managed	West Cascades	18.5° C	8/18/2004
<i>Smith River below Smith Dam (incl. Bunchgrass Creek)</i>	Managed	West Cascades	14.8° C	8/18/2004
<i>McKenzie River below Trail Bridge Dam</i>	Managed	West Cascades and High Cascades	10.2° C	8/2/2004
<i>French Pete Creek*</i>	Un-managed	West Cascades	16.7° C	8/11/2004

The temperature data suggest that geology is a stronger influence on stream temperature regimes than past management, but that management has had an impact on stream temperatures in Smith River. The importance of geologic influence on stream temperatures is corroborated by Torgerson et al. who conducted an aerial survey of the Upper McKenzie River in 1999 for the McKenzie River Ranger District, (Torgerson, Faux, and McIntosh, 1999), and by Grant et al. in (Grant et al. 2002).

All three streams that are situated exclusively on West Cascades geology exhibited dramatically higher maximum temperatures in 2004 than was observed in the McKenzie River above Trail Bridge Dam which flows from High Cascades geology. The McKenzie River below Trail Bridge Dam exhibited intermediate maximum temperatures that represent the mix of inflows from both West Cascades and High Cascades geology.

Smith River below Smith Dam, which is basically Bunchgrass Creek, was cooler than Smith River due to the presence of cool springs in glacial terrain in its upper reaches. Glacial terrain is characterized by deeper accumulation of soil and alluvium which provide the stream with greater opportunity for hyporheic interaction with the valley bottom. Recent research is beginning to indicate

that substrate may play a substantial role in stream temperature regulation through hyporheic activity (Johnson S.L. 2004).

Both Smith River, above Trail Bridge Dam, and French Pete Creek share common geology and geomorphic attributes, but have had dramatically different management histories. Smith River has experienced extensive timber harvest and road construction activities, while French Pete Creek is situated almost entirely in wilderness.

Road construction and timber harvest began in Smith River 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 July 1990, resulted in removal of riparian vegetation that provided shade to streams in the project area. The removal of shade likely resulted in elevated stream temperatures that appear to be represented in the current temperature data.

The 2004 data suggest that in the absence of known natural processes that could account for a deviation between the two streams, water temperatures are currently elevated approximately 1.5 – 2.0 degrees C. compared to French Pete Creek (Table 26 above). The date on which the annual maximums occurred was roughly the same for each station, suggesting that shifts in the annual timing of maximum values have not occurred as a result of management activities, and is not substantially affected by geologic type.

Environmental Consequences

Effects of Alternative A-C

Direct and Indirect Effects

The geographic scale used to assess direct, indirect and cumulative effects on stream shade and stream temperature is the Upper McKenzie Watershed. For all action alternatives, treatments within riparian areas have been designed to 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 Sufficiency Analysis 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 100 - 180 feet tall currently, and slopes typically fall within a 30% to 70% range. All fish bearing streams (Class 1 and 2) are provided a

minimum of 360 feet of primary shade buffer to retain effective shade for stands of this height and these slopes. Smaller perennial (Class 3) streams have primary shade buffers that range from 50 to 180 feet. Field observation of these smaller, more constrained streams indicate that these widths, combined with canopy retention requirements are adequate to provide effective shade. Intermittent (Class 4) streams are dry during the portion of the year that elevated temperatures are a problem. However, bank stability trees and in some cases no harvest buffers as wide as 180 feet will be retained for other resource objectives, and will provide substantial shade regardless. For all classes of stream, 40% to 50% crown closure will be retained within the remainder of the riparian reserve that is not set aside as a no harvest buffer.

Based on the preceding 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 these alternatives. Consequently, as in the No Action Alternative, water temperatures in Smith River will continue to recover toward more natural levels, as riparian vegetation re-grows and re-establishes streamside shade. Incremental increases or decreases in the rate of recovery as a result of implementation of this alternative are not anticipated.

Effects of Alternative D, No Action

Direct and Indirect 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 Smith River will 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.

Cumulative Effects, Stream Shade and Stream Temperature

Based on alternative 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.

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 the previous discussion. A summary of the total acres of riparian area affected by management can be found in the Discussion of Historical Management of Riparian Resources that follows later in this document. From these two 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 of the positive effects of this project as well as other recent projects which began to address the need to restore the large wood component to riparian stands.

Environmental Consequences

Effects of Alternatives A-C

Direct and Indirect Effects

The area of analysis to assess the direct, indirect, and cumulative effects of riparian habitat enhancement is the Upper McKenzie 5th Field Watershed. There are approximately 290 acres of riparian reserves within stands harvested or underburned in the action alternatives. No shelterwood harvest treatments are prescribed within riparian reserves. Table 27 below summarizes the percentage of riparian reserves affected by prescribed fire or harvest. Actual treatment acres are disclosed in the fisheries resources discussion that follows.

Table 27: Percent Riparian Reserve Acres Prescribed for Partial Cutting and Burning

Activity	Alternative A	Alternative B	Alternative C	Alternative D (No Action)
<i>Riparian Partial Cut</i>	3%	33%	8%	0%
<i>Prescribed Fire</i>	22%	54%	85%	0%

One of the expected benefits of partial cutting in riparian reserves is that stand structure, especially the development of larger diameter trees, can accelerate forests toward late-successional conditions. Partial cutting can also facilitate development of more, large diameter trees that will eventually fall and provide large wood structure in streams and adjacent riparian areas. Maintaining the existing hardwood component also adds to structural diversity and complexity. Table 28 below summarizes existing and future stand average stem sizes associated with units where partial cutting would occur in riparian reserves.

Table 28: Predicted Effects of Partial Cutting in Riparian Reserves

Unit	Existing Condition Average Diameter (dbh)	Diameter (dbh) in 40 Years			
		Alternative A	Alternative B	Alternative C	Alternative D (No Action)
1	18"	22"	22"	28"	20"
6	21"	24"	29"	NA	22"
7	21"	NA	29"	NA	22"
18	16"	NA	19"	22"	18"
22	19"	26"	NA	34"	20"
26	29"	NA	35"	NA	32"

Unit	Existing Condition Average Diameter (dbh)	Diameter (dbh) in 40 Years			
		Alternative A	Alternative B	Alternative C	Alternative D (No Action)
27	22"	NA	34"	NA	23"
33	23"	NA	34"	NA	25"
34	27"	NA	32"	NA	28"

Introduction of low severity fire into riparian reserves is also anticipated to have desired effects. At low burn severities, large wood would not be removed from the reserves. In addition, with local differences in soil moisture and relative humidity, the pattern of burning in the riparian reserves is expected to resemble a patchwork mosaic of unburned, lightly burned, and occasionally moderately burned sites. In the unburned portions, the existing under story vegetation including conifers would be retained. In lightly burned areas, under story conifers would experience some mortality, but fire “endurer” species such as willow and other hardwood shrubs would re-sprout and in some instances be stimulated into enhanced growth in response to the disturbance. In the moderately burned patches, areas of exposed soil would provide opportunities for opportunistic species such as cottonwood and Scouler’s willow, which require disturbance, to occupy these sites. The net result would be increased plant species and stand structural diversity.

Effects of Alternative D

The effects of implementing Alternative D, No Action, would be neither negative nor beneficial to riparian habitat.

Cumulative Effects on Riparian Habitat Improvement

Approximately 100 acres of similar riparian reserve stand treatments have occurred within the Upper McKenzie Watershed with timber sales associated with the Robinson-Scott Landscape Management Project and the Foley Ridge Landscape Management Project. Timber sales older than these two sales were not considered as they either avoided riparian areas or did not have beneficial treatments, described previously, as part of their design.

The proposed action and the other action alternatives provide the following incremental changes in total area of riparian reserves with improvements to stand structure: Alternative A would include an additional 56 acres of treatments in riparian reserves, for a total of 156 acres. Alternative B (the proposed action) would treat approximately 213 acres of riparian reserves, for a total of 313 acres. Alternative C would treat 208 acres in riparian reserves, for a total of 308 acres.

No other reasonably foreseeable future actions are planned to provide additional improvements to riparian reserve stand structure.

Affected Environment, Aquatic Resources

The following description of aquatic resources describes fish species considered Management Indicator Species (those native and anadromous fishes described below) in the Willamette Forest Plan. The scale of analysis of effects on aquatic resources involves three six-field watersheds (Hackleman Creek, Smith River and Kink/Inland Basin), evaluated at this scale due to the project footprint and potential effects of project activity downstream.

Fish historically present above Trail Bridge Dam include mountain whitefish (*Prosopium williamsoni*). Mountain whitefish are common in main stem McKenzie River, and have been found above Smith Dam, utilizing the Smith River drainage. Whitefish success above Smith and Trail Bridge Dam is likely limited due to the isolated and small extent of habitat meeting their life history needs.

Native rainbow trout (*Oncorhynchus mykiss*), similar to distribution of whitefish, are river dwelling in the main stem McKenzie River and larger tributaries. The extent of their range following completion of the Carmen-Smith Project is known to include the McKenzie River above Trail Bridge Dam (including lower Smith River). Rainbow trout distribution above Smith Dam and whether adequate habitat is available to sustain native rainbow is unknown. Rainbow trout distribution above Smith Dam (other than hatchery plants) has not been observed since completion of the dam. Native rainbow would have been expected to inhabit most of Smith River. Currently, ODFW stocks a fall spawning strain of rainbow in Clear Lake (33,000), Carmen (23,000), Smith (15,000) and Trail Bridge (14,000) Reservoirs from spring to late summer. Native rainbow trout are spring spawning.

Historically, non-native brook trout (*Salvelinus fontinalis*) have been stocked in upper basin lakes, streams and reservoirs. Where brook trout became self-sustaining populations, or where conflicts with native fishes were found, stocking has ceased. Even though there are no locations in the Two Bee project area that continue to be stocked with brook trout, they are now found naturalized in Heart Lake, Hackleman Creek, Fish Lake, Fish Lake Creek, Clear Lake, Upper McKenzie River/Carmen Reservoir, Smith Reservoir/Smith River, and Trail Bridge Reservoir. A significant threat is posed by brook trout that overlap the distribution of the Trail Bridge bull trout. The risk of brook trout hybridization with native bull trout adds to a high risk of Trail Bridge bull trout extinction.

Native cutthroat trout (*Oncorhynchus clarki clarki*) are the most widely distributed fish in the landform, ranging from headwater streams to meandering meadows, to seasonal Fish Lake, to perennial Clear Lake and all reservoirs. An isolated population of cutthroat trout is found in the Hackleman Creek drainage, isolated by recent volcanism. Hackleman cutthroat trout are listed as a Category 2, Stock of Concern by ODFW. Other populations are likely isolated in upper Two Bee drainages located upstream of barrier falls. Currently, there is a large population of cutthroat trout in Ikenick Creek, isolated above a passage barrier culvert at Hwy 126. This barrier is beneficial as it isolates Ikenick habitat and cutthroat from invasion of brook trout residing in Clear Lake. As has been observed in nearby lakes and streams, brook trout may displace native cutthroat trout, particularly in disturbed aquatic habitat. The risk of brook trout displacing the unique Hackleman Cutthroat exists

through brook trout competition and their potential to transmit disease. Brook trout composes 5-12% of Hackleman Creek population in recent sampling by ODFW. In Heart Lake, introduced and naturalized brook trout were the only fish observed prior in 1992, however, following stocking of cutthroat trout in 1993 and 1995, brook trout were found to compose less than 33% of the lake population.

Bull trout (*Salvelinus confluentus*) use of the upper McKenzie River is believed historically to have included the mainstem of the Smith River, and the upper McKenzie River to the base of Tamolitch Falls prior to construction of Trail Bridge and Smith River Dams. Bull trout in the upper McKenzie River were likely part of a single McKenzie River population and part of the larger Willamette Basin metapopulation. Upper McKenzie River bull trout have been isolated from the larger McKenzie River population and Willamette Basin metapopulation with construction of Trail Bridge Dam since the early 1960s, and are now considered the separate Trail Bridge population. Fragmentation of their range has resulted in changes in Trail Bridge population life history as they have adapted to a lake dwelling existence (adfluvial) as opposed to historic river dwelling (fluvial) adults. Migration patterns and timing are likely similar since their isolation, with adults leaving Trail Bridge Reservoir and entering spawning habitat in late summer. Current bull trout distribution in the project area (see map appendix) is Trail Bridge Reservoir (rearing and foraging habitat), McKenzie River to Tamolitch falls (spawning and rearing habitat), and Smith River below Smith Dam (rearing and foraging habitat). Sweetwater Creek, a tributary entering Trail Bridge Reservoir from the east, beyond the project area, also serves as bull trout spawning and rearing habitat to the Trail Bridge population.

Spring Chinook (*Oncorhynchus tshawytscha*) use of the upper McKenzie River is believed to have historically overlapped bull trout distribution and are included in the main stem Smith River and the upper McKenzie River to the base of Tamolitch Falls prior to construction of Trail Bridge and Smith River Dams. Historically, the upper extent of Chinook salmon distribution in the upper McKenzie sub-basin is believed to have occurred in the project area, ending at Tamolitch Falls and in the currently inundated Smith River channel. Currently, the end of spring Chinook salmon migration is to the base of Trail Bridge Dam at McKenzie river mile 82. As no passage was constructed with Trail Bridge Dam, a 500-foot long spawning channel was constructed as mitigation for lost habitat below the dam. The structure is operated and maintained by EWEB and named “Carmen Spawning Channel” after the hydroelectric project. The spawning channel was designed to compensate for blocked access to approximately 4 miles of spawning habitat for up to 200 adult spring Chinook.

Currently, ODFW transports 40 to 100 spring Chinook adults above Trail Bridge Reservoir to increase production and restore nutrient and bull trout prey sources in habitat above Trail Bridge Dam. Spring Chinook salmon and bull trout utilize similar spawning habitat in the McKenzie River above Trail Bridge Dam. Current spring Chinook distribution in the project area is in Trail Bridge Reservoir for juvenile rearing and adult holding habitat. McKenzie River to Tamolitch Falls functions as spawning and rearing habitat, and Smith River below Smith Dam as spawning and rearing habitat. (see Appendix E for map.)

Additional description of Endangered Species Act listed aquatic species is found in Appendix B (Biological Assessment for Spring Chinook Salmon and Bull Trout).

Aquatic Habitat Quality

Western Cascades are generally more steeply incised and prone to mass wasting. The younger High Cascades are more resistant to erosion. Incision into older Western Cascades due to uplift and more rapid rate of erosion has resulted in steeper stream gradients as compared to High Cascade channels. Broad meadows generally occur at the contact between the High and Western Cascades. West-to-east flowing channels in the project area characterize the Western Cascades, until they converge with north-to-south flowing channels at the contact between High and Western Cascades (Smith River and McKenzie River). The process of debris transport (debris torrents) is more common in the Western Cascade drainages, particularly the upper reaches of Hackleman, Bunchgrass, Browder and Gate Creeks. This process is important in providing woody material to the stream channel and continued large woody material transport into lower elevation river channels.

Streamside recruitment is generally a more common process of wood supply to High Cascade channels. Flat, broad floodplains and reduced stream energy are less likely to transport large-sized organic debris. In places where stream energy is significantly reduced (such as at Fish Lake and Ikenick Creek), only the finer sediments and organics are transported by water. These low gradient areas are important fish production areas, as they provide generally rich, complex and low gradient rearing for juvenile fish, and foraging areas for adult fish. In slightly steeper habitats located upstream or adjacent to these rich areas, (such as upper Ikenick Creek) are located spawning areas, also ideal for native cutthroat. In the McKenzie River above Trail Bridge Dam, low gradient areas are important reproductive and rearing areas for bull trout that are isolated above the dam

Sediment production in the Western Cascades portion of the landform is high. The erosive nature of the Western Cascades geology historically combined with large, high severity fire to be a large contributor to Upper McKenzie River sediment. Larger contributors in Two Bee project area are Browder and Bunchgrass Creek, and Smith River.

Low gradient reaches of Ikenick Creek do not transport large volumes of in-stream wood. The steepest reach is located immediately upstream of State Highway 126, all other reaches are low gradient (less than 2%). Recruitment of large in-stream wood comes from streamside. While there have been some salvage and timber harvest of riparian areas in Ikenick Creek, there are good densities of currently available in-stream wood. In the 1993 survey summary, Upper Ikenick Creek reaches with low counts per mile are generally due to valley form and naturally low levels conifers adjacent to streams flowing through broad, sedge meadows.

Western Cascade portions of the Two Bee area are important sources of in-stream wood and sediment for the Upper McKenzie River. Alteration of sediment and debris supply has occurred through time. Smith River drainage, which is historically a large producer of sediment and woody debris to the Upper McKenzie, supplies material in altered quantities due to the presence of roads, dams, or past timber management. For example, large woody material migration, interrupted by

stream crossings and dams, and volume reduced by stream adjacent harvest and salvage, has resulted in a reduction of in-stream wood in project area tributaries, and larger rivers below.

Evidence of debris torrents traveling down stream channels is present in Smith River, indicated by the presence of bedrock scoured channels. Torrents in the Smith River channel may have occurred during significant flow event years (>15 year recurrence interval), five of which have occurred in the last 50 years. The constrained reaches of Smith River for two miles above Smith Reservoir transport in-stream wood and sediment efficiently. Low volumes of in-stream wood are present in Smith River reaches. Steep side slopes appear to limit development of riparian vegetation. In various Smith River reaches a lack of canopy may contribute to elevated temperatures observed upstream of the reservoir, as high light penetration and algal growth have been observed. Most in-stream wood is located in scattered debris jams. Currently, reduced sediment storage capacity, provided by debris jams, is available in Smith River.

Alteration of sediment supply through time has occurred with fire suppression and mass wasting resulting from road-related failures. Combined with the change in sediment transport capability due to the presence of dams, volume and composition of sediment supply is expected to be reduced. Interception of sediment by dams, and altered composition from road related failures – generally smaller sized sediments, with reduced organic debris component – delivers an altered supply of sediment to the McKenzie River. Where this may be most evident is below Trail Bridge Dam, where upper McKenzie and Smith River drainages sediment supply have been intercepted. Lower sediment supply to the McKenzie River below Trail Bridge has likely resulted in that channel coarsening and down cutting.

Other Upper McKenzie tributaries, such as Deer, Frissell, Lost, and Horse Creek are important sources of sediment, particularly for spring Chinook salmon reproduction in the main stem of the river and larger tributaries.

The density of large woody debris in the McKenzie River above Trail Bridge Dam has recently been treated with addition of large wood (under the Upper McKenzie Aquatic Restoration Project EA, August 2005). A one-mile reach from Trail Bridge Reservoir to near the Kink Creek confluence is known spawning habitat for bull trout isolated above Trail Bridge Dam. The improved volume of large sources of flow deflection is expected to allow gravel deposition and improve spawning opportunity for spring Chinook salmon and bull trout. Future phases of the Upper McKenzie River Aquatic Restoration Project may supplement spawning-sized substrates should large wood additions fail to recruit gravel sizes necessary for listed species reproduction (following monitoring results; potential implementation in 2007-2008).

Historical Management of Riparian Reserves

Historically, management activities have occurred adjacent to and have impacted riparian areas adjacent to streams within the analysis area. Table 29 below summarizes sub-watershed in the analysis area by total acres of Riparian Reserves, the acres that have been impacted by management activities such as timber harvest and roads, and the percent of the Riparian Reserve area that has been affected. The acres listed are further stratified by stream-class. Areas mapped in the Willamette

National Forest Soil Resource Inventory as Land-type 15 which is equivalent to floodplain features, have been included in the stratification for Class 1 streams.

Table 29: Sub-Watershed Summary of Past Impacts to Riparian Reserves.

Sub-watershed Name	Stream Class	Acres of Riparian Area	Acres Affected by Past Management	% of Acres Affected
<i>Kink/Inland Basin</i>	1	94	0	0%
	4	287	44	15.3%
	Reservoir	8	1	12.5%
	Wetland	0	0	NA
<i>Smith River</i>	1	181	7	3.9%
	2	1,039	187	18.0%
	3	601	162	27.0%
	4	1,782	450	25.3%
	Reservoir	79	2	2.5%
	Wetland	37	3	8.1%
<i>Hackleman Creek</i>	1	717	57	8.0%
	2	462	143	31.0%
	3	775	338	43.6%
	4	1,292	229	17.7%
	Lake	449	62	13.8%
	Reservoir	3	1	33.3%
	Wetland	52	5	9.6%

Stream Classes:

- 1 – Fish bearing/municipal water supply
- 2 – Perennial, containing fish
- 3 – Perennial, does not have fish
- 4 – Ephemeral, intermittent

Portions of riparian areas along Class 1 and Class 2 streams have been heavily affected by the locations of State Highway 126 and U. S. Highway 20 in the Hackleman Creek Sub-watershed. Much of the disturbance in riparian areas adjacent to Class 2 streams in the Smith River Sub-watershed results from the location of access roads for the Smith River Dam. Most timber management activities have occurred along Class 3 and 4 streams within the analysis area.

Additional information on water resources can be found in the project file and in the Upper McKenzie Watershed Analysis (1995).

Environmental Consequences

Additional discussion of effects of proposed actions to aquatic resources is described in the Fisheries Biological Assessment, Appendix B.

Effects of Alternative A-C

Direct and Indirect Effects

Potential downstream effects of timber harvest and underburning to habitat important to native cutthroat, spring Chinook and bull trout is expected to be negligible due to treatment scale, low severity and proximity of activity to stream channels. Short-term increases in sources of sedimentation from ground disturbing activity (primarily through road reconstruction, culvert replacement and temporary road construction) are expected to occur at the site-specific level.

All road reconstruction activities related to timber harvest would occur in non-Key Hackleman Creek and Smith River watersheds. No stream crossing reconstruction would occur within bull trout or spring Chinook habitat. Habitat of importance to listed species could be subjected to short-term increases in turbidity if reconstruction activity were to occur in the immediate vicinity. However, distance of reconstruction activity and natural and human-made impoundments (lakes and reservoirs) would substantially reduce the risk. Project effects are expected to be of short duration during the season of implementation. Suspended sediments are not expected to adversely impact habitat important to spring Chinook and bull trout due to low project scale and intensity, flow routes, distance of activity from listed species habitat, and use of best management practices.

Effects of Alternative D

Direct and Indirect Effects

Alternative D, the No Action Alternative, would leave roads untreated, yielding sediments similar to current levels. Aquatic habitat would be maintained at current conditions. Accelerated growth expected from silvicultural prescriptions within non-Key Watershed riparian reserves would not occur. Two seasonal migration barriers to native cutthroat and amphibians on Ikenick Creek would not be replaced. Habitat conditions would be maintained for bull trout and spring Chinook.

Cumulative Effects

The scale of analysis of cumulative effects on aquatic resources involves three six-field watersheds (Hackleman Creek, Smith River and Kink/Inland Basin), evaluated at this scale due to the project footprint and potential effects of project activity downstream. The percent of riparian area affected by past management is summarized in Table 30.

Table 30: Acres of Riparian Reserves Affected by Past Timber Management.

Subwatershed Name	Riparian Reserve Acres	Acres Affected	% of Affected
Kink/Inland Basin	389	45	11.6%
Hackleman Creek	3,750	835	22.3%
Smith River	3,736	813	21.8%

The Two Bee project does not propose to partial cut, thin, or underburn in riparian reserves within the Tier 1 Key Watershed. Partial cutting and under-burning would occur in riparian reserves within non-key watersheds only. Table 31 displays the proposed timber harvest acres and percentages within the non-key watershed riparian reserves.

Table 31: Harvest Acres in Non-Key Watershed Riparian Reserves, by Alternative.

Subwatershed Name	Alt. A Riparian Partial Cutting Acres	Alt. B Riparian Partial Cutting Acres	Alt. C Riparian Partial Cutting Acres
Kink/Inland Basin	0	0	0
Hackleman Creek	8 (0.2%)	32 (0.8%)	24 (0.6%)
Smith River	1 (<0.1%)	66 (1.8%)	0 (0%)

Table 32 displays proposed underburning acres and percentage in the non- Key Watershed riparian reserves in the three subwatersheds.

Table 32: Underburning Acres in Non-Key Watershed Riparian Reserves, by Alternative.

Subwatershed Name	Alt. A Riparian Underburning	Alt. B Riparian Underburning	Alt. C Riparian Underburning
Kink/Inland Basin	0	0	0
Hackleman Creek	15 (0.4%)	43 (1.1%)	47 (1.3%)
Smith River	32 (0.9%)	72 (1.9%)	137 (3.7%)

Partial cutting objectives include improving existing riparian forest conditions. Risk of short-term disturbance would be mitigated by the following: dry season operations, limiting equipment proximity to no closer than 50 feet in Class 3 and 4 channels, requiring full suspension over perennial channels, and using existing skid trails in the riparian reserves. With the limited extent of disturbance within riparian reserves in close proximity to stream channels associated 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 (1-2 years) and of insufficient magnitude to place native aquatic organisms at risk.

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; or
4. Adverse alteration of sediment storage and structure in channels.

Carmen-Smith Hydroelectric Project fragmentation of aquatic habitat in the upper McKenzie continues to be a major influence on the aquatic landscape and plays a crucial role in at-risk species viability. Cumulatively, the Two Bee project would not incrementally contribute to increased fragmentation of habitat. Up- and downstream passage measures will not be known until the final license application is made, expected in 2008. No future projects are foreseeable within the Two Bee 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) and 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.

The No Action Alternative would maintain habitat conditions currently available to aquatic MIS fish and ESA listed aquatic species.

Temporary Roads in Alternative A-C

Alternative A would require construction of approximately 1,200 feet of temporary road and Alternative B and C would require approximately 4,200 feet. Temporary roads built for any of the action alternatives are not expected to adversely impact aquatic habitat. The following rationale was used in making this determination:

All proposed temporary road locations are located outside the riparian reserve and do not cross perennial or intermittent channels. Temporary roads would be constructed on native surfaces without importation of surfacing material composed of fill and gravel, and roads will be decommissioned upon completion of timber harvest operations. Culverts would not be necessary. Protection measures described in Mitigation Measures in Chapter 2 apply to temporary road construction, use, and decommissioning. The measures reduce ground disturbance and transmission of fine sediments that potentially degrade waterways.

Decommissioning roads upon completion of harvest operations would return the disturbed surface to function hydrologically as forested landscape. Disturbance caused by temporary road construction and decommissioning, and any of the timber yarding methods are expected to be short-term and local in effects. Potential to mobilize fine sediment continues to be described as short-term in duration and at the site-specific level. Aquatic habitat contributing to the life history needs of native aquatic biota continues to be described as “maintained.”

Magnuson-Stevens

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.

Two Bee projects are located in the Upper McKenzie River Watershed, which is included in the waters designated as EFH for spring Chinook salmon by the PFMC.

Potential downstream effects from timber harvest, road reconstruction, and under-burning 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 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 and natural and human-made impoundments in lakes and reservoirs would substantially reduce the risk. Project effects are expected to be of short duration during the season 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, and use of best management practices. The No Action alternative will not adversely affect EFH habitat.

As described above, project cumulative effects of past, current (any Two Bee action alternative) and foreseeable actions is expected to maintain EFH habitat within and downstream of the project area. The proposed action will 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 will not adversely affect EFH, no further consultation under the Magnuson-Stevens Fishery Conservation and Management Act is required.

ESA Consultation

The scale of analysis to address the direct, indirect, and cumulative effects on aquatic resources involves three six-field watersheds (Hackleman Creek, Smith River and Kink/Inland Basin), 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 Fisheries Biological Assessment (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, and under-burning. 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).

Short-term increase in sources of sedimentation is expected to occur at the site-specific level from ground disturbing activity. These short-term increases are primarily the result of road reconstruction, culvert replacement and temporary road construction. The absence of stream crossing reconstruction in the vicinity of listed species habitat is expected to maintain Critical Habitat for bull trout and spring Chinook salmon. 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 and the natural and human-made impoundments (lakes and reservoirs) substantially reduce the risk.

Project effects are expected to be of short duration during the season of implementation. As described above, the cumulative effects from this proposal are expected to maintain listed species and their habitat within and downstream of the project area. Implementing Alternative D (No Action) would not adversely affect listed species or adversely modify their habitat.

ESA informal consultation was originally completed with the receipt of a letter of concurrence from USFWS (ref. 03-1497; Feb. 26, 2003) 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 proposed Critical Habitat; and with the receipt of a letter of concurrence from NMFS (ref. 2003/00033; February 11, 2003) agreeing with the Forest Service determination that Two Bee project (Alternative B, proposed action) was Not Likely to Adversely Affect spring Chinook salmon.

ESA consultation was reinitiated with NMFS on February 6, 2006, to address recently designated Critical Habitat for spring Chinook salmon. NMFS agreed that the Two Bee project would not adversely modify designated Critical Habitat for spring Chinook salmon with their letter of concurrence dated March 24, 2006.

Changes to the project since ESA informal consultation have been assessed. The effects to ESA fish species are at a magnitude that is the same or less than originally consulted. The original Biological Assessment examined potential project effects on Matrix of Indicators at a project magnitude which was greater than in the current action (Alternative B). The revised Fisheries Biological Assessment (October 2, 2006) finds site specific and short-term effects continue to be anticipated at the same or reduced intensity and magnitude than originally described (Fisheries Biological Assessment; November 24, 2003). The maintenance of listed species and their habitat is therefore, expected to continue with revisions to the Two Bee project.

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. 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.

Table 33 below, summarizes the current levels of recovery for the planning sub-watersheds affected by the project area, and the Forest Plan Midpoint ARP levels. These current levels are derived from data in the Forest's VEGIS database, which includes all past harvest activities.

Table 33: Planning Subwatersheds and ARP Current Condition (2003).

	Current Condition	Midpoint
Upper West Side	90.6	75
Bunchgrass	77.2	70
Browder	85.3	70
Hackleman	85.0	75
Gate	78.6	75
Ikenick	83.0	70

Environmental Consequences

Table 34 below 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 above in Table 34.

Table 34: Recovery Levels Immediately after Project Implementation (2010).

Planning Subwatershed	Alternative A	Alternative B	Alternative C	Alternative D (No Action)	Midpoint ARP
<i>Upper West Side</i>	93.4	93.4	93.4	93.4	75
<i>Bunchgrass</i>	80.4	90.3	80.4	90.3	70
<i>Browder</i>	89.5	89.5	89.5	89.5	70
<i>Hackleman</i>	89.4	89.4	89.4	89.4	75
<i>Gate</i>	90.0	90.0	81.5	90.0	75
<i>Ikenick</i>	91.6	91.6	87.2	91.6	70

Examination of this information indicates that ARP levels are maintained well above recommended values by all alternatives in each 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.

Effects of Alternative D

Alternative D, No Action, would result in no changes to existing peak flows.

Cumulative Effects, Stream Flows/Disturbance History

As previously discussed, Aggregate Recovery Percentage (ARP) provides an analysis of the cumulative impacts of past management activities, and actions included in the alternatives for this project. There are no reasonably foreseeable future actions 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 Two Bee project area are not inherently prone to extensive erosion unless disturbed as discussed in the Soils Specialist Report in Appendix G. 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 on Smith Ridge 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.

The McKenzie River Sub-Basin, including the Two Bee 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 65 miles downstream from the project area. Sedimentation and associated turbidity are the most likely consequences of the Two Bee project that could adversely affect municipal water quality. Monitoring data that was collected during three storm events in 1998 suggest that, even with the current road conditions that have been previously discussed, turbidity levels in the McKenzie River remain relatively unchanged below the project area compared to values measured above the area. Measurements collected above the project area near Highway 126 below Clear Lake and below

the project area at Olallie Boat-ramp both remain below 5 NTUs (Nephelometric Turbidity Unit), which measure the amount that light is scattered by suspended sediment particles. The lower the number, the less turbidity there is. In contrast, several sites further down river on different geological settings, which are more conducive to sedimentation and resulting turbidity, show values ranging from 20 to 35 NTUs (McKenzie Watershed Council. 1998.)

Environmental Consequences

Effects of Alternative A-C

The area of analysis for the direct, indirect, and cumulative effects of riparian habitat enhancement is the Upper McKenzie 5th Field Watershed. Road reconstruction work associated with the Two Bee 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 streams. 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 35 provides a summary of these replacements and the potential amount of fill material that would have a reduced risk of entering streams.

Table 35: Culvert Replacements in Perennial and Intermittent Streams by Alternative.

	Stream Type	Number of Culverts Replaced	Cubic Yards of Fill Stabilized
Alternative A	Intermittent	8	2,000
	Perennial	2	500
	Total	10	2,500
Alternative B	Intermittent	8	2,000
	Perennial	3	750
	Total	10	2750
Alternative C	Intermittent	8	2,000
	Perennial	3	750
	Total	11	2750
Alternative D (No Action)	Intermittent	0	0
	Perennial	0	0
	Total	0	0

In addition, the third perennial culvert replacement that is included in Alternatives B and C only would occur where Ikenick Creek crosses Road 2672-675. The design of this crossing to meet 100 year flows will also permit restoration of fish and amphibian species to and from stream and wetland habitat, above and below the crossing.

All temporary roads that would be used in the action alternatives are situated on relatively flat, stable terrain, and all are situated outside of riparian reserves where the potential for extension of drainage networks is negligible. These conditions make run-off and transport of sediment from disturbed soils unlikely, and consequently no measurable 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, Table 21. The following table provides additional information about road maintenance:

Table 36: Road Maintenance Summary.

	Alternative A	Alternative B	Alternative C	Alternative D
Miles	28.4	26.0	33.2	0
New Relief Culverts	27	23	23	0
Replacement Relief Culverts	44	35	35	0

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.

Just below the crossing of Road 2672-675 over Ikenick Creek is a water fill source that is currently used as a dispersed recreation site. It would be restored by installing traffic control barriers and by re-vegetating the portion of the site excluded from vehicle traffic. The area that would be treated has substantial amounts of bare, compacted soil that is vulnerable to erosion and runoff into nearby Ikenick Creek. The flow from a ditch relief culvert on Road 2672-650 currently flows directly into Ikenick Creek. With the elimination of vehicle traffic and restoring vegetation, this source of sediment into Ikenick Creek would be eliminated.

Effects of Alternative D

Alternative D, No Action, 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.

Cumulative Effects

Timber sales associated with the Robinson-Scott Landscape Management Project has previously decommissioned 4.1 miles of roads within the Upper McKenzie Watershed. All alternatives propose 10.2 miles of road for decommissioning, closure, or storm proofing from all action alternatives. The cumulative effects of past actions and the proposed action would be a total of 14.3 miles of roadway, which will be eliminated in terms of substantial hydrologic effects, or placed into long term self-maintaining conditions where they would be unlikely to contribute additional adverse flow or sediment effects. No other reasonable foreseeable future actions exist that would contribute additional decommissioning, closure, or stormproofing in the Upper McKenzie Watershed.

Threatened Northern Spotted Owl ---

Affected Environment

The analysis area chosen for considering effects on spotted owls is the Two Bee Project area. The project area was selected for its known distribution of spotted owls and associated owl home-range delineations. The northern spotted owl is considered a Management Indicator Species (MIS) for old growth habitat in the Willamette Forest Plan p. IV-160 (USDA Forest Service. 1990). Past surveys for spotted owls have documented eleven spotted owl activity centers within 1.2 miles of the Two Bee Project. Nine of the eleven spotted owl activity centers are surrounded by established, 100-acre late successional reserves.

Challenges to spotted owl conservation exist range-wide, which includes potential threats from wildfires, barred owl competition, great horned owl predation, West Nile Virus and sudden oak death. 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 these species. Fragmented habitat increases flight distance and energy consumption for foraging, and increases habitat suitability for predatory and competitive owls such as the 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. All known activity centers in the Two Bee 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 red cedar, 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 would not have the large, old-growth nest trees, multi-layered canopy, or many large snags and logs. The minimum canopy closure for dispersal habitat is 40%.

Past logging activities in the Two Bee project area has removed many acres of spotted owl habitat. Remaining suitable habitat in the project area is now highly fragmented, lowering the overall quality of habitat on the landscape.

Environmental Consequences

Effects of Alternative A-C

Direct and Indirect Effects

The Two Bee Project would modify existing suitable spotted owl habitat, which consists of nesting, roosting, and foraging habitat. Suitable habitat would be degraded, downgraded or removed in the action alternatives as shown in Table 38 below. The following definitions apply to these terms:

Degraded: to affect the quality of spotted owl suitable or dispersal habitat without altering the functionality of such habitat. This degrading of habitat can occur with light partial cutting, underburning and salvage treatments.

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 from moderate and moderate multi-story partial cutting and heavy partial cutting where the canopy and understory are thinned and still retain a minimum of 40% average canopy closure.

Removed: to alter spotted owl suitable or dispersal habitat so that the habitat no longer supports nesting, roosting, or foraging behavior. This removal of habitat can result from shelterwood regeneration harvests that reduce the average canopy closure below 40%.

Planned snag and down wood creation would improve future spotted owl habitat and prey base conditions. Snag creation methods include a variety of treatment heights, diameters, both scattered and clumped distribution. Planned pre-commercial thinning, pruning, and conifer release units in the project area (listed in Appendix F, Stand List for Non-Timber Sale Treatments) would require seasonal restrictions to avoid disturbance to spotted owls.

Table 37: Spotted Owl Habitat Degraded, Downgraded, or Removed by Alternative.

	Alternative A	Alternative B	Alternative C	Alternative D
<i>Degraded</i>	103	26	156	0
<i>Downgraded</i>	249	712	387	0
<i>Removed</i>	117	0	573	0

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.

Formal consultation with the U.S. Fish & Wildlife Service for effects to the northern spotted owl was initiated in 2002. Re-initiation of consultation occurred for the FY2003/2004 Habitat Modification Projects in the Willamette Province. A Biological Opinion was received that concluded the finding of no jeopardy and no adverse modification of critical habitat. Concurrence with the Biological Assessment (which included the Two Bee project) found that the Two Bee project may affect, but is not likely to adversely affect northern spotted owls. A new consultation occurred for the Two Bee project area and a Biological Opinion (BO/LOC 1-7-06-F-0013) for this activity was issued February 1, 2006. **A supplement to the Biological Assessment was submitted on September 12, 2006. An amended Biological Opinion and letter of concurrence will need to be received by the Forest prior to signing a decision notice for this project.**

Effects of Alternative A

Direct and Indirect Effects

With Alternative A, 103 acres of suitable habitat would be treated with a light partial cut or salvage, 249 acres with moderate partial, and 117 acres of shelterwood regeneration harvest. Light partial cutting and salvage are expected to degrade suitable habitat by removing habitat components such as trees and down wood. These acres would remain suitable habitat. Moderate partial cutting is expected to downgrade suitable habitat to dispersal habitat by removing habitat components and reducing canopy closures. Shelterwood treatments are expected to remove suitable habitat as tree densities and canopy closures are reduced. These stands are expected to grow back into dispersal habitat in 40-50 years.

Effects of Alternative B

With alternative B, 26 acres of suitable habitat would be treated with salvage, and 712 acres would be treated with moderate partial cutting. Light partial cutting and salvage are expected to degrade suitable habitat by removing habitat components such as trees and down wood. These acres would remain suitable habitat. Moderate partial cutting is expected to downgrade suitable habitat to dispersal habitat by removing habitat components and reducing canopy closures. Planned snag and down wood creation would improve future spotted owl habitat and prey base conditions.

Effects of Alternative C

Direct and Indirect Effects

With this alternative, 156 acres of suitable habitat would be treated with a light partial cut, underburning or salvage; 387 acres with moderate and heavy partial cutting; and 573 acres with shelterwood regeneration harvest. Light partial cutting and salvage are expected to degrade suitable habitat by removing habitat components such as trees and down wood. These acres would remain suitable habitat. Moderate heavy partial cutting is expected to downgrade suitable habitat to dispersal habitat by removing habitat components and reducing canopy closures. Shelterwood treatments are expected to remove suitable habitat as tree densities and canopy closures are reduced. These stands are expected to grow back into dispersal habitat in 40-50 years.

Effects of Alternative D (No Action)

Direct and Indirect Effects

Under this alternative, no actions would be implemented to changes spotted owl breeding 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, 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 windthrow, and possibly from root rot over time. Down wood would be provided as tree mortality occurs, which contributes to maintaining the spotted owl prey base.

Cumulative Effects

The analysis area chosen for considering cumulative effects on spotted owls is the Two Bee Project area. The project area was selected for its known distribution of spotted owls and associated owl home-range delineations. Timber sales have occurred on approximately 3,879 acres within the Two Bee Project area since the 1950s (see Table 25), representing about 31% of the 12,456 acre project area. Past timber harvest has resulted in the removal or fragmentation of many acres of suitable spotted owl habitat, but some of the previously managed stands are currently providing low quality dispersal habitat. Many stands are too young and have too small a diameter to be considered dispersal habitat at this time, but they would grow into dispersal habitat over time.

The effects of Alternative B, the proposed action, on suitable spotted owl habitat acres would be to degrade or downgrade the acres displayed in Table 37. Alternative B would not remove spotted owl habitat but it would degrade 26 acres and downgrade 712 acres, having the cumulative effect of reducing one owl sites below the 40% threshold level. Both Alternative A and C would reduce one owl site below the 40% threshold level. However, the USFWS has concluded that this proposed action, the Two Bee Timber Sale, would not jeopardize the continued existence of the spotted owl.

There are no reasonably foreseeable future actions identified which could alter suitable habitat and incrementally contribute to the cumulative effects of past actions and the proposed actions.

Elk Habitat

Affected Environment

The Two Bee planning area has three designated Elk Emphasis Areas: Gate/Ikenick, Hackleman, and Upper West Side McKenzie/Fritz/Bunchgrass (UWSM/F/B) (See Elk Emphasis Area Map in Appendix E). All three of the areas are designated High Emphasis Areas. These areas are managed for elk habitat under guidance from the Willamette Forest Plan with the assumption that providing high quality elk habitat would adequately address the needs for black-tailed deer.

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 value in the range of 0.5-1.0 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.

Summary of Existing Elk Model Variables for the Two Bee Project Analysis Area:

Cover: The habitat effectiveness value for cover (HEc) in the Gate/Ikenick area is currently meeting the standards (0.64). The other two emphasis areas are currently below standards Hackleman (0.44) and UWSM/F/B (0.47).

Forage: The forage quality habitat effectiveness ratings (HEf) for all three areas are currently below standards Gate/Ikenick (0.39), Hackleman (0.28) and UWSM/F/B (0.42).

Size and Spacing of Forage: The size and spacing habitat effectiveness rating (HEs) for forage and cover in these three elk emphasis areas indicates that the existing distribution of cover and forage is very good and that management goals for size and spacing are currently being met Gate/Ikenick (0.85), Hackleman (0.87) and UWSM/F/B (0.82).

Road Density: Road densities in the Gate/Ikenick area are currently adequate (0.54). The open road density habitat effectiveness ratings (HEr) indicate that road densities are below the Forest Plan recommendations for the Hackleman (0.49) and UWSM/F/B (0.49) emphasis areas.

Habitat Effectiveness Index (HEI): The overall ratings of (HEI) indicate that all three emphasis area are currently above Forest plan standards: Gate/Ikenick (0.58), Hackleman (0.50), and UWSM/F/B (0.53).

The following table provides a comparison of the effects of each alternative within each Elk Emphasis Area:

Table 38: Habitat Effectiveness Ratings for Two Bee Sub-drainages.**Gate/Ikenick:**

HE Value	Alt A	Alt B	Alt C	Alt D (No Action)
HEc	0.65 (0.63)	0.63 (0.61)	0.62 (0.59)	0.66 (0.64)
HEf	0.39**	0.39**	0.39**	0.39**
HEs	0.85	0.85	0.85	0.85
HEr	0.54	0.54	0.54	0.54
HEI	0.58	0.58	0.58	0.58

Hackleman:

HE Value	Alt A	Alt B	Alt C	Alt D (No Action)
HEc	0.52 (0.43**)	0.52 (0.43**)	0.52 (0.43**)	0.52 (0.44)**
HEf	0.28**	0.28**	0.28**	0.28**
HEs	0.87	0.87	0.87	0.87
HEr	0.50	0.50	0.50	0.49**
HEI	0.50	0.50	0.50	0.50

Upper West Side McKenzie/ Bunchgrass / Fritz:

HE Value	Alt A	Alt B	Alt C	Alt D No Action)
HEc	0.46** (0.46**)	0.47** (0.47**)	0.46** (0.46**)	0.47** (0.47)**
HEf	0.42**	0.42**	0.42**	0.42**
HEs	0.82	0.82	0.82	0.82
HEr	0.53	0.53	0.53	0.49**
HEI	0.54	0.54	0.54	0.53

** Below the forest plan threshold value of 0.5 for high emphasis area.

Forage, Hiding, Thermal and Optimal Thermal Habitat, and Road Densities

Past harvest activities have shaped the landscape in terms of the juxtaposition and types of elk habitat. Since 1970, over 6,241 acres have been managed with timber harvesting. 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.

Environmental Consequences

Effects of Alternative A-C

Direct and Indirect Effects

The proposed timber harvests would change the function of this elk habitat from hiding or thermal cover to foraging habitat, as displayed in the table below.

Table 39: Approximate Change in Elk Habitat Abundance by Elk Emphasis Area

Gate/Ikenick Emphasis Area:

Alternative	Optimal Thermal	Thermal	Sub Quality Thermal	Hiding	Forage
A	0	-277	-201	0	+76
B	0	-664	+757	0	0
C	0	-871	+339	0	+532
D	0	0	0	0	0

Hackleman Emphasis Area

Alternative	Optimal Thermal	Thermal	Sub Quality Thermal	Hiding	Forage
A	0	-48	+48	0	0
B	0	-48	+48	0	0
C	0	-48	+48	0	0
D	0	0	0	0	0

UWSM/F/B Area

Alternative	Optimal Thermal	Thermal	Sub Quality Thermal	Hiding	Forage
A	0	-128	0	+87	+41
B	0	-87	0	+87	0
C	-9	-119	0	+8	+41
D	0	0	0	0	0

+ indicates gain in habitat acreage

- indicates loss of habitat acreage

0 indicates no change to habitat available

Open road miles would decrease 7.5 miles for alternatives A-C. The Gate/Ikenick emphasis area would have a reduction of 0.4 miles of open road. The Hackleman emphasis area would have open road miles reduced by 3.3 miles. The UWSM/F/B would have a reduction of 3.8 miles of open road.

Road side screening for elk security would be a mitigation measure on planned project units including pre-commercial thinning, pruning, and conifer release that are adjacent to well traveled roads.

With these changes, it is expected that elk would continue to thrive on the landscape, adapting well to changes in their habitat. The opportunist nature of elk and their persistence at survival make it likely that they would continue to persist in this project area in the foreseeable future.

Effects of Alternative A

Direct and Indirect Effects

Cover would be slightly reduced in all three elk emphasis areas, including winter range cover in Hackleman. Thermal habitat would be converted to hiding or a sub-quality thermal through moderate partial cutting. No optimal thermal habitat would be affected. The model values for cover in the UWSM/F/B and the winter range portion of Hackleman are currently below the management threshold of 0.5. Thermal cover, which is the most impacted with this alternative, is expected to recover within five to ten years. Over time, the moderate partial cutting should result in higher quality habitat by increasing the diversity of structure in these areas. Forage habitat is below the management threshold of 0.5 in all emphasis areas. Though modeling does not reflect a change in foraging habitat, shelterwood and partial cutting open up forests and stimulate the quality and availability of many of the preferred elk forage species. Security for elk would increase in all three emphasis areas under this alternative due to proposed road closures. Commercial thinning would increase the potential use of young forests in the area for foraging and hiding cover. Overall habitat quality would essentially be maintained or slightly increased in all emphasis areas under this alternative. Projects such as browse cutback, forage seeding, pruning, and pre-commercial thinning would a benefit to elk by providing forage species, either directly or indirectly, and by increased solar input to the forest floor.

Effects of Alternative B

Direct and Indirect Effects

Cover would be slightly reduced in the Gate/Ikenick emphasis area, and in the winter range portion of Gate/Ikenick and Hackleman areas. Thermal habitat would be converted to hiding or a sub-quality thermal through moderate partial cutting. No optimal thermal habitat would be affected. The model values for cover in the UWSM/F/B and the winter range portion of Hackleman are currently below the management threshold of 0.5. Thermal cover, which is the most impacted with this alternative, is expected to recover within five to ten years. Over time, the moderate partial cutting should result in higher quality habitat by increasing the diversity of structure in these areas. Forage habitat is below the management threshold of 0.5 in all emphasis areas. Though modeling does not reflect a change in foraging habitat, partial cutting opens up forests and stimulates the quality and availability of many of the preferred elk forage species. This alternative does not include any shelterwoods, which often provide better forage following harvest than partial cutting does. Security for elk would increases in all three emphasis areas under this alternative due to proposed road closures. Commercial thinning would increase the potential use of young forests in the area for foraging and hiding cover. Overall habitat quality would be maintained or slightly increases in all emphasis areas under this alternative.

Projects such as browse cutback, forage seeding, pruning, and pre-commercial thinning would a benefit to elk by providing forage species, either directly or indirectly, and by increased solar input to the forest floor.

Effects of Alternative C

Direct and Indirect Effects

Cover would be moderately reduced in the Gate/Ikenick area and slightly reduced in the UWSM/F/B emphasis area. It would also be slightly reduced in the winter range portions of Hackleman and the UWSM/F/B and moderately reduced in the Gate/Ikenick area. Thermal habitat would be converted to hiding or a sub-quality thermal through moderate partial cutting. Approximately 9 acres of optimal thermal habitat would be affected. The model values for cover in the UWSM/F/B and the winter range portion of Hackleman are currently below the management threshold of 0.5. Thermal cover, which would be the most affected with this alternative, is expected to recover within five to ten years. Over time, the moderate and heavy partial cutting should result in higher quality habitat by increasing the diversity of structure in these areas. Heavy partial cutting would take longer to recover. Forage habitat is below the management threshold of 0.5 in all emphasis areas. Though modeling does not reflect a change in foraging habitat, partial cutting and shelterwood would open up forests and stimulate the quality and availability of many of the preferred elk forage species. This alternative includes shelterwoods, which often provide better forage following harvest than partial cutting does. Security for elk would increase in all three emphasis areas under this alternative due to proposed road closures. Commercial thinning would increase the potential use of young forests in the area for foraging and hiding cover. Overall habitat quality would essentially be maintained or slightly increases in all emphasis areas under this alternative. Projects such as browse cutback, forage seeding, pruning, and pre-commercial thinning would a benefit to elk by providing forage species, either directly or indirectly, and by increased solar input to the forest floor.

Effects of Alternative D – No Action

Direct and Indirect Effects

Current trends of elk habitat development would continue to occur naturally over time with Alternative D. Existing elk foraging habitat is expected to continue growing into hiding cover and then to thermal cover. Thermal cover would continue to grow toward optimal thermal cover. There would be no change to the current elk effectiveness ratings (see Appendix E).

In ten years, forage availability would be expected to decrease in this area as current openings succeed 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 25% 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.

Cumulative Effects

Analysis for cumulative effects is based on an area comprised of the three High Elk Emphasis Areas where management activities would occur. The Elk Emphasis Areas were used for the scope of analysis because of the determined ratings for elk habitat that is described for the Elk Emphasis Areas in the Willamette National Forest.

Past management activities initially resulted in an abundance of forage habitat with the many acres of regeneration harvesting that occurred (see Appendix K). The more recent lack of harvest has allowed these forests to grow into hiding and thermal cover to create the current condition represented by the no action alternative in the tables in Appendix E – Elk Habitat Model Results. Change from the current conditions with implementation of the proposed action and the other action alternatives, is displayed in Table 38. The overall impact of the proposed action is that thermal cover in the treated stands would be degraded or reduced to hiding cover.

There are no reasonably foreseeable future actions planned within the Two Bee project area that would contribute to the cumulative effects from the past, and current proposed actions.

Threatened, Endangered, and Sensitive Species _____

Affected Environment, Wildlife

The Endangered Species Act (ESA), administered by the U.S. Fish and Wildlife Service (USFWS), mandates protection of threatened and endangered species. Listed species are typically habitat-specific with narrow geographic and environmental distributions. Proposed, threatened, endangered, and sensitive (PETS) species have specific requirements under the ESA and 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. Consultation is required with USFWS on activities that may affect these species or their habitat.

Table 40 lists the PETS wildlife species on the Willamette National Forest (USDA Forest Service, 2002) and whether there is potential habitat in the planning area. Additional detailed information about these species is in Appendix C Biological Evaluation for Wildlife.

Table 40: Potential for Occurrence of PETS Species in the Project Area.

Species	Habitat Present in the Two Bee Project Area?
<i>Amphibians and Reptiles</i>	
Oregon Slender Salamander	Yes
Cascade Torrent Salamander	Yes
Foothill Yellow-legged Frog	No
Oregon Spotted Frog	No
Northwestern Pond Turtle	No

Species	Habitat Present in the Two Bee Project Area?
Birds	
Least Bittern	No
Bufflehead	Yes
Harlequin Duck	Yes
Northern Bald Eagle	Yes
American Peregrine Falcon	Yes
Yellow Rail	No
Black Swift	Yes
Tri-colored Blackbird	No
Northern Spotted Owl	Yes
Mammals	
Baird's Shrew	Yes
Pacific Shrew	Yes
California Wolverine	Yes
Pacific Fisher	Yes
Pacific Fringe-tailed Bat	Yes
Lynx	No
Mollusks	
Crater Lake Tightcoil	Yes
Invertebrates	
Mardon skipper	No

Environmental Consequences, Wildlife

Northern Bald Eagle

Bald eagle habitat occurs along the McKenzie River, Fish Lake, and Carmen and Smith reservoirs. There is one known bald eagle nest site at Clear Lake. The nest was located in 1988. However, no successful reproduction has ever been documented. The nest and the supporting branches were destroyed in the winter of 1999. Subsequent surveys have not documented any new nests. With seasonal restrictions in place, no effects on the northern bald eagle are anticipated with the implementation of any action alternatives.

Harlequin Ducks

Harlequin ducks, which are listed as a sensitive species, have often been seen in the McKenzie River above Trail Bridge Reservoir. It is suspected they use other tributaries with fast-moving water as well. Habitat includes large downed wood for resting and loafing.

Since no action alternative is located near the McKenzie River, there are no effects on Harlequin ducks.

Peregrine Falcon

Nesting peregrine falcons have been documented in the vicinity of the Two Bee project area. Annual protocol surveys have been conducted to observe nesting chronologies. Habitat management zones have been delineated to protect peregrine falcon habitat. Seasonal restrictions are in place to reduce disturbance to peregrine falcons during the critical breeding season each year (Table 19).

Survey and Manage Wildlife Species:

On January 9, 2006 Judge Pechman signed an Order on Plaintiffs' Motion for Injunctive Relief that set aside the March 22, 2004 Survey and Manage ROD, reinstated the January 2001 Survey and Manage ROD, and instructed affected Forest Service and Bureau of Land Management units to "not authorize, allow, or permit to continue any logging or other ground disturbing activities on projects to which the 2001 ROD applied unless such activities are in compliance with the provisions of the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004).

To comply with this order, Forest Service and Bureau of Land Management units are required to survey for 2001 ROD (amended March 2004) Category A and C species.

Surveys were conducted for Survey and Manage and Protection Buffer Wildlife Species in all areas proposed for ground disturbing activities from 1999 to 2001, prior to the effective date of the March 2004, amendment. No Survey and Manage mollusks, red tree voles, or great gray owls were found during these surveys.

Affected Environment, Botanical Species and Special Habitats

Sensitive Plants

The Forest Service manual directs us 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 a Regional Forester's Sensitive Species List (USDA Forest Service, 2002). These species and their habitats are often rare and limited in distribution. A prefield review was conducted to determine which sensitive species have historically been documented in the Two Bee Project area. There are no documented sites of sensitive plants in the Two Bee Project area.

Intuitive-controlled field surveys in 2000 and 2001 followed up the prefield review to determine presence of sensitive plant species within those special habitat areas, as well as other potential habitats. No sensitive plants were observed during these surveys.

In January 2004, the Bureau of Land Management and Forest Service released a Supplemental Environmental Impact Statement (SEIS) and Record of Decision (ROD) which amended 28 land and resource management plans with the range of the northern spotted owl by removing the Survey and Manage Mitigation Measure Standards and Guidelines from the Northwest Forest Plan. This Record of Decision added many former Survey and Manage species to the respective Bureau of Land Management and Forest Service programs for special status species.

During June and July of 2006, intuitive controlled surveys were conducted in the Two Bee project area for species in which the 2004 ROD applies. Sensitive plant species located from the most recent Two Bee survey effort is listed below.

Table 41: Survey & Manage / Sensitive Species Survey Results.

Species	Sensitive Species? Y/N	Survey & Manage? Y/N	Prefield Review	Date of Field Recon.	Presence/Mitigation Measures
Nephroma occultum	Y	Y	Habitat present	Jun-Jul. 2006	Units: 6, 34, 39 91, Mitigation: 180 ft. no-harvest buffer
Peltigera pacifica	Y	Y	Habitat present	Jun-Jul. 2006	Units: 31, 39, Mitigation: 180 ft. no-harvest buffer

Survey and Manage Botanical Species

On January 9, 2006 Judge Pechman signed an Order on Plaintiffs' Motion for Injunctive Relief that set aside the March 22, 2004 Survey and Manage ROD, reinstated the January 2001 Survey and Manage ROD, and instructed affected Forest Service and Bureau of Land Management units to "not authorize, allow, or permit to continue any logging or other ground disturbing activities on projects to which the 2001 ROD applied unless such activities are in compliance with the provisions of the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004).

To comply with this order, Forest Service and Bureau of Land Management units are required to survey for 2001 ROD (amended March 2004) Category A and C species. Intuitive-controlled field surveys in 2000 and 2001 followed up the prefield review to determine presence of sensitive plant species within those special habitat areas, as well as other potential habitats. No sensitive plants were observed during these surveys.

Survey and Manage botanical species are species that are genuinely rare or, because of lack of information about them, the agencies did not know whether they would adequately be protected by other elements of the Northwest Forest Plan. The list of species that have potential habitat within the planning area and Survey and Manage species located in the planning area can be found in the Botanical Resource Report located in Appendix C.

In 2004, the Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines was released (USDA Forest Service and USDI Bureau of Land Management. 2004a). As a result, some of the species that were formerly Survey and Manage are now managed under the interagency Special Status Species Program (SSSP) as sensitive species. A pre-field review of the project area was conducted to determine the presence of potential habitat for former Survey and Manage species. Surveys were conducted in 2000, 2001 and 2006 in these potential habitats. Results from the pre-field review and surveys are above in Table 41, and in Appendix C.

Special Habitats

The prefield review also determined locations of several special habitats, potential habitat for sensitive plant species, within the project area. These special habitats include a wet draw and wetlands.

Table 42: Special Habitats Identified in Two Bee Project Units.

Proposed Units	Special Habitat	No-Harvest Buffer
18	Wetland/Conifer Swamp	100 ft
30	Wetland/Seeps (forested)	50 ft.

Environmental Consequences, Botanical Species

Effects of Alternatives A – C

Direct and Indirect Effects

The action alternatives would have no direct or indirect impact on sensitive plants, Survey and Manage species that are managed under the Forest Service Sensitive Species Program, or other botanical species. Known occurrences would be protected with a no disturbance buffer to maintain the viability of the populations. The buffer would maintain the microclimate for those species requiring cover or moisture retention and protect the species from being physically damaged during project implementation. This buffer applies to all harvest activities, ground disturbing activities, and broadcast burning. 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. For further discussions on botanical species see the Botany BE and the Supplemental botanical report in Appendix C.

The other actions common to Alternatives A – C (listed in Chapter 2), with the exception of aerial fertilization, would have no direct or indirect effect on sensitive plants, Survey and Manage species, or other botanical species as none of these species are known to occur in the areas where the other actions are proposed.

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.

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 Two Bee units.

For the fungus *Bridgeoporus nobilissimus* there is incomplete and unavailable information relating to the effects of aerial fertilization of managed plantation units outside the harvest units. The mitigation measure of surveying for *B. nobilissimus* prior to implementation of aerial fertilization is

listed in Chapter 2. If any *B. nobilissimus* are found during these surveys they will receive adequate protection to ensure there will be no adverse effects to the individual.

Lichens known to occur in the Two Bee project area are protected using 180 ft. no-harvest buffers. There are no expected direct or indirect effects to these sites because of the no-harvest buffer.

Effects of Alternative D (No Action)

Direct and Indirect Effects

This alternative would have no direct or indirect impact on sensitive plants, Survey and Manage species that are managed under the Forest Service Sensitive Species Program, or other botanical species. There would be no ground disturbance or disturbance of the microclimate with this alternative.

Selecting the No Action alternative may have adverse effects on fungi. Without management action, woody material will continue to accumulate over time, thus increasing fuel loads. Landscapes with heavy fuel loads are at greater risk of stand replacing fires. High intensity fire is more likely to destroy spores and mycelium found in organic matter on the surface and in the uppermost soil horizons.

Cumulative Effects

The analysis area for cumulative effects is the Two Bee Project area. This area was chosen because activities outside the analysis area would have no affect on sensitive species, Survey and Manage species, or other botanical species located within the project analysis area.

As discussed above, implementation of the proposed action or any action alternatives would not have direct or indirect adverse effects on known populations of sensitive plants, Survey and Manage species, or other botanical species. Based on the analysis of this project there will be no incremental change to existing populations of sensitive species, Survey and Manage species, or other botanical species in the project area.

Migratory Land Birds

Affected Environment

Migratory landbirds and their required protection are outlined in the January 11, 2001, Executive Order “Responsibilities of Federal Agencies to Protect Migratory Birds.” A Memorandum of Understanding was signed between the USFS and USFWS to complement the January 2001, Executive Order. Agreed-to measures include identification of habitats needed by priority species. Habitats vary broadly for this large group of species. The Two Bee Project Area contains populations of migratory landbirds typical of the western Cascades.

There are 85 bird species recognized as neotropical migrants on the Willamette National Forest. Thirty-five of these species found on the Willamette National Forest have been identified as species of concern (Sharp, Brian. 1992). These species are associated with old-growth, riparian, rocky cliffs, or grass habitats. Snags in the area may be providing important habitat for Vaux’s swifts, Williamson’s

sapsuckers, and American kestrels. Old growth stands occupy portions of this landscape, which may be supporting Cooper's hawks, olive-sided flycatchers, western wood-pewee, and mountain bluebirds. Riparian habitat associated with streams in the area may be providing habitat for riparian-associated species such as Williamson's flycatchers, tree swallows, and red-eyed vireos.

Past harvest in the Two Bee Project area has changed the seral stage composition of the landscape, altering habitat conditions for landbirds. Large snag habitat used by some landbird species, i.e. hairy woodpeckers and brown creepers, has been lost due to past timber sales, as well as roadside salvage. Any future logging of young or older forest stands would continue to impact local populations of landbirds because different species thrive in various types of forested habitats.

Environmental Consequences

Effects of Alternative A-C

Direct and Indirect Effects

Felling of trees associated with this project may unintentionally affect individual migratory birds, but is not expected to have a measurable negative effect on bird populations because of the limited extent of habitat removal. Thinning and removal of stands may negatively impact certain species such as Hutton's vireo, golden-crowned kinglet, hermit thrush, and Swainson's thrush. There will be areas of no harvest, such as riparian buffers, within some of the proposed stands providing structural variability and potentially less impact.

Species that use early seral-stages, such as the winter wren, American robin, and grouse, may benefit from thinning and regeneration harvest. Species which would increase in number, as a result of thinning would 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).

Some snag habitat used by migratory birds such as western bluebirds or swallows, would be lost due to roadside hazard tree removal under Alternatives A-C. However, snag creation activities in units following logging would mitigate this loss in the long-term. It would take approximately ten or more years before these created snags become functional.

Effects of Alternative A

Direct and Indirect Effects

Alternative A would impact migratory landbirds by thinning 432 acres of forest stand habitat. In addition, 117 acres would have a regeneration shelterwood harvest, leaving 15% green tree retention.

This may impact some bird species if they are nesting in the remaining green trees. In some cases, this may cause nest failure, especially for those birds which nest relatively low to the ground such as hummingbirds, flycatchers, warblers, sparrows, and thrushes. Most neotropical migrants 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.

Effects of Alternative B

Direct and Indirect Effects

Alternative B would impact migratory landbirds by thinning 799 acres of forest stand habitat. This alternative does not include any regeneration units nor the associated low intensity broadcast burning which may impact certain species of landbirds. This alternative would include more acres of moderate thinning than other alternatives. Those species that would be less affected as a result of moderate thinning, compared to heavy thinning, include Pacific-slope flycatchers, Hutton's vireos, and brown creepers (Hayes, J. et al. 2003).

Effects of Alternative C

Direct and Indirect Effects

Alternative C would impact migratory landbirds by thinning 474 acres of young forest stand habitat. In addition, 573 acres would have a regeneration harvest, leaving 15% green tree retention. This alternative includes the most acres of heavily thinned and regeneration units, therefore, impacts to landbirds are expected to be the greatest in the short-term. Those species, which would be impacted more as a result of heavy thinning, compared to moderate thinning, include Pacific-slope flycatchers, Hutton's vireos, and brown creepers (Hayes, J. et al. 2003). It is expected that habitat for these species would again improve once canopies close back in. A low intensity burn is proposed for this alternative in which two units totaling 149 acres could disrupt some bird species.

Effects of Alternative D (No Action)

Direct and Indirect Effects

Alternative D 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. No snag habitat used by certain species of migratory land birds would be lost from roadside hazard tree removal. Additional snag habitat would occur through natural mortality in forest stands currently at low densities, or non-existent.

Cumulative Effects

Past management activities within the Two Bee Project area have resulted in changes to the seral stage composition across the landscape altering habitat conditions for landbirds. Different species occupy different seral stage habitats and therefore the effects to each species depend on the type of change that occurred. The effects from the proposed harvest activities in the Two Bee project area would be an increase in the acres of openings created across the landscape, which may impact some landbirds 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 ravens. There are no other reasonably foreseeable future timber harvest activities for the project area.

Snags and Down Wood

Affected Environment and Current Conditions

The significance of the ecological role of snags and down wood in influencing ecosystem diversity and productivity is addressed in the Willamette National Forest Land and Resource Management Plan (1990). The significance of this relationship in coniferous forests of the Pacific Northwest is further emphasized by management S&Gs under the Northwest Forest Plan ROD (1994, 2001, 2004) and elsewhere throughout published literature (Hallett et al. 2001, Laudenslayer et al. 2002, Lewis 1998, 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 questioned the validity of the potential population approach to species management. Strong support for identifying more appropriate amounts of snag and down wood habitat is being given to new approaches in addressing these habitat components. One such approach devoted to identifying appropriate levels of snag and down wood in selected habitat types 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).

The proposed project involves activities that would directly affect current habitat associated with dead wood or defective trees. Some advance decay class down wood or snags may be affected by harvest and under burning activities. The amount of dead wood potentially affected is considered minor within the context of the surrounding Montane Mixed Conifer and Westside Lowland Conifer-Hardwood forest Habitat types where large snags and logs historically vary from abundant to uncommon, and where fire is recognized as the major natural disturbance (Chappell et al. 2001).

DecAID is being used as best available science information. DecAID is a web-based advisory tool to help land managers assess impacts of forest conditions and existing or proposed management activities on organisms that use snags and down wood. It is a summary, synthesis, and integration of published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. DecAID was used to compare natural snags in unharvested plots in Montane mixed conifer forests and Westside lowland conifer-hardwood forests.

When using the data from unharvested inventory data in DecAID, caution should be used due to years of fire exclusion. DecAID vegetation data provide the most current scientific data available and it should be used until new information is acquired.

The Forest Plan, as amended, requires retention of snags at levels sufficient to support cavity-nesting birds at 40 percent potential population levels. Biological potential models have been invalidated (Johnson and O'Neil, 2001). The DecAID advisory tool (Mellen et al. 2006) has been developed to help federal land managers evaluate effects of management activities on certain wildlife species that use dead wood habitats. DecAID displays data on wildlife use based on snag density and diameter. Data in DecAID suggests that snag retention levels for some cavity excavators may need to be higher than the levels previously calculated from biological potential population models. DecAID

does not model biological potential or population viability. Furthermore, there exists no direct relationship between tolerances, snag densities and sizes used in DecAID and the measurements of population levels.

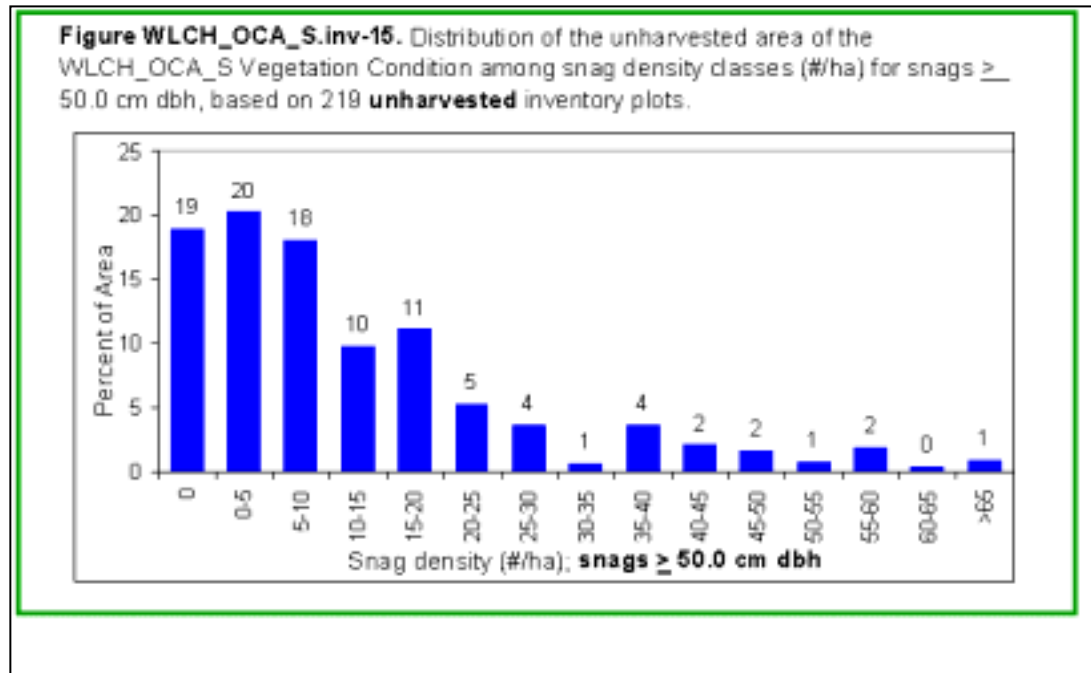
The following data shown in the Decayed Wood Advisor (DecAID) (Mellen et al. 2006) from plots in natural stands was used as guidance when determining the prescription for snags in Two Bee units. (See Tables 5, 9, and 13 in Chapter 2 for the number of live green trees to be left for snags and down wood in the action alternatives.)

Landscape Distribution of Snags in Natural Conditions

The following data describes distribution of snags on unharvested plots (n=219) in the Westside lowland conifer-hardwood forest in the western Oregon Cascades.

- 13% of the unharvested area has > 30 snags/ha (12/acre) that are ≥ 50.0 cm (19.7 in) dbh; the value of snags/ha is similar to the midpoint of the 80% tolerance level for wildlife.
- 22% of the unharvested area has > 20 snags/ha (8.1/acre) that are ≥ 50.0 cm (19.7 in) dbh; the value of snags/ha is similar to the data points at the 50% tolerance level for wildlife.
- 43% of the unharvested area has > 10 snags/ha (4/acre) that are ≥ 50.0 cm (19.7 in) dbh; the value of snags/ha is similar to the data points at the 30% tolerance level for wildlife.
- 19% of the unharvested area has no snags ≥ 50.0 cm (19.7 in) dbh.

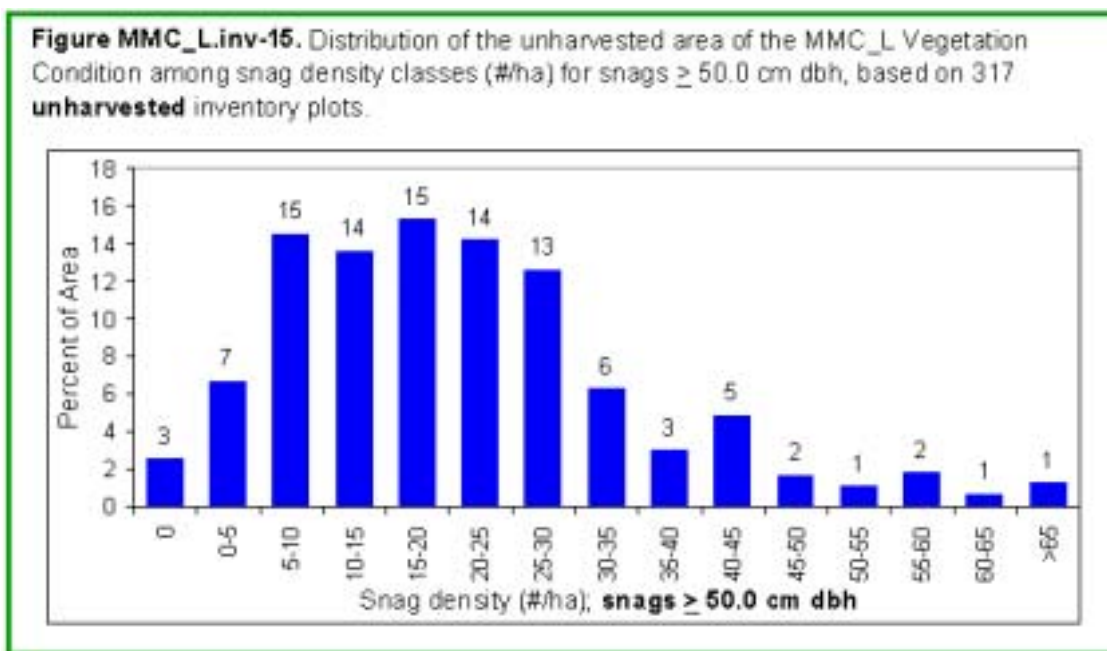
Table 43: DecAID Model, Westside Lowland Conifer-Hardwood Forest.



The following data describes distribution of snags on unharvested plots (n=317) in Montane Mixed Conifer forests.

- 21% of the unharvested area has > 30 snags/ha (12/acre) that are ≥ 50.0 cm (19.7 in) dbh; the value of snags/ha is similar to the midpoint of the 80% tolerance level for wildlife.
- 48% of the unharvested area has >20 snags/ha (8/acre) that are ≥ 50.0 cm (19.7 in) dbh; the value of snags/ha is similar to the data points at the 50% tolerance level for wildlife.
- 77% of the unharvested area has > 10 snags/ha (4/acre) that are ≥ 50.0 cm (19.7 in) dbh; the value of snags/ha is similar to the data points at the 30% tolerance level for wildlife.
- 3% of the unharvested area has no snags ≥ 50.0 cm (19.7 in) dbh.

Table 44: DecAID Model, Montane Mixed-Conifer Forest.



Down Wood

Standards and Guidelines call for down wood distribution of the appropriate quantities, sizes and species as shown on pages C-40 and C-41 of the Northwest Forest Plan ROD and Standards and Guidelines. For the Willamette National Forest, down wood standards and guidelines state that at least 240 linear feet of logs per acre greater than or equal to 20 inches in diameter; must be greater than 20 feet in length to be counted toward this total. It is the down wood in decay classes I and II that are to be counted. The down wood species to be left should be a reflection of the species mix found in the original stand.

When partial harvest occurs, these standards and guidelines still apply however, modifications should occur to reflect the timing of stand development cycles. The integrity and structure of existing down wood should be protected from yarding and slash treatment whenever possible.

Environmental Consequences

Effects of Alternative A-C

Direct and Indirect Effects

This project involves activities having potential to both reduce and create dead wood habitats. Some loss of existing snag habitat would occur for each action alternative to address safety concerns. Decadent trees that are not a safety hazard would be protected to the extent feasible during timber harvest operations. Snags felled for safety concerns would be left as down wood.

Partial cutting and shelterwood harvest, which underburning as a method of treating activity generated fuels, may cause partial or complete consumption of these felled trees depending on decay class of the tree and burning conditions. Commercial thinning is not likely to have any additional effect on dead wood habitat. Project effects relative to this type of habitat component in the surrounding landscape are considered inconsequential.

Data analysis reveals the amount and distribution of snag and down wood habitat would essentially remain unchanged or experience a slight increase under any of the action alternatives.

The Two Bee project would comply with Forest Plan Standards and Guidelines pertaining to snag and down wood management.

Effects of Alternative D (No Action)

The no action alternative would not involve manipulation of timber stands to either create or remove snags and down wood. Natural processes that affect the creation and removal of snags and down wood will include insects and pathogens, wildfire, and wind events.

Cumulative Effects

The area considered for cumulative effects analysis is the Two Bee project area. The 12,456-acre project area is an appropriate minimum sized area of similar habitat to consider when evaluating current and future levels on dead wood (Mellen et al. 2006). Past management actions associated with timber harvest activity has affected the overall amount and distribution of dead wood habitat by reducing the amount of old-growth habitat and increasing the amount of mid-late seral habitat. Project effects would result in a negligible contribution to effects that have already occurred from past management actions on the landscape throughout the project area.

There are no reasonably foreseeable future actions that would affect dead wood habitat in the project area. Current science and the changing trend in timber management that has occurred within the past decade, and which 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 un-harvested stands.

Management Indicator Species

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 may occur in the Two Bee 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 Emphasis Area Management section in this chapter.

Affected Environment – Fisheries

Management indicator fish species found in this area were described previously in the Aquatic Resources discussion. The three anadromous and resident MIS fish species commonly fished for are spring Chinook salmon, rainbow trout and cutthroat trout. Because the distribution and range of these three MIS fish overlap and possess similar requirements in water and habitat quality, the analysis findings for spring Chinook are applicable to rainbow and cutthroat trout.

Environmental Consequences

Effects of Alternative A-C

Direct and Indirect Effects on Terrestrial Species

Two Bee Alternatives A through C meet all applicable Standards and Guidelines from the Willamette Forest Plan. All alternatives of the Two Bee Project would meet Northwest Forest Plan Standards and Guidelines, and therefore maintain persistent populations of spotted owls, pileated woodpeckers, and marten (USDA Forest Service, USDI Bureau of Land Management. 1994. Appendix J2). Under Alternatives A-C, changes in the amount or characteristics of required habitat for these species would be minimal. Changes that would improve habitat include the increased levels of snags and down wood. Between 4 and 11 trees per acre would be left in all units for future snag and down wood creation up to five years after harvest.

Impacts of alternatives of the Two Bee Project for the spotted owl, bald eagle, peregrine falcon, and fish can be found in the Biological Evaluations in the Appendix. This project may affect, but is not likely to adversely affect, the northern spotted owl due to modification or removal of Suitable habitat in Alternatives A-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 Two Bee Project on elk and deer are discussed in the elk 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).

Direct, and Indirect Effects on Fish Species

Project effects on aquatic habitat quality summarized in the Fisheries Biological Assessment, Appendix B, describes potential effects of the project to spring Chinook habitat. Project direct, indirect and cumulative effects will not adversely affect fisheries MIS. Water and habitat quality will be maintained meeting the objectives of the Willamette National Forest LRMP and Aquatic Conservation Strategy of the Northwest Forest Plan.

Effects of Alternative D (No Action)

Direct and Indirect Effects

Under Alternative D, 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 unchanged from current conditions. Alternative D would meet all applicable Standards and Guidelines from the Willamette Forest Plan.

Cumulative Effects

Cumulative effects for TES wildlife species (spotted owl, bald eagle, and Peregrine falcon):

The 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.

There would be minimal additional incremental effects from the proposed action or alternatives actions, on the remaining MIS species or their habitat within the project area (including pileated woodpeckers, pine martens and non-TES fish), when considering the effects from all past actions. There is no foreseeable future habitat management actions planned within the Two Bee Project area that would add to the cumulative effects of the past and currently proposed actions or action alternatives.

Cumulative effects for TES fish: 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 above in Water Quality/Aquatic Resources. The proposed action and the other action alternatives would not incrementally contribute to loss of aquatic habitat, 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:

5. The timing or magnitude of peak flow events (planning sub-drainage ARP remain above the Willamette Forest Plan recommended levels);
6. Instability of stream banks [recommended ARP midpoints are exceeded, and exclusion of bank destabilizing activity];
7. Adverse alteration of the supply of sediment to channels; or

8. Adverse alteration of sediment storage and structure in channels.

No other future projects are planned within the Two Bee Project area that would add incremental changes to the cumulative effects of past and current actions in the project area.

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.

Fire and Fuels

Affected Environment

Scale of Analysis

The Fire and Fuels analysis for the Two Bee Project area was conducted at both the stand and landscape level. The project area lies within the Upper McKenzie Watershed and includes the Hackleman, Kink/Inland Basin, and Smith River subwatersheds. Fire regimes and Fire Regime Condition Class (FRCC) were evaluated at the landscape level, with the most recent Fire Regime data from the Northwest Oregon Ecology work group with Jane Kertis, Fire Ecologist for the Siuslaw and Willamette National Forest (Hann, W. et al. 2003). The FRCC condition class for the Two Bee Landscape Management area is level 1, or within the range of historic variability for this area.

Fuel loading (amount of fuel measured in tons per acre) was analyzed at the stand level. Fire behavior predictions were calculated using the predicted fuel loading with larger landscape level factors such as topography and weather. Detailed fuels analysis information is found in the Project Fire and Fuels Specialist Report in the analysis file.

Fire History

Fire plays an active and vital role in the forest ecosystem. Historic fires ranged in size and frequency across the landscape, and have been the dominant disturbance process affecting vegetation type and distribution (Kertis, 2004).

From 1970-2002, 41 fires occurred in the Two Bee Project Area. All fires were suppressed and most contained to less than one acre. Lightning is a normal occurrence across the McKenzie River Ranger District, and during this time period accounted for 17 of the 41 fires in the Project Area. The remaining fires were human-caused.

Fuel Profile and Fire Behavior

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 classification key of fuel models, i.e. grass, timber litter, brush or timber slash, describes the fuel that carries the fire. 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 the ladder fuels such as limbs on the bole of trees, regeneration, and brush.

Some fuel profiles on the Two Bee Project and on the McKenzie River Ranger District do not fit exactly to the vegetation descriptions listed in Anderson's "Aids to Determining Fuel Models for

Estimating Fire Behavior” (Anderson, H. E. 1982) but the fuel loading and fire behavior observed correlates to one of the appropriate fuel models. The Two Bee Project Area is represented by the following 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.
- 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.
- 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.
- 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 or 9 because of the heavier fuel loading. Torching of trees (fire in the crowns of trees) occurs more frequently.

Fire behavior is a result of the fuels, topography, and weather conditions. Areas with light fuel loading experience low intensity fires with low severity (mortality of dominant vegetation). Higher fire intensity with crown fire results in areas with greater fuel loading (in the fine and large diameter fuels), continuous canopy closure, and ladder fuels. In many of the stands in Two Bee Project Area, FM 10 would display this type of wildfire behavior.

Larger fuel, > 3” diameter, creates greater fire intensity, longer flame lengths, and enables crown fires and higher severity fire to establish and progress. Standard fire suppression operations require mechanized suppression resources when flame lengths reach over four feet high. Firefighters are not able to safely suppress fires if the flame lengths exceed four feet.

Environmental Consequences

Effects of Alternative A – C

Direct and Indirect Effects

The proposed action timber harvests would create increased amounts of timber slash in each unit. Activity fuels treatments are proposed in each unit to reduce the amount of fuel created from the harvests. Fuels treatments are proposed to be within 1-2 years following the harvest and most often involving fire (underburning or burning of piles).

Fuel treatments aim to reduce slash to the desired residue profile to remain consistent with Forest Plan Standards and Guidelines FW-252. The desired profile states 0-3 inch diameter fuel should be at 7-11 tons/acre. Underburning will be prescribed where fuel loading exceeds standards and guidelines. Underburning would take place during the spring or during 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 needed levels of soil coverage and large woody debris. Additionally, mortality of overstory trees can be controlled more specifically because of high live fuel moistures.

Some additional fuel reduction measures, including hand, grapple, and landing piling, would be used where site specific fuel reduction is needed. These piles would be covered following construction, which 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. Pile burning can take place during rainy or snowy days which helps to extinguish the piles and create little or no spread of fire outside of the pile perimeter.

Debris prediction tables from the Handbook for Predicting Residue Weights of Pacific Northwest Conifers, GTR PNW-103, February 1980, (Snell, J.A. et al. 1980) were used to estimate the amount of slash that would result from each timber harvest unit. Prediction tables are included in the Project Fire and Fuels Specialist Report in the analysis file. Fire behavior, during the wildfire season, is usually more active in timber slash fuel models because of the increase in fuel loading and the amount of red needles that may exist for 1 to 3 years after the harvest. Two fuel models describe post-timber sale slash fuel profiles predicted for the Two Bee project area:

- 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 < 11.5 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.

Slash left untreated creates a short-term increase in fire hazard, for approximately 1-3 years following harvests. The 0-3 inch diameter slash on the ground, especially with red needles, may increase the potential for ignitions (lightning or human caused) to carry quickly. The increased fine fuel loading may reduce the success of initial attack suppression operations.

The proposed actions including fuel treatments would change the fuel profile to beneficially reduce future wildfire effects within the stand and across the landscape.

Direct and Indirect Effects Unique to Alternative C

Natural Fuels Prescribed Fire would be implemented in units 90 and 91. No timber harvest or other mechanical treatment would take place prior to the burn. The prescribed fire would occur in the spring or under spring-like conditions in order to retain duff and large woody debris. Mortality from the treatment would likely occur throughout the unit and range from low in the overstory trees to moderate or high in the smaller trees and shrubs of the understory. Some overstory trees would be killed by fire, thereby creating patches in the continuous canopy on the hillside. Mortality of the understory would reduce ladder fuels. Both the reduction of ladder fuels and the opening of the canopy would help reduce the fire behavior potential within the stand in the event of a wildfire. The residual trees in the

stand would respond to the decrease in densities with increased diameter growth and crown expansion. Openings created would provide opportunities for establishment of understory vegetation over time.

Fuel loading may increase following the natural fuels prescribed fire. In the short term, needle fall from scorched or killed trees would increase the fine fuel loading. Within a few years, large woody debris may increase due to fire killed trees or snags falling over. However, the reduction of the existing fuels, the reintroduction of fire, and the change in the vertical fuel profile would provide a greater benefit to the landscape than the small increase in fuels due to the prescribed fire. The effects of underburning natural fuels would result in lower wildland fire severity and mortality on the treated stands.

Effects of Alternative D (No Action)

Direct and Indirect Effects

Fuel loading would continue to increase as biomass continues to accumulate through the successional pathway of the forest. Fire suppression would also continue. In the absence of management ignited prescribed fire, ladder fuels and canopy closure would continue to be high, supporting conditions for severe, high intensity wildfires on the landscape.

Cumulative Effects

Cumulative effects for this section is a combination of residual effects of past stand treatments, the proposed actions, and any reasonably foreseeable future stand treatment and fuel reduction activities that may occur within the Two Bee Project Area. The measurement of change will be the extent to which Fire Regime Condition Class changes for the landscape analysis area. Past management activities that have changed the fuel profile or fire behavior include timber harvesting activities, fuels treatments following timber harvests, and fire suppression. Table 25 displays the number of acres harvested within the past 50 years. Most stands were managed with a regeneration harvest followed by a broadcast burn. No natural fuels prescribed fire has occurred in the project area within the last 50 years.

Stand management and activity fuels treatments in the proposed action or any of the action alternatives have not been of a sufficient scale to result in changing the current Fire Regime Condition Class level for this landscape. No foreseeable future stand management or fuels management activities are planned within the Two Bee landscape area that would add to the cumulative effects.

Affected Environment

Air Quality

Air quality was analyzed at a larger landscape level, because guidelines and regulations for prescribed fire smoke emissions are established at the state level. 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. The Oregon Smoke Management Plan (Oregon Department of Forestry, 1995) establishes regulations to maintain air quality standards. To achieve these standards, the Oregon State Implementation Plan (SIP) provides guidelines such as: emission reduction, duration, location, and

time of year. These are guidelines and regulations for prescribed fire smoke emissions in Oregon. The Willamette National Forest has adopted this plan for emission control.

Designated areas and Class I Airsheds are priority areas regulated in order to protect air quality. Eugene and Oakridge are the closest designated areas to the Two Bee Project Area (58, 50, 39 miles away respectively). The closest Class I Airsheds are Three Sisters Wilderness (9 miles), Mt. Jefferson Wilderness (3 miles), and Mt. Washington Wilderness (1 mile). Class I Airsheds must be protected from July 1 through September 15 to avoid visibility impairment.

Smoke emissions were predicted using the post harvest fuel loading estimates and the First Order Fire Effects Model (FOFEM). FOFEM is a computer program for predicting tree mortality, fuel consumption, smoke production, and soil heating caused by prescribed fire or wildfire. (Reinhardt, et al. 2005).

These models calculate 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. On average, 80% of the fine fuels (0-1 inch diameter) would be consumed, 60% of the 1-3 inch fuels would be consumed, and only about 20 % of the 3-inch and greater fuels would be consumed. The following table summarizes particulate matter predicted for fuels treatment activities.

Table 45: Summary of Particulate Matter Emissions for Two Bee Project Area.

	Alternative A	Alternative B	Alternative C	Alternative D - Wildfire
<i>PM 2.5 total</i>	125 tons	181 tons	265 tons	1,355 tons
<i>PM 10 total</i>	147 tons	211 tons	311 tons	1 600 tons

It is important to note these emissions levels do not occur at one time. Usually, prescribed fire operations occurs one unit at a time (in one day). For example, Unit 3 is predicted to have 20.0 tons/acre of 0-3 inch diameter fuel post-harvest. During the prescribed fire underburn for this unit, emissions are estimated at 12.7 tons/unit of PM2.5 and 15 tons/unit of PM 10.

If no management actions take place in the Two Bee Project Area, no impacts would occur to air quality. However, the risk of wildfire would still exist. In the event of a wildfire, air quality impacts are considerably higher than management ignited prescribed fire. Smoke emissions from wildfire are not short term and can often last for months, as witnessed during the B&B Fire in 2003. Smoke emissions from wildfire are more likely to impact communities and contribute to harmful, concentrated levels of PM 2.5 and PM 10. Table 42 above demonstrates that emissions are higher from wildland fire than with management ignited fire, and pose a risk to community residents, forest users, and firefighters. Acreage used for the above wildfire calculation was 1,203 acres, or the number of management acres in Alternative C, the alternative with the largest management acres.

Cumulative Effects

The effects on air quality from the proposed fuel treatments are short term and local in nature. Smoke emissions would be short duration and measures to meet the requirement of the Oregon Smoke Management Plan would reduce the quantity of emissions during prescribed burns. Past management activities on the landscape do not add to air quality impacts from the proposed treatments. No other foreseeable management activities are scheduled to occur in the Two Bee Project Area.

Noxious Weeds

Affected Environment

Noxious weeds on the McKenzie River Ranger District are predominately located along roads, power lines, and recreation sites. They are primarily introduced or spread by vehicle traffic, road maintenance, recreational users, and ground disturbing activities including timber harvest.

Roads tend to serve dual roles with noxious weeds. Vehicular traffic and road maintenance oftentimes create enough of a foothold for weed establishment, while providing access via motorized vehicles, to other un-colonized areas. Road maintenance currently occurring in the analysis area, consisting of blading, grading, ditch cleaning, brushing, and culvert replacement, would provide opportunities for the establishment and spread of noxious weeds. Design measures, mitigation measures, and Best Management Practices would be implemented to minimize the risk.

The Willamette National Forest divides noxious weeds into three categories: established infestation, new invader, and potential invader. Established infestation species are abundant and widespread on the Forest. These species are managed for containment with a goal of preventing spread to uninfested areas. New invader species are not well established or widespread on the Forest and are treated aggressively, with the goal of treatment being elimination of the species. Potential invader species are not known to be on the forest, but are present in neighboring Forests or counties. Table 44 is a list of the established, new invader, and potential invader species.

Table 46: Weed Classification for Willamette National Forest.

Potential Invaders	New Invaders	Established Infestations
Leafy spurge	Spotted knapweed	Canada thistle
Yellow starthistle	Diffuse knapweed	Bull thistle
Distaff thistle	Meadow knapweed	Scotch broom
Squarrose knapweed	Yellow toadflax	Tansy ragwort
Gorse	Dalmatian toadflax	St. Johns-wort
Orange hawkweed	Giant/Japanese knotweed	Foxglove
	Climbing nightshade	Ox-eye daisy
	Field bindweed	
	Evergreen blackberry	

Potential Invaders	New Invaders	Established Infestations
	Himalayan blackberry	
	False brome	
	Reed canarygrass	
	Sweetclover	
	Hounds tongue	
	English ivy	
	Butterfly bush	
	Yellow hawkweed	
	Purple loosestrife	
	Everlasting peavine	
	Vinca	
	Evening primrose	
	Bladder campion	

Roadways proposed quarries, and proposed units within the Two Bee planning area have been surveyed for noxious weeds. Plant species abundance and distribution varies from isolated plants to large, well-established populations. Species found in the Two Bee planning area are located along state highways, forest roadsides, landing and clearcuts, campgrounds, along trails, and along power line corridors. No weed species were found in the proposed rock quarries. Forest roads, Oregon State Highway 126, U.S. Highway 20, and the power line corridor are conduits for continual weed dispersal and expansion in this area. Routine road maintenance and construction activities contribute to the spread of weeds through ground disturbance, seed spread by the use of mowers, road equipment, and contaminated rock and fill material. Most weed species become established as a result of a soil disturbance activity, either natural or artificial. Once species are established they are able to persist and reproduce with little competition from native vegetation.

The species that are most abundant in the project area are bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), St John's wort (*Hypericum perforatum*), and tansy ragwort (*Senecio jacobaea*). These species are found along the roads adjacent to almost all of the proposed harvest units. In the project area there are few occurrences of Scotch broom (*Cytisus scoparius*).

There are no new invader species located in proposed units. There are new invader species located along potential travel routes for proposed projects. Evergreen blackberry (*Rubus laciniata*) and Himalayan blackberry (*Rubus discolor*) occur in three isolated patches. Two other new invader species, spotted knapweed (*Centaurea maculosa*) and diffuse knapweed (*Centaurea diffusa*) occur along State Highway 126. There are three occurrences of spotted knapweed along forest roads 2600-655 and 2600-730. There is one occurrence of diffuse knapweed along forest road 2672-655. The new invader species evening primrose (*Oenothera biennis*) occurs along State Highway 126.

The knapweed species along Hwy 126 are treated annually by the Oregon Department of Agriculture with the herbicides Rodeo and Garlon 3A. The evening primrose along State Highway 126 and knapweed along forest roads 2600-655 and 2600-730 are manually pulled annually.

Environmental Consequences

Effects of Alternatives A – C

Direct and Indirect Effects

Harvest prescription and yarding method plays a major role in raising the risk of noxious weed establishment as well as spreading existing weeds into uninfested areas within units. Units proposed for shelterwood harvest and heavy partial cutting would be opened to higher light conditions that are favorable for the establishment of noxious weeds. Weed populations that may become established in full sun would start to decline however, as the canopy of the trees close approximately 10 years after the units are harvested. Alternative C has 573 acres of shelterwood harvest and 175 acres of heavy partial cut, the treatments that open up the canopy the most. Alternative A has 117 acres of shelterwood. Alternative B does not have either shelterwood or heavy partial cut harvest. See Chapter 2 for different types of harvest methods by alternative.

Ground-based harvest equipment poses the greatest risk for introducing noxious weeds to the proposed project area. However, contract provisions that require off-road equipment and road maintenance equipment be cleaned before entering National Forest System lands and requirements for seeding disturbed areas would reduce the risk that weeds might spread and find favorable growing sites. The risk of noxious weed establishment and spread would be greatly reduced through prevention, monitoring, and treatment according to the design measures for noxious weed control (see Chapter 2). The risk of weed spread in ground based harvest units is low to moderate given above mentioned contract requirements, mitigation measures, and design measures. Alternative C has the greatest amount of ground-based harvest followed by Alternative B and Alternative A respectively. See Chapter 2 for the acres of yarding systems by alternative. The risk of weed spread in skyline and helicopter units is lower since there is less ground disturbance.

All action alternatives propose some combination of treatment for timber sale generated fuels by yarding tops attached, hand piling and burning, and under burning. In addition, Alternative C includes 149 acres of Natural Fuels Prescribed Burning. These management actions indirectly provide opportunity for noxious weeds to colonize previously undisturbed areas. Therefore, the risk of weed spread from fuels treatment is increased by alternative with the amount of acres of timber harvest and burning.

Road maintenance activity provides an opportunity for spread of noxious weed to un-infested road systems. The project mitigates this risk by including vehicle cleaning requirements and treatment of new invader species prior to ground disturbing activities in all action alternatives. Disturbed areas would be planted with native seeds upon completion of operations.

Similarly, construction of temporary roads may increase the risk of weed introduction because of the associated ground disturbance and the potential use of weed-contaminated material if fill or rock is brought in from off-site. Alternative A proposes 1,200 feet of temporary roads, Alternatives B and C propose 4,200 feet. Road closures, however, reduce the open road density thereby reducing the risk of weed spread by motorized vehicles and road maintenance equipment. All action alternatives propose to close 7.5 miles of currently open roads by either gating, berming or through decommissioning in the

project area. Table 21 displays road maintenance, temporary road construction, road closure, and road decommissioning by alternative.

Considering the above factors the risk of introduction of noxious weeds to the Two Bee Project Area has been rated from Low to High. Alternative A has a Medium Risk Rating, Alternative B has a Medium Risk Rating, and Alternative C has a High Risk Rating.

Effects of Alternative D (No Action)

Direct and Indirect Effects

Under Alternative D, the risk of noxious weed spread along open roads would continue unchanged since there would not be a reduction in open road miles. Roadways support the heaviest populations of noxious weeds and pose a threat for invasion by not decreasing vehicle access and requiring continual maintenance. With this alternative there would be no ground disturbance or opening of the canopy that would create the ideal conditions for weed seed to grow and establish. A limited amount of treatment of noxious weeds would continue to occur within the project area, as currently programmed and funded, with new invader species receiving the highest priority for treatment. Compared to the other action alternatives, Alternative D has a Low Risk Rating.

Cumulative Effects

The analysis area for determining cumulative effects for noxious weeds is the Two Bee Project area. This analysis area was selected for its known distribution of noxious weeds and because it contains likely travel routes for the proposed project.

Even without past or present management in the Two Bee project area, noxious weeds would still be present from natural and biological vectors. However, past management within the Two Bee project area has provided opportunities for establishment and spread of noxious weeds, due to road building, road maintenance and timber harvest. These activities created short and long-term conditions favorable for noxious weeds, thus allowing for larger infestations. All Two Bee action alternatives would close 7.5 miles of forest road. Risk of further establishment from the proposed action, or any action alternatives, would be minimized with design and mitigation measures to reduce spread of seeds.

Considering the effects from past management actions that currently enables the spread of noxious weeds by vehicular traffic over the current 33.1 miles of road in the project area. The proposed action reduces road mileage by 7.5 miles or about one third, and there would be a decrease in the potential spread of new invaders because of reduced road miles.

Normal road maintenance on Forest roads is considered to be a reasonably foreseeable management action that would continue as a very small to negligible potential risk for the introduction and spread of noxious weeds in the watershed.

Roads and Access

Affected Environment

Past management activities in and near the Two Bee 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.

Scale of Analysis

This section would consider the current condition and affects on the transportation system in the Two Bee Project Area. The project area includes approximately 2.5 miles of U.S. Highway 20, 3.9 miles of State Highway 126, and 66.0 miles of Forest system roads for a total of 72.4 miles within the McKenzie River Ranger District.

Existing Condition of the Road System

Forest road 2672, known as the Hackleman Creek Road, is a single-lane aggregate surfaced road that provides the primary access to the project area from U.S. Hwy 20 and State Highway 126. Other important Key Forest roads that provide access to the area include Forest roads 2972-655, tributary to Forest road 2672, and Forest road 2655, tributary to State Highway 126 by way of the Deer Creek Road. These Key Roads and numerous secondary roads are predominately surfaced with crushed rock.

Approximately 32.9 miles of the Forest roads are currently closed with gates, berms, or other structures.

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. Specifically, the Forest roads provide access to historic Forest Service facilities at Fish Lake, the EWEB's Carmen-Smith Hydroelectric facilities, communications sites for both EWEB and Quest Communication, the Three Sisters IMPROVE (air quality monitoring) site, public recreation opportunities at Carmen, Smith and Trail Bridge reservoirs, Trail Bridge campground, the McKenzie River Wild and Scenic River corridor, and 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.

Environmental Consequences

Effects of Alternatives A – 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 noxious weeds. 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 reconstruction or maintenance would protect the existing road infrastructure, improve safety of the road, decrease sedimentation, and reduce the spread of noxious weeds. Brushing roads increases sight distance to improve 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 noxious weeds. Designated water sources for filling water tankers for compaction and dust abatement operations are not expected to affect stream flows.

After the road closures and decommissioning, the open road density within the project area would be reduced from approximately 72 miles to 65 miles in all action alternatives (A, B, and C). Proposed road closures with gates or earth berms would decrease access (public, administrative and commercial), decrease the current effective open road density, reduce existing road erosion problems, and reduce road maintenance costs. Roads closed 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. Removing berms to access roads for fires suppression would take additional time and equipment. It would cost more to treat weeds if vehicle access is prevented (walking in to the treatment areas would be required). Future access on closed roads would have the additional cost of reopening and later re-closing the road. However, the cost of maintaining a road that has been effectively blocked to traffic and has self-maintaining water drainages is less costly than keeping it open.

Effects of Alternative D (No Action)

Direct, Indirect Effects

Alternative D 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 rates of the spread of noxious weed could continue on roads not maintained.

Cumulative Effects

The effect of past management actions have created a 72 mile road system within the Two Bee Project area that requires consistent road maintenance levels to provide adequate resource protection. The incremental cumulative effect of all action alternatives would be to reduce the miles of road available within the project area for public access by approximately 7.5 miles. There are no additional foreseeable future management actions that would add to or subtract mileage from the current roaded condition of the project area.

The effect of Alternative D – No Action on the road system would be that, over time, fewer miles of open road would be available for public and administrative access due to lack of maintenance to keep roads open. Limited funds would be focused on key forest roads, and maintenance would be deferred on other roads.

Recreation

Affected Environment

The project area is popular for both dispersed and developed recreational activities including: scenic viewing, driving, hiking, boating, fishing, and camping in the summer and cross-country skiing, snow shoeing, snowmobile riding, and hunting in the winter. Portions of the McKenzie-Santiam segment of the West Cascades National Scenic Byway, the McKenzie River National Recreation Trail, and the McKenzie Wild and Scenic River Corridor are within the project area.

The forested slopes along the McKenzie River form an important scenic backdrop to the McKenzie-Santiam segment of the National Scenic Byway that includes the portion of State Highways 126 adjacent to the project area. 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 lies along the east boundary of the project area. It is designated a Class I trail in the Willamette Forest Plan and is heavily used by hikers and mountain bikers. A portion of the project area is a favorite for cross-country skiers, with marked trails located along Smith Ridge accessed from Ikenick Sno-Park on State Highway 126.

The project area outside the designated river corridor receives light to seasonally heavy recreation use. Recreational activities include hiking, horseback riding, berry picking, viewing scenery, and hunting. Hunting is particularly heavy for deer and elk in the fall.

Developed recreation sites within or adjacent to the project area include: Fish Lake, Clear Lake, Ikenick Sno Park, Coldwater Cove Campground, Sahalie Falls, Koosah Falls, Ice Cap Campground, Carmen Reservoir, Trail Bridge Campground, Smith Reservoir Boat Launch, and Lakes End Campground.

Smith Reservoir is popular for fishing and boating, having Lakes End Campground as an overnight destination for visitors traveling the two-mile reservoir by boat. Trail Bridge and Carmen Reservoirs are also popular for fishing and boating with small boats. Trail Bridge Campground is along Trail Bridge Reservoir and a day use area is along Carmen Reservoir.

Clear Lake is also a popular site for non-motorized boating and recreational diving because of a submerged forest at the bottom of the lake. A private lodge and a day use area are located to the north. Cold Water Cove Campground is on the opposite side of the lake.

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 small, remote, undeveloped areas to large, easily accessed highly developed sites. Settings are described in the following five ROS Classes: Primitive, Semiprimitive Nonmotorized, Semiprimitive Motorized, Roaded Natural, and Roaded Modified. Whereas Primitive falls on the most un-modified natural environment end of the spectrum and Roaded Modified falls on the most substantially modified end of the spectrum. Table 45 displays the ROS for those Management Areas within the project area.

Table 47: Recreation Opportunity Spectrum for the Project Area.

Willamette Forest Plan Management Areas	ROS Class	Unit(s)
6d – McKenzie River Wild & Scenic River (Rec)	ROS – Roaded Natural	3
9d – Wildlife Habitat, Special Areas	ROS – Roaded Natural	18
11c – Scenic – Partial Retention Middleground	ROS – Roaded Natural	33,34,39
11f – Scenic – Retention Foreground	ROS – Roaded Natural	1
14a – General Forest	ROS – Roaded Modified	All remaining units

Recreational Driving

The most noticeable driving for pleasure (sightseeing) occurs along the Santiam Pass-McKenzie Pass National Scenic Byway that includes the portion of State Highways 126 adjacent to the project area, but some use occurs along Forest roads too.

Approximately 12 miles of State Highway 126 is adjacent to the planning area. It receives heavy traffic from motorcycles, RV's, logging trucks, passenger cars and pickups, as well as bicycles. Fewer vehicles travel the Forest roads off of Highway 126 with the later traffic use decreasing in the winter months due to the snow levels.

The use of Forest road system varies from very light use on most dead end roads, to moderate use on secondary and connector and key Forest roads. Secondary and connector roads receive increased use during the hunting and winter snow play season. These roads, primarily constructed and maintained for future timber harvest and other land management activities, are currently utilized as part of the Santiam Pass Winter Recreation Area. For example, the former Tattoo Timber Sale, which occurred in the Two Bee Project area, reconstructed portions of three roads that now comprise the winter ski route system originating from Ikenick Snopark, located at the junction of State Highway 126 and Road 2672.

Dispersed Camping

Few dispersed campsites are located within the project area. The number and location of sites may vary somewhat as road closures limit access to some areas, and as new roads open others. The more popular sites are often found on open roads and landings. The dispersed sites are usually associated favorite hunting areas and get-away-spots, and are often near water. Some dispersed sites are located along Smith Reservoir and are usually accessed by boat only.

Day Use

Trail Bridge Campground and Smith Reservoir Boat Launch are popular summer day use areas in the project area. Overnight camping is not allowed in the boat launch area at Smith Reservoir, however dispersed camping and access to Lakes End Campground is from this area. Fish Lake, Cold Water Cove, and Clear Lake all are popular water related day use areas during the summer. Ikenick Sno Park is a popular winter day use area in the project area.

Developed Sites

Ikenick Sno Park, Trail Bridge Campground, Smith Reservoir Boat Launch, and Lakes End Campground are developed sites located in the project area. Ikenick Sno Park consists of a parking area and access to winter trails. Trail Bridge Campground contains approximately 46 sites with tables and fire rings, drinking water, flush toilets, garbage service, portable toilets, and boat access to Trail Bridge reservoir. Smith Reservoir Boat Launch provides access to Smith Reservoir and two vault toilets. Lakes End Campground is a small boat access only site with approximately 17 campsites with tables and fire rings. Four pit toilets are located within Lakes End Campground. There is no drinking water on site for Ikenick Sno Park, Smith River Boat Launch or Lakes End Campground.

Trails

Approximately 9 miles of McKenzie River National Recreation Trail is located within the Two Bee project area. It originates approximately 2 miles east of the Highway 20 and Highway 126 junction. The total trail length is approximately 26 miles long. This trail is managed for non-motorized uses such as hiking and bicycling. The trail offers spectacular views of waterfalls, lava flows, and Douglas-fir forests.

Environmental Consequences

Effects of Alternatives A-C

Direct and Indirect Effects

The direct effect of proposed timber harvest, log truck hauling, and fuel treatments would be localized road closures; disruption to hunting, hiking, camping and driving in some areas. The logging activity and hauling could cause noise and dust 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.

All action alternatives would include timber harvest and hauling and could cause short term, localized road closures along Forest Road 2672. Logging during the winter could affect the public's use of a popular cross country skiing area designated along Road 2672 and other tributary roads. Parking at Ikenick Sno Park may also be affected during logging and hauling of unit 1. Dispersed recreation on Forest Road 2672-675 at Ikenick Creek, would be temporarily closed to public use during work.

The effects of summer timber harvest and associated activities within the Smith Reservoir area could increase pressure on other water-related areas. This would be caused by temporary displacement of recreating visitors for the duration of helicopter timber harvest and hauling activities within units 33, 34, and 39. Lakes End Campground would be temporarily closed to public use during the salvage of unit 39.

Cumulative Effects

Past activities in the Two Bee 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 the proposed and all action alternatives would be to reduce approximately 10 miles of road, as discussed in Chapter 3, Roads and Access, to vehicle access open to public where dispersed recreational activities may occur.

There is no foreseeable future management action planned, which would add cumulative effects to the recreation uses condition in the project area.

Effects of Alternative D (No Action)

Direct, Indirect Effects and Cumulative Effects

Current uses of the National Forest in the project 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, day use areas, developed sites, trails, and roads.

Scenic Quality

Affected Environment

The landscape within and adjacent to the project area is generally characterized as being a Douglas-fir dominate forest. From the road, river, and reservoir 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 and facility development) are visible within and adjacent to the project area.

There are openings in the project area from past timber management activity (within last 20 years) in the visually sensitive landscape (MA-11c or MA-11f). Some older existing openings are visible in the scenic viewshed (MA-11c) of Smith Reservoir, but these stands are considered vegetatively recovered, as defined by Willamette Forest Plan standards and guidelines. Some management created openings above Trail Bridge Reservoir are visible from State Highway 126 near the Carmen-Smith Hydropower facility. However, proceeding upriver from Trail Bridge to Fish Lake, the scenic viewshed of the Upper McKenzie Wild and Scenic River corridor within the project area has few visible openings created by timber management.

Bullet Timber Sale unit 7, a 190-acre moderate thinning from the Robinson-Scott EIS, was harvested in 2004. It received post-harvest underburning in spring 2006. The unit is outside the Two Bee project area, but within the viewshed of the Upper McKenzie River Wild and Scenic corridor. Approximately 20 acres of unit 7 received severe heat and heavy mortality during the underburning, and the opening will be seen for the long term 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:

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 48: Visual Quality Objective Categories for the Project Area.

Willamette Forest Plan Management Areas	VQO category	Unit
6d – McKenzie River Wild & Scenic River (Rec)	VQO – Retention and Partial Retention	3
9d – Wildlife Habitat, Special Areas	VQO – Retention	18
11c – Scenic – Partial Retention Middleground	VQO – Partial Retention	33,34,39
11f – Scenic – Retention Foreground	VQO – Retention	1
14a – General Forest	VQO – Maximum Modification	All remaining units

McKenzie River Wild and Scenic River Corridor

A Wild and Scenic River (WSR) is a river or river segment that has been designated by Congress or by the Secretary of the Interior under the provision of the Wild and Scenic Rivers Act, as part of the National Wild and Scenic Rivers system.

In 1988, a 12.7 mile portion of the McKenzie River within the project area was designated as a Wild and Scenic River for the following Outstandingly Remarkable Values (ORV): recreational, scenic, cultural and fisheries. Subsequently, a detailed site specific assessment of the upper McKenzie River resource values was completed. From that assessment, the following five outstanding remarkable/special attributes were found: scenic, recreation, geologic/hydrologic, water quality, and fish.

The Upper McKenzie River is divided into three WSR segments A, B, and C (omitting the existing hydroelectric developments). Approximately 41 acres of timber harvest in Unit 3 is included in all action alternatives. This partial cutting treatment occurs on the slope of Segment B. (Also discussed in Chapter I, Forest Plan Management Area MA-6d.)

Oregon State Scenic Waterway

The Oregon Rivers Initiative, a statewide ballot measure, was passed in 1988 and added the upper McKenzie River to the State Scenic Waterway program. (Also discussed in Chapter 3, Compliance with Other Laws, Regulations and Policies)

The Upper McKenzie River Management Plan (USDA Forest Service. 1992.), a joint federal and state plan, provides for protection and enhancement of resource values in the river corridor, and allows public use and enjoyment of those resources. Management goals include striving for a balance of resource use and protection, and permitting other activities to the extent that they protect and enhance the river's special attributes.

Approximately 16 miles of the upper McKenzie River are designated as a State Scenic Waterway. As the WSR segments omit the existing hydroelectric developments, the three State Scenic Waterway

segments additionally omit a stretch of river from Carmen Reservoir to Tamolich Falls and lower terminus extends past Scott Creek to Paradise Campground.

Although the project area includes portions of the Oregon State Scenic Waterways from Trail Bridge Reservoir northward along the McKenzie River to the southern end of Clear Lake, there is no timber harvest or other actions proposed within the State Scenic Waterway-Scenic River Area.

Environmental Consequences

Effects on Alternatives A-C

Direct and Indirect Effects

McKenzie River Wild and Scenic River Corridor and Outstanding Remarkable Values

In November 2002, a Section 7, Wild and Scenic Rivers Act evaluation was prepared to determine consistency of proposed actions within the Wild and Scenic River corridor with the Wild and Scenic Rivers Act. (USDA Forest Service. 2002a.) The evaluation was signed by McKenzie River District Ranger John Allen, and contains this finding:

SECTION 7 DETERMINATION – Based on the Analysis below, it is my finding that proposed thinning projects and the upper McKenzie River restoration project are consistent with Section 7 of the Wild and Scenic Rivers Act, and will not have an adverse effect on the values for which the river was authorized by Congress. The project is also consistent with the current Forest Land and Resource Management for the Willamette N.F. and the Record of Decision for Amendments of Land Management Planning Documents Within the Range of the Northern Spotted Owl. It is recognized there will be short-term effects but they are at an acceptable level. There will be no long-term adverse effects.”

The Two Bee EA only includes the stand treatments proposed in Unit 3 within the WSR corridor. Several other site-specific actions were included within the Two Bee project area at that time and evaluated, but they were subsequently dropped from the project and analyzed separately in the Upper McKenzie Aquatic Restoration Project in (USDA Forest Service 2003).

None of the action alternative proposes to create openings in the McKenzie River Wild and Scenic River. For all action alternatives, including the proposed action, unit 3 will receive a moderate partial cutting, maintaining a canopy closure of 50-65% on this even aged stand. Approximately 31 of the 41 total acres in unit 3 are within MA-6d, the McKenzie Wild and Scenic River Corridor. It would be yarded with skyline cable to the top of the ridge. Cable corridors would be kept at a minimum width. This level of partial cutting would not result in substantial removal of the canopy, maintaining a canopy that would remain visually subordinate to the characteristic landscape of the Tamolitch Valley as seen from the river or State Highway 126.

The Visual Quality Objective (VQO) of Partial Retention would be maintained in the McKenzie River Wild and Scenic River Corridor. Effects of the action alternatives (A, B, and C) on the Outstanding Remarkable Values that contributed to the McKenzie River's inclusion into the Wild and Scenic Rivers system (Scenic, Recreation, Geologic/Hydrologic, Water Quality, and Fish) are summarized below in the following table.

Table 49: Effects of All Action Alternatives on ORVs.

Scenic	Recreation	Geologic/ Hydrologic	Water Quality	Fish
No Effects	Short-term closures to nearby areas of public use, limited to working periods.	See Geologic/Soils and Hydrologic Effects in Chapter 3 Environmental Consequences.	See Water Quality Effects in Chapter 3 Environmental Consequences.	See Fisheries Effects in Chapter 3 Environmental Consequences.

Scenic ORV

Findings on effects from the above Section 7 Determination state: “The scenic qualities of the Upper McKenzie River are visible from McKenzie River National Scenic Trail, campsites, forest roads, and Highway 126, a segment of designated National Scenic Byway. The scenic attributes of the Wild and Scenic corridor will not be impacted by this project.” (USDA, Forest Service, 2002a).

Recreation ORV

Findings on effects from the Section 7 Determination also includes the following statement: “Recreationists seeking a wide variety of recreational experiences use the river corridor in the project area; these include developed and dispersed camping, recreational driving, fishing, and bicycling and hiking the McKenzie River National Scenic Trail. There is no known “on river” recreation such as boating or kayaking occurring at this time in this segment. Boating guides typically begin boating/kayaking opportunities at Olallie Campground due to the difficulty in river access upstream of this point. The project will have no effect upon the recreational opportunities or quality of recreational experience in the Wild and Scenic River corridor. ”

In addition, “Some short-term interference with area road use, camping, angling and trail recreation ...” is expected to occur with project activity. “Nearby trails, roads, and dispersed campsites will be temporarily closed during project work for the protection of public safety.” (USDA, Forest Service, 2002a).

Scenic Partial Retention Middleground (Smith Reservoir)

The slopes above Smith River and Smith Reservoir Scenic are within Partial Retention Middleground, MA-11c.

Alternative A includes only salvage harvest in unit 39 within this visual allocation, yarded by helicopter. This alternative would not affect the visual quality of this viewshed, and meets the VQO of partial retention.

Alternative B proposes moderate partial cutting in units 33 and 34, and salvages hazard trees in the Lake’s End Campground in unit 39. The moderate partial cut would maintain 50 to 65% canopy closure. No even-aged openings would be created in the Smith Reservoir viewshed. Units 33 and 39 would be yarded by helicopter and unit 34 would be both helicopter and skyline yarding. The necessary cable corridors for skyline yarding in unit 34 would contractually be kept to a minimum width during harvest. It is not expected that skyline corridors would be seen, considering the post-harvest 50-65% canopy closure. The effects from partial cutting are not expected to add visual

contrasts to the scenic area, and would only slightly modify canopy texture and color. The disturbance would be subordinate to the characteristic landscape above Smith Reservoir. The VQO of partial retention would be maintained within this visual management area.

Alternative C includes shelterwood harvest with heavy reserves in units 33 and 34, which is considered a regeneration-type treatment. Salvage in unit 39 is also included. Units 33 and 39 would be yarded by helicopter and unit 34 would be both helicopter and skyline yarding. This alternative also includes prescribed underburning in units 90 and 91.

The shelterwood with heavy reserves prescription would leave approximately 20 trees per acre of the largest available in the stand, primarily Douglas-fir. Future removal of the overstory trees is not prescribed. The shelterwood treatment would result in a 20% to 40% canopy closure after harvest, with 15% green tree retention patches (uncut) scattered throughout the units. Noticeable stand disturbance would exist above Smith Reservoir, appearing as though a moderate intensity fire had occurred. Units 33 and 34 would not conform to the line, texture, and color of the stands under this treatment. Shelterwood units substantially change the characteristic landscape above Smith Reservoir over the long term. Units 33 and 34 exceed the maximum size limitation of 10-15 acres for regeneration harvest MA-11c.

The prescribed underburning in units 90 and 91 would occur under very narrow burning prescription, considering fuel moisture, time of day, and weather conditions. The effects from the underburning is not expected to be visible except for short term scorching of live trees, though it is likely there would be scattered gaps in the canopy closure from isolated torching and single tree mortality. The visual effect from the burning would remain subordinate and conform to the line, texture, and color of the characteristic landscape.

Alternatives C would not meet the VQO of Partial Retention for the viewed area above Smith Reservoir. A decision to implement Alternative C and shelterwood units 33 and 34 may require approval to exceed the 60 acre created opening regional limit and a one-time Forest Plan Amendment to exceed Willamette Forest Plan standards and guidelines for MA-11c in the Smith Reservoir viewshed.

Scenic Outside of Wild and Scenic River and Partial Retention Middleground

Short term effects to visual quality for the Two Bee 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 be 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. More visually interesting structure, depth of view, and mix of vegetative species are likely long term effects of proposed vegetation entry.

Cumulative Effects

Considering that all alternatives would include moderate partial cutting of a small portion (less than 2%) of the visual management area for the McKenzie River Wild and Scenic River, there would be no adverse effect on the scenic ORVs which contributed to the inclusion of the McKenzie River into the Wild and Scenic Rivers system. Short term acceptable effects from the partial cutting on the recreation ORV are recognized.

The proposed action and Alternative A would not contribute additional adverse effects to the other visually sensitive area located both above Smith Reservoir and downstream to Trail Bridge Reservoir. In Alternatives C, the shelterwood harvest in units 33 and 34 would create openings that change the characteristic landscape above Smith Reservoir. Small openings could also result from the natural fuels prescribed burning in units 90 and 91. However, the level of modification anticipated from these treatments would not exceed 10% of the suitable and available land within the landscape. 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.

Effects of Alternative D (No Action)

Direct, Indirect Effects and Cumulative Effects

Scenic quality along the McKenzie River would remain unchanged. The No Action Alternative would not harvest timber stands in any visual management areas in the Two Bee planning area. Stands within the Smith Reservoir viewshed would not be altered and would continue to develop along successional pathways. All visually sensitive Management Areas remain consistent with Forest Plan standards and guidelines, and VQOs are met.

Roadless and Unroaded Areas ---

Affected Environment

The Two Bee Project Area does not include Inventoried Roadless Areas (IRAs). The project area does contain about 2,700 acres of contiguous unroaded areas 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. They are linear features no greater than one mile wide and intermingled within existing Forest roads and State and U.S. Highways. 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.

The unroaded areas are not likely to be considered candidates for future Wilderness because the existing roads are between the unroaded areas and IRAs. The nearest IRA is Mt. Washington West, which is approximately 2 miles east of Unit 3, the eastern-most unroaded area, and across State Highway 126. The Echo IRA is north of the project area and north of U.S Highway 20. Echo IRA is greater than 4 miles from unit 29, the northern-most unit that includes unroaded area.

Timber harvest would affect Matrix and Congressionally Reserved Management Areas from the amended Willamette Forest Plan. Table 48 displays harvest units by alternatives, and approximate acres within unroaded areas greater than 1,000 ac, along with Management Areas (2003 Willamette Roads Analysis, Map 4).

Table 50: Forest Plan Allocations (NWFP) and Units within Unroaded Areas.

	Units in Congressionally Reserved	Acres	Units in Matrix	Acres	Total Acres by Alternative
Alternative A	Unit 3	18	Units 30, 31, and 39	46	64
Alternative B	Unit 3	18	Units 11, 27, 33, 34, and 39	111	129
Alternative C*	Unit 3	18	Units 10, 27, 30, 31, 33, 34, and 39	117	135

* Alternative C also includes 45 acres of Natural Fuels Prescribed Burning within an unroaded area in Units 90 and 91. This treatment does not include timber harvest or road building.

Environmental Consequences

Effects of Alternative A – C

Direct and Indirect Effects

Soil, water, and air: The effects of the action alternatives on water quality, soils, and air are discussed elsewhere in this chapter (Aquatic/Riparian Habitat and Soils). Stands within the unroaded areas managed with partial cutting treatments would not adversely affect roadless characteristics derived from these resources. Applying partial cutting or shelterwood timber harvest to stands within the unroaded areas is not expected to affect the current ability for this area to function as a source of public drinking water to communities downstream.

Diversity of plant and animal communities: Because of the heavily roaded condition of the project area, the proposed harvest units do not contain the diversity of plant and animal species that would be found in large, natural unmanaged stands where there would be no disturbance from roading and forest management activities. None of the action alternatives are expected to result in any decrease in such diversity of plant and animal species. The effects on sensitive plant and animal species are discussed elsewhere in this chapter.

Habitat for TES species and biological strongholds: Units 3, 30, 31, and 39 are currently foraging habitat for the northern spotted owl. Moderate thinning, shelterwood, or salvage harvest in these units would result in either the downgrade or removal of habitat within the unroaded areas (see the Threatened Northern Spotted Owl section). Effects on the spotted owl are consistent with Standards and Guidelines from the Willamette Forest Plan. Through formal consultation, the U.S. Fish and Wildlife Service concurs with the Biological Assessment, that the Two Bee Timber Sale would not jeopardize the continued existence of the spotted owl. All sites at risk from noise disturbance would be protected with seasonal restrictions.

None of the proposed harvest units are located in Critical Habitat or within Late Successional Reserves. Effects of the proposed units on the habitat for other Threatened, Endangered, or Sensitive species are also discussed elsewhere in this chapter.

Because of the existing roaded condition of the project area and the relatively small size and linear configuration of the areas considered unroaded, the areas are not considered interior habitat. The proposed action is not expected to affect areas that would function as biological strongholds or refuges for species that depend on large undisturbed areas, such as the Threatened northern spotted owl.

Primitive, Semi-Primitive Non-Motorized classes of recreation: With clear evidence of past forest management, the landscape in the Two Bee Project is characterized as a patchwork of natural stands and second growth conifer plantations. As stated elsewhere in this chapter, the proposed partial cutting in this proposal, and the other action alternatives, 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 Scenic Quality). Roads are either visible or vehicles can be heard on roads from any location in the project area. Some of the larger unroaded areas in the project areas surround Smith Reservoir, where powerboats can be heard almost daily during the summer recreation season. Except for short term noise and traffic occurring during project implementation, the proposed action and other action alternatives would have not diminish any sense of remoteness or solitude that currently exist within any unroaded areas in the project area.

Traditional cultural properties and sacred sites: As discussed later in this chapter, there are no known cultural sites within any of the stands where timber harvest operations would occur, including managed stands within the unroaded areas. There would be no effect on traditional cultural properties or sites from the proposed action or any other action alternative.

Cumulative Effects

The area of consideration for the unroaded area analysis is the 12,456 acre Two Bee Project Area. Timber sales have modified approximately 3,879 acres within the project area with primarily regeneration harvest since the 1950s (see Table 25). Timber sales (and State and Federal Highway

development) have also contributed to the development of a 66-mile network of roads on the area. As a result, there are now roughly 2,700 acres of contiguous unroaded areas 1,000 acres or more in size.

Alternative B, the proposed action, includes about 129 acres of partial cutting timber harvest within unroaded areas. Alternative A would harvest 64 acres, and Alternative C would harvest 135 acres within unroaded areas. No alternative includes permanent or temporary road construction within unroaded areas. Precommercial thinning, snag and cavity creation, and other post-timber harvest actions are proposed actions within existing managed stands in the project area, as identified previously in this EA.

Considering past effects on unroaded areas by timber management, road development, and post-harvest treatment over the last 50 years, the partial cutting in Alternative B would affect an additional 5% of the 2,700 acres considered unroaded and without management. In comparison, Alternative A affects an additional 2%, and Alternative C also affects an additional 5%. No other management actions are planned for the project area that would result in additional affects to unroaded areas.

Effects of Alternative D (No Action)

Direct, Indirect and Cumulative Effects

Alternative D would not implement any management actions within the project area. Natural processes and forest successional pathways would continue. Alternative D does not manage forested stands within unroaded areas and therefore, would have no direct, indirect effects on any unroaded areas or on any roadless values that currently exist within the project area.

Social/Economics

Affected Environment

The Two Bee project area is situated 10 miles to the north east of McKenzie Bridge, and 28 miles west of Sisters, Oregon on Oregon State Highway 126. Highway 126, a major travel route for commercial and recreation traffic passing through these communities and follows along the McKenzie River. Highway 126 is near the east boundary, and U.S. Highway 20 is near the northern boundary of the project area.

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, and the many inns, lodges, restaurants, stores, gas stations, and 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

Effects of Alternatives A – 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 Two Bee 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 two to four years. As the alternative volume tables in Chapter 2 indicate, Alternative A would provide a relative moderate level of opportunity for timber harvest-related employment, and higher revenues. The proposed action, Alternative B, would provide higher employment and revenues than A. Alternative C, with an estimated five times the volume of Alternative A, would likely translate into considerably greater employment and revenues than in A or B. Table 49 discloses costs and revenues and the estimated present net value of each of the action alternatives, based on an average bid price of \$120.00/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 alternative from the Two Bee project would have a moderate and localized beneficial effect for the socio-economic environment of western and central Oregon.

Table 51: Estimated Present Net Value of Alternatives.

	Alternative A	Alternative B Proposed Action	Alternative C
<i>Volume (MBF / CCF)</i>	5,696 / 10,802	10,787 / 20,460	24,343 / 46,169
<i>Discounted Costs</i>	\$2,808,016	\$5,552,129	\$10,722,326
<i>Discounted Revenues*</i>	\$2,931,214	\$6,109,390	\$13,351,499
<i>Present Net Value (PNV)</i>	\$123,198	\$557,261	\$2,629,173
<i>PNV per Acre</i>	\$222	\$548	\$2,112

* Discounted Revenues based on July 2006, selling values.

Effects of Alternative D (No Action)

Effects of Alternative D (No Action)

Direct and Indirect 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.

Heritage Resources

Affected Environment

There are numerous heritage resources within the Two Bee Planning area. They include ancient prehistoric lithic sites (of varying sizes), historic period Indian peeled tree locations (culturally-modified trees), historic roads and trails, historic recreation sites, and the famed Fish Lake Remount Depot.

Prehistoric Settlement

The overall Two Bee Planning Area contains a moderate to high density of prehistoric lithic (stone tool) archeological sites. The high site density relates to the likely position of the area within prehistoric hunter/gatherer settlement patterns in the upper McKenzie area. Much of the area exhibits gentle topography, abundant water, and productive big game habitat. Thus, it was a highly attractive hunting and foraging area.

Recent archeological surveys conducted in concert with the District's timber sale program have increased the sample of known sites. The known, fully documented sites in the vicinity of Two Bee Planning Area are either eligible or assumed to be eligible to the National Register of Historic Places because of their ability to yield information about prehistory. They are "lithic" sites; comprised of obsidian chipped stone tool making debris and discarded tools; basalt and other lithic raw materials are a minor fraction of the artifacts in some of the sites. Tool making debris found in the archeological sites within the area tends to be at the low to moderate densities. Most of the archeological evidence appears to derive from the Middle Archaic period of about 6000-2000 years age.

Historic Native American Land Use

Before the 1855 Dayton Treaty, west side Indian bands (likely ancestors of the Molalla and Kalapuya) used the area. A band of Kalapuya Indians lived at the mouth of the McKenzie, near its confluence with the Willamette River. They may have visited or traveled through the area during the summer and fall. However, once they were relocated to the Grand Ronde or Siletz Reservations in the Coast Range (in the mid to late 1850s), they could not easily get to the area. The 1851 Gibbs and Starling treaty sketch map depicts this part of Western Oregon as being within the tribal area of the Molalla Indians. Indians from the Warm Springs Reservation traveled into the area regularly by the mid-late 19th

Century, typically in the late summer and fall. Thus, the Two Bee area can be thought of as a “shared use” area, rather than an exclusive use area for one tribe.

Euro-American Settlement

Perhaps the most significant historic development was the development of the transportation system. This consists of the Santiam Wagon Road (a commercial toll road) and also of the later Forest Service trails and road systems. Development of that transportation system began before the Forest Service era, when Indians brought horses into the area and when sheep were grazed there. The Santiam Wagon Road followed in part those earlier Indian trails, and was in use from the late 1860’s through the early part of the 20th Century, when it reverted to public ownership. The highly significant Fish Lake Remount Depot began as a way station on the Wagon Road, with a hotel and saloon. By the WWI era, however, it was withdrawn from homestead entry and became a Forest Service administrative site. Both the Santiam Wagon Road and Fish Lake Remount Depot are significant cultural resources, evaluated as eligible for the National Register of Historic Places (NRHP). The Forest Service transportation system development was also important since it enabled the implementation of the fire suppression policy as well as commercial logging.

Other traces of 19th and early-20th Century Euro-American activity are found in remnant way trails, blazed trees, spring board stumps and old clearings, as well as later Forest Service trail blazes, old roads, trails, etc. Thus far, none of these have been formally evaluated as historically significant.

Archeological Methodology

This heritage assessment of the Two Bee project area is based on a detailed records search. Those records included historic overviews, project-specific field survey reports, field notes, archeological site base maps, archeological survey base maps, and archeological site files kept at the McKenzie River Ranger District. Archeological field surveys were completed for areas proposed for ground-disturbance in the Action Alternatives. Existing, surfaced access routes were not surveyed, while unsurfaced access routes were surveyed if no acceptable prior survey pertains. Previously recorded prehistoric cultural sites were monitored, one of which was found to be within a proposed sale unit. Additionally, one other potentially significant prehistoric cultural site, previously unknown, was discovered within another proposed sale unit.

Environmental Consequences

Effects of Alternatives A, B, and C

Direct, Indirect, and Cumulative Effects

All action alternatives for the Two Bee Project could cause ground disturbance over 1,054 acres of ground in harvest units, 4,200 feet of temporary road, and 33.2 miles of road maintenance with Alternative C. Alternatives A and B would result in lesser amounts of potential disturbance. These activities could directly affect the condition of significant heritage resources. Since appropriate and approved surveys and cultural site protection measures are already in place for this project, the potential direct effects would be in the form of inadvertent damage to the integrity of cultural

resources which were not discovered during initial survey. Any sites identified during implementation of the project would require surveys to be completed and design measures applied as necessary. Any such discoveries of previously unknown cultural sites will result in evaluation against National Register of Historic Places criteria for significance, and design measures as described in Chapter 2 would be implemented.

There are no known additional incremental affects to cultural resources from implementing the proposed action (Alternative B) or any of the alternative actions. There are also no foreseeable future management activities within the Two Bee project area involving ground disturbing activities that could add to the cumulative effects of past management in the area.

Effects of Alternative D (No Action)

Direct and Indirect Effects

Under Alternative D, no effects to cultural resources are expected since no ground disturbance activity would occur.

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 within this project area are also in portions of the 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 is 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, 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 Two Bee Landscape Management project area have been completed. During the survey, one previously identified significant cultural site was found to be within a proposed sale unit and one previously-unknown (and potentially significant) cultural site was discovered in another

proposed sale unit. In the first instance, the unit boundary was withdrawn (with a safety buffer) from the cultural site area. The sale unit in the second instance was dropped from the Two Bee project.

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, there would be no effect to any historic property listed in or eligible to the National Register of Historic Places.

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. A Biological Assessment (BA) was prepared for the northern spotted owl, and for the bull trout, and spring Chinook salmon.

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).

There are no streams in the Two Bee Project Area listed by Oregon Department of Environmental Quality as 303(d), as water quality limited based on water temperature during the summer season. (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 pits 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 Two Bee Landscape Management project area is located in the Upper McKenzie River Watershed, which is included in the waters designated as EFH 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 (see Chapter 3, Water Quality/Aquatic Resources.)

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. Moderate partial cutting in unit 3 (41 acres) is included within this Congressionally Reserved designation. However, timber harvest as prescribed is consistent with the allowable timber harvest specified in the McKenzie River Wild and Scenic River Plan (USDA Forest Service 1993). See Scenic Quality.

Inventoried Roadless Areas and Wilderness – There are no actions proposed within Inventoried Roadless Areas (IRAs) or Wildernesses in the Two Bee Landscape Management 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 Two Bee Landscape Management 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 the proposed action or any of the 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, and nearby communities would mainly be affected by economic impacts connected with contractors implementing harvest, road reconstruction, tree thinning, planting, fuels treatment activities. Racial and cultural minority groups could also be prevalent in the work forces that implement timber harvest, road reconstruction, tree thinning, planting, and fuels treatment 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 Two Bee Landscape Management Project Area contains populations of migratory landbirds typical of the western Cascades. See Migratory Landbird above for further discussion of effects on 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 Two Bee Landscape Management 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 over the project area as a whole, while 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 alternatives include proposed actions that 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 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 Two Bee 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 (partial cutting, commercial thinning, salvage, and shelterwood, and underburning) associated with the Two Bee Landscape Management 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 that address watershed restoration needs 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 Two Bee Landscape Management 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 will 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 proposed 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. Log landings would produce irretrievable changes in the natural appearance of the landscape as well. 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 will not result in irreversible or irretrievable commitment of resources that foreclose formulation or implementation of reasonable or prudent alternatives.

With all Action Alternatives (A, 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 D (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 catastrophic 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

Noxious Weeds

Post-sale noxious weed 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 noxious weeds 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

Regeneration surveys would be conducted in the first and third year by District personnel after any planting to assess natural and planted seedlings survival and growth. Replanting would occur if necessary.

Forest Plan Implementation Monitoring

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 and decommissioning for watershed restoration, and harvest effects on scenic quality above Smith Reservoir and in the Wild and Scenic River corridor.

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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 10 of Chapter 1.

On June 10, 2005 a scoping letter was mailed to following:

Federal, State, and Local Agencies:

- Megan Finnessey, Coordinator, McKenzie Watershed Council
- Oregon Dept. of Fish and Wildlife
- USDI Fish and Wildlife Service
- USDC NOAA Fisheries
- Jan Houck, Oregon Parks and Recreation Department
- Sid Leiken, Mayor, Springfield City Council
- Karl Morgenstern, Source Water Protection Manager, Eugene Water and Electric Board
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- Kitty Piercy, Mayor, Eugene City Council

Tribal Governments:

- Allen Foreman, The Klamath Tribe
- Cheryle Kennedy, Confederated Tribes of the Grande Ronde
- Delores Pigsley, Confederated Tribes of the Siletz
- 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.
- Terry Damon, Rosboro Lumber Co.
- Ken & Louise Engelman, River Reflections
- Forest Conservation Council
- Mike Graney
- Griffin Green, Mt. Jefferson Snowmobile Club
- Jim and Nancy Holland
- Josh Laughlin, Cascadia Wildlands Project
- Conservation Leader, Lane Co Audubon Society
- Joan and Hector Leslie
- Jeremy Hall, ONRC
- Doug Heiken, Oregon Natural Resources Council
- Chairperson, Forest Issue, Many Rivers Group, Sierra Club
- Manager, McKenzie River Chamber of Commerce
- Ross Mickey, American Forest Resource Council

- Jim Todd, Oregon Nordic Club, Willamette Chapter
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- Greg Pitts, Oregon Council, Federation of Flyfishers
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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 – Biological Evaluation, Wildlife

Appendix E – Project Analysis Maps:

- 1990 Willamette Forest Plan Management Areas, North Half (of project area)
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Appendix K – Past Actions and Cumulative Effects

APPENDIX A

An Evaluation of Activities Authorized by the Two Bee Landscape Management Project Environmental Assessment for Consistency with the Aquatic Conservation Strategy

Introduction

The Two Bee Environmental Assessment analyzes a variety of activities that have been designed to meet the following landscape objectives.

To manage the project area on a landscape-level that approximates historical conditions, and that meet desired future conditions presented in the Willamette Forest Plan;

To provide long-term, sustainable habitat for plants, fish, and wildlife species;

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands through management to accomplish a set of nine objectives in the strategy. A specific goal of this strategy is to maintain a "natural" disturbance regime. 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) (UMWA) made recommendations for riparian reserve widths for the streams in the watershed, retaining the initial reserve widths from the ROD for all fish bearing and perennial streams, and allowing for reduction in reserve widths along intermittent streams. The analysis also established the site potential tree heights to be used in identifying reserve widths based on timber type (UMWA Chapter 5, page 22).

During the analysis for the Two Bee project, reserve widths from the ROD were retained for fish bearing and perennial streams as recommended in the Watershed Analysis. No reductions of riparian reserve widths along intermittent 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 Two Bee project area includes both Tier 1 Key Watershed and non-Key Watershed designated lands. The entire project area is within the area analyzed by the Upper McKenzie Watershed Analysis.

3. & 4. Watershed Analysis and Watershed Restoration

The Upper McKenzie Watershed Analysis (UMWA) was prepared by the McKenzie Ranger District in 1995. The watershed was characterized in terms of past and current conditions, stratified into landform blocks, and recommendations were made to guide development of management proposals to maintain and restore watershed conditions. Watershed Analysis is conducted at the fifth field watershed scale and provides descriptions of the important physical and biological components of the watershed.

Many of the recommendations in the Watershed Analysis, especially those associated with the issues of natural disturbance and past harvest, highlight the need to restore stand components, structures, and species diversity where they are outside, or trending outside, of the natural range of variability. Return of stand patch size and spatial arrangement to within the natural range of variability, as well as restoration of natural disturbance processes were also recommended.

The Two Bee Project has incorporated these recommendations 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 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 Two Bee Landscape Management Project with the four components of the Aquatic Conservation Strategy. This section will outline how the activities proposed in the action alternatives may affect physical and biological components within the 5th field watershed. The information presented is summarized from Chapter 2, of the Environmental Assessment which includes a discussion of the important physical and biological components from the Upper McKenzie Watershed Analysis and Chapter 4 of the Environmental Assessment, which includes a discussion of the effects of the action alternatives including effects on the important physical and biological components of the watershed. For convenience, they are organized by the 9 objectives identified in the ACS.

Objective #1

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

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, and vegetative species richness and diversity. 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. One of these crossings is being 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 Two Bee Landscape 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.

Reconstruction 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 and the scuba access proposal 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 Two Bee Landscape 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.

Reconstruction 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 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 Two Bee 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 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.

Consistency

The above discussion as well as discussion in the effects analysis, disclose that there will be short term adverse effects of these actions. To the extent possible, these effects have been minimized through project design and incorporation of mitigation practices. However, the project is designed to maintain and restore the 5th field watershed through development of alternatives intended to implement recommendations from the Upper McKenzie Watershed Analysis. Consequently, this project is consistent with the Riparian Reserve standards and guidelines on pages C-31 through C-38 of the ROD.

Two Bee landscape Management Project Aquatic Conservation Strategy Analysis

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Date: April 23, 2004

Appendix B

Biological Assessment for Spring Chinook Salmon and Bull Trout

Two Bee Landscape Projects

**Upper McKenzie Watershed
Willamette National Forest
McKenzie River Ranger District**

7 February 2003

**October 2, 2006 ☐
Revision Attached**

Prepared By: David Bickford
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I. Introduction

This Biological Assessment (BA) was prepared pursuant to the Endangered Species Act of 1973, as amended, to evaluate and describe the effects of land management projects on spring chinook salmon (*Onchorhynchus tshawytscha*) and bull trout (*Salvelinus confluentus*). The BA was prepared in accordance with the National Marine Fisheries Service (NMFS) guidelines found in their 1996 publication: *Making Endangered Species Act Determinations of Effects for Individual or Grouped Actions at the Watershed Scale* and similar guidance from the US Fish and Wildlife Service (USFWS) found in their 1998 publication: *A Framework to Assist in Making Endangered Species Act Determinations of Effects for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale*.

The projects assessed with this BA include all activities associated with the Two Bee Landscape Project. The project is described in detail in Chapter III of this BA. All components of the Two Bee Landscape Project are evaluated under the NEPA process, under the Two Bee Landscape Project Environmental Analysis.

II. Watershed Description

The Two Bee Project occurs within the Upper McKenzie River 5th Field and three subset 6th Field watersheds (Kink/Inland Basin, Hackleman Creek, Smith River 6th Fields). An assessment of watershed baseline condition for the Upper McKenzie River 5th Field and three subset 6th Field watersheds is described in Table 1. The McKenzie Ranger District completed a Watershed Analysis for the Upper McKenzie River watershed in August 1995. The watershed analysis, and stream and field surveys conducted periodically since its completion, provided the majority of the data utilized for this assessment of condition. The data was then compared to the established matrix indicator criteria to categorize the baseline condition as properly functioning, at risk, or not properly functioning. Baseline condition was assessed utilizing both the NMFS matrix values and US Fish and Wildlife Service (USFWS) bull trout matrix values. Where differences in criteria values occurred, the most conservative value was utilized.

Table 1. Baseline Condition Ratings for the Upper McKenzie River Watershed.

Indicator	6 th Field Watersheds			5 th Field
	01-4 (Kink/Inland Basin) (Tier 1 Key Watershed)	01-5 (Hackleman Creek) (non-Key Watershed)	01-6 (Smith River) (non-Key Watershed)	1709000401 (Upper McKenzie River)
Water Temperature	PF	AR	AR	PF
Sediment	AR	AR	AR	AR
Chemical Contaminants/Nutrients	PF	AR	PF	PF
Physical Barriers	PF	AR	AR	AR
Substrate Embeddedness	PF	PF	PF	PF
Large Woody Debris	AR	AR	AR	AR
Pool Frequency and Quality	AR	AR	AR	AR
Off-Channel Habitat	AR	AR	AR	AR
Refugia	AR	AR	AR	AR
Wetted Width/Max Depth Ratio	PF	PF	AR	PF
Streambank Condition	PF	PF	AR	PF
Floodplain Connectivity	AR	AR	AR	AR
Change in Peak Base Flow	AR	AR	AR	AR
Drainage Network	AR	AR	AR	AR
Road Density and Location	AR	AR	AR	AR
Disturbance History and Regime	AR	AR	NPF	AR
Riparian Reserves	AR	AR	AR	AR

PF = Properly Functioning, AR = Functioning At Risk, NPF = Not Properly Functioning

Habitat important to spring chinook salmon and bull trout exists within the project area. Currently spring chinook salmon adults are transported around Trail Bridge Dam to utilize historically accessible habitat located upstream of

the dam. There are no fish passage facilities present at Trail Bridge Dam. Isolated above Trail Bridge Dam is a small population of bull trout. Both bull trout and spring chinook utilize the McKenzie River above Trail Bridge Reservoir as spawning habitat, to the confluence of Kink Creek, a distance of about 1 mile. Accessible to both spring chinook and bull trout is lower Smith River. However, the coarseness of the channel prohibits spawning use by spring chinook, and channel coarseness and water temperature prohibits spawning use by bull trout. The lower Smith River channel likely provides rearing and foraging habitat for spring chinook and foraging habitat for bull trout. Trail Bridge Reservoir provides rearing and foraging habitat for bull trout and spring chinook salmon. A portion of the population of bull trout above Trail Bridge Dam utilizes Sweetwater Creek as spawning habitat, located outside the project area. The Trail Bridge bull trout population is considered at high risk of extinction (Buchanan, et. al 1997). The Kink/Inland Basin 6th field is located within a Tier 1 Key Watershed, and corresponds to habitat important to spring chinook and bull trout. The remainder of the project area is located within the Hackleman Creek and Smith River 6th field watersheds, both located within non-Key Watersheds.

Bull Trout

Bull trout use of the upper McKenzie River is believed historically to have included the mainstem Smith River, and the upper McKenzie River to the base of Tamolitch Falls prior to construction of Trail Bridge and Smith River Dams. Bull trout in the upper McKenzie River were likely part of a single McKenzie River population and part of the larger Willamette Basin metapopulation. Upper McKenzie River bull trout have been isolated from the larger McKenzie River population and Willamette Basin metapopulation with construction of Trail Bridge Dam since the early 1960's, and are now considered the separate Trail Bridge population. Fragmentation of their range has resulted in changes in Trail Bridge population life history as they have adapted to a lake dwelling existence (adfluvial) as opposed to historic river dwelling (fluvial) adults. Migration patterns and timing are likely similar since their isolation, with adults leaving Trail Bridge Reservoir and entering spawning habitat in late summer.

The upper McKenzie River and Sweetwater Creek provide the only known bull trout spawning and rearing habitat for the Trail Bridge population of bull trout. Exceptional habitat and water quality conditions provide for the reproductive needs of bull trout within a narrow temperature tolerance range. Bull trout spawning occurs between 4-10°C, embryo incubation between 1-6°C, and juvenile rearing between 4-10°C (Spence et. al 1996). The spring-fed headwaters of the upper McKenzie River and Sweetwater Creek provide optimal bull trout spawning temperatures of 4-7°C. Properly functioning incubation temperatures less than or equal to 6°C are present in both channels, providing the low temperatures necessary for embryonic development and survival. Once bull trout fry have emerged from gravels in the upper McKenzie River and Sweetwater Creek, optimal rearing temperatures are available at 4-7°C.

A low level of sedimentation in the upper McKenzie River was estimated as cobble embeddedness by the Level II survey as about 35% embedded (USDA FS 1991). Similar levels of embeddedness are present in bull trout natal tributaries in the upper McKenzie River (Anderson Creek and Olallie Creeks) and are believed to be within historic ranges. Current sources of sedimentation in the upper McKenzie River are roads and cut banks, and natural background levels of sediment production from the landscape. Few areas of natural instability are present in the relatively new high Cascade geology. Turbidity levels in the upper McKenzie River sub-basin are low as well. The short distance surface water travels within this portion of the sub-basin, and its spring-fed headwaters and stable landform contribute low quantities of fine sediments, thus the upper McKenzie River and Sweetwater Creek retain their characteristically clear water during most high flow events.

The upper McKenzie River is characterized as a Rosgen type B3a stream channel which typically possesses coarse substrate (Rosgen 1996). This channel is dominated by cobble and small boulder with low quantities of gravel and sand. While channel substrate are in quantities expected to be representative of a B3a stream channel, the concentrations of Large Woody Material (LWM) are thought to be outside of natural conditions. Low levels of LWM in upper McKenzie River are at 7 pieces/mile ($\geq$ 24 inch diameter by 50 ft. length) and do not meet Regional guidelines considered properly functioning (>80 pieces/mile of 24 inch or greater by 50 ft. length). Rosgen type B3a channel is characterized by 30-40 pools/mile with an average channel width of 40 feet and channel gradient of 3 percent. Lower than expected pool frequency is believed to result from low LWM counts and survey protocol as USDA Forest Service Level II records channel spanning pools only. Off-channel habitat in the upper McKenzie River may be expected to fall within historic condition. However, due to low quantities of LWM and reduced structural influence on velocity, low energy habitats are believed to be at the low end of historic range. The recruitment supply of large wood to the upper McKenzie River channel from stream adjacent stands is considered excellent. Mature to old growth Douglas fir stands are present in high density with few road segments within the Riparian Reserve.

High water quality in the 6th field watershed provides for bull trout reproduction and rearing on the sub-drainage scale. Although water quality conditions in the upper McKenzie River are considered good, lower levels of LWM, pool habitat and off-channel habitat translate into lower reproductive and rearing habitat quality in the upper McKenzie River, thus less than potential refugia quality on the sub-drainage scale. The area of available and suitable spawning, rearing and foraging habitat in the upper McKenzie may be expected to limit the Trail Bridge

population of bull trout. A channel uncharacteristically low in gravel content restricts bull trout reproduction to small existing pockets of gravel accumulation. Off channel area is characteristically low for Rosgen B3a channels. The low amount of available bull trout rearing habitat near or below known bull trout spawning areas may also limit bull trout production in the upper McKenzie. On the McKenzie Basin scale, the upper McKenzie River does not currently function as refugia for the Trail Bridge bull trout population, due to the isolation of the upper McKenzie River from the mainstem McKenzie River.

Factors identified as suppressing bull trout numbers in the upper McKenzie River were described by Ratliff and Howell (1992) as: over harvest from angling, passage barriers, and the presence of brook trout. Based upon available information on abundance and limiting factors, the Trail Bridge population was characterized as at high risk of extinction in 1992. Current estimates of abundance, based upon ODFW and USFS surveys in the upper McKenzie River, estimate population of adult bull trout to range from 25 to 50. The most recent characterization of the Trail Bridge population continues to be described as at high risk of extinction (Buchanan et al 1997) based upon low population size and suppressing factors. Past work in the upper McKenzie River focused on removal of factors suppressing bull trout population, namely restoration of the spring chinook prey base, restoration of passage to spawning tributaries, and reduction in angling harvest rates. Upstream and downstream passage at Trail Bridge Dam has not been addressed to date. Population resiliency may be suppressed due to small population size and isolation, due to low genetic variability. Lack of genetic exchange with the McKenzie River population may contribute to inbreeding depression and further suppress the upper McKenzie population. The upper McKenzie population would be expected to decline further if there were increases in angler harvest, degradation of habitat quality, or continued isolation (and low genetic variation).

Spring Chinook

Spring chinook use of the upper McKenzie River is believed historically to have overlapped bull trout distribution and included the mainstem Smith River, and the upper McKenzie River to the base of Tamolitch Falls prior to construction of Trail Bridge and Smith River Dams. Historically, the upper extent of chinook salmon distribution in the upper McKenzie sub-basin is believed to have occurred in the project area, ending at Tamolitch Falls and in the currently inundated Smith River channel. Currently, the end of spring chinook salmon migration is to the base of Trail Bridge Dam at McKenzie rivermile 82. As no passage was constructed with Trail Bridge Dam, mitigation for lost habitat was constructed below the dam in the form of a 500-foot long spawning channel. Named "Carmen Spawning Channel" after the Carmen-Smith-Trail Bridge Hydroelectric Project, the structure is operated and maintained by Eugene Water & Electric Board. The Carmen Spawning Channel is maintained periodically (once every 1-2 years) with air injection to cleanse it of fine sediments. The spawning channel was designed to compensate for blocked access to approximately 4 miles of spawning habitat for up to 200 adult spring chinook.

Currently, ODFW transports spring chinook adults above Trail Bridge Reservoir to increase production and restore nutrient and bull trout prey sources in habitat above Trail Bridge Dam (Table 2). Spring chinook salmon and bull trout utilize the same spawning habitat in the McKenzie River above Trail Bridge Dam. Due to the limited quantity of spawning habitat, superimposing of redds is expected to occur. Exceptional water quality conditions provide for

Table 2. Spring Chinook Salmon Adults Transported above Trail Bridge Dam by ODFW.

Transport Year	Female	Male
1997	15	48
1998	20	30
1999	20	20
2000	19	23
2001	30	30
2002	43	56

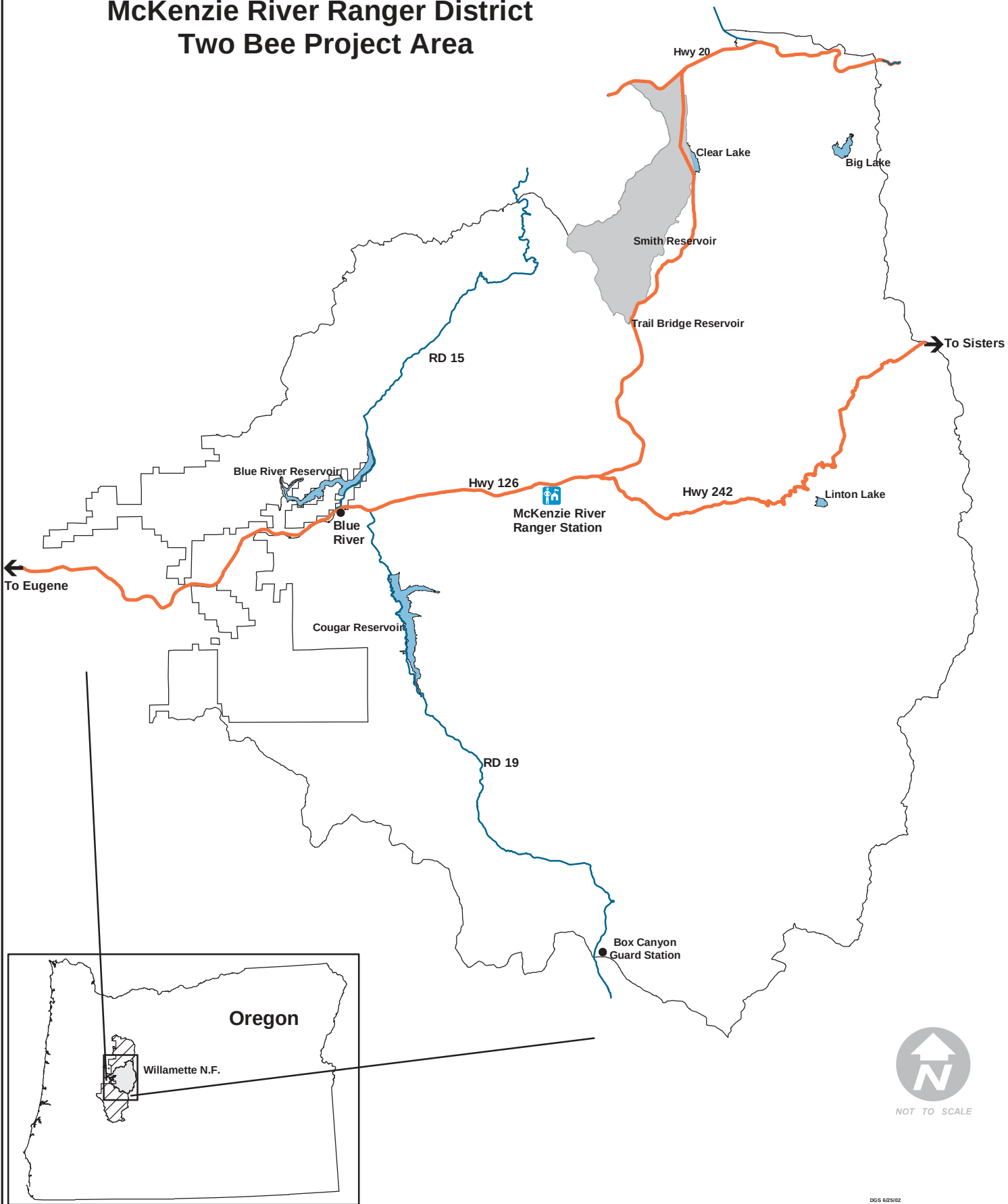
the reproductive needs of spring chinook within a narrow temperature range (4-7° C) in the upper McKenzie River. Temperatures present for spring chinook incubation are located within the optimal range at 4-5.5° Centigrade (Spence et. al 1996).

Habitat limitations used to describe bull trout habitat also limit spring chinook production in the upper McKenzie River, with concentrations of LWM thought to be outside of natural conditions. With low quantities of LWM and reduced structural influence on velocity, low energy habitats are believed to be at the low end of historic range. The recruitment supply of large wood to the upper McKenzie River channel from stream adjacent stands is considered excellent. Mature to old growth Douglas fir stands are present in high density with few road segments within the Riparian Reserve.

High water quality in the 6th field watershed provides for spring chinook reproduction on the sub-drainage scale. Although water quality conditions in the upper McKenzie River are considered good, lower levels of LWM, pool

Figure 1

**Willamette National Forest
McKenzie River Ranger District
Two Bee Project Area**



habitat and off-channel habitat translate into lower reproductive and rearing habitat quality in the upper McKenzie River, thus less than potential refugia quality on the sub-drainage scale. The area of available and suitable spawning, rearing and foraging habitat in the upper McKenzie are expected to limit spring chinook production above Trail Bridge Dam. A channel uncharacteristically low in gravel content restricts spring chinook reproduction to small existing pockets of gravel accumulation. The low amount of available spring chinook rearing habitat near or below known salmon spawning areas may also limit their production in the upper McKenzie. On the McKenzie Basin scale, the upper McKenzie River does not currently function as refugia for spring chinook, due to the isolation of the upper McKenzie River from the mainstem McKenzie River.

III. Description of the Federal Actions

The Two Bee Project area location is depicted in Figure 1. Willamette Forest Plan and Northwest Forest Plan management allocations are described in Figure 2 and 3. This Biological Assessment will analyze the Two Bee Landscape Project currently planned for implementation in the Upper McKenzie 5th Field Watershed. The Two Bee Landscape Project consists of timber management, fire prescriptions and road treatment components. The project is described in the following narrative.

The timber management portion of the project includes road reconstruction activity (Table 3). The following definition of road reconstruction applies to the project. Roads are reconstructed prior to being used to transport timber from project units to ensure that the roads meet safety and structural integrity requirements, as well as environmental requirements. For example, road surfacing must be adequate to support the weight of loaded commercial haul vehicles without causing road rutting, slumping, or damage to the road base. Roadside vegetation must be removed to provide clearance and safe viewing distances. Undersized culverts are replaced to reduce risk of road failure during peak runoff.

Road reconstruction activities, in general, can be separated into two categories. Minor reconstruction generally includes those roads where activities include cutting roadside vegetation, removing trees that have fallen across the road, reconditioning the roadbed (grading) and limited application of new aggregate surfacing (usually at approaches to stream crossings, across newly installed culverts, or at areas of water pooling in the roadway). Major reconstruction may involve reshaping the roadbed, road realignment, road widening, ditch cleanout, resurfacing entire road segments, and repairing road failures, in addition to minor reconstruction activities. Generally, major road reconstruction will result in more soil disturbance than minor reconstruction. Reconstruction primarily involves maintaining existing roads to a higher standard than normal Forest road maintenance. Existing roads currently open to vehicle traffic are brought up to a higher standard so they are then able to withstand the additional impacts caused by travel by heavier vehicles, such as log trucks and yarding equipment.

Timber sales provide a source of funding which is used to improve these roads; non-timber road maintenance funding is limited and these road improvements may not occur if timber sale projects are not implemented. The general result of road maintenance is a road system that causes less sedimentation, and poses reduced risk to listed fish and water quality.

Table 3. Road Treatment Proposed for Timber Transportation.

Road Number	Surface Type	Miles of Major Road Re-construction	Miles of New Aggregate Surfacing	Number of Stream Crossings		Miles of Existing Road Within Perennial Stream Riparian Reserves
				LFH ¹	Additional Perennial	
2655-505	Aggregate	0.4		0	2	0.15
2655-510	Aggregate	4.0		0	0	0.56
2655-516	Aggregate	0.4		0	0	0.15
2672	Aggregate	1.2	1.2	0	1	0.07
2672-650	Aggregate	3.5		0	0	0.07
2672-651	Aggregate	0.7		0	0	0
2672-655	Aggregate	6.9	6.9	0	1	1.0
2672-659	Aggregate	0.9		0	0	0
2672-667	Aggregate	0.5		0	0	0
2672-675	Aggregate	1.3		0	0	0
2672-681	Aggregate	0.2		0	0	0
2672-700	Aggregate	1.9		0	1	0.22
Totals		21.9 miles	8.1	0	5	2.22

¹ LFH = Listed Fish Habitat (habitat potentially occupied by fish species listed under the ESA).

Figure 2

**1990 Willamette Forest Plan
Management Areas**

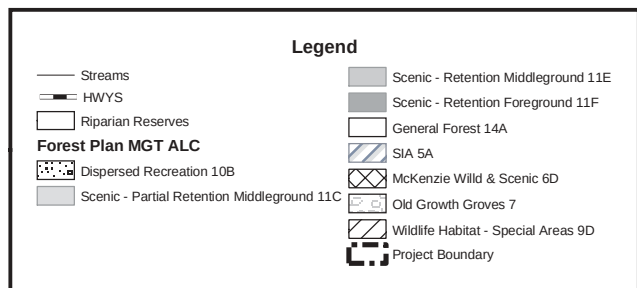
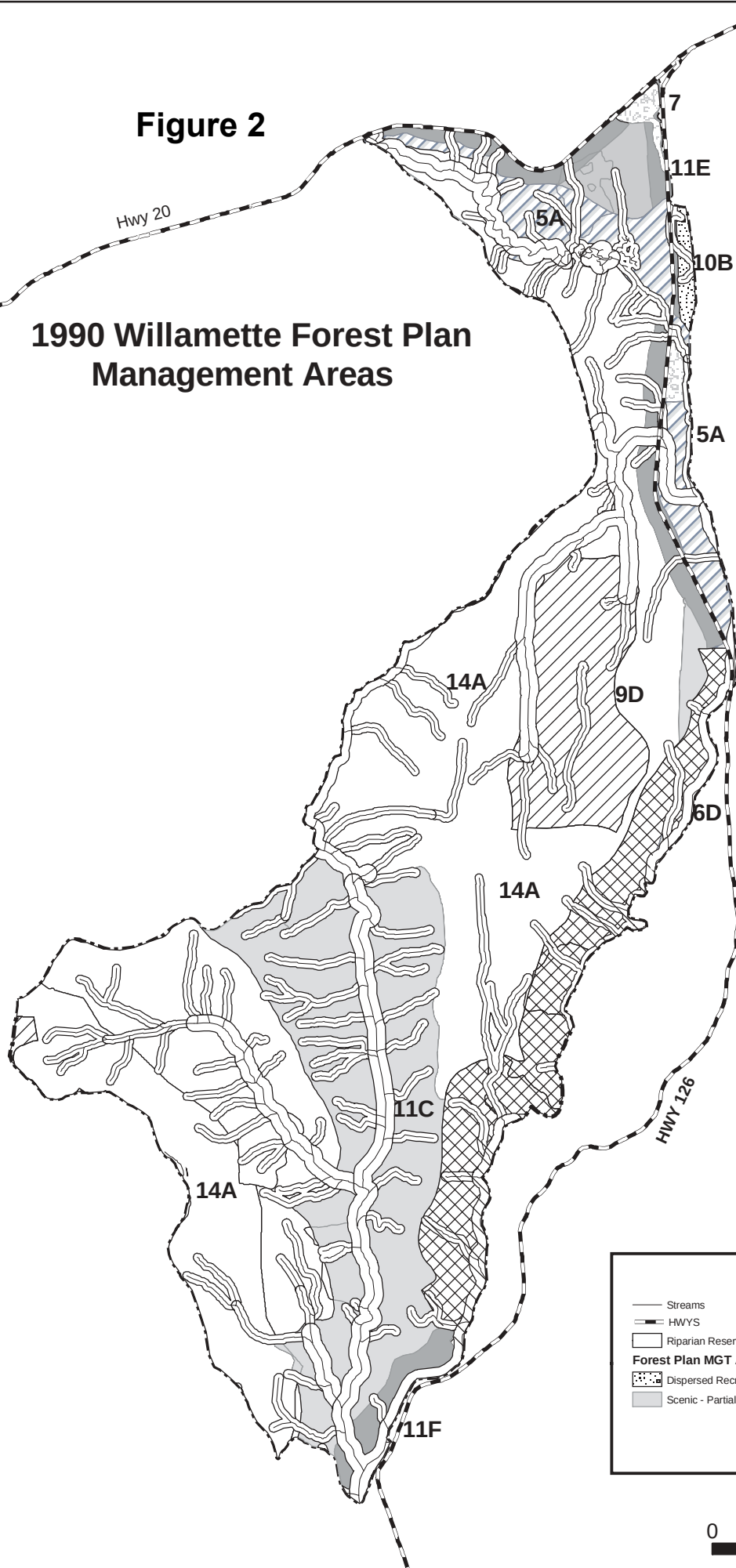


Figure 3

**Two Bee □
Northwest Forest Plan
Management Areas**

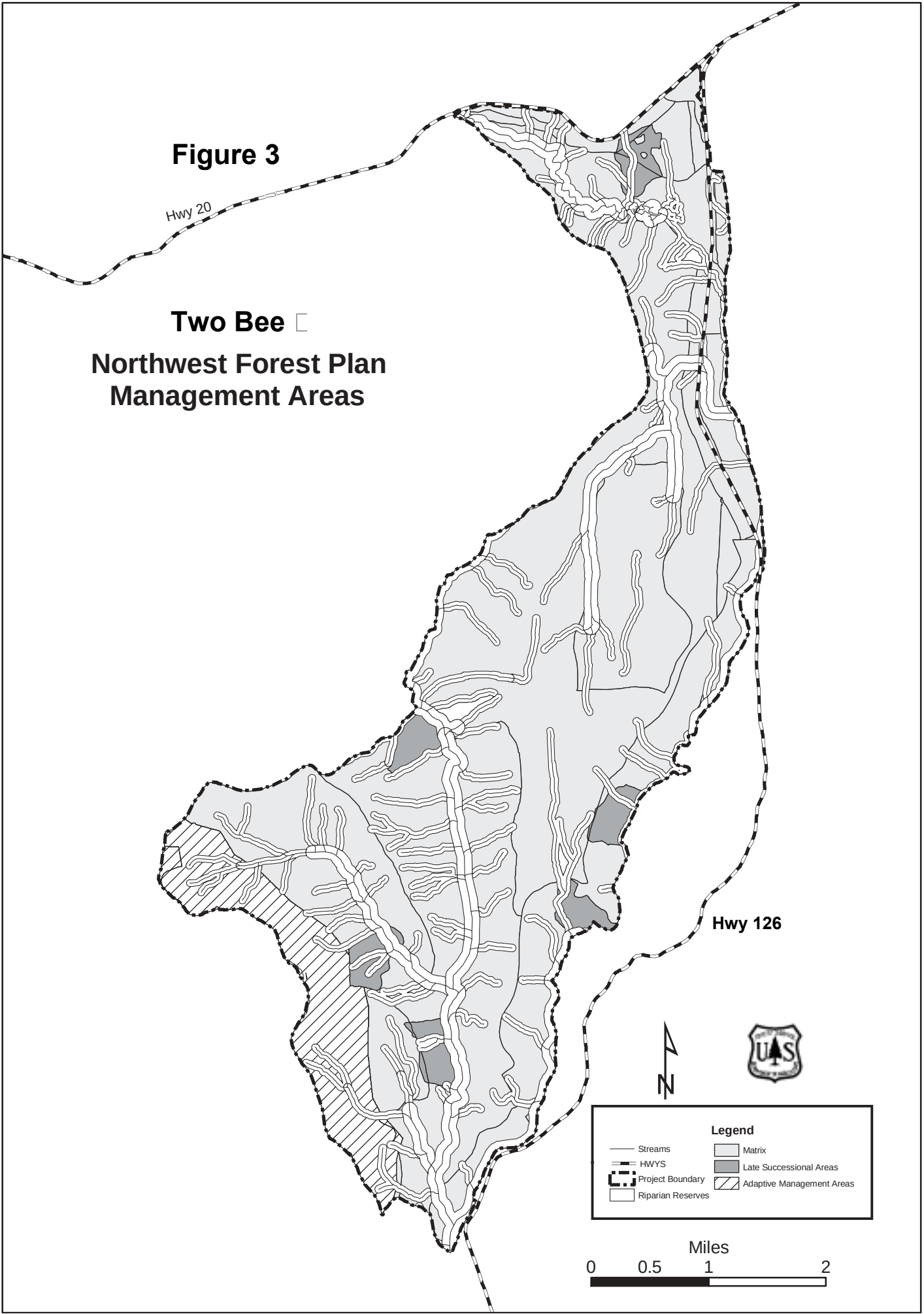
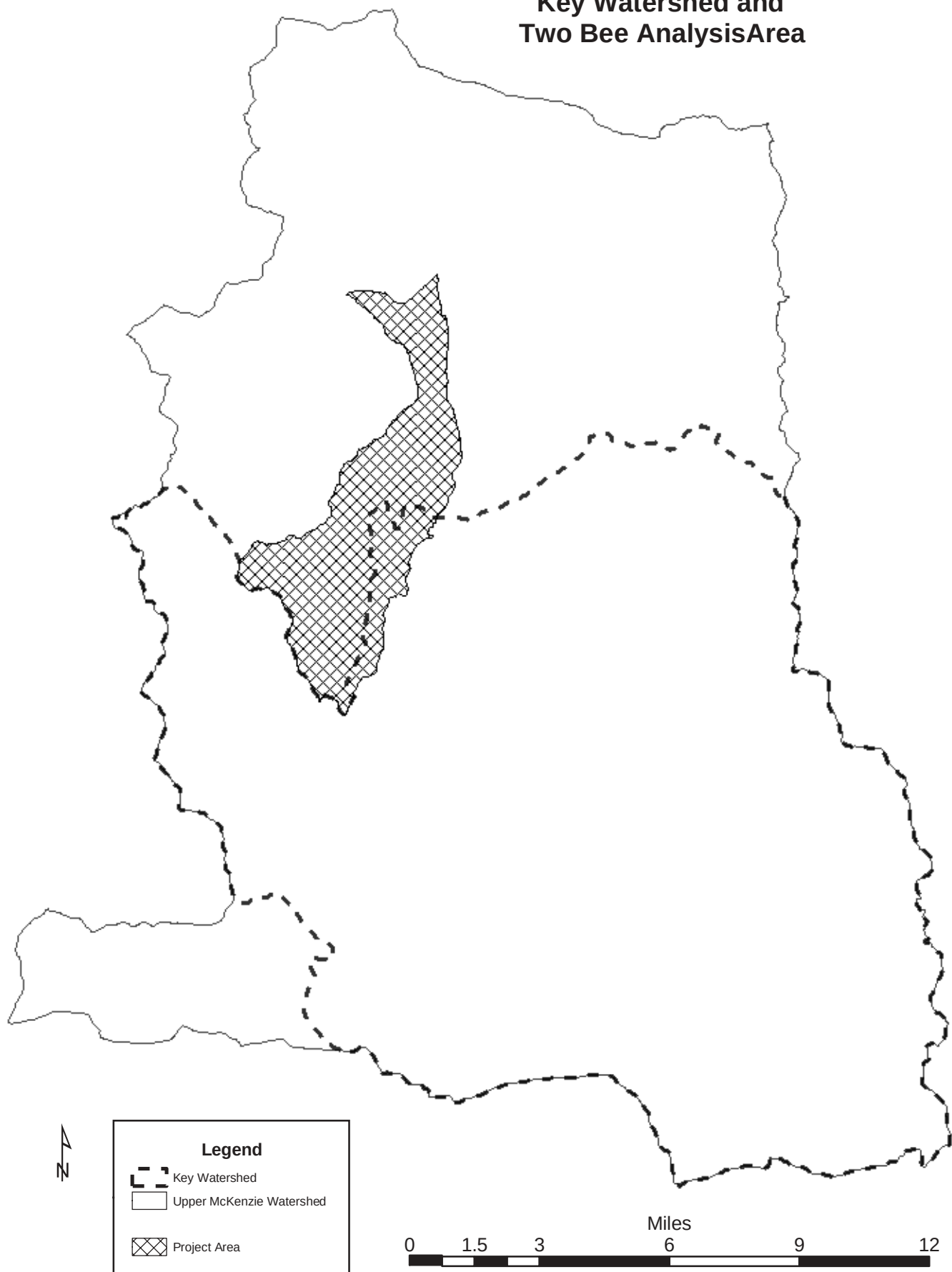


Figure 4

**Upper McKenzie Watershed
Key Watershed and
Two Bee Analysis Area**



Two Bee Timber Project

This project, located entirely within the Upper McKenzie River 5th Field Watershed (1709000401), will harvest 17 units using ground, skyline cable, and helicopter logging methods (Table 5). The harvest prescription for units range from Light Partial Cut to Moderate Partial Cut, and two Post and Pole units. Riparian reserves as described in the Northwest Forest Plan are established for Tier 1 Key Watershed portions of the sale area (Figure 4). Timber harvest is not planned within these areas. In non-Key Watershed portions of the project area, areas not adjacent to spring chinook or bull trout habitat, thinning is recommended along Class III and IV stream channels. All units are located on slopes with a low probability of mass failure.

This project does not propose new permanent roads (Table 11). The preferred alternative proposes 0.09 miles of temporary roads construction. Temporary roads constructed for the project will be closed with a long-term, active closure technique immediately following the season of harvest. Long-term active closure involves the removal of culverts, subsoiling the roadbed, building water diversion structures (waterbars/dips) where necessary, and blocking access to the old road prism. No temporary roads will cross perennial or intermittent streams. Approximately 21.9 miles of road will undergo major reconstruction with this project.

This project will replace or install 95 culverts, primarily ditch relief culverts (Table 4). Two large culverts will be replaced on native cutthroat streams, and 11 will be replaced or installed on intermittent streams. The two large culvert replacements are located approximately 9 miles upstream of habitat for spring chinook salmon and/or bull trout. Standard Best Management Practices will be used to reduce the adverse effects associated with these culvert replacements. Additionally, this work will be completed between July 1 and August 15 to meet State in-stream work period requirements, and streams will be temporarily diverted while work occurs. Sediment-trapping geotextile cloth will be installed downstream from perennial culvert installations to minimize downstream effects.

Table 4. Culvert Work Associated with Road Reconstruction.

Road Number	Road Mile	Culvert Information			
		New or Replacement?	Culvert Diameter	Stream Type ¹	Distance to Listed Fish Habitat ²
2655-517	0.10	R	18"	DR/E	
	0.15	N	18"	DR/E	
	0.21	N	18"	DR/E	
	0.27	N	18"	DR/E	
	0.31	N	18"	DR/E	
	0.38	N	18"	DR/E	
	0.42	N	18"	DR/E	
	0.50	R	48"	I	1.3 miles SPCH
	0.59	N	24"	I	
2672-655	0.33	R	18"	DR/E	
	0.43	R	(18)24"	I	8.9 miles BUT/SPCH
	0.54	R	18"	DR/E	
	0.83	N	24"	I	
	0.86	R	(24)48"	F	
	1.08	R	18"	DR/E	
	1.61	R	18"	DR/E	
	2.41	R	18"	DR/E	
	2.71	R	18"	DR/E	
	3.37	R	18"	DR/E	
	4.47	R	18"	DR/E	
	7.09	R	18"	DR/E	
2672-659	7.25	R	(18)24"	I	
	0.32	R	18"	DR/E	
	0.38	N	18"	DR/E	
	0.41	R	(18)24"	DR/E	
	0.49	R	24"	DR/E	
	0.51	R	24"	DR/E	
	0.63	R	24"	DR/E	
2672-700	0.09	N	18"	DR/E	
	0.58	N	18"	DR/E	
	0.59	R	(30)48"	I	5.9 miles SPCH
	1.32	N	18"	DR/E	
	1.35	R	(18)24"	I	
	1.52	N	18"	DR/E	
	1.54	R	18"	DR/E	
	1.59	N	18"	DR/E	
	1.93	N	18"	DR/E	
2672-675	0.01	R	(48)96"	F	9.4 miles SPCH

Road Number	Road Mile	Culvert Information			
		New or Replacement?	Culvert Diameter	Stream Type ¹	Distance to Listed Fish Habitat ²
	0.09	N	18"	DR/E	
	0.17	N	18"	DR/E	
	1.12	N	18"	DR/E	
	1.31	N	18"	DR/E	
2655-510	0.20	R	18"	DR/E	
	0.57	R	18"	DR/E	
	0.96	N	18"	DR/E	
	1.10	N	18"	DR/E	
	1.73	N	24"	DR/E	
	1.79	R	36"	I	3.3 miles SPCH
	1.80	R	24"	I	
	1.92	R	(18)24"	DR/E	
	1.96	R	18"	DR/E	
	2.01	R	(18)24"	DR/E	
	2.05	R	18"	DR/E	
	2.13	N	18"	DR/E	
	2.16	N	18"	DR/E	
	2.19	R	(18)24"	DR/E	
	2.24	R	(18)24"	DR/E	
	2.43	R	(18)24"	DR/E	
	2.47	R	(30)36"	I	
	2.54	N	18"	DR/E	
	2.57	R	18"	DR/E	
	2.68	R	(18)24"	DR/E	
	2.70	N	18"	DR/E	
	2.73	N	18"	DR/E	
	2.77	R	(18)24"	DR/E	
	2.83	N	18"	DR/E	
	2.86	R	24"	DR/E	
	2.96	N	18"	DR/E	
2672-650	0.34	R	18"	DR/E	
	0.55	R	18"	DR/E	
	0.98	R	24"	DR/E	
	1.15	N	24"	DR/E	
	1.18	R	(18)24"	DR/E	
	1.23	R	18"	DR/E	
	1.28	R	(18)24"	DR/E	
	1.35	N	24"	DR/E	
	1.74	N	18"	DR/E	
	1.90	R	(18)24"	DR/E	
	2.00	N	18"	DR/E	
	2.15	N	18"	DR/E	
	2.27	N	18"	DR/E	
	2.33	R	18"	DR/E	
	2.79	R	18"	DR/E	
	4.55	N	18"	DR/E	
	4.62	R	18"	DR/E	
	4.92	R	(30)36"	I	3.1 miles BUT/SPCH
	5.02	N	18"	DR/E	
	5.10	N	18"	DR/E	
	5.14	R	18"	DR/E	
2655-511	0.16	R	24"	DR/E	
	0.33	R	24"	DR/E	
	0.36	R	(18)24"	DR/E	
	0.81	R	(18)24"	DR/E	
	1.31	R	18"	DR/E	
	1.75	N	18"	DR/E	

¹Stream Types: F=Fishbearing, P=Perennial, I=Intermittent, or DR/E=Ditch Relief/Ephemeral.

²Closest downstream distance from culvert site to listed fish habitat. DR/E culverts do not generally transport sediment; therefore the distance to listed fish is not applicable. SPCH = spring chinook; BUT = bull trout

F Indicates redesign to avoid beaver damming and improve fish/amphibian passage.

(#) Indicates existing diameter.

Timber will be transported from the project area on the roads as shown on Figure 6 and 7, and described in Table 3. Transport is only allowed when road surfaces are dry (seasonal restriction). Roads used for transport cross 4 or 5 perennial streams, depending upon the haul route. Most perennial stream crossings are via aggregate surfaced

roads over habitat not occupied by listed species. Approximately 2.22 miles of road are located within Riparian Reserves associated with perennially flowing streams; the remaining roads are located outside of the Riparian Reserve. One crossing of the McKenzie River exists over habitat occupied by rearing and foraging spring chinook salmon or bull trout at Trail Bridge bridge. Trail Bridge bridge and approaches are paved. Road 655 to the west of the Hwy 126 is aggregate and parallels the McKenzie River for ½ mile. This potential haul route is the only unpaved road in the vicinity of spring chinook and bull trout spawning habitat. FS Road 655 is located outside of the floodplain but within the riparian reserve of the McKenzie River. A dense layer of vegetation exists between the road and the stream.

Table 5. Two Bee Landscape Project Harvest Unit Information.

Unit	Acres	Treatment	Logging System	Unit Elev.	Slope	Aspect	Mean Tree Age (douglas fir)	Volume (MBF)	Trees per Acre (merchantable)		Mean Tree Dia.(in) (douglas fir)	Miles of Road Construction	
									Pre	Post		Syste	Temp
1	81	Mod. Partial cut	ground	3400	15	E	156	320	91	55	15.7	0	0.09
2	47	Mod. Partial cut	ground Partial-skyline	3600	70	SE	130	482	100	55	21.8	0	0
3	41	Mod. Partial cut	Partial-skyline	3600	75	SE	110	800	99	50	17.7	0	0
4	21	Mod. Partial cut	ground	3700	10	E	140	206	115	40	34.0	0	0
6	74	Mod. Partial cut	ground	3500	10	NE	200	1169	103	50	26.1	0	0
7	173	Mod. Partial cut	ground	3500	10	N	167	2342	105	50	26.2	0	0
11	19	Salvage	ground	3400	10	E	140	30			28.0	0	0
13	40	Post and Pole	ground	3200	20	E	26	100	218	135	11.1	0	0
14	98	Lt. Partial-cut/ Salvage	Partial-skyline	4000	65	E	120	640	179	105	17.5	0	0
17	64	Mod. Partial cut	Heli, Partial-skyline	3600	80	SE	125	410	128	75	19.3	0	0
18	121	Mod. Partial cut-Multi	ground	3600	15	E	133	1650	186	100	22.4	0	0
26	93	Mod. Partial cut	Partial-skyline	3000	65	E	180	734	47	30	21.8	0	0
27	38	Mod. Partial cut	Partial-skyline	3200	70	W	162	786	123	45	29.6	0	0
33	50	Mod. Partial cut	Partial-skyline	3200	65	W	132	709	78	33	31.4	0	0
34	91	Mod. Partial cut	Partial-skyline	3200	65	W	140	1772	77	37	21.7	0	0
39	7	Salvage	Helicopter	3000	20	E	180	10	46	40	22.9	0	0
41	9	Post and Pole	ground	3000	15	SE	26	120	200	100	8.4	0	0
Totals	1,093							12,280					0.09

Two different landscape-level riparian reserve strategies were used in project planning, depending upon whether the units are adjacent to spring chinook and bull trout areas or not. The Kink/Inland Basin 6th field watershed is designated Tier 1 Key Watershed and all units located within this 6th field are located adjacent to spring chinook and bull trout habitat. Project plans recommend riparian reserve widths from the Northwest Forest Plan as refined in the Upper McKenzie Watershed Analysis for all stream classes (Table 6). Project plans do not recommend thinning removal in riparian reserves in the vicinity of spring chinook or bull trout spawning habitat (coincides with Tier 1 Key Watershed designation). In units located in non-Key Watershed portions of the watershed and not adjacent to spring chinook and bull trout spawning areas, thinning prescriptions are recommended within the reserve while retaining a 50 foot no-harvest area on either side of Class III perennial channels. On Class IV intermittent streams not associated with spring chinook or bull trout units, bank trees and associated riparian vegetation to assure

stream stability would be maintained, with a minimum 50% canopy closure on thinning units. Thinning is allowed within the reserve and beyond a protection buffer to enhance the forested stand in the reserve, on non-spring chinook and bull trout adjacent units.

Table 6. Riparian Reserve Management Strategies

Commercial Partial cut and Post and Pole Spring Chinook and Bull Trout Areas (Tier 1 Key Watershed) Units 3, 4, 11, 17	Class I – 360 feet no harvest Class II – 360 feet no harvest Class III – 180 feet no harvest Class IV – 180 feet no harvest
Commercial Partial cut and Post and Pole Non-Spring Chinook and Bull Trout Areas (non-Key Watershed) Units 1, 2, 6, 7, 13, 14, 18, 26, 27, 33, 34, 39	Class I – 360 feet no harvest Class II – 360 feet no harvest Class III – 50 feet no harvest and 50-75% canopy closure within the 180 foot reserve. Class IV – Retain bank trees and 50-75% canopy closure within the 180 foot reserve. Lakes – 180 feet no harvest and retain a minimum 50% canopy closure in the remainder of the 180 foot reserve. Wetlands > 1 acre – 180 feet no harvest Reservoirs, and Wetlands < 1 acre – 50 feet no harvest and retain a minimum 50% canopy closure in the remainder of the 180 foot reserve.

Prescribed Fire

Prescribed fire will consist of two strategies, depending upon proximity of harvest units to habitat utilized by spring chinook and bull trout. In non-spring chinook and bull trout areas, prescribed fire will more closely approach waterways in portions of the riparian reserve entered for thinning. Fire will be used in riparian reserves only when fire control lines are not necessary. Post-harvest treatment with fire will utilize low intensity fire. Table 7 summarizes the two prescribed fire strategies for the Two Bee Landscape Project.

Table 7. Prescribed Fire Treatment Strategies

	Prescribed Fire Treatment
Spring Chinook and Bull Trout Areas Units 3, 4, 11, 17	Class I & II – 360 feet no treatment Class III & IV – 180 feet no treatment
Non-Spring Chinook and Bull Trout Areas Units 1, 2, 6, 7, 13, 14, 18, 26, 27, 33, 34, 41	Class I & II – 180 feet no treatment and allow low intensity fire if control lines in the riparian reserve are not needed in the remainder of the 360 foot reserve. Class III & IV – Allow low intensity fire if control lines in the riparian reserve are not needed. Lakes – 180 feet no treatment and allow low intensity fire if control lines in the riparian reserve are not needed in the remainder of the 600 foot reserve. Wetlands and Reservoirs – Allow low intensity fire if control lines in the riparian reserve are not needed.

Stand treatment prescriptions have the following objectives:

A Light Partial Cut will treat single-storied stands predominantly comprised of Douglas-fir trees. Average stand ages range from 110-200 years old. A few trees will be removed per acre, primarily of smaller diameter Douglas fir, to maintain at least a 65-75% canopy closure (Table 8). The goal is to maintain growth and vigor of remaining trees and enhance development of the understory. Emphasis will be on maintaining species such as western hemlock, western red cedar, and hardwoods. This prescription will maintain or improve vegetative diversity and resilience to future insect infestations and disease. Important dead woody material in snags and large wood on the forest floor will be maintained or enhanced. Horizontal diversity will be created through designation of no-harvest areas scattered throughout the stand. This prescription is proposed for all portions of the stand, including the stream adjacent portions of the stand. The objective of understory development and increased vigor of residual trees is expected to enhance riparian stand condition and contribute to future sources of in-stream large woody material.

Figure 6

**Two Bee Project Area
South Half
Alternative B**

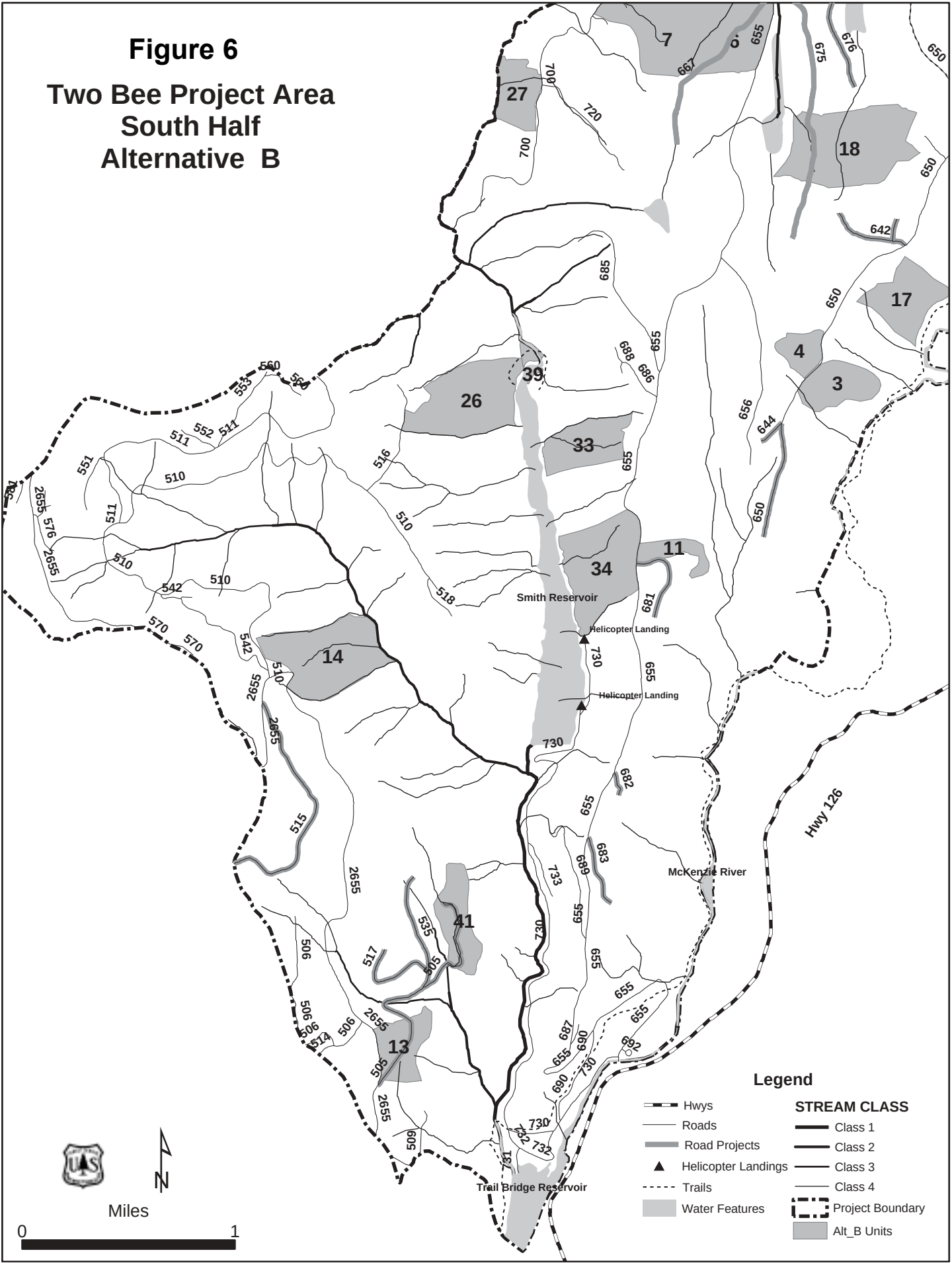


Table 8. Stand Treatment Prescriptions

Stand Treatment	Percent Maximum of Stand Density Index	Post-Harvest Percent Canopy Closure
Light Partial Cut (including Salvage)	>50%	65-75%
Moderate Partial Cut	45-50%	50-65%

Stand composition described above characterize **Moderate Partial Cut** units. Average stand ages range from 110-250 years old. A moderate partial cut unit will be thinned to 50-65% canopy closure, primarily through removal of smaller diameter Douglas fir. The goal is to increase growth and vigor of remaining trees and enhance development of the understory and mid-canopy, shade-tolerant trees. Emphasis will be on maintaining species such as western hemlock, western red cedar, and hardwoods. This prescription will maintain or improve vegetative diversity and resilience to future insect infestation and disease. Important dead woody material in snags and large wood on the forest floor will be maintained or enhanced. Horizontal diversity will be created through designation of no-harvest areas scattered throughout the stand. This treatment will begin the development of two to three storied stands in the future. This prescription is proposed for all portions of the stand, including the stream adjacent portions of the stand. The objective of understory development and increased vigor of residual trees is expected to enhance riparian stand condition and contribute to future sources of in-stream large woody material.

Moderate Multi-Story Partial Cut will treat single or two-storied stands comprised predominantly of Douglas fir trees. Stand ages average 120-130 years old. The stand will be thinned to maintain 50-65% canopy (moderate multi-story thin), through removal of a wider variety of diameter classes, depending on stand composition. The goal is to create multi-storied stands over time, with multiple thinning treatments over time. The prescription will develop the understory, stimulate growth of small conifers in patches within the understory, and increase growth of mid-canopy, shade-tolerant trees. Emphasis will be on maintaining species such as western hemlock, western red cedar, and hardwoods. This prescription will maintain or improve vegetative diversity and resilience to future insect infestations and disease. Important dead woody material in snags and large wood on the forest floor will be maintained or enhanced. Horizontal diversity will be created through designation of no-harvest areas scattered throughout the stand. This prescription is proposed for all portions of the stand, including the stream adjacent portions of the stand. The objective of understory development and increased vigor of residual trees is expected to enhance riparian stand condition and contribute to future sources of in-stream large woody material.

IV. Effects of the Actions on Matrix Indicators

The potential effects that the Two Bee Landscape Projects may have on the matrix indicators was analyzed at three different scales: effects to site specific condition, effects to listed fish habitat, and effects to the overall 6th field watershed conditions. The site-specific analysis focuses on the immediate direct effects to each indicator. This scale of analysis is the most sensitive, effects will be noted here where they might be diluted or eliminated before they effect listed fish habitat or affect the 6th field watershed condition. An example of a site-specific effect might be analyzing the effect to a pool located immediately downstream from a culvert replacement. This level of effects analysis is important in that it identifies all sources of potential cumulative or aggregate effects and sources of indirect effects to listed fish habitat or 6th field watershed condition. Secondly, effects to listed fish habitat are addressed. This helps determine direct and indirect effects to the listed species, and can help in determining if a project is likely or not likely to adversely affect the species. Then the effects to the 6th field watershed are assessed. Very rarely would a project be of the magnitude or duration that it would cause a change in existing condition at this large-scale. Table 13 summarizes the overall effects to each indicator at these three scales.

Temperature

Determination:

Project	Effect to the Indicator at Different Scales		
	Site Specific	Listed Fish Habitat	6th Field Watershed
Two Bee Landscape Projects	Maintain	Maintain	Maintain

The implementation of the Two Bee Landscape projects will not affect stream shade or stream flow to an extent where stream water temperature would be increased. Timber projects will maintain the existing condition at all scales

Rationale:

Utilization of Northwest Forest Plan and watershed analysis recommended Riparian Reserve widths in harvest units located in the vicinity of bull trout and spring chinook habitat would protect water quality in the upper McKenzie River. No alteration of available stream shade will occur on perennial or intermittent streams near listed species habitat. Short-term alteration of available shade will occur with thinning activity near intermittent (Class IV) channels in non-bull trout and spring chinook habitat portions of the project area. The seasonal nature of intermittent channels (fall, winter, spring) and low ambient temperatures present during seasonal flow is not expected to contribute to increases in water temperature.

Sediment

Determination:

The Two Bee Landscape Projects will likely cause a very small increase in sediment delivery rates to streams and lakes within the watershed upstream of habitat occupied by listed fish. The risk that this slight increase in sediment will affect sediment levels in streams potentially utilized by listed fish is very low. This will lead to a short-term degradation of the indicator at the site-specific level. Overall, it is expected that the positive effects from road improvements associated with these projects will result in a long-term reduction in road origin sediments, particularly in non-bull trout and spring chinook portions of the project area. Aquatic habitat contributing to the life history needs of bull trout and spring chinook will be maintained.

Rationale:

The potential for increases in turbidity through colloidal suspension of clay particles associated with hauling activity will be mitigated through seasonal hauling restrictions. Where hauling occurs on road surfaces that become dusty during summer hauling, particularly in those areas adjacent to bull trout and spring chinook spawning habitat (Rd 655), watering of the road surface will occur. Mitigation measures are designed to minimize transmission of fine sediments potentially originating from timber harvest activities. No significant increase to turbidity is expected in association with harvest activities as Riparian Reserve widths are sufficient to protect waterways and mitigation measures are designed to reduce transportation of fines. No increase in levels of cobble embeddedness is expected to occur. It is expected that due to the spatial location and low magnitude of the anticipated effects, sediment moving into stream channels due to these projects will not reach streams potentially utilized by listed fish, and the condition of listed fish habitat will be maintained (Table 9). The effect to this indicator is not of sufficient magnitude to affect overall condition of the 6th field watershed either negatively or beneficially, therefore the condition will be maintained.

Ground disturbance occurring with harvest equipment will be located sufficient distances from stream channels to avoid introduction of fine sediments. Mitigation methods prescribed for timber harvest operations will protect waterways from potential sedimentation sources, particularly those sources associated with temporary roads and skid trails, hauling, and seasons of use.

Table 9. Species Proximity to Timber Management Units and Flow Routes.

Unit	Proximity to habitat (miles)	Species present downstream	Flow route and Impoundments	Unit	Proximity to habitat (miles)	Species present downstream	Flow route and Impoundments
1	6.6	But/Spch	CL/CR/IMcK	17	3.1	But/Spch	I, IV
2	4.3	But/Spch	CR/IMcK	18	5.2	But/Spch	CL/CR/IMcK
3	2.9	But/Spch	IV	26	4.0	Spch	SR/TBR
4	3.0	But/Spch	IV	27	5.9	Spch	SR/TBR
6	9.4	But/Spch	CL/CR/IMcK	33	3.9	Spch	SR/TBR
7	9.4	But/Spch	CL/CR/IMcK	34	3.0	Spch	SR/TBR
11	1.6	But/Spch	subsurface	39	4.3	Spch	SR/TBR
13	1.2	Spch	TBR	41	1.3	Spch	TRB
14	3.3	Spch	TBR				

Boldface units are located near bull trout and spring chinook habitat; others are spatially remote with natural and human made impoundments between the timber harvest area and important habitat. But = bull trout; Spch = spring chinook CL = Clear Lake; CR = Carmen Reservoir; IMcK = Intermittent McKenzie River; TBR = Trail Bridge Reservoir; SR = Smith Reservoir

Road treatments are proposed on current sources of potential road origin sediments (mainly in non-bull trout and spring chinook watersheds) with decommissioning of 3.7 miles of road and closure of 7.1 miles of road. Decommissioning will consist of installing waterbars, maintaining existing drainage structures and maintaining a gate or berm closure. Closure will consist of closing roads currently open with a gate or berm, maintaining existing drainage structures and installing waterbars on roadbeds with steeper grades. Closed roads would be subject to administrative travel if gated and periodic use for land management activities. Some reduction in long-term sources of road-derived sedimentation is expected with road storage and decommissioning. Decommissioning of 0.5 mile of Road 644, may be expected to reduce long-term sources of sedimentation in the vicinity of listed species habitat. Proposed road treatments are low in ground disturbing activity, comparable to road maintenance activity during implementation. Implementation of action alternatives will not adversely affect aquatic habitat quality, including habitat important to bull trout and spring chinook reproduction in the Kink/Inland Basin 6th field watershed. The No Action Alternative would leave roads untreated, yielding sediments similar to current levels. No road treatment would be expected to maintain aquatic habitat at current conditions.

Culvert replacements are proposed on two crossings of fish-bearing Ikenick Creek. Resized culverts and stream

crossings will be designed to safely accommodate over topping of the road surface when beaver activity impairs culvert function. Culvert replacements will also improve fish and amphibian passage. A total of 82 ditch relief culverts will be included with road reconstruction, of these 44 are proposed replacements and 37 are new. Eleven crossings of intermittent (Class IV) channels would be accomplished with timber harvest activity, consisting of 9 replacements and 2 new culverts. Road reconstruction and culvert replacements will likely result in impaired water quality through short-term increases in turbidity. Mitigation measures to reduce potential transmission of sediment include requiring road reconstruction occur during dry periods, temporary road removal, and bringing roads to an upgraded condition to accommodate hauling activity with improved aggregate surfacing. All areas of exposed soil associated with road reconstruction will be seeded with non-invasive cereal grains and/or native perennial species. As road reconstruction and culvert replacement locations are located remote from listed species habitat, the downstream effects of turbidity on habitat important to spring chinook and bull trout will be negligible. The fine clay particles that compose the majority of sediment remaining suspended are expected settle out in low velocity habitat located upstream of spring chinook and bull trout habitat.

Fire intensities lower than would create hydrophobic soils are prescribed for all units. In addition to no fire treatments within the Riparian Reserve near listed species habitat, the use of low intensity understory burning in the uplands will retain live plants and duff and discourage potential transport of sediment into channels.

Large Woody Material

Determination:

Project	Effect to the Indicator at Different Scales		
	Site Specific	Listed Fish Habitat	6th Field Watershed
Two Bee Landscape Projects	Maintain	Maintain	Maintain

The Two Bee Landscape Projects

are expected to maintain large woody material at all scales. Some improvement of riparian stand growth, vigor and future large wood supply is expected from silvicultural treatments in non-bull trout and spring chinook areas, remote and upstream of habitat containing listed species.

Rationale:

The Two Bee Landscape Projects enter riparian reserves in an effort to improve the riparian stand condition in non-bull trout and spring chinook portions of the project area. Previous harvest units are expected to benefit from silvicultural prescriptions through increased growth and vigor of riparian stands. This is expected to provide improvement of future sources of in-stream wood upstream of native cutthroat trout habitat. No treatment of riparian stands adjacent to spring chinook and bull trout will occur. The potential for riparian reserve treatments in non-bull trout and spring chinook areas to influence the availability of large wood in downstream habitat occupied by listed species is negligible due to the fragmentation of flow routes by natural and human-made barriers. No harvest will occur within stands on unstable slopes, thus avoiding adverse effect on existing in-stream woody material levels or recruitment rates to area streams.

Peak/Base Flows

Determination:

Project	Effect to the Indicator at Different Scales		
	Site Specific	Listed Fish Habitat	6th Field Watershed
Two Bee Landscape Projects	Maintain	Maintain	Maintain

It is unlikely that the implementation of the Two Bee Landscape Projects will cause changes in peak and base flows. If minimal changes were experienced, they would not be expected to reach a level where they would be measurable, nor would a minor increase result in adverse effects such as accelerated stream bank erosion or channel scouring. A negligible increase in peak flow is not expected to result in degradation of this indicator at the site-specific level. These effects are not expected to reach the magnitude where listed fish or their habitat would be affected and would not be measurable at the 6th field scale. No change in existing condition is expected at the 6th field watershed level.

Rationale:

Aggregate Recovery Percent (ARP) is a measure of the vegetative condition related to its ability to intercept rain, snow and wind. Proposed thinning units will maintain or exceed ARP midpoints prescribed in the Willamette Forest Plan (Table 10). Maintenance of ARP values above the Recommended and Midpoint ARP on the planning sub-drainage scale is expected to maintain peak flow frequency and intensity and base flows. Maintenance of canopy in thinning units at 50% or greater (considered 70% recovered in terms of ARP) is expected to intercept a significant portion of snow load and dampen the potential effects of rain-on-snow events. Stand canopy recovery (to 70% canopy) is expected to occur within a decade. Maintenance of the current flow regime may be expected to maintain aquatic habitat conditions and the conditions necessary for bull trout and spring chinook reproduction and rearing in the upper McKenzie River.

Table 10. Aggregate Recovery Percent Values Immediately after Project Implementation (2007).

Planning Subwatershed	Alt. B	Midpoint
Upper West Side	93.4	75
Bunchgrass	90.3	70
Browder	89.5	70
Hackleman	89.4	75
Gate	90.0	75
Ikenick	91.6	70

Road Density, Location, Drainage Network

Determination:

Project	Effect to the Indicator at Different Scales		
	Site Specific	Listed Fish Habitat	6th Field Watershed
Two Bee Landscape Projects	Short-term Degrade	Maintain	Maintain

Activities associated with timber management propose to construct temporary roads; this will cause a short-term increase in road density. All temporary roads will be constructed, utilized during the project and then removed. Culvert replacements will improve the current drainage network in non-bull trout and spring chinook watersheds. Overall, the implementation of these projects will lead to a minor short-term degradation of this indicator at the site-specific level. Temporary roads are outside of the Riparian Reserve and are not located near streams potentially occupied by bull trout or spring chinook salmon, therefore the existing condition is expected to be maintained at the habitat and 6th field watershed scale. Due to the small magnitude of the increase in temporary road length, this indicator will be maintained at the habitat and 6th field scale.

Rationale:

Two Bee timber project temporary roads and road reconstruction listed by 6th field watershed are described in Table 11. The majority of proposed temporary roads are located in non-listed species portions of the project area, at a distance sufficient to minimize potential introduction of fine sediment into spring chinook/bull trout habitat. As all temporary roads will be located outside the Riparian Reserve, the effects of construction are expected to be limited to site specific disturbance, with negligible increases in fine sedimentation to listed fish habitat.

Table 11. Road Density Information for the Kink/Inland, Hackleman Ck, Smith River 6th Fields.

6 th Field Watershed	6 th Field Name	Existing Road Density (mi/mi ²)	Temporary Road Miles	Road Reconstruction Miles	Post-project Road Density (mi/mi ²)
07-4	Kink/Inland	1.4	0	3.7	1.4
07-5	Hackleman Ck.	3.1	0.09	13.4	3.1
07-6	Smith R.	2.4	0	4.8	2.4

The drainage network in the affected watersheds will be improved with the implementation of timber management projects. Existing culverts that are undersized, improperly placed, or damaged/aged will be replaced. Additional ditch relief culverts will be installed to improve road drainage. Road reconstruction and culvert replacements will likely result in locally impaired water quality through short-term increases in turbidity on perennial channels. Mitigation measures to reduce potential transmission of sediment require road reconstruction occur only during dry periods, require temporary road removal, and bring roads to an upgraded condition to accommodate hauling activity with improved aggregate surfacing. All areas of exposed soil associated with road reconstruction will be seeded with non-invasive cereal grains and/or native perennial species. As road reconstruction and culvert replacement locations are located remote from listed species, the downstream effects of turbidity on habitat important to spring chinook and bull trout will be negligible. The fine clay particles that compose the majority of sediment remaining suspended are expected settle out in low velocity habitat located upstream of spring chinook and bull trout habitat. Mitigations for two culvert replacements on perennial fish-bearing channels include a seasonal restriction for replacement (July1-Aug. 15) and requiring sediment trapping during culvert installation to minimize downstream effects.

Disturbance History

Determination:

Project	Effect to the Indicator at Different Scales		
	Site Specific	Listed Fish Habitat	6th Field Watershed
Two Bee Landscape Projects	Short-term Degrade	Maintain	Maintain

Timber harvest, road reconstruction and burning activities associated with Two Bee Landscape Projects will create newly disturbed areas on the landscape. This will add to the aggregate level of disturbance in each of the affected 6th field watersheds. This indicator will be degraded at the site-specific level. It is likely that this level of disturbance will not be of the

magnitude where effects to streams occupied by listed fish would occur, so the existing condition at the habitat level will likely be maintained. Similarly, the effect at the 6th field watershed scale is minimal, and no change in baseline condition is expected.

Rationale:

The percent of riparian area affected by past management is summarized in Table 12. The Two Bee timber management project does not propose additional Riparian Reserve treatments near bull trout and spring chinook habitat. In non-bull trout and spring chinook areas, timber management projects propose thinning and burning in Riparian Reserves. Total acres of affected Riparian Reserve are summarized below. Risk of short-term disturbance is mitigated by dry season operation, limiting equipment proximity to Class III and IV channels to no closer than 50 feet, requiring full suspension over perennial channels, and use of existing skid trails in the Riparian Reserve.

Management induced effects are not significant in aggregate to increment changes in 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 met or exceeded, and exclusion of bank destabilizing activity]; 3) adverse alteration of the supply of sediment to channels; 4) adverse alteration of sediment storage and structure in channels.

Table 12. Acres of Subwatershed Riparian Reserve Affected by Past and Proposed Timber Management Treatments and Proposed Burning Treatments.

Subwatershed	Subwater-shed Riparian Reserve Acres	Total Riparian Reserve Acres Affected by Past Management / Percent Subwatershed area	Two Bee Project Riparian Reserve Acres / Percent Subwatershed area	Rip. Res. Proposed Acres to Partially cut / Percent Subwatershed area	Alt. B Rip. Res. Proposed Acres to Burn / Percent Subwatershed area
Kink/Inland Basin	389	45 11.6%	9 2.3%	0 0%	0 0%
Hackleman Creek	3750	835 22.3%	69 1.8%	32 0.8%	43 1.1%
Smith River	3736	813 21.8%	233 6.2%	103 2.8%	117 3.1%

Timber management activities in combination with past or foreseeable events, are not expected to contribute to degradation of aquatic habitat conditions through increases in peak flow frequency or intensity. Habitat conditions necessary for bull trout and spring chinook reproduction and rearing in the Upper McKenzie River are expected to be maintained. The No Action Alternative would be expected to maintain habitat conditions currently available to bull trout and spring chinook.

Riparian Reserves

Determination:

The Two Bee Landscape Projects will not significantly or adversely modify existing condition of the riparian reserves. The projects will maintain the condition of this indicator at all scales.

Rationale:

Class III (perennial, non-fish bearing) channels will be protected with a 50 foot no harvest area adjacent to each bank in non-bull trout and spring chinook adjacent thinning units. This width will sufficiently protect the perennial waterway from increases in water temperature.

Maintenance of streambank trees in non-bull trout and spring chinook adjacent units will sufficiently protect stream bank integrity. Short-term alteration of Class IV stream microclimate is not expected to increase water temperatures, due to the seasons (fall, winter and/or spring) surface flow is available to intermittent channels. Riparian Reserve thinning treatments in non-bull trout and spring chinook portions of the project will not adversely affect downstream habitat critical to spring chinook and bull trout due to the distance of treatments from important habitat (Table 9).

Low intensity understory burning in Riparian Reserve treatments is proposed in 160 acres of non-bull trout and spring chinook 6th Field Hackleman Creek and Smith River watersheds (Table 12). The proportion of each watershed's Riparian Reserve is 1.1% and 3.1% respectively. A high intensity fire would be expected to influence water quality through short-term increases in ammonium and phosphate levels, and increased soil erosion rates through reduction in streamside vegetation, removal of duff and alteration of soil properties. A low intensity fire

Project	Effect to the Indicator at Different Scales		
	Site Specific	Listed Fish Habitat	6th Field Watershed
Two Bee Landscape Projects	Maintain	Maintain	Maintain

conducted during spring or fall will avoid combustion of duff and live vegetation and associated alteration of water quality. Erosion rates would not be expected to increase due to retention of duff and maintenance of soil properties. Potential increases in ammonium and phosphate levels associated with fire will be of reduced magnitude compared to high intensity fire, and will be at levels expected within the range of variability. Aquatic habitat conditions are expected to remain within the range of natural conditions. Aquatic organisms, adapted to fire frequency greater than is experienced under current fire suppression strategies, are not expected to respond adversely to the scale and intensity prescribed. Potential downstream effects to habitat critical to spring chinook and bull trout is expected to be negligible due to treatment scale, low intensity and distance.

Matrix Indicators With A Low Risk of Being Adversely Affected:

Chemical Contaminants

The Two Bee Landscape Projects are not expected to have any effect on this indicator. Any work by heavy equipment near or in the streams requires spill protection plans to be prepared, and emergency cleanup equipment available on-site. The existing condition will be **Maintained** at all scales.

Physical Barriers

The Two Bee Landscape Projects will replace two current culverts in fish-bearing streams, improving fish passage in the Hacklemen Creek 6th field for native cutthroat. No alteration of current human-made fish barriers to listed species (Trail Bridge or Smith Dam) will occur with Two Bee Projects. This indicator will be **Maintained** at all scales.

Pool Frequency and Quality

These projects will not directly affect current or future quality or frequency of large pools; this indicator will be **Maintained** at all scales. No work occurs within fish-bearing stream channels other than culvert replacements in Ikenick Creek, and slight increases in sediment are short-term and not expected to decrease pool quality or frequency.

Off-Channel Habitat

The Two Bee Landscape Projects will not affect off-channel habitat. The existing condition of this indicator will be **Maintained** at all scales.

Refugia

These projects will not lead to a reduction in the quality of existing refugia habitat. The existing condition of this indicator will be **Maintained** at all scales.

Width/Depth Ratio

These projects will not affect stream channels or flows; the existing condition of this indicator will be **Maintained** at all scales.

Streambank Condition

The implementation of Riparian Reserves protections will sufficiently protect streambanks from direct effects in listed species habitat areas of the project. Protections for streambank integrity will be utilized for portions of the project located within non-bull trout and spring chinook subwatersheds. These projects are not expected to increase stream flows, so streambank erosion should not be increased. This indicator will be **Maintained** at all scales.

Floodplain Connectivity

The Two Bee Landscape Projects will not change the existing connectivity between streams and their floodplains. Existing condition will be **Maintained** at all scales.

Table 13. Summarization of Effects to Matrix Indicators at Different Scales.

Indicator	Effect to the Indicator at Different Scales		
	Site Specific	Listed Fish Habitat	6 th Field Watershed
Water Temperature	Maintain	Maintain	Maintain
Sediment	STD,LTM	Maintain	Maintain
Large Woody Debris	Maintain	Maintain	Maintain
Change in Peak Base Flow	Maintain	Maintain	Maintain
Road Density and Location, Drainage Network	STD/LTM	Maintain	Maintain
Disturbance History and Regime	STD/LTM	Maintain	Maintain
Riparian Reserves	Maintain	Maintain	Maintain
Chemical Contaminants/Nutrients	Maintain	Maintain	Maintain
Physical Barriers	Maintain	Maintain	Maintain
Pool Frequency and Quality	Maintain	Maintain	Maintain
Off-Channel Habitat	Maintain	Maintain	Maintain
Refugia	Maintain	Maintain	Maintain
Wetted Width/Max Depth Ratio	Maintain	Maintain	Maintain
Streambank Condition	Maintain	Maintain	Maintain
Floodplain Connectivity	Maintain	Maintain	Maintain

STD = Short Term Degrade, effect limited in duration. LTR = Long Term Restore, action eventually will improve existing condition. LTM = Long Term Maintain, action will eventually allow a recovery to baseline condition.

Table 14. Summarization of Effects to Matrix Indicators at the Fifth Field.

Fifth Field Matrix for UPPER MCKENZIE RIVER Watershed

HUC Location 1709000401

	Current Condition			Effects of the Action (s)		
Relevant Indicators	Properly Functioning	At Risk	Not Prop. Functioning	Degrade	Maintain	Restore
Water Quality						
Temperature	1,2				X	
Sediment & Turbidity		1,2			X	
Chemical Conc./ Nutrients	1				X	
Habitat Access						
Physical Barriers		1			X	
Habitat Elements						
Substrate/ Sediment	1,2				X	
Large Woody Material		1,2			X	
Pool Character and Quality		1,2			X	
Pool Frequency		1,2			X	
Off-Channel Habitat		1,2			X	
Refugia		1			X	
Channel Condition and Dynamics						
Width/Depth Ratios	2				X	
Streambank Condition	2				X	
Floodplain Connectivity		1,2			X	
Flow/Hydrology						
Changes in Peak/Base Flows		1			X	
Increase in Drainage Network		1			X	
Watershed Conditions						
Road Density and Location		1			X	
Riparian Reserves		1			X	
Disturbance History		1			X	

Key for determination:

1 = Data came from Watershed Analysis

2 = Data came from surveys

3 = Data came from field review for the project

4 = Professional Judgment

5 = Data came from EA or EIS

6 = Data came from Water Quality Management Plan

7 = Restoration Project

V. Aggregate Effects

The Two Bee Landscape Projects are summarized in context of past and proposed future projects in Table 12. The projects include thinning within 135 acres of Riparian Reserve within non-bull trout and spring chinook adjacent areas. No thinning within bull trout and spring chinook adjacent Riparian Reserves is proposed with Two Bee Projects. The projects propose burning within 160 acres of Riparian Reserve within non-bull trout and spring chinook areas. No burning within listed species area Riparian Reserves is proposed. Risk of short-term disturbance is mitigated by dry season operation, limiting equipment proximity to Class III and IV channels to no closer than 50 feet, requiring full suspension over perennial channels, and use of existing skid trails in the Riparian Reserve.

Management induced effects are not significant in aggregate to increment changes in 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; 4) adverse alteration of sediment storage and structure in channels. The quality of habitat important to spring chinook salmon and bull trout is expected to be maintained with implementation of any proposed action alternative.

VI. Determination of Effect - ESA

Two Bee Landscape Projects

Determination:

The Two Bee Landscape Project, including road reconstruction, road treatments and prescribed fire **may affect, but is not likely to adversely affect** (NLAA) spring chinook salmon or their habitat. While critical habitat is not currently designated for spring chinook, the implementation of these projects will not adversely modify habitat important to spring chinook salmon in the upper McKenzie 5th field watershed. The Two Bee Landscape Project, including road reconstruction, road treatments and prescribed fire **may affect, but is not likely to adversely affect** (NLAA) bull trout or their habitat. While critical habitat is not currently designated for bull trout, critical habitat is proposed in the portions of the project area described as bull trout and spring chinook habitat. The implementation of these projects will not adversely modify habitat important, or habitat proposed as critical habitat for bull trout in the upper McKenzie 5th field watershed.

Rationale:

The analysis of effects on the matrix indicators describe limited effects, generally limited to site specific, short duration, low magnitude effects. The projects were designed to protect water quality and fish habitat. These effects are not expected to directly or indirectly change the condition of potentially occupied listed fish habitat, and these effects would be non-detectable at the 6th field watershed level. Although both spring chinook salmon and bull trout are known to utilize habitat immediately downstream from the Two Bee Landscape Projects, the probability that the implementation of this project will affect these fish or their habitat is very low. The majority of the timber management project, including road reconstruction, road treatments and prescribed fire, is located above a natural barrier and man-made impoundment(s) for both listed species, further reducing the probability that this project will adversely affect the listed fish. These timber management projects do not construct any new permanent roads, limit entry into riparian reserves to the outer portion of one intermittent stream's reserve, and use reduced-impact yarding systems such as skyline and helicopter yarding to reduce soil disturbance.

VII. Determination of Effect - Essential Fish Habitat

Two Bee Landscape Projects

Determination:

When the Magnuson-Stevens Act of 1976 was re-authorized in 1996, it directed Regional Fishery Management Councils to identify Essential Fish Habitat (EFH) for commercial fish species of concern. The Pacific Fishery Management Council identified EFH in the Willamette Basin in June 2000. The Magnuson-Stevens Act requires Federal Agencies to consult with the Secretary of Commerce (NMFS) regarding any action authorized, funded, undertaken by such agency which may adversely affect EFH. The National Marine Fisheries Service has identified the waters upstream from Trail Bridge Dam as Essential Fish Habitat for spring chinook salmon. Effects analysis contained here and in the Biological Assessment address potential effects to EFH (i.e., effects to spring chinook salmon habitat). The effects analysis presented in this effects summary indicates minimal risk of adversely affecting watershed condition. The biological assessment found that a "May Affect, Not Likely to Adversely Affect"

determination for spring chinook salmon was appropriate in summarizing effects to habitat. Therefore it is expected that Two Bee Landscape Projects will have a minimal effect to EFH. It is determined that these projects will not exceed the "May Adversely Affect" EFH threshold and are therefore not subject to EFH consultation with NMFS. EFH does not apply to bull trout and other native fish as they are not a component of a commercial fishery.

VIII. References

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- USDA Forest Service. 1995. Upper McKenzie Watershed Analysis. Willamette National Forest, McKenzie Ranger District, McKenzie Bridge, Oregon.
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Two Bee EA Revisions

October 2, 2006

Changes to Appendix B—Fisheries Biological Assessment

This addendum identifies changes in project design, extent and magnitude from project descriptions and effects in the Fisheries Biological Assessment dated 7 February 2003.

The following changes are to be incorporated into the Fisheries Biological Assessment at the sections indicated.

III. Description of Federal Actions

The revisions to Alternative B include additional temporary roads not described in the 7 February 2003 Fisheries Biological Assessment (BA) for Two Bee Landscape Project.

Table 1: Revisions to Preferred Alternative (Alt. B)	
Unit	Modification
3	300 feet of temporary road needed to thin unit.
6	900 feet of temporary road needed to thin unit.
7	3000 feet of temporary road needed to thin unit.

The revisions to Alternative B will drop all of Unit 14 (98 acres), Unit 17 (64 acres), Unit 26 (93 acres) and portions of Unit 2 located within the Wild and Scenic River corridor (25 acres) [Table 5, page 7 of the Fisheries BA]. The modified dimension of Unit 2 is 22 acres.

Logging systems described in Table 5 change to:

Unit 2 – 25 acres are dropped; 22 acres of ground-based harvest remain

Unit 14 – unit is dropped (98 acres)

Unit 17 – unit is dropped (52 acres)

Unit 18 – 101 acres ground-based; 20 acres skyline (formerly 121 acres ground-based)

Unit 26 – unit is dropped (93 acres)

Unit 34 – 77 acres skyline; 14 acres helicopter (formerly 91 acres skyline)

Unit 13 and Unit 41, described as “Post and Pole” units in the Fisheries BA, are now considered thinning units due to increased tree diameter and will be thinned by moderate commercial thin. Harvest method (ground-based) and post-treatment tree density remain as described in Table 5, page 7 of the Fisheries BA. Unit 41 dimensions were described erroneously as 9 acres in the Fisheries BA and should read 47 acres in Table 5, page 7 of the Fisheries BA.

Total Alternative B treatment area is 825 acres (formerly 1,093 acres); total volume (in 1000 board feet or MBF) is 10,787 (formerly 12,280 MBF) in Table 5, page 7 of the Fisheries BA.

Figure 1. Temporary Roads in Unit 3.

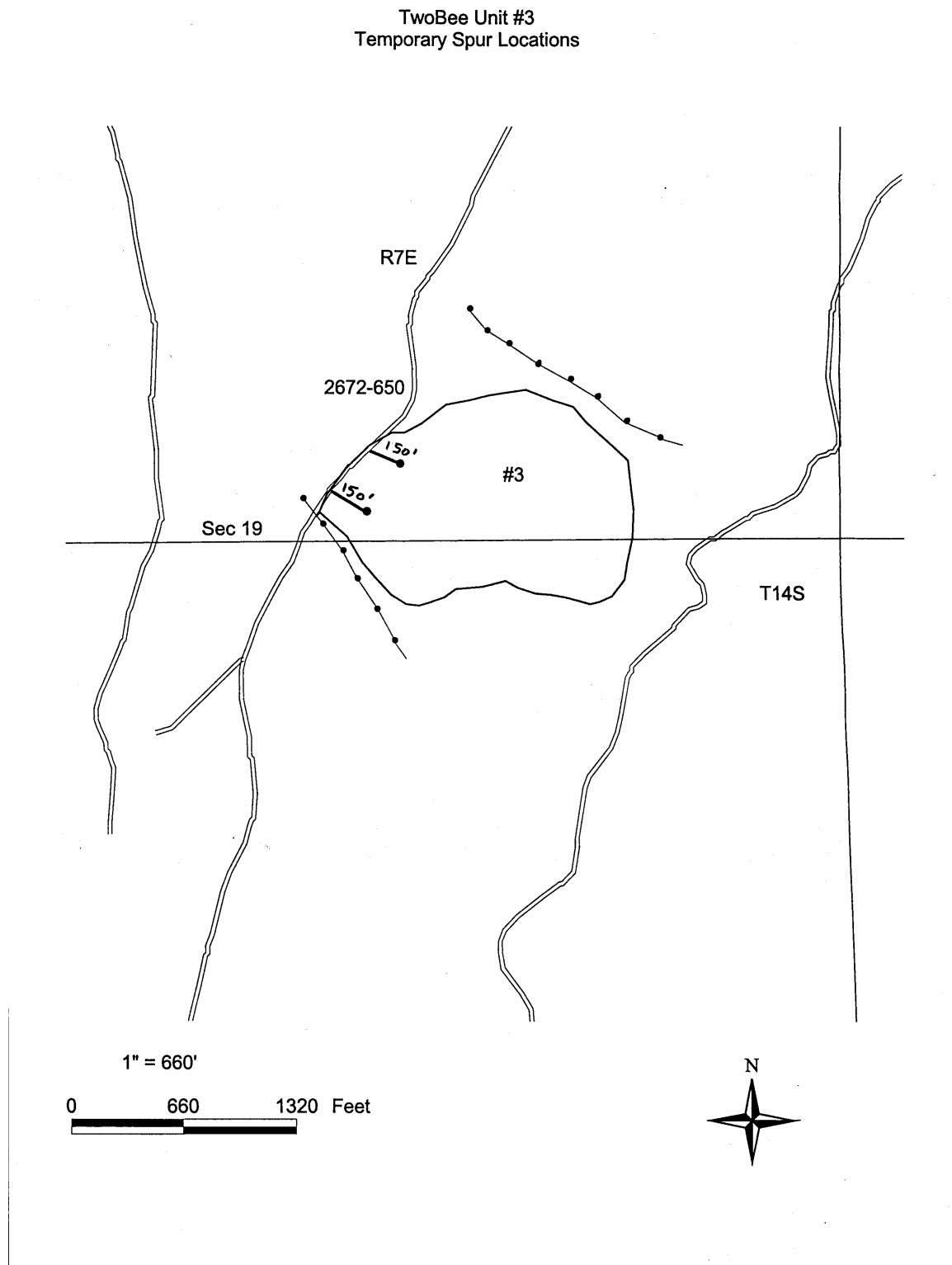
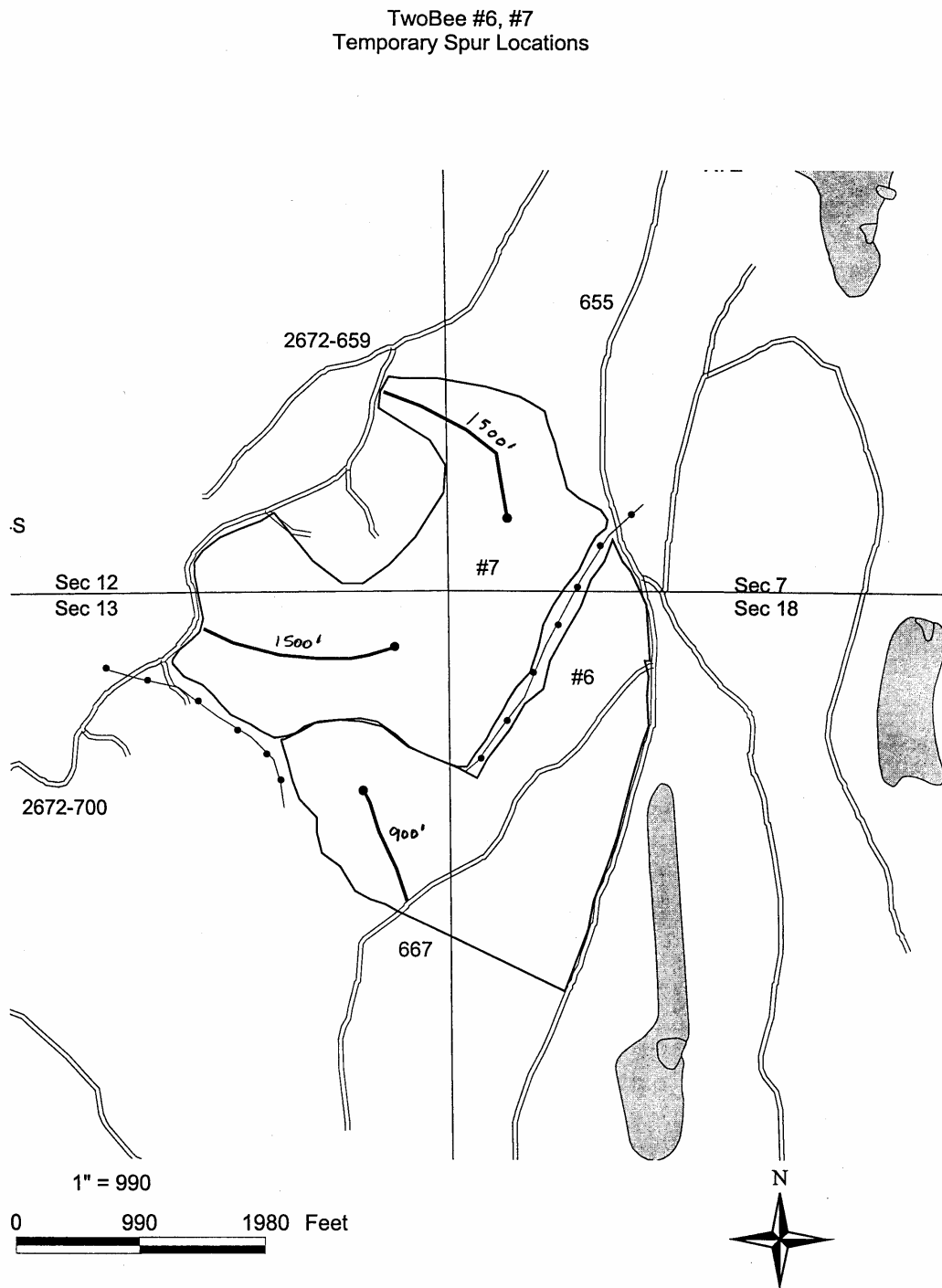


Figure 2. Temporary Roads in Unit 6 and 7.



Forest Road 655 was considered a potential haul route and presented a potential source of dusting to the nearby McKenzie River and listed species spawning habitat. Modification of Alternative B will specify no hauling occur on portions of Forest Road 655 in the vicinity of bull trout and spring Chinook spawning habitat. Mitigation measure 18 specifies “The segment of road 2672-655 south of MP 5.04, from the intersection with road 2672-682 to road Oregon State Highway 126, is not to be used as an alternate haul route.” The intent is to protect bull trout and spring Chinook spawning habitat between EWEB facilities and McKenzie River Trailhead from impacts of hauling.

Associated with dropping Units 14 and 26 is included dropping culvert replacements on forest roads 2655-510 and 2655-511 (Table 4, page 5 of the Fisheries BA). New or replacement culverts would total 63 (formerly 95). Of those no longer included in the project, 21 were replacements and 11 new placements. Three of the total no longer included in the project were on intermittent streams, the remainder (29) were replacement or new ditch relief culverts.

Further rock pit development associated with road reconstruction on existing Boulder Creek and Dogwood rock pits would produce crushed aggregate, pit run aggregate, and riprap for road maintenance needs. Development at both these pits includes clearing and grubbing trees, removal of soil overburden, drilling and blasting, reducing existing oversize material, and eventual rehabilitation of the site. Pit development and overburden disposal utilize Best Management Practices to reduce risk of fine sediment mobilization. Dogwood Rock Pit proximity to existing waterways is 1,200 feet to a seasonal tributary to Deer Creek (4,500 total feet from Deer Creek) and Boulder Rock pit is 1,000 feet to seasonal Twisty Creek (4,550 feet to McKenzie River).

Mitigation Measures and Design Criteria

The following list describes the mitigation measures that would be applied in the implementation of the proposed action Alternative B. These measures, or equivalent effective measures, will be incorporated into individual unit prescriptions by resource specialists as needed to mitigate potential undesirable effects.

Soil, Watershed, and Fisheries Protection:

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. Best Management Practices (BMPs), 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 for hauling during the winter rainy season between November 1 and May 31. The objectives are to maintain water quality and fish habitat.
3. Construction and or maintenance of roads would not be done when soils are saturated or run off occurs, to minimize erosion and sedimentation, and a stable fill would be constructed across all streams.
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 when void of snow when runoff from the road surface is unlikely. Watering the road surface would be used if roads become excessively dusty during the summer.
5. Ground-based yarding systems 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 if rainfall or precipitation results in pooling of water in skid trails or landings.

6. Designated skid trails would be required in all ground based yarding units. 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.
7. 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. Traditional ground based yarding equipment would not be permitted within Riparian Reserves of Class I and Class II (fish bearing) streams. Alternative low disturbance ground based equipment such as shovel yarding would not be permitted within 150 feet of fish bearing streams. Traditional ground based equipment would not be permitted within 50 feet of the stream channel in Class III and Class IV (non-fish bearing) streams. In the remainder of the riparian reserve, traditional 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 are 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. Prescription elements designed to accomplish this are detailed in Table 14. Minimum canopy closure of 40% would be permitted in units harvested by helicopter to facilitate operational safety requirements.
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.
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 units with ground based yarding would be scarified to a depth of 3-6 inches. Skid trails in regeneration treatments and all landings would be sub-soiled to a depth of 18-22 inches.
14. All 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.
15. Temporary roads would be decommissioned after completion of logging operations. 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.

16. In units containing stream channels, all existing large woody debris would be retained within riparian reserves to maintain channel stability; provide nutrients and food for aquatic plants and insects, and to provide buffering so as to filter sediment from runoff and maintain water quality.
17. Water sources used by project operations will be reconstructed or maintained as necessary to protect stream bank stability, riparian vegetation, and water quality.
18. The segment of road 2672-655 south of MP 5.04, from the intersection with road 2672-682 to road Oregon State Highway 126, is not to be used as an alternate haul route. The intent is to protect bull trout and spring Chinook spawning habitat between EWEB facilities and McKenzie River Trailhead from impacts of hauling.

IV. Effects of the Action on Matrix Indicators

Sediment

The revisions to Alternative B include construction of 4,200 feet of temporary road to thin Units 3, 6, and 7 (Figure 1 and 2). Of the 4,200 feet of temporary road, 3,900 feet of road described in this addendum (in Units 6 and 7) occur in non-bull trout and spring Chinook areas and outside of key watersheds, and 300 feet of temporary road within Tier 1 Key Watershed (Unit 3). Revisions to Alternative B also include reduction in culvert placement/replacement from 95 to 63. The BA disclosed that short-term increases in sources of sedimentation from ground disturbing activity, primarily through road reconstruction, culvert replacement, ground-based timber harvest and temporary road construction, were expected to occur at the site-specific level.

The addition of 4,200 feet of temporary road and reduction in quantity of culvert work to the project is not expected to adversely impact listed species habitat. The following rationale was used in making this determination:

All proposed temporary roads are located outside the Riparian Reserve and do not cross perennial or intermittent channels. Culverts are not necessary in construction of temporary roads described above. Roads will be constructed on native surfaces without importation of surfacing material (fill and gravel) and roads will be decommissioned upon completion of thinning operations. The list of protection measures above describe mitigations that apply to temporary road construction, use and decommissioning (from Two Bee Landscape Projects EA).

Temporary road construction will utilize 500 feet of existing skid roads (Unit 7), with the remaining 3,700 feet built on forested terrain. Temporary road width is 12 feet, requiring clearing of 1.0 acre for construction of 3,700 feet of road. As temporary roads are located outside of Riparian Reserve and do not cross streams, the potential to transport sediment is significantly reduced. Combined with mitigation measures described above, the potential to mobilize and transport sediment to waterways is minimal, and negligible to aquatic habitat occupied by listed species. As described in the addendum to hydrology analysis: *All temporary roads in each of the action alternatives are located on stable, gently rolling terrain, on Land-type 66 (Soil Resource Inventory for the Willamette National Forest, 1973). No stability problems associated with cut banks are identified for the land-type, and failure potential for road waste and fills is rated as low. None of the roads cross streams, and none are located in riparian reserves. Based on the location of these temporary roads, the forgiving nature of the landscape and soils, and the extensive mitigation included, measurable amounts of sediment transported from these roads is not anticipated.*

Modification to Alternative B with additional temporary roads in Unit 6 and 7 is not expected to affect water quality in listed species habitat (spring Chinook salmon and bull trout). This is due to the large

distance of the activities from listed species habitat (9 river miles downstream of units). Opportunity for suspended sediments to travel the 2.9 mile distance is negligible. The water course includes intermittent sections of the McKenzie River or Clear Lake and intermittent sections of the McKenzie River, two interruptions that would force deposition of suspension.

Table 2. Modification to Two Bee Landscape Project by additional temporary roads.

Unit	Proximity to habitat (miles)	Species present downstream	Flow route and Impoundments	Temporary Road Construction
3	2.9	But/Spch	IVMcK	300 feet
6	9.4	But/Spch	CL/CR/IVMcK	900 feet
7	9.4	But/Spch	CL/CR/IVMcK	3,000 feet

CL = Clear Lake; CR = Carmen Reservoir; IVMcK = intermittent McKenzie River; But = bull trout; Spch = spring Chinook

Unit 3, with closest proximity to bull trout and spring Chinook habitat would experience an increase in temporary road length as described in the Biological Assessment (increased from 0 feet to 300 feet). Temporary road construction consists of two 150 foot spurs in Unit 3 (Figure 1) and occur on flat terrain (the Smith Plateau), to the edge of a break in slope above the Tamolitch Valley. The potential flow route sediment would travel to any bull trout and spring Chinook habitat is 2.9 miles distant with over half of that distance through the intermittent McKenzie River channel as it flows through the Tamolitch Valley. As no waterways are crossed with temporary road construction and proposed roads are located on flat terrain a significant distance from sensitive habitat, the ability to transmit sediments to the river valley is negligible. A measurable change in fine sediment supply to listed species habitat is not expected with construction of 300 feet of temporary road in Unit 3.

Complete removal and re-vegetation of temporary roads (decommissioning) upon completion of thinning operations will return the disturbed surface to function hydrologically as a forested landscape. Disturbance caused by temporary road construction and decommissioning is expected to be short-term and local in effects. The matrix indicator of sediment continues to be described as a short-term degradation at the site-specific level in this addendum. Aquatic habitat contributing to the life history needs of bull trout and spring Chinook continues to be described as maintained.

Rock pit development is located sufficient distance from existing waterways to avoid transport of fine sediment to listed species habitat. Overland transport of sediment will be avoided due to topography of Boulder and Dogwood pit locations, distance to existing waterways and use of Best Management Practices (dry season development, overburden storage and stabilization, and post-development restoration measures of seeding, mulching and drainage improvement).

Dropping Unit 14, 17, 26 and a reduction in size of Unit 2, will reduce project area by 268 acres, which may be expected to reduce potential sources of sedimentation. Reduction in harvest generated sedimentation is expected to be too small to measure due to the small extent of change in project area and magnitude of effect (project design and mitigations sufficiently mitigate potential effects to water quality). Dropping of potential haul route along Forest Service Rd. 655 may be expected to reduce dusting of the nearby McKenzie River, but the absence of haul on this short road segment is not expected to measurably reduce project generated sediment. Dropping of reconstruction activity on portions of road 2655 and spurs accessing Units 14 and 26, and associated culvert placements may be expected to reduce short term fine sediment mobilization at a local level, but to no measurable extent in listed species habitat.

Logging system changes in Unit 18 and 34 will incorporate less ground disturbing harvest methods than originally described in the Fisheries Biological Assessment. Skyline harvest on 20 acres in Unit 18 and helicopter harvest on 14 acres in Unit 34, will result in a reduction in project related ground disturbance.

Due to the small extent of change in area and magnitude of effect, the reduction in ground disturbance will not result in a measurable difference.

VI. Determination of Effect - ESA

Consultation with regulatory agencies U.S. Fish and Wildlife Service and NOAA Fisheries was completed in February 2003 for the Two Bee Landscape Project with the Level 1 team concurring with a May Affect, but Not Likely to Adversely Affect (NLAA) determination. Re-consultation with USFWS and NOAA is initiated if one of three conditions exist:

1. New information reveals that effects of the action may affect listed species in a way not previously considered.
2. The action is modified in a way that causes an effect on listed species that was not previously considered.
3. A new species is listed or critical habitat is designated that may be affected by the action.

Condition 2 potentially exists with revisions to the Two Bee Landscape Project. However, the original analysis examined potential project effects on Matrix of Indicators (Temperature, Sediment, Large Woody Material, Peak/Base Flows, Road Density, Disturbance History, Riparian Reserves, etc.) at a project effects magnitude that is greater than is currently described as Alternative B.

Site-specific and short-term effects continue to be anticipated with project activities and at a reduced level than originally described. The maintenance of listed species habitat may be expected to continue with revisions to the Two Bee Landscape project.

Two Bee Landscape Management Project, Determination of Effect – ESA

Determination:

The Two Bee Landscape Management Project, when considered with the revisions to Alternative B, may affect, but is not likely to adversely affect (NLAA) **spring Chinook salmon or their habitat**. Critical habitat is designated for spring Chinook in the upper McKenzie River. The implementation of this project will not adversely modify habitat designated as Critical to spring Chinook salmon in the upper McKenzie 5th field watershed. The Two Bee Landscape Management Project, when considered with revisions to Alternative B, may affect, but is not likely to adversely affect (NLAA) **bull trout or their habitat**. Critical Habitat for bull trout is designated in the upper McKenzie 5th field watershed, and habitat of importance to bull trout in the project area will be maintained. The implementation of this project will not adversely modify Critical bull trout habitat in the upper McKenzie 5th field watershed.

Rationale:

The analysis of effects on the matrix indicators in the BA is limited to site specific, short duration and low magnitude effects. The project is designed to protect water quality and fish habitat. These effects are not expected to directly or indirectly change the condition of existing or potentially occupied listed fish habitat. These effects would be non-detectable at the 6th field watershed level. Although both spring Chinook salmon and bull trout utilize habitat downstream from the Two Bee Landscape Project, the probability that the implementation of this project will affect these fish or their habitat is very low. The majority of revisions to Alternative B are located above a natural barrier and man-made impoundment(s) for both listed species, further reducing the probability that this project will adversely affect the listed fish or their habitat.

VII. Determination of Effect – Essential Fish Habitat

Two Bee Landscape Project, Determination of Effect - Essential Fish Habitat

Determination:

When the Magnuson-Stevens Act of 1976 was re-authorized in 1996, it directed Regional Fishery Management Councils to identify Essential Fish Habitat (EFH) for commercial fish species of concern. The Pacific Fishery Management Council identified EFH in the Willamette Basin in June 2000. The Magnuson-Stevens Act requires Federal Agencies to consult with the Secretary of Commerce (NMFS) regarding any action authorized, funded, undertaken by such agency which may adversely affect EFH.

The National Marine Fisheries Service has identified the waters upstream from Trail Bridge Dam as Essential Fish Habitat for spring Chinook salmon. Additional effects analysis contained in this addendum and in the Biological Assessment address potential effects to EFH (i.e., effects to spring Chinook salmon habitat). The effects analysis presented in this addendum to effects summary indicates minimal risk of adversely affecting watershed condition. The biological assessment finds that a “May Affect, Not Likely to Adversely Affect” determination for spring Chinook salmon was appropriate in summarizing effects to habitat. Therefore it is expected that Two Bee Landscape Project will have a minimal effect to EFH. It is determined that these projects will not exceed the “May Adversely Affect” EFH threshold and are therefore not subject to EFH consultation with NMFS. EFH does not apply to bull trout as they are not a component of a commercial fishery.



United States
Department of
Agriculture

Forest
Service

Willamette National Forest
McKenzie Ranger District

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File Code: 2670
Route To: Files

Date: 2 October 2006

Subject: Biological Assessment – Two Bee Landscape Management Project, Other Actions Analyzed.

To: Al Brown – Team Leader

The purpose of this biological assessment/biological evaluation (BA/BE) is to document the potential effects of *Other Actions* proposed in the Two Bee Landscape Management Project on listed and native fish species and their habitat. The two listed species that will be evaluated are bull trout (*Salvelinus confluentus*) and Upper Willamette spring Chinook salmon (*Oncorhynchus tshawytscha*). Both of these species are listed as threatened under the Endangered Species Act. and both species have Critical Habitat within the project area. In addition to listed species inhabiting the project area, native aquatic species are located in the project area. A portion of these are considered **Management Indicator Species**. Anadromous (sea-run fish) and resident fish considered Management Indicator Species are those species commonly angled for. In the McKenzie River sub-basin and tributaries in the project area, the species commonly angled for are spring Chinook salmon, rainbow trout, and cutthroat trout.

The proposed action includes project associated actions, described in the Other Actions Analyzed of the Two Bee EA. Other actions consist of the following activities:

Other Actions	Acres	Stand composition
Aerial fertilization	1,350	20-40 year old second growth
Precommercial thinning	834	10-20 year old plantations
Pruning	65	20-40 year old second growth
Reforestation	117 – Alt. A 666 – Alt. C	Shelterwood units in Alternative A or C
Diversity (precommercial) thinning	139	10-20 year old plantations
Pond habitat improvement	4	Near Units 2 and 23
Native seed application on skid roads, landings and decommissioned roads	4	Project-wide
Forage seeding	70	Project-wide
Manual noxious weed treatment	5	Project-wide

The actions are designed to improve stand condition and include measures to improve habitat conditions for wildlife and aquatic species.

Environmental and Biological Consequences of Proposed Action

The Two Bee project Other Actions will remain consistent with the programmatic Biological Opinions (U.S. Fish and Wildlife Service – April 11, 2003; and NOAA Fisheries – February 25, 2003). Project activities described above will meet Project Design Criteria required of programmatic actions within bull trout and spring Chinook salmon watersheds. Project Design



Criteria applied to project activities will include measures necessary to maintain a *Not Likely to Adversely Affect (NLAA)* determination.

Project Design Criteria specific to these activities are as follows:

- Measures appropriate to ensure protection of aquatic and riparian habitats will be applied.
- Fisheries, hydrology or other qualified personnel shall review proposed activities to define the affected areas.
- Streambank trees will not be cut.
- An untreated area within 10 feet along ephemeral and non-fish bearing intermittent streams, and a 20 foot untreated buffer on perennial streams, including fish bearing streams, will be maintained to prevent any potential adverse effects to stream channel or water quality conditions.
- While refueling power equipment remain at least 150 feet distant from water bodies to prevent direct delivery of contaminants into a water body. Use absorbent pads for immobile equipment and while refueling. Where it is not possible to refuel 150 feet distant (where local site conditions do not allow a 150-foot setback), refuel as far as possible from the water body and ensure use of absorbent pads.
- Follow ODFW guidelines for timing of in-water work.
- Do not apply chemical fertilizer within 50 feet of live water.

Ground disturbing activities associated with thinning, reforestation, pruning, manual noxious weed pulling, and native seeding have little potential to adversely affect water quality conditions in nearby channels due to the manual accomplishment of each task and low intensity of the activity. There is negligible risk of transporting sediments to sensitive spring Chinook salmon and bull trout spawning and rearing habitat. Because of the factors described above, there are no known direct, indirect or cumulative effects on water quality associated with action alternatives. The project areas or no activity zones buffering streams are situated far enough away from surface water to avoid impacts to water quality. If project areas are in the immediate vicinity of a channel or water, precautions include maintenance of stream bank stability during and after thinning activity, and fuel containment measures sufficient to avoid impacts to water quality.

The potential to disturb water quality is greater with aerial fertilization and pond habitat improvement. Mitigations described in Project Design Criteria above will significantly reduce risk to water quality and aquatic habitat (no fertilizer within 50 feet of live water and adherence to ODFW in-water work guidelines). Because of the factors described above, there are no known direct, indirect or cumulative effects on water quality associated with action alternatives. No activity zones buffering streams and timing of in-water work will avoid impacts to water quality and habitat.

Aggregate Federal Effects

The Two Bee Landscape Projects, including Other Projects described here, are evaluated in context of past and proposed future projects. All projects include thinning within 135 acres of Riparian Reserve within non-bull trout and non-spring Chinook adjacent areas. No thinning within bull trout

and spring chinook adjacent Riparian Reserves is proposed with Two Bee Projects. The entire project proposes burning within 160 acres of Riparian Reserve within non-bull trout and non-spring Chinook habitat adjacent areas. No burning within listed species area Riparian Reserves is proposed. Risk of short-term disturbance is mitigated by dry season operation, limiting equipment proximity to Class III and IV channels to no closer than 50 feet, requiring full suspension over perennial channels, and use of existing skid trails in the Riparian Reserve.

Following examination of aggregate effects of past and proposed projects, management induced effects are not significant in aggregate to increment changes in; 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; 4) adverse alteration of sediment storage and structure in channels. The quality of Critical Habitat important to spring Chinook salmon and bull trout is expected to be maintained with implementation of any proposed action alternative.

Effects Determination

The Project Design Criteria will ensure that the environmental effects found in the Northwest Oregon Programmatic Biological Assessment (NWORBA) (October 9, 2002) remain within the range of “typical effects.” This activity will not result in ground disturbance and therefore will not cause sediment mobilization and transport to streams. Bank stability will be protected and shade trees will not be cut and therefore there will be no stream temperature increases. Finally, this project will not remove sufficient vegetation to affect peak flows. Given these environmental effects, this project is consistent with the programmatic Biological Opinions (U.S. Fish and Wildlife Service – April 11, 2003; and NOAA Fisheries –February 25, 2003) and the effects determination is “**may affect, not likely to adversely affect**” (NLAA) listed fish species.

Due to the factors described above, mitigations, and proximity of fish-bearing channels, the Two Bee Project **will not adversely modify** Critical Habitat for spring Chinook salmon and bull trout.

Magnuson-Stevens Fishery Conservation Act

The National Marine Fisheries Service has identified the waters upstream and downstream from Trail Bridge Dam as Essential Fish Habitat for spring Chinook salmon. Additional effects analysis contained in this supplement to the Biological Assessment address potential effects to EFH (i.e., effects to spring Chinook salmon habitat). Given protections provided by Project Design Criteria, the project will have **no adverse affect** on EFH in any of the project areas. This project is expected to have beneficial effects to EFH in the long term by encouraging the growth of large trees in riparian reserves that are expected to eventually fall into stream channels.

The effects analysis presented in this assessment indicates minimal risk of adversely affecting watershed condition. The biological assessment finds that a “May Affect, Not Likely to Adversely Affect” determination for spring Chinook salmon is appropriate in summarizing effects to habitat. Therefore it is expected that Other Projects described in Two Bee Landscape Project EA will have a minimal effect to EFH. It is determined that these projects will not exceed the “May Adversely Affect” EFH threshold and are therefore not subject to EFH consultation with NMFS. EFH does not apply to bull trout as they are not a component of a commercial fishery.

Management Indicator Species

Project Design Criteria employed to conserve listed species and their habitat sufficiently protect habitat necessary to Management Indicator Species. This project is expected to maintain MIS habitat and species in the short term and have beneficial effects to MIS habitat and species in the long term by encouraging the growth of large trees in riparian reserves and enhancing future in-stream wood supply.

/s/ Dave Bickford

Dave Bickford

District Fisheries Biologist

McKenzie River Ranger District

Appendix C: Botany



United States
Department of
Agriculture

Forest
Service

Willamette National Forest
McKenzie River Ranger District

McKenzie Bridge,
OR 97413
Tel (541) 822-3381
FAX (541) 822-7254

Date: February 4, 2003

File Code: 2670 Botany
Subject: Two Bee Projects BE

I. Introduction

Purpose:

The purpose of this Biological Evaluation is to review the Two Bee Landscape Management Project (Two Bee Project) in sufficient detail as to determine whether the proposed action will result in a trend toward Federal listing of any sensitive plant species.

Plant Species of Concern:

Current management direction mandates conservation of several categories of rare plants on the Willamette National Forest. Protection of federally listed Threatened and Endangered species is mandated by the Endangered Species Act. No federally listed Threatened or Endangered, or proposed plants, nor suitable habitat for these listed plants are known to occur in the project area. Sensitive species are protected by USDA Forest Service regulations and manual direction (FMS 2672.4).

Prefield reviews were conducted to determine which species from the Regional Foresters 2002 Sensitive Species List for the Willamette National Forest are known from the project area or have suitable habitat present and potentially occur in the project area. Results show no known occurrences of sensitive plant species within the project area. There is potential habitat for eight sensitive species (see Appendix A).

II. Description of the Proposed Project

Location Description:

The proposed projects for the Two Bee Project are located in the Upper McKenzie Watershed on the McKenzie River Ranger District, Willamette National Forest, OR. The legal location for the project is: T.13S., R.6E., Sections 25 and 26; T.13S., R.7E., Sections 29-31, and 32; T.14S., R.6E., Sections 12-14, 22-28, and 33-36; T.14S., R.7E., Sections 5-8, 17-20, 30, and 31; T.15S., R.6E., Sections 1-3, 11, and 12.

Alternative A:

Proposed harvest prescriptions may include partial cutting and shelterwood with high retention, salvage, and post and pole thinning. Methods of harvest may include ground based, skyline with partial suspension, and helicopter. Project-related road maintenance will occur.

Alternative B:

Proposed harvest prescriptions may include partial cutting, salvage, and post and pole thinning. Methods of harvest may include ground based, skyline with partial suspension, and helicopter. Project related road maintenance will occur.



Alternative C:

Proposed harvest prescriptions may include partial cutting and shelterwood with heavy retention, salvage, and post and pole thinning. Methods of harvest may include ground based, skyline with partial suspension, and helicopter. Two units will be understory burned. Project related road maintenance will occur.

Projects Common to all Action Alternatives:**Road System Maintenance**

Some of the National Forest System Roads within the project area would require maintenance to provide for safe and efficient travel for administration, utilization and protection of National Forest System lands, or to meet resource and other management objectives. Road maintenance activities typically include cutting roadside brush, repairing or replacing culverts, falling hazard trees, blading roads, minor realignment, placement of aggregate surfacing, dip or water bar construction, riprap placement, seeding and mulching, installation of signs, gates, etc. Aggregate for surfacing or riprap would be produced at the Dogwood or Boulder Creek Pits in accordance with their respective development plans. Roads no longer needed to meet forest resource management objectives would be considered for storage or decommissioning.

Helicopter Landings

Helicopter landings would be needed to facilitate harvest activities. The existing landing/turnaround at the end of Forest Road 2600-730 would require enlarging, to accommodate helicopter logging. The boat launch at Smith Reservoir may also be needed as a log landing for helicopter logging.

Alternative D:

The no-action alternative would not implement timber harvesting and post and pole thinning. No understory burning would occur. Road maintenance and reconstruction would not occur in the project area at this time.

III. Existing Environment**Survey Results:**

Field surveys using the intuitive-control method were conducted July, August, and September of 2000, and August and September of 2001. Most of the surveys were conducted by Tamen Earhart, Ron Hamill, Eric Muench, and Jennifer Hutchinson of Cryptogam Research Associates. One unit and the rock pits were surveyed by Susan Stearns, the district botanist. Concentrated surveys were conducted in areas of suspected suitable habitat for sensitive plants. No sensitive plant species from the 2002 Regional Forest's Sensitive Plant List for the Willamette National Forest were located during the survey. There were no changes to the Sensitive Plant List for the Willamette National Forest from 2000 to 2002.

IV. Impacts of the Proposed Project**Direct and Indirect Impacts:**

This project will cause no direct or indirect effects to sensitive plant because no sensitive plants were observed during surveys of the project area.

Cumulative Effects:

There are no cumulative effects to sensitive plant species because no sensitive plants were observed during surveys of the project area.

Compliance with Management Direction:

This Biological Evaluation has documented the completion of the steps outlined in the Regional Office directive on the 2670 section of the Forest Service manual.

V. Determinations

It is my determination that selection of any alternative will have no impact on sensitive plants and their associated habitat because no sensitive plant species occur within the Two Bee project area.

In the event that a sensitive plant population is discovered after the timber sale is sold, Contract Clauses C9.52 and C6.25 will be enforced and project modifications may result.

Prepared by: Susan Stearns
Susan Stearns District Botanist
McKenzie River Ranger District

Date: February 6, 2003

Reviewed by: Cheryl Friesen
Cheryl Friesen, Resources Staff
McKenzie River Ranger District

Date: February 6, 2003

Appendix A: Willamette National Forest 2002 Sensitive Plant Species List

Species	Habitat Present in Project Area	Species Present in Project Area
<i>Agoseris elata</i>	N	N
<i>Arabis hastatula</i>	N	N
<i>Arnica viscosa</i>	N	N
<i>Asplenium septentrionale</i>	N	N
<i>Aster gormanii</i>	Y	N
<i>Aster vialis</i>	Y	N
<i>Botrychium minganense</i>	Y	N
<i>Botrychium montanum</i>	Y	N
<i>Botrychium pumicola</i>	N	N
<i>Calamagostis breweri</i>	N	N
<i>Carex livida</i>	N	N
<i>Carex scirpoidea</i> var. <i>stenochlaena</i>	N	N
<i>Cimicifuga elata</i>	Y	N
<i>Coptis trifolia</i>	Y	N
<i>Corydalis aqua-gelidae</i>	Y	N
<i>Frasera umpquaensis</i>	N	N
<i>Gentiana newberryi</i>	N	N
<i>Iliamna latibracteata</i>	N	N
<i>Lewisia columbiana</i> var. <i>columbiana</i>	N	N
<i>Lycopodiella inundata</i>	N	N
<i>Montia howellii</i>	N	N
<i>Ophioglossum pusillum</i>	N	N
<i>Pellaea andromedaefolia</i>	N	N
<i>Polystichum californicum</i>	Y	N
<i>Potentilla villosa</i>	N	N
<i>Romanzoffia thompsonii</i>	N	N
<i>Scheuchzeria palustris</i> var. <i>americana</i>	N	N
<i>Sisyrinchium sarmentosum</i>	N	N
<i>Utricularia minor</i>	N	N
<i>Wolffia borealis</i>	N	N
<i>Wolffia columbiana</i>	N	N



Date: 3 February 2003

File Code: 2670 Botany

Subject: Two Bee Supplemental Botany Report

This document serves as the Botanical Resource Report for the TwoBee Projects on the McKenzie River Ranger District, Willamette National Forest. The legal location for the Planning Area is: T.13S., R.6E., Sections 25 and 26; T.13S., R.7E., Sections 29-31, and 32; T.14S., R.6E., Sections 12-14, 22-28, and 33-36; T.14S., R.7E., Sections 5-8, 17-20, 30, and 31; T.15S., R.6E., Sections 1-3, 11, and 12.

Sensitive Plants

A prefield review showed no known populations of sensitive plants listed on the Regional Forester's 2002 Sensitive Plant List for the Willamette National Forest. Potential habitat for eight sensitive plant species occur in the TwoBee project area. No sensitive plant species were observed during surveys of the project area.

Survey and Manage Species

The TwoBee Project Area contains late-successional/old-growth habitat and potential habitat for survey and manage vascular plants, lichens, bryophytes, and fungi. Surveys were conducted for Category A and C vascular plants, lichens, bryophytes, and fungi. See attached prefield review form for results of the survey. All survey and manage species known to occur in the TwoBee project area will receive a no-harvest buffer. Lichen and bryophyte species will be buffered 180' to maintain the microclimate of the site. Fungi species will be buffered 360' to maintain the microclimate of the site. The larger buffer is recommended because the extent of the underground mycelia is unknown.

Noxious Weeds

Noxious weed species that are most abundant in the project area are bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), St. John's wort (*Hypericum perforatum*), and tansy rag-wort (*Senecio jacobaea*). These species are found along the roads adjacent to almost all of the proposed harvest units. In the project area there are four occurrences of Scotch broom (*Cytisus scoparius*), two of reed Canarygrass (*Phalaris arundinacea*) and evergreen blackberry (*Rubus laciniata*), and one occurrence of Himalayan blackberry (*Rubus discolor*). Spotted knapweed (*Centaurea maculosa*) and diffuse knapweed (*Centaurea diffusa*) occur along State Highway 126.

The following mitigation measures will be implemented to reduce the introduction and spread of noxious weeds in the TwoBee project area:

- All off-road construction and logging equipment will be pressure washed to remove all dirt and debris prior to entering Forest land.
- KV dollars will be collected for controlling noxious weeds on all harvest units and associated roads in the planning area.
- Haul truck turn-arounds will not be constructed in known noxious weed populations.



- Minimize fire line construction; where it is necessary use hand construction rather than machine constructed line.
- Clean fill (soil or rock free of slash and debris) will be used for new temporary road construction and reconstruction.
- Sources of rock and fill material shall be free of noxious weeds.
- Roads to be bermed or decommissioned will be treated for noxious and non-native weeds prior to treatment.
- Bermed and decommissioned road will be monitored for noxious weeds for three year after the road treatment is completed.

Special Habitats

The following non-forested habitats occur with-in proposed project areas of the TwoBee Planning Area: rock faces, rock outcrops, tallus slopes, wet draws, wetlands/conifer swamps, and forested wetlands/seeps. These habitats will be protected with a 50-300' no-harvest buffer. The rock outcrop in Unit 4 requires no botanical protection because it does not have any unique vegetation.

The following mitigation measures will be implemented to reduce the impact to non-forested areas:

- A 50-360 foot buffer will be placed around non-forested habitats where appropriate.
- Skid trails and roads will not be located within the buffer.
- When within 180 feet of non-forested habitats and when possible trees will be felled away from the non-forested habitats.

Prepared by: /s/ Susan Stearns
 Susan Stearns District Botanist
 McKenzie River Ranger District

Date: 3 February 2003

Results of Prefield Review and Field Reconnaissance for Protection Buffer and Survey and Manage Plant Species Willamette National Forest: FY 2002

Project Name: TwoBee Unit #(s): 1, 2, 3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 17, 18, 21, 22, 23, 24, 25, 26, 27, 29, 30, 31, 33, 34, 39, 40, 41, 90, 91, and Other Projects

Legals: T.13S., R.6E., Sections 25 and 26; T.13S., R.7E., Sections 29-31, and 32; T.14S., R.6E., Sections 12-14, 22-28, and 33-36; T.14S., R.7E., Sections 5-8, 17-20, 30, and 31; T.15S., R.6E., Sections 1-3, 11, and 12.

Is the project ground disturbing? Yes ☒ (if yes, then conduct survey)
No ☐ (if no, then document in project file)

Species	Habitat Present? (Y/N)	Date Surveyed	Surveyor(s) Name(s)	Species Located? (Y/N)	Additional Survey Needs? When and Where?
<i>*¹Botrychium minganense</i>	Y	2000 & 2001	CRA	N	N
<i>*Botrychium montanum</i>	Y	2000 & 2001	CRA	N	N
<i>Bridgeoporus nobilissimus</i>	N	2000 & 2001	CRA	N	N
<i>*Coptis trifolia</i>	Y	2000 & 2001	CRA	N	N
<i>*Corydalis aqua-gelidae</i>	Y	2000 & 2001	CRA	N	N
<i>Cypripedium montanum</i>	N	2000 & 2001	CRA	N	N
<i>*Eucephalus vialis</i>	Y	2000 & 2001	CRA	N	N
<i>Galium kamtschaticum</i>	N	2000 & 2001	CRA	N	N
<i>Hypogymnia duplicata</i>	N	2000 & 2001	CRA	N	N
<i>Lobaria linita</i>	Y	2000 & 2001	CRA	N	N
<i>Pseudocyphellaria rainierensis</i>	Y	2000 & 2001	CRA	Y Unit 23 and log jam	N
<i>Schistostega pennata</i>	Y	2000 & 2001	CRA	N	N
<i>Tetraphis geniculata</i>	Y	2000 & 2001	CRA	N	N

This list is from the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, USDA & USDI 2001.

¹ * Starred species are also on the Willamette NF Sensitive Species List

Leptogium cyanescens and *Ramalina thrausta* were added to Category A in January 2001, *Dendroscopaulon intricatum* and *Nephroma occultum* were added to Category A on June 14, 2002 following the 2001 Annual Species Review. No botanical species were added to the list during the 2002 Annual Species Review. These species are exempt from surveys for this project because the survey protocols had not been developed at the time of the survey (Survey and Manage ROD and S&G 2001, Pg23).

Other S&M Species occurring in the TwoBee Planning Area:

Nephroma occultum Units 1, 3, 17, 18, 23, 24, 26, 30, 37, and the Log Jam project.

Buxbaumia viridis Units 4, 26, and 30; *Ramaria rubripermanens* Units 6, 7, and 14

Collybia bakerensis Units 6, 8, 21, and 23; *Gastroboletus subalpinus* Unit 7

Ramaria amalyoidea Units 21, 23, and 24; *Polyozellus multiplex* Unit 22; *Cortinarius olympianus* Unit 23

Gymnopilus punctifolius Unit 23; *Gomphus kauffmanii* Unit 23

Signature: /s/ Susan Stearns
Botanist

March 27, 2003
Date

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United States
Department of
Agriculture

Forest
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File Code: 2670
Route To: Two Bee Timber Sale Analysis Files

Date: October 2, 2006

Subject: Botanical Resources: Two Bee Biological Evaluation Addendum

To: Al Brown – Project Leader

Introduction

This report serves as a supplement to the February 4, 2003 botanical biological evaluation prepared for the Two Bee project area.

The Forest Service manual directs us 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 a Regional Forester's Sensitive Species List (USDA Forest Service, 2002). These species and their habitats are often rare and limited in distribution. A prefield review was conducted to determine which sensitive species have historically been documented in the Two Bee Project area. There are no documented sites of sensitive plants in the Two Bee Project area.

Intuitive-controlled field surveys in 2000 and 2001 followed up the prefield review to determine presence of sensitive plant species within those special habitat areas, as well as other potential habitats. No sensitive plants were observed during these surveys.

Survey Results and Mitigations

Intuitive control field surveys were conducted June and July of 2006 for the species listed below in order to comply with the 2001 ROD. Two lichen species were documented in the Two Bee project area from these surveys and mitigations have been developed for their protection.

Two Bee Sensitive Species Prefield Review and Survey Results-2006 Field Season

Species	Prefield Review	Field Recon.	Species Presence
<i>Leptogium cyanescens</i>	Habitat present	Jun-Jul. 2006	Absent
<i>Nephroma occultum</i>	Habitat present	Jun-Jul. 2006	Units: 6, 7, 34, 39, 91 Mitigation: 180 ft. no-harvest buffer
<i>Castilleja rupicola</i>	Habitat absent	Jun-Jul. 2006	Absent
<i>Chaenotheca subroscida</i>	Habitat absent	Jun-Jul. 2006	Absent
<i>Dermatocarpon luridum</i>	Habitat absent	Jun-Jul. 2006	Absent
<i>Leptogium burnetiae</i> var. <i>hirsutum</i>	Habitat absent	Jun-Jul. 2006	Absent
<i>Lycopodium complanatum</i>	Habitat absent	Jun-Jul. 2006	Absent



<i>Pannaria rubiginosa</i>	Habitat absent	Jun-Jul. 2006	Absent
<i>Peltigera neckeri</i>	Habitat absent	Jun-Jul. 2006	Absent
<i>Peltigera pacifica</i>	Habitat present	Jun-Jul. 2006	Units: 31, 39 Mitigation: 180 ft. no-harvest buffer
<i>Pilophorus nigricaulis</i>	Habitat absent	Jun-Jul. 2006	Absent
<i>Ramalina pollinaria</i>	Habitat absent	Jun-Jul. 2006	Absent
<i>Rhizomnium nudum</i>	Habitat absent	Jun-Jul. 2006	Absent
<i>Thorluna disimilis</i>	Habitat absent	Jun-Jul. 2006	Absent
<i>Usnea longissima</i>	Habitat present	Jun-Jul. 2006	Absent
<i>Pseudocyphellaria raineriensis</i>	Habitat present	Jul-Aug. 2001	Absent
<i>Hypogymnia duplicata</i>	Habitat absent	Jul-Aug. 2001	Absent
<i>Lobaria linita</i>	Habitat present	Jul-Aug. 2001	Absent
<i>Schistostega pennata</i>	Habitat present	Jul-Aug. 2001	Absent
<i>Tetraphis gemiculata</i>	Habitat present	Jul-Aug. 2001	Absent

Description of the Proposed Project

The proposed Two Bee projects are located in the Upper McKenzie Watershed on the McKenzie River Ranger District, Willamette National Forest, Oregon. The legal location for the project is: T.13 S., R.6 E., Sections 25 and 26; T.13 S., R.7 E., Sections 29-31, and 32; T.14 S., R. 6E., Sections 12-14, 22-28, and 33-36; T.14 S., R 7E., Sections 5-8, 17-20, 30, and 31; T.15S, R.6E., Sections 1-3, 11 and 12.

Alternative A:

Proposes harvest prescriptions that may include partial cutting and shelterwood with high retention, salvage, moderate commercial thinning. Harvest methods may include ground based, skyline with partial suspension, and helicopter. Project related road maintenance will occur.

Alternative B:

Proposes harvest prescriptions that may include partial cutting, salvage, moderate commercial thinning thinning. Harvest methods may include ground based, skyline with partial suspension, and helicopter. Project related road maintenance will occur.

Alternative C:

Proposes harvest prescriptions that may include partial cutting and shelterwood with heavy retention, salvage, and moderate commercial thinning. Harvest methods may include ground based, skyline with partial suspension, and helicopter. Two units will be understory burned. Project related road maintenance will occur.

Alternative D:

The no-action alternative would not implement timber harvesting and moderate commercial thinning. No understory burning would occur. Road maintenance and reconstruction would not occur in the project area at this time.

Effects of the Proposed Project

Direct and Indirect Effects Common to All Action Alternatives

There will be no direct impacts to lichen species found in the Two Bee project area because 180 ft. no-harvest buffers will be placed around known sites. The no-harvest buffers will protect sites from yarding, and accidental degradation from harvest activities.

Indirect impacts are not anticipated from implementing any of the action alternatives. The no-harvest buffers will maintain microclimatic and hydrologic conditions at the known sites, while serving to minimize edge effects from adjacent timber harvest.

Cumulative Effects

No cumulative effects are expected because of the no-harvest buffers around known sites.

Determinations

It is my determination that selection of any of the action alternatives will not likely adversely affect any plant species known to occur in the project area. Implementing any of the action alternatives will not adversely affect habitats associated with known sensitive plants in the Two Bee project area.

/s/ Burtchell Thomas

BURTCHELL THOMAS

Botanist-McKenzie River Ranger District

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APPENDIX D

WILDLIFE BIOLOGICAL EVALUATION

Two Bee Project

February 4, 2003

Alternatives considered in the Two Bee Environmental Assessment require a Biological Evaluation to be completed (FSM 2672.4). The Biological Evaluation process is intended to analyze and document activities to ensure proposed management actions:

1. Do not contribute to loss of viability of any native or desired non-native plant or animal species;
2. Incorporate concerns for sensitive species throughout the planning process, reducing negative impacts to species and enhancing opportunities for mitigation;
3. Ensure that activities will not cause a species to move toward federal listing;
4. Comply with the requirements of the Endangered Species Act that actions of Federal agencies not jeopardize or adversely modify critical habitat of Federally listed species;
5. Provide a process and standard by which to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision making process (FSM 2672.41 ID and 2672.41).

Species evaluated include:

- Species listed or proposed to be listed as endangered (E) or threatened (T) by the USDI Fish and Wildlife
- Species listed as sensitive (S) by USDA Forest Service Region 6.

I. INTRODUCTION

This Wildlife Biological Evaluation determines the effects of all alternatives of the EA on any proposed, threatened, endangered, or sensitive fauna that may occur within the analysis area. This evaluation, required by the Interagency Cooperation Regulations (Federal Register, January 4, 1978), ensures compliance with the Endangered Species Act of 1973, P.L. 93-205 (87 Stat. 884) as amended.

Project Location and Description

The Two Bee Landscape Management Project Area covers 12,456 acres within the Upper McKenzie River Watershed on the McKenzie River Ranger District. Proposed actions would occur in an area west of the McKenzie River, north of Trail Bridge Reservoir, and to the District boundaries west and north. Major drainages include

Hackleman Creek, Smith Creek, Browder Creek, and Bunchgrass Creek. Elevations range from 2,300 ft. at Trail Bridge Reservoir to 5,200 ft. at Bunchgrass Mountain.

This BE evaluates 4 alternatives: 1 no action and 3 action. Tables 1-3 summarize the forest treatments involved by alternative. Table 4 describes the underburning activities, which are common to all action alternatives.

Table 1: Alternative A Forest Treatments

Unit	Harvest Prescription	Acres	Logging Systems	Fuels Treatment
1	Moderate Partial Cut	81	Ground-based	UB
2	Light Partial Cut	47	Ground-based and Skyline partial suspension	YTA
3	Moderate Partial Cut	41	Skyline partial suspension	YTA/L
4	Moderate Partial Cut	21	Ground-based	UB/GP
6	Light Partial Cut	74	Ground-based	UB/GP
8	Moderate Partial Cut	12	Ground-based	UB/GP
13	Post and Pole	40	Ground-based	HP
21	Moderate Partial Cut	21	Ground-based	GP
22	Moderate Partial Cut	22	Ground-based	GP
23	Moderate Partial Cut	39	Ground-based	GP
24	Moderate Partial Cut	12	Ground-based	GP
29	Shelterwood/HR	12	Skyline, partial suspension	YTA/UB
30	Shelterwood/HR	41	Skyline, full suspension	YTA/UB
31	Shelterwood/HR	64	Skyline, partial suspension	YTA/UB
39	Salvage	7	Helicopter	YTA/L
41	Post and Pole	47	Ground-Based	HP
Total		581		

GP: Grapple Pile and burn

HP: Hand Pile and burn

UB: Underburn

YTA: Yard Tops Attached and burn at landing

YTA/L: Yard Tops Attached / Limbing done at landing

MBF = Thousand Board Feet/CCF = Hundred Cubic Feet

Total Estimated Road Maintenance: 14.7 miles.

Table 2: Alternative B Forest Treatments

Unit	Harvest Prescription	Acres	Logging Systems	Fuels Treatment
1	Moderate Partial Cut	81	Ground-based	UB
2	Moderate Partial Cut	47	Ground-based and Skyline Partial Suspension	UB/GP
3	Moderate Partial Cut	41	Skyline Partial Suspension	YTA/L
4	Moderate Partial Cut	21	Ground-based	UB/GP
6	Moderate Partial Cut	74	Ground-based	UB/GP
7	Moderate Partial Cut	173	Ground-based	UB/GP

11	Salvage	19	Ground-based	HP
13	Post and Pole	40	Ground-based	HP
14	Light Partial Cut /Salvage	98	Skyline Partial Suspension	YTA/L
17	Moderate Partial Cut	52	Skyline partial suspension/helicopter	YTA/L
18	Moderate Partial Cut for Multistory	121	Ground-based	GP
26	Moderate Partial Cut	93	Helicopter	YTA/L
27	Moderate Partial Cut	38	Helicopter / Skyline, partial suspension	YTA/UB
33	Moderate Partial Cut	50	Helicopter	YTA/L/UB
34	Moderate Partial Cut	91	Helicopter / Skyline, partial suspension	YTA/L/UB
39	Salvage	7	Helicopter	YTA/L
41	Post and Pole	47	Ground-based	HP
Total		1,093		

Total Estimated Road Maintenance: 21.9 miles

Table 3: Alternative C Forest Treatments

Unit	Harvest Prescription	Acres	Logging Systems	Fuels Treatment
1	Heavy Partial Cut	81	Ground-based	UB
2	Moderate Partial Cut	47	Skyline partial suspension	UB/GP
3	Moderate Partial Cut	41	Skyline partial suspension	YTA/L
4	Shelterwood/HR	21	Ground-based	UB/GP
6	Shelterwood/HR	74	Ground-based	UB/GP
7	Shelterwood/HR	173	Ground-based	UB/GP
8	Heavy Partial Cut	12	Ground-based	GP
10	Moderate Partial Cut	16	Ground-based	UB
13	Post and Pole	40	Ground-based	HP
14	Light Partial Cut /Salvage	98	Skyline partial suspension	YTA/L
18	Moderate Partial Cut	121	Ground-based	GP
21	Heavy Partial Cut	21	Ground-based	GP
22	Heavy Partial Cut	22	Ground-based	GP
23	Heavy Partial Cut	39	Ground-based	GP
24	Moderate Partial Cut	12	Ground-based	GP
26	Shelterwood/HR	93	Helicopter	YTA/L
27	Shelterwood/HR	38	Skyline partial suspension	YTA/L
29	Shelterwood/HR	12	Skyline partial suspension	YTA/UB
30	Shelterwood/HR	41	Skyline full suspension	YTA/UB
31	Shelterwood/HR	64	Skyline partial suspension	YTA/UB

33	Shelterwood/HR	50	Helicopter	YTA/L/UB
34	Shelterwood/HR	91	Helicopter / Skyline, partial suspension	YTA/L/UB
39	Salvage	7	Helicopter	YTA/L
40	Shelterwood/HR	9	Ground-based	UB
41	Post and Pole	47	Ground-based	HP
Total		1,270		

Total Estimated Road Maintenance: 23.8

Table 4: Prescribed fire areas.

Unit	Prescription	Acres
90	Underburn	69
91	Underburn	80

Table 5: Restoration Projects Common to all Action Alternatives

- Rehabilitate dispersed recreation site on Forest Road 2672655
- Berm 3.3 miles of road
- Gate 3.76 miles of road
- Re-design Ikenick Cr. crossing on Road 2672 to accommodate over-topping when beaver activity impairs culvert function and facilitate amphibian passage
- Decommission 3.0 miles of road
- Storm-proof 1.5 miles of road
- Replace undersized culvert on Road 2672675 at Ikenick Creek to accommodate a 100-year flood recurrence and upstream and downstream passage of aquatic species (Alternatives B and C only).
- Enlarge end of Forest road 2600-730 to accommodate helicopter landing.
- Develop Boulder Rock Pit and Dogwood Rock Pit

II. RISK ASSESSMENT PROCESS

This Biological Evaluation covers a 6-step process to identify proposed, threatened, endangered, and sensitive wildlife species that may be associated with the project area, and to evaluate any impacts the project may have to those species:

1. Review of existing documented information.
2. Field reconnaissance of the project area for evidence of species or habitat
3. Evaluation of the impacts of the project to suspected or known local populations of TE&S species.
4. Analysis of the significance of the project's effects on local and entire populations of TE&S 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 FWS is initiated at appropriate stage as outlined in FSM 2673.2-1, or is otherwise arranged through formal channels.

* Step #5 pertains only to T and E Federally listed species and will not be shown in the table below except when applicable.

A summary of the Biological Evaluation process for species that occur on the Regional Forester's Sensitive Species list as of January 2002, and that also have potential to occur in this project area, is displayed below

Step #5 (BIOLOGICAL INVESTIGATION) was not required for any species, and it is not displayed.

The entire analysis area has been surveyed for potential habitat on aerial photos, and to a large extent, on the ground. Surveys completed are described on the following pages by species. Specific wildlife surveys are not required if potential habitat is not present or if the proposed alternatives would avoid impacts to potential habitat (FSM ID 2672.43, 1992) (indicated under "Habitat Surveyed," by a No*).

Table 6: Effects Determination Screening.

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 6
Species	Pre-Field Review	Field Recon.	Conflict Determination	Analysis of Significance	FWS Review
	<i>Habitat Present?</i>	<i>Habitat Surveyed?</i>	<i>Species Present?</i>	<i>Conflict? Mitigation?+</i>	<i>Consultation?</i>
Spotted Owl <i>Strix occidentalis caurina</i>	Yes	Yes	yes	No – RX 1, 3, 4	yes
Bald Eagle <i>Haliaeetus leucocephalus</i>	yes	yes	yes	No – RX 1, 2, 3	no
Canada Lynx <i>Lynx canadensis</i>	No	N/a	no	no	no
Least Bittern <i>Ixobrychus exilis</i>	No	N/a	no	no	
Bufflehead <i>Bucephala albeola</i>	yes - wintering	yes	yes	no	
Harlequin Duck <i>Histrionicus histrionicus</i>	yes	yes	yes	No – RX 1, 2, 3	
American Peregrine Falcon <i>Falcon peregrinus anatum</i>	yes	yes	yes	No – RX 1, 2, 3, 4	

Table 6 Continued

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 6
Species	Pre-Field Review	Field Recon.	Conflict Determination	Analysis of Significance	FWS Review
	<i>Habitat Present?</i>	<i>Habitat Surveyed?</i>	<i>Species Present?</i>	<i>Conflict? Mitigation?+</i>	<i>Consultation?</i>
Yellow Rail <i>Coturnicops noveboracensis</i>	no	N/a	no	no	
Black Swift <i>Cypseloides niger</i>	no	N/a	no	no	
Tricolored Blackbird <i>Agelaius tricolor</i>	no	N/a	no	no	
Baird's Shrew <i>Sorex bairdii permiliensis</i>	yes	no*	unknown	No – RX 2, 3	
Pacific Shrew <i>Sorex pacificus cascadenis</i>	yes	no*	unknown	No – RX 2, 3	
California wolverine <i>Gulo gulo</i>	yes	no*	no	No – RX 3	
Pacific Fisher <i>Martes pennanti</i>	yes	no*	no	No – RX 2, 3, 4	
Pacific Fringe-tailed Bat <i>M. thysanodes vespertinu</i>	yes	no*	unknown	no	
OR Slender Salamander <i>Batrachoseps wrighti</i>	yes	no*	unknown	No – RX 3, 4	
Cascade Torrent Salamander <i>Rhyacotriton cascadae</i>	yes	no*	unknown	No – RX 2	
Foothill Yellow-legged Frog <i>Rana boylei</i>	no	N/a	no	no	
Oregon Spotted Frog <i>Rana pretiosa</i>	no	N/a	no	no	
Northwestern Pond Turtle <i>C. marmorata marmorata</i>	no	N/a	no	no	

+ Mitigation Key

RX 1 = Seasonal Restriction will be in place during breeding season

RX 2 = No harvest near riparian areas (streams and wetlands)

RX 3 = Existing down, large woody material retained. Additional Class I-II material added (approximately 240 lineal feet as outlined in the NWFP)

RX 4 = Existing snags retained where operationally feasible; additionally snags created to provide at least 40% habitat levels for cavity users; 100% levels within 660' feet of streams within peregrine falcon tertiary zones where regeneration harvest is prescribed.

III. AFFECTED WILDLIFE

A discussion of the affects of the proposed project alternatives on TE & S species follows. All species on the 2002 R-6 Regional Forester's Sensitive Species List for the McKenzie River Ranger District (Table 6) were considered. If it was determined that their habitat needs do not exist in this analysis area, they are not discussed below. References for this determination are listed at the end of this document.

NORTHERN SPOTTED OWL (*Strix occidentalis*)

Federal Threatened

State Threatened

Introduction

In general, owl activity is expected to occur primarily in the interior of older timber stands. These habitats provide the structural characteristics required by the owls for food, cover, nest sites, and protection from weather and predation.

Spotted owl habitat, as referred to in this document, is divided into 3 types for purposes of analysis. Reproductive habitat refers to stands which exhibit moderate to high canopy closure (60 to 80 percent); a multi-layered, multi-species canopy dominated by large overstory trees (> 30 inches in diameter at breast height); a high incidence of large trees with various deformities (e.g. large cavities, broken tops, dwarf-mistletoe infections, and other evidence of decadence); numerous large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for owls to fly (USFWS Biological Opinion 1990, ISC 1990). Foraging habitat consists of mature stands that have at least 2 canopy layers; overstory trees greater than 21" DBH; snags and down woody material present; and a 60-80% canopy closure (ISC 1990). Foraging and reproductive habitat are considered "suitable habitat" within the Spotted owl FEIS (1992). Dispersal habitat includes stands that have at least an 11" DBH average tree diameter and at least 40% canopy closure (ISC 1990, USFWS 1991).

Habitat Availability and Owl Sites

The planning area was surveyed for spotted owls in 1990-2001 using standard inventory protocols as directed by Region 6 (RO, 2670, 15 May 1989)(RO, 2670, 28 March 1991). Most of the owls have USFWS leg bands and color bands as part of an Oregon State University Demographic study.

The area includes 11 spotted owl sites. One hundred-acre Late Successional Reserves (LSR) have been designated around 9 of the sites as required by the Northwest Forest Plan FEIS ROD (1994). One was located after the cut-off date of 1994, and the other was recently incorporated into another historic site.

Suitable spotted owl habitat for all owl pairs within the planning area was identified through the use of aerial photos and field surveys. Acres of existing spotted owl habitat for each pair are displayed in Table 7.

Habitat Trends

The Upper McKenzie Watershed Analyses (1995) describes the vegetation types in this area, past abundance and disturbance factors, and current condition in great detail. Generally, the habitat is in a stable condition with few landscape or stand-level threats in the lower elevations. Fire return intervals are generally long enough to sustain foraging habitat, though east wind driven wildfire events could result in significant landscape-level changes.

CONFLICT DETERMINATION

Management Plan Compliance

On April 13, 1994, the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (1994 ROD) was signed by the Forest Service and other Federal agencies. This 1994 ROD vacated previous direction and amended the Willamette National Forest Land Management Plan (1990). The 1994 ROD includes a network of large Late Successional Reserves (LSR) distributed throughout the owl's range, totaling approximately 7.4 million acres. It also includes 100 acre LSR's to be designated around owl sites known as of Jan. 1, 1994. The 1994 ROD, which also includes additional protection for riparian areas and other species, was assessed by the USFWS, and they determined it would not jeopardize the northern spotted owl. Incidental take, however, still requires consultation at the project level.

Implementation of the 1994 ROD includes the following requirements:

- 1) Establishment of 100 acre LSR's around known sites, and no treatment of stands > 80 years old in LSR's;
- 2) The implementation of all other applicable standards and guidelines within the ROD.

Analysis of the proposed alternatives indicates that no conflicts exist between any action or no action alternative and the implementation of the 1994 ROD:

- 1) One hundred-acre late successional reserves have been designated around all owl sites known prior to 1994. No stands greater than 80 years old within 100-acre or "large" LSR's will be treated with any action alternative.
- 2) All applicable standards and guidelines described in the 1994 ROD will be implemented for all action alternatives. They are listed in Chapter 2 of the EA under "Mitigation common to all action alternatives" and will also be included in the stand-level prescriptions.

Direct Effects/Incidental Take

No Action: There are no expected negative impacts to spotted owls or their habitat with the selection of the no action alternative. Forested stands will continue to succeed, providing additional, higher quality habitat in the future. Fragmented forest blocks will aggregate into contiguous forest over time. Risk from fire on the landscape is not expected to increase in the short-term. In the long-term, as the forested stands develop and fuels build to levels outside of historic ranges, fire risk may increase.

Action: Managing Forest Service lands consistent with the 1994 ROD will minimize the direct adverse effects of the proposed action on the spotted owl. Avoiding implementation of activities that result in "incidental take" of owls will further mitigate adverse effects. Though avoiding take is not required by the 1994 ROD, it is recommended by the USFWS in the Draft Recovery Plan (1992), the Biological Evaluation for the 1994 ROD to accelerate the recovery of the species, and in the Biological Opinion developed by the USFWS (in press 2003).

Analysis criteria to determine effects to the spotted owl were described in the Biological Assessment (USDA 2002) provided to the USFWS for consultation on habitat altering and disturbance-only projects in the Willamette Province. The following 5 criteria for assessing incidental take were analyzed:

1. Does the project alter or remove nesting, roosting, or foraging habitat within the provincial radius of a known owl site below the recommended 40% level?
Yes. All action alternatives alter or remove NRF habitat within the provincial radius of owl sites. Of the 11 owl sites in the project area, in Alternative A, 9 have habitat downgraded or removed, and one owl site has levels reduced below 40%; in Alternative B, 10 have habitat downgraded or removed, and three owl sites have levels reduced below 40%; in Alternative C, 11 have habitat downgraded or removed, and one owl site has levels reduced below 40%. Alternative D, no action, does not impact owl sites. A summary of habitat acres per site with the implementation of each alternative is shown in Table 7. The partial cut prescriptions are designed to accelerate the development of late successional habitat characteristics, and critical structural components, such as existing large overstory trees, down woody material, and snags, will be retained in the areas. In the long-

term, there may be benefits to the spotted owl from the partial cutting activity in Alternatives A, B and C.

2. Does the project alter or remove NRF habitat within the provincial radius of a known site, but the acres of habitat post-action still exceed 40%?

Yes. All alternatives, except the No Action, alter or remove NRF habitat within the provincial radius of known owl sites; but all alternatives reduce owl sites below 40% for at least 1 owl site.

3. Does the project alter or remove NRF habitat, but survey information indicates that there are no owl pairs or resident singles within the provincial radius of the proposed action?

There are owl pairs within 1.2 miles of all projects proposed in the action alternatives with the exception of unit 23.

Table 7a: Impacts to suitable spotted owl habitat within a 0.7 and a 1.2 mile radius of each owl site following implementation of each alternative. (The critical threshold for available habitat within 0.7 miles of an owl site is 500 acres; for 1.2 miles it is 1182 acres).

Affects of Alternative A

Spotted Owl Site Number	Existing Habitat Acres	MA/LAA Acres of Habitat Removed	MA/NAA Acres of Habitat Downgraded	MA/NLAA Acres of Habitat Degraded	Post-treatment Habitat Available
	(No Action)	(Forage/Nesting changed to Non-Habitat)	(Forage/Nesting changed to Dispersal)	(Forage/Nesting changed to Forage)	
	0.7/1.2	0.7/1.2	0.7/1.2	0.7/1.2	0.7/1.2
0673	736/1962	0	0/33	19/0	736/1929
0821	568/1241	0	6/79	0	562/1162
0822	791/2113	0	0	0	791/2113
0824	639/2042	0	2/109	32/114	637/1993
0825	734/1857	0	0	19/43	734/1857
2411	664/1828	6/79	0	0	658/1749
2415	571/1399	0	0	0/28	571/1399
2424	721/2101	29/54	0	1	692/1990
2447	719/1900	0	0/0.1	0	719/1900
2451	570/1670	0	62/64		508/1606
2964	713/1717	0/13	0	0	713/1704

Affects of Alternative B

Spotted Owl Site Number	Existing Habitat Acres	Acres of Habitat Removed	Acres of Habitat Downgraded	Acres of Habitat Degraded	Post-treatment Habitat Available
	(No Action)	(Forage/Nesting changed to Non-Habitat)	(Forage/Nesting changed to Dispersal)	(Forage/Nesting changed to Forage)	
	0.7/1.2	0.7/1.2	0.7/1.2	0.7/1.2	0.7/1.2
0673	736/1962	0	151/261	0	585/1701
0821	568/1241	0	6/79	0	562/ 1162
0822	791/2113	0	0	0/32	791/2113
0824	639/2042	0	72/479	0	567/1563
0825	734/1857	0	19/101	0	716/1756
2411	664/1828	0	0/59	85/85	664/1769
2415	571/1399	0	0/29	0	571/1370
2424	721/2101	0	222/234	4/96	499 /1867
2447	719/1900	0	0/89	8/19	719/1811
2451	570/1670	0	91/139	0/19	479 /1531
2964	713/1717	0	0	0	713/1717

Affects of Alternative C

Spotted Owl Site Number	Existing Habitat Acres	Acres of Habitat Removed	Acres of Habitat Downgraded	Acres of Habitat Degraded	Post-treatment Habitat Available
	(No Action)	(Forage/Nesting changed to Non-Habitat)	(Forage/Nesting changed to Dispersal)	(Forage/Nesting changed to Forage)	
	0.7/1.2	0.7/1.2	0.7/1.2	0.7/1.2	0.7/1.2
0673	736/1962	151/173	0/121	0	585/1668
0821	568/1241	0	6/79	0	562/1162
0822	791/2113	0/4	0	0/93	791/2113
0824	639/2042	0/239	60/149	2/121	579/1654
0825	734/1857	19/19	0/48	0/33	715/1814
2411	664/1828	6/138	0	0/87	658/1690
2415	571/1399	0	0/28	0	571/1371
2424	721/2101	251/288	0/150	0	470 /1663
2447	719/1900	0/89	0/6	71/98	719/1805
2451	570/1670	29/43	0/9	0/50	541/1618
2964	713/1717	0/30	0	0	713/1687

Table 7b: Total acres of suitable spotted owl habitat affected by alternative (not necessarily within a 1.2 mile home range).

Alter-native	Alt A	Alt B	Alt C	Alt D
Acres	487	980	1176	0

Table 7c: Total acres of suitable spotted owl habitat altered or removed by alternative (not necessarily within a 1.2 mile home range).

Alternative	Spotted Owl Habitat Degraded	Spotted Owl Habitat Down-graded	Spotted Owl Habitat Removed
Alternative A	121	249	117
Alternative B	98	882	0
Alternative C	98	412	666
Alternative D	0	0	0

Table 8: Current and future habitat condition of units proposed with the Two Bee EA. These are approximate based estimates of post-treatment canopy closure. The end-result may slightly differ.

UNIT #	APPRX ACRES	HABITAT CURRENT (AND Alt. D)	HABITAT CAPABILITY	POST TREATMENT HABITAT TYPE		
				ALT A	ALT B	ALT C
1	81	F	F/N	D	D	D
2	47	F	F/N	F	D	D
3*	41	F	F/N	D	D	D
4	21	F	F/N	D	D	NON
6	74	F	F/N	F	D	NON
7	173	F	F/N	-----	D	NON
8	12	F	F/N	D	-----	D
10	16	F	F/N	-----	-----	NON
11	19	F	F/N	-----	F	-----
13	40	NON	F/N	NON	NON	NON
14*	98	F	F/N	-----	F	F
17	64	F	F/N	-----	D	-----
18	121	F	F/N	-----	D	D
21	21	F	F/N	D	-----	D
22	22	F	F/N	D	-----	D
23	39	F	F/N	D	-----	D
24	12	F	F/N	D	-----	D
26	93	F	F/N	----	D	NON
27	38	F	F/N	-----	D	NON
29	12	F	F/N	Non	-----	NON
30	41	F	F/N	Non	-----	NON
31	64	F	F/N	Non	-----	NON
33	50	F	F/N	-----	D	NON
34	91	F	F/N	-----	D	NON
39	7	F	F/N	F	F	F
40	9	F	F/N	-----	-----	NON
41*	47	NON	F/N	NON	NON	NON
90	69	F	F/N	F	F	F
91	80F	F	F/N	F	F	F

D = Dispersal, F = Foraging, N = Nesting Non = Non Habitat

** These units will require a seasonal restriction (See #4 Below)*

4. Is the project of a disturbance nature only and within 0.25 miles of an activity center?

Yes. All action alternatives could potentially disturb owl activity centers. However, seasonal restrictions will be required to mitigate this disturbance as indicated in Table 6 for harvest activities in units 3, 14, and 41. Restrictions will be maintained from March 1 - July 15 unless non-reproduction is verified. Non-habitat altering projects that also require seasonal restrictions include:

- *Blasting at the Dogwood Rock Pit (owl sites 1739, 2412, 0828)*
- *Blasting at the Boulder Rock Pit (owl sites 0823)*

The disturbances associated with this project are allowed under the Disturbance Biological Opinion received from the USFWS (USDI May 2002) for noise occurring between July 16 – September 30.

The berming/closing of the 2000-150 road will reduce human disturbance to spotted owls because vehicular traffic will be eliminated within 0.25 of a known owl site (owl site 0123).

The other projects associated with action alternatives do not impact spotted owls or their habitat.

5. Does the project modify NRFD habitat within a Critical Habitat Unit?

No. There are no CHU's in the project area.

Cumulative Affects

The Two Bee area has been heavily harvested in the past. Alternative C has the greatest impact on spotted owl habitat. It converts the greatest number of acres into a non-habitat condition with an extended recovery period. Of the action alternatives, A and B have the least impacts on spotted owl habitat. Treatments are predominantly partial cutting, and though short-term reductions in canopy closure are expected, the treatment will increase stem diameter growth and may promote multi-canopy development in the future. Variable density partial cutting that is intended to create multi-storied forested stands in the future will be beneficial to spotted owls in the long-term, potentially resulting in nesting habitat. The No Action alternative would have the greatest beneficial impacts to spotted owls because no habitat would be removed or degraded.

The proposed actions were designed using knowledge of historic stand and landscape level disturbance patterns and affects. The result of their implementation is intended to reflect stand structures that would historically have existed on the landscape after natural fire disturbance events. The landscape will continue to be within its range of natural variability as described in the Upper McKenzie Watershed Analyses (1995). Because of the legacy of over 20 years of staggered setting clearcutting, altering the pattern on this landscape to resemble that of historic conditions will take a very long time. The action alternatives do not significantly alter the pattern of habitat on this

landscape in the short-term. A ranking of the alternatives from greatest cumulative effect to least would show C, B, A, D.

Area of Concern (AOC)

The planning boundary overlaps the southwest portion of the Santiam Area of Concern. Unit 1 (27 acres of a total 81) lies within the AOC. This unit is proposed to be thinned, and will continue to provide at least dispersal habitat immediately following treatment in Alternatives A and B. It is expected to recover to foraging habitat within 5 years. Under Alternative C, a heavy partial cut is prescribed that will not provide dispersal immediately after harvest, and will take longer to recover. Because of the small acreage of impact and the continuing function of this stand as owl habitat in Alternatives A and B, no significant impacts to the AOC are expected.

CONCLUSION

At the time this document was written, a final Recovery Plan for the spotted owl had not been published. Final Critical Habitat (CHU) had been designated January 15, 1992. A "No Jeopardy" Biological Opinion was prepared for the 1994 FEIS ROD. Consultation guidelines were provided in the Biological Assessment (USDA 2002). Based on analysis described above, the following determinations can be made:

*Formal consultation is required for the forest harvest portions of the action alternatives because **regeneration and heavy partial cutting harvest may affect, and is likely to adversely affect** the spotted owl because it eliminates the forests' ability to function as spotted owl habitat. **Moderate partial cutting may affect and is likely to adversely affect** the owl because such action could reduce the canopy cover to as low as 40% and could remove potential nest trees, thus downgrading suitable habitat. **Light partial cutting may affect but is not likely to adversely affect** the spotted owl because the function of the suitable habitat will be maintained. **Light underburning may affect, but is not likely to adversely affect**, the spotted owl because the function of the suitable habitat will be maintained. The project was included in the Biological Assessment submitted to the USFWS for the Willamette National Forest (USDA 2002). A Biological Opinion authorizing this activity will be available prior to signing the decision for this project. Mandatory terms and conditions described in that document generally include seasonal restrictions on disturbing activities within 0.25 miles of active nests. This mitigation measure is included in all alternatives. The disturbances associated with this project may affect, but are not likely to adversely affect, the spotted owl. Consultation with USFWS on this determination was completed with the Disturbance Biological Opinion received from the USFWS (USDI May 2002) for noise occurring between July 16 – September 30.*

Yearly surveys of potential nesting habitat within this landscape will continue until all activities are completed. Contract clause C6.25 will be included in all contracts so that activity can be modified after a sale is sold.

NORTHERN BALD EAGLE (*Haliaeetus leucocephalus*)

Federal Threatened

State Threatened

The bald eagle requires habitat consisting of scattered old-growth conifer trees in proximity to available food sources, such as lakes, reservoirs, and rivers (USDI 1990).

Conflict Determination

Potential nesting, foraging, and roosting habitat occurs within 1.1 miles of the McKenzie River and Clear Lake. The McKenzie River and Clear Lake have been surveyed yearly since 1993. No nest or roost sites have been documented on the McKenzie River, though there have been numerous sightings. Clear Lake has a documented nest site, which has never been successful. The reasons for this are unknown.

Habitat Trends

Bald eagle habitat is increasing in the area as stands continue to develop old growth structures. Water quality in the river corridor and lake is currently high, and this is expected to continue. Allocations associated with McKenzie Wild and Scenic River Corridor, Visual Areas, Special Wildlife Habitat Areas, and Late Successional Reserves will maintain an abundance of mature/old growth habitat into the future. The greatest risk to future bald eagle use is increased human use and unexpected impacts to water quality.

Direct/Indirect and Cumulative Effects

No Action Alternative: There are no expected affects to bald eagles associated with implementation of the no action alternative. In the absence of disturbance from wildfire, young stands will continue to succeed into mature forests, providing additional nesting structures in the future. The No Action alternative does not provide the opportunity to do several habitat improvement projects that could benefit the bald eagle, such as a road closures/ decommissioning, culvert replacements, and riparian recreation site rehabilitation. Implementation of these projects could have directly or indirectly improved water quality, riparian habitat, and fish habitat to the benefit of bald eagles in the area.

Action Alternatives: There are no expected affects to bald eagle occupied nesting habitat, since there are no known nest sites in any of the proposed project areas. Regeneration harvest is not prescribed within any class I-II riparian areas where the highest potential for bald eagle nesting habitat occurs. Water quality will continue to be maintained on this landscape under all action alternatives through mitigation measures outlined in the EA. Large woody material will be retained or supplemented in all harvested areas to provide habitat for bald eagle prey species. Several habitat improvement projects that could benefit the bald eagle, such as a road closures/decommissioning, culvert replacements, and riparian will occur, and implementation of these projects will directly or indirectly improve water quality, riparian

habitat, and fish habitat to the benefit of bald eagles in the area. Seasonal restrictions will limit the potential impact from noise disturbance associated with projects in these alternatives. This will be required from January 1 to July 15 (or until non-occupancy or non-breeding status can be determined) to ensure that the activity does not effect newly established bald eagle nest sites on the following projects: Units 1, 2, 11, 17, 26, 31, 33, 34, 39, 90, 91.

The other projects associated with action alternatives do not impact bald eagles or their habitat.

Yearly surveys of potential nesting habitat within this landscape will continue until all activities are completed. Contract clause C6.25 will be included in all contracts so that activity can be modified after a sale is sold.

Conclusion: No adverse affect to individuals or population; potential positive affects to individuals with restoration projects.

AMERICAN PEREGRINE FALCON (*Falco peregrinus*)

Federal Endangered

State Endangered

In the Pacific states, preferred peregrine falcon nesting sites are sheer cliffs 75 ft. or more in height within proximity to meadows, lakes, or riparian areas where there is an abundance of prey. They forage within a variety of forest types.

Conflict Determination

In 1981, 1990, 1991, and 1992 the Oregon Department of Fish and Wildlife completed an aerial reconnaissance of cliffs on the McKenzie RD that identified areas with nest site potential. There were cliff structures found near the Two Bee planning area. The tertiary zone for one known site extends into the planning area.

Habitat Trends

The documented eyrie is not experiencing any threat, and it is expected to continue to provide stable, high quality habitat in the future. The habitat within the management area will provide a diversity of habitats over time, but the area will be dominated by late successional forest.

Direct/Indirect/Cumulative Affects

No Action Alternative: If the No Action alternative is selected, there are no known direct affects expected to peregrine falcons or their habitat. Stand structure and composition will continue to change naturally over time as the forests succeed. The passerine bird community may change its composition in response to different stand structures, species composition, and landscape patterns. Whether this change in prey species composition will affect the peregrine falcon is not known, but we suspect this

species has the flexibility to adapt to natural changes in its environment. Projects that restore riparian habitat will not occur with this alternative, resulting in continued degradation of potentially valuable prey habitat.

Action Alternatives: All of the units, except 1, 13, 29 and 30, fall within the tertiary zone of an eyrie. The creation of different stand structures and alteration of the landscape pattern in this area with the action alternatives is not expected to effect the peregrine falcon. The post-treatment condition at the stand level will include habitat features recommended by peregrine management plans, including 100% snag levels in riparian areas, retention of hardwoods, and retention of abundant large woody material standing and on the forest floor. The peregrine feeds on a diversity of bird species that occur in all seral stages. The creation of early seral habitat in Alternatives A and C and more open-structured forests as proposed in all Action Alternatives may provide a different prey population, but abundance of prey is not expected to decline. Class I-III streams in regeneration units that lie within the tertiary zone of the known eyrie will retain 660' no-harvest buffers to maintain the populations of riparian-associated prey species. This includes units 6, 7, and 26 in Alternative C.

Other projects that restore riparian habitat, including restoring the recreation site will benefit the peregrine falcon by increasing the availability of prey habitat. This project occurs in all action alternatives. The understory-burning project also occurs within the eyrie tertiary zone. Burning this area may change the peregrine prey species foraging in the area by opening the understory and stimulating shrubs. This change in prey species is not expected to have an effect on the peregrine falcon.

To avoid disturbance impacts, helicopter and blasting activity will be restricted during nesting season on all units within the tertiary zone of the eyrie. Harvest activity is not restricted because it is proposed outside of the primary zone.

The restriction period will be January 15 - July 31 or until non-occupancy or non-breeding status can be determined. Yearly surveys of potential nesting habitat in this landscape will continue until all projects are completed, and contract clause C6.25 will be included in all contracts so that activity can be modified if any nests are found after a sale is sold.

The other restoration/development projects associated with action alternatives do not impact peregrine falcons or their habitat.

Conclusion: No negative impacts to individuals or population.

HARLEQUIN DUCK (*Histrionicus histrionicus*)
State Sensitive
Federal Sensitive

During nesting season (April-June) adult harlequins require fast-flowing water with one or more loafing sites nearby, dense shrub or timber/shrub mosaic vegetation on the bank, and an absence of human disturbance. Harlequins nest on the ground under the shelter of vegetation, rocks, or large woody debris. Midstream loafing sites are very important. Broods prefer low gradient streams with adequate macroinvertebrate abundance. In one study, 90% of all brood observations occurred near mature or old growth stands (Cassirer and Groves 1990). Woody debris and riparian vegetation must be maintained adjacent to streams to avoid negative impacts to harlequins. The buffer must be wide enough to recruit large woody debris for loafing sites (Murphy and Koski 1989). Stream work that would cause greater surface runoff, change water levels, or lower macroinvertebrate levels should be avoided (Kuchel 1977). Human disturbance to breeding sites should be minimized.

Conflict Determination

The majority of documented harlequin duck use on the McKenzie River Ranger District occurs in the McKenzie River floodplain and its class I tributaries. Surveys have been conducted on the McKenzie River yearly since 1992. Approximately 8 “sites” based on families located are thought to occur in the river corridor. We suspect nest sites occur on the waterway, however none have been documented below Trail Bridge Reservoir. Nests are extremely difficult to find without the use of radio telemetry.

Habitat Trends

Habitat quality for harlequin ducks in this area is expected to continue to be high. There are no threats to water quality in the McKenzie River or its tributaries. Human disturbance in riparian habitat (primarily in recreation sites) may cause the loss of nest sites. Disturbance from rafters on the River may cause disturbance to females with their young.

Direct/Indirect/Cumulative Impacts

No Action Alternative: There are no impacts to the harlequin duck with the selection of the no action alternative. Existing habitat quality and threats to this species will not change. The No Action Alternative does not provide the opportunity to do several habitat improvement projects that could benefit the harlequin duck, such as road decommissioning, fish passage, and recreation site rehabilitation. Implementation of these projects could have directly or indirectly improved water quality and fish habitat, and therefore harlequin duck habitat in the area.

Action Alternatives: Activities that could directly impact harlequin ducks include regeneration harvest, understory burning, and partial cutting within Class I-II riparian areas, and projects that increase sediment into the McKenzie River or its tributaries. With the action alternatives, there is no activity occurring within any class I-II riparian area with harlequin duck habitat. No-harvest buffers on smaller streams will minimize or remove the risk of sediment generated from harvesting. There are expected beneficial impacts to the harlequin with the implementation of several projects in the action alternatives. Road decommissioning, fish passage, and recreation site

rehabilitation could directly or indirectly improve water quality, and therefore harlequin duck habitat in the area.

Seasonal restrictions will be required because riparian vegetation will be disturbed during the following activities: watershed restoration projects the culvert upgrade; and dispersed recreation site rehabilitation. Seasonal restriction will be in place from April 1 - July 1 or until the area has been surveyed to document non-nesting or until the chicks are observed out of the nest.

The other projects associated with action alternatives do not impact harlequin ducks or their habitat.

Conclusion: No negative impacts to individuals or population; potential positive impacts to individuals with restoration projects.

Oregon Slender Salamander (*Batrachoseps wrighti*)

State Sensitive

Federal Sensitive

This species is found on the west slope of the Cascades from the Columbia River to Southern Lane County. They are primarily found under loose bark and moss, especially in old-growth Douglas-fir forests and younger stands with abundant down large logs. They lay their eggs under thick bark, inside a crevice, 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 with abundant woody material. During the fall and spring when conditions are moist, they can be found near the surface, but they retreat underground in late spring and summer.

Conflict Determination

No Oregon Slender Salamanders are known from the Two Bee project area. However, systematic surveys have not been conducted. Documented sightings are scattered throughout McKenzie River RD at lower elevations.

Habitat Trends

Historic harvest in this area did not retain abundant down woody material, so this key habitat component is limited in second growth forests. Maturing stands appear to have abundant large woody material on the forest floor, providing habitat in a mosaic across this landscape. Moist hardwood forests occurring in the Smith Ridge Special Wildlife Habitat Area within the Two Bee landscape is suspected to provide habitat for this species.

Direct/Indirect/Cumulative Impacts

No Action Alternative: The No Action Alternative is not expected to have any impacts to this species. In the absence of wildfire, forested stands will continue to develop, providing large woody debris inputs to the forest floor over time.

Action Alternatives: Logging and disturbance of existing down woody material may impact individuals of this species. To mitigate this potential impact, the prescription maintains existing large woody material on the forest floor that is in an advanced state of decay, and it provides additional inputs of class I and 2 large woody material. The older down woody material with loose bark will continue to provide habitat for this species. However, opening of the forest canopy, especially in regeneration units (Alt. A 29, 30, 31; Alt. C 4, 6, 7, 26, 27, 29, 30, 33, 34, 40) reduces the value of this habitat by accelerating the timeframe in which the ground and outer part of logs dry out. This may result in slender salamanders retreating underground earlier in the summer season. It is unknown what impacts this may have on their survival. Partial cutting harvest that retains some canopy closure is expected to impact these salamanders less because the canopy will protect the log habitat from desiccation.

Understory burning in units 90 and 91 may impact some individuals that do not escape into the ground, but the fire is not expected to reach high enough temperatures to burn large log habitat, and canopy closures are not expected to be significantly reduced.

Other projects do not alter forested habitat or down woody material, so they are not expected to have any impact to this species.

Conclusion: May be negative impacts to individuals or population, but extent of activity will not trend species towards federal listing

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Cascade Torrent Salamander (*Rhyacotriton cascadae*)

State Sensitive

R-6 Sensitive

This salamander inhabits the southern Washington Cascades and northern Oregon Cascades. An isolated population occurs in the southern Oregon Cascades. The Cascade Torrent salamander lives in very cold, clear springs, seeps, headwater streams, and waterfall splash zones. They forage in moist forests adjacent to these areas. Their 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 constantly flowing or seeping. Adults may be found under debris on streambanks or in streamside forests and talus during rainy periods

Conflict Determination

No Cascade Torrent Salamanders are known from the Two Bee project area. However, systematic surveys have not been conducted. There are documented sightings from class IV stream headwater areas on McKenzie River Ranger District.

Habitat Trends

Stream/aquatic habitat in this landscape is expected to remain high in quality. Historic harvesting removed forest vegetation along some small streams in this area, but the overstory vegetation is recovering and now providing cover during portions of the year.

Direct/Indirect/Cumulative Impacts

No Action Alternative: The No Action Alternative is not expected to have any impacts to this species. In the absence of wildfire, riparian areas and aquatic habitat will continue to provide high quality habitat, and recovering areas will add to habitat availability over time.

Action Alternatives: The Two Bee Project is not expected to impact Cascade Torrent Salamanders. Aquatic and riparian habitat will be maintained in its current high quality through no-harvest buffers and other measures outlined in the EA to protect water quality. Road decommissioning and recreation site rehabilitation could directly or indirectly improve water quality, and therefore cascade torrent salamander habitat in the area.

Other projects associated with the action alternatives do not impact habitat for this species.

Conclusion: No negative impacts to individuals or population; potential positive impacts to individuals with restoration projects.

Bufflehead (*Bucephala albeola*)

State Sensitive

Federal Sensitive

Buffleheads breed from Alaska across Canada and south to Oregon, California, and Wisconsin. After the breeding season, they can be found on open waters throughout the state, along major rivers, and along the coast. Buffleheads nest near mountain lakes surrounded by open woodlands containing snags. Nesting normally occurs near lakes in tree cavities 5-50 feet high. They dive underwater to eat small mollusks, fish, snail, crustaceans, and aquatic insects. In Oregon, most Buffleheads nest in artificial nest boxes. Nesting begins in late April, and young are fledged in early August. Bufflehead are hunted in Oregon. Only several hundred pair are thought to breed in the state.

Conflict Determination

Buffleheads are known to occasionally stop during their migration on Clear Lake and Fish Lake (when it has water). They are not known to nest on the McKenzie River Ranger District.

Habitat Trends

Because migration or wintering is the only activity for this species in this area, maintaining foraging habitat is the most important factor. Water quality in Clear Lake is monitored by the District and DEQ, and there are no known threats to maintaining its current high quality.

Direct/Indirect/Cumulative Impacts

No Action Alternative: The No Action Alternative is not expected to have any impacts to this species. In the absence of wildfire, riparian areas and aquatic habitat will continue to provide high quality habitat at Clear Lake and Fish Lake for activities associated with wintering and migration.

Action Alternatives: Activities that could directly impact this species include those projects that increase sediment into Clear or Fish Lakes. With the action alternatives, there is no harvest occurring near lakes, and best management practices and no-harvest buffers on tributaries that feed these water bodies will mitigate any potential for sediment to alter water quality (See Hydrologists Report). There are expected beneficial impacts to the bufflehead with the implementation of several projects in the action alternatives. Road decommissioning, fish passage, and recreation site rehabilitation could directly or indirectly improve water quality, and therefore bufflehead habitat in the area.

Seasonal restrictions will not be required because nesting does not occur in this area.

The other projects associated with action alternatives do not impact bufflehead habitat.

Conclusion: No negative impacts to individuals or population; potential positive impacts to individuals with restoration projects.

Baird's Shrew (*Sorex bairdii permiliensis*)

State Sensitive

R-6 Sensitive

The Baird's Shrew is endemic to Oregon (Verts and Carraway, 1998), occurring along 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. 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.

Conflict Determination

No Baird's Shrews are known from the Two Bee project area. However, systematic surveys have not been conducted. It has been trapped on the McKenzie River RD in the Mill Creek area and in the Blue River watershed.

Habitat Trends

There is very little information on the specific life history needs of this species. In the absence of wildfire, this landscape will continue to provide abundant forested habitat of a variety of seral stages that may benefit this species.

Direct/Indirect/Cumulative Impacts

No Action Alternative: The No Action Alternative is not expected to have any impacts to this species. In the absence of wildfire, this landscape will continue to provide abundant forested habitat of a variety of seral stages that may benefit this species.

Action Alternatives: The Two Bee Project is not expected to impact Baird's Shrews, and may benefit this species by creating more open forest canopies. Elements of high quality forests of all seral stages, including large down woody material, snags, patchiness, and hardwoods will be retained in all harvested areas.

The other projects associated with action alternatives do not impact Baird shrew habitat.

Conclusion: No negative impacts to individuals or population; potential positive impacts to individuals with habitat creation.

Pacific Shrew (*Sorex pacificus cascadenis*)

State Sensitive

R-6 Sensitive

An Oregon endemic, (Verts and Carraway 1998), this shrew 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. It is often found in wet or marshy areas along class III-IV streams with red alder-salmonberry/skunk cabbage communities and banks with abundant down material. Their nests are made of grasses, mosses, lichen or leaves. They feed on slugs, snails, insects, and sometimes vegetation.

Conflict Determination

No Pacific Shrews are known from the Two Bee project area. However, systematic surveys have not been conducted. There are no documented sightings on the entire McKenzie River RD.

Habitat Trends

There is very little information on the specific life history needs of this species. In the absence of wildfire, this landscape will continue to provide abundant forested habitat of a variety of seral stages that may benefit this species.

Direct/Indirect/Cumulative Impacts

No Action Alternative: The No Action Alternative is not expected to have any impacts to this species. In the absence of wildfire, this landscape will continue to provide abundant forested habitat of a variety of seral stages that may benefit this species.

Action Alternatives: The Two Bee Project is not expected to impact Pacific Shrews, and may benefit this species by creating more open forest canopies and brushy conditions. No-harvest/no-burn buffers will maintain moist habitat near streams and wetlands. Elements of high quality forests of all seral stages, including large down woody material, snags, patchiness, and hardwoods will be retained in all harvested areas. Of particular importance to this species is that existing decaying down material is retained in all harvested areas, and additional material will be felled and left on site to provide habitat.

The other projects associated with all action alternatives do not impact Pacific shrew habitat.

Conclusion: No negative impacts to individuals or population; potential positive impacts to individuals with habitat creation.

California wolverine (*Gulo gulo luteus*)

State Sensitive

R-6 Sensitive

Wolverine have been described as solitary, secretive animals that are usually found in areas remote from humans and human developments (Banci, 1994). High elevation wilderness areas appear to be preferred in summer, which also acts to effectively separate wolverines and humans in many areas. In winter, wolverines may move to lower elevation, snowbound areas with very limited human activity. In one study, 70% of wolverine habitat use occurred in large expanses of scattered mature timber, while the remaining were in ecotonal areas. These were small timber pockets, and rocky, broken areas of timbered benches. Wolverines made little use of young, thick timber and open clear-cuts (Hornocker and Hash, 1981). However, heavy use was found in openings which support good winter populations of big game animals, the principle source of carrion and much of the wolverine's diet (Marshall, 1988). Another study found that wolverines commonly crossed areas with sparse overstory such as burned areas or meadows (Copeland, 1996). In addition to carrion, wolverines also opportunistically feed on small prey, including marmots, snowshoe hares, various rodents, insects, insect larvae, eggs and berries (Marshall, 1988). Natal dens have been associated with snow-covered tree roots, log jams, or rocks and boulders (Hash, 1987)(Copeland, 1996). Habitats that provide the appropriate structures, such as large cavities, large down wood, and old beaver lodges, likely will provide suitable den site habitat (Banci 1994).

Conflict Determination

The wolverine is not known to occur in the Two Bee project area, though systematic surveys have not occurred. Several wolverine sightings have occurred on the McKenzie River Ranger District within 30 miles of this area.

Habitat Trends

The highest quality habitat for this species occurs in the Three Sisters, Mt. Washington, and Mt. Jefferson Wilderness areas to the north and east of this project area. Adjacent areas where road closures have restricted human activities appear to be beneficial.

Direct/Indirect/Cumulative Impacts

No Action Alternative: The no-action alternative is not expected to have any negative impact on wolverines in this area. In the absence of wildfire, forest habitat in this area will continue to succeed into older stands, and younger plantations will recover and gain structure over time. The loss of early seral habitat created by harvest or wildfire may reduce the availability of prey species associated with open forest. Because this species is so wide-ranging with such a variable diet, it is unknown whether this site-specific change will have an impact on any individuals or the population.

Action Alternatives: Since wolverines scavenge on big game carrion, improvements to big game habitat, such as road closures, benefit wolverines. Approximately 10.06 miles of road will be either decommissioned or closed with the action alternatives. Improvement in elk and deer forage associated with forest openings created by harvest in Alternatives A and C may also benefit wolverines. It is unknown whether partial cutting would alter the movement patterns or foraging ability of wolverine. Partial cutting may stimulate the understory, providing more habitat for small mammals that wolverine prey upon. Retention and addition of down woody material will also aid in the productivity of small mammal prey for this species.

The other projects associated with action alternatives do not impact wolverine habitat.

Conclusion: No negative impacts to individuals or population; potential positive impacts to individuals with habitat creation and road closure projects.

Pacific Fisher (*Martes pennanti*)

State Sensitive

R-6 Sensitive

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. Fishers occupy a wide variety of densely forested habitats at low to mid-elevations (100-1800m). Typical habitats include sub alpine Pacific fir (26%), western hemlock (54%), and Sitka spruce (20%). Aubry and Houston (1992) 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.

Conflict Determination

The fisher is not known to occur in the Two Bee project area, though systematic surveys have not occurred. Several fisher sightings have occurred on the McKenzie River Ranger District within 30 miles of this area. Of the three specimens on deposit in systematic collections, two are from Lane County.

Habitat Trends

The highest quality habitat for this species occurs in the Three Sisters, Mt. Washington, and Mt. Jefferson Wilderness areas to the north and east of this project area. Adjacent areas where road closures have restricted human activities appear to be beneficial.

Direct/Indirect/Cumulative Impacts

No Action Alternative: The no-action alternative is not expected to have any negative impact on fisher in this area. In the absence of wildfire, forest habitat in this area will continue to succeed into older stands, and younger plantations will recover and gain structure over time. Landscape patterns will shift in the long term, providing more contiguous forest canopy, which fishers prefer.

Action Alternatives: Since fisher may benefit from reduced human disturbance, road closures increase habitat quality. Approximately 10.06 miles of road will be either decommissioned or closed with the action alternatives. It is unknown whether partial cutting would alter the movement patterns or foraging ability of fisher, but the alternatives were designed to minimize fragmentation and retain high canopy levels, particularly in Alternative B, that may minimize the impacts to this species. Elements of high quality forests of all seral stages, including large down woody material, snags, patchiness, and hardwoods will be retained in all harvested areas, and may benefit this species. Supplementation of down woody material will also aid in the productivity of small mammal prey for fisher.

The other projects associated with action alternatives do not impact fisher habitat.

Conclusion: No negative impacts to individuals or population; potential positive impacts to individuals with road closure projects.

Pacific Fringe-tailed Bat (*Myotis thysanodes vespertinu*)

State Sensitive

Federal Sensitive

Pacific fringe-tailed bats range from western North America and south-central British Columbia south through the western U.S. to southern Mexico. Most Oregon records for this species are from the western Cascades. This species is migratory, and there are

only two winter records from Oregon. Very little is known about their habitat in Oregon. Three animals 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 their habits in winter. They are thought to forage by picking food items from shrubs or off the ground. They consume beetles, moths, harvestmen, crickets, craneflies, and spiders. Females form maternity colonies of up to several hundred individuals in caves, mines, and buildings (Csuti et al. 1997). Like most bats they are very sensitive to disturbance.

Conflict Determination

No mines or caves are known to occur in the Two Bee Project area. There are no recorded sightings on the entire McKenzie River Ranger District.

Habitat Trends

There is very little information on the specific life history needs of this species. In the absence of wildfire, this landscape will continue to provide abundant forested habitat of a variety of seral stages that may benefit this species.

Direct/Indirect/Cumulative Impacts

No Action Alternative: The No Action Alternative is not expected to have any impacts to this species. In the absence of wildfire, this landscape will continue to provide abundant forested habitat of a variety of seral stages that may benefit this species.

Action Alternatives: The Two Bee Project is not expected to impact Fringe-tailed bats, and may benefit this species by creating more open and brushy habitat for insect prey. Elements of high quality forests of all seral stages, including large down woody material, snags, patchiness, and hardwoods will be retained in all harvested areas, and may benefit this species.

The other projects associated with action alternatives do not impact Pacific fringe-tailed bat habitat.

Conclusion: No negative impacts to individuals or population; potential positive impacts to individuals with habitat creation projects.

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Two Bee Revisions

September 8, 2006

Changes to Appendix D- Wildlife Biological Evaluation

This addendum identifies changes in the project design, extent and magnitude from project descriptions and effects in the Wildlife Biological Evaluation dated February 4, 2003.

I. Project location and Description

The prescribed burnings described in Table 4 are associated with alternative C only.

Table 1,2, and 3 describe units 13 and 41 as “post and pole”. These units are now considered commercial thinning units with a moderate commercial thin prescription under alternatives A-C.

Unit 2 has dropped 25 acres for a total of 22 acres in alternatives A-C.

Unit 17 was dropped (52 acres) from alternative B.

Unit 26 was dropped (93 acres) from alternatives B and C.

Unit 14 was dropped (98 acres) from alternatives B and C.

Table 5: Decommission of 3.0 miles of road has changed to 3.1 miles.

Table 6 Mitigation key: delete last sentence that reads “100% levels within 660’ feet of streams within peregrine falcon tertiary zones where regeneration harvest is prescribed”.

Table 6 Continued

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 6
Species	<i>Pre-Field Review</i>	<i>Field Recon.</i>	<i>Conflict Determination</i>	<i>Analysis of Significance</i>	<i>FWS Review</i>
	<i>Habitat Present?</i>	<i>Habitat Surveyed?</i>	<i>Species Present?</i>	<i>Conflict? Mitigation?+</i>	<i>Consultation?</i>
Crater Lake tightcoil <i>Pristiloma acticums</i>	yes	yes	no	no	no
Mardon Skipper <i>Polites mardon</i>	no	N/a	no	no	no

Page 9 replace sentence with ‘... in Alternative B, 10 owl sites have habitat degraded or downgraded and one owl site MSNO 0821 has habitat levels reduced below the 40% threshold;’

Tables 7a should read:

Table 7a: Impacts to suitable spotted owl habitat within a 0.7 and a 1.2 mile radius of each owl site following implementation of each alternative. (The critical threshold for available habitat within 0.7 miles of an owl site is 500 acres; for 1.2 miles it is 1182 acres).

Affects of Alternative A

Spotted Owl Site Number	Existing Habitat Acres (No Action) 0.7/1.2	MA/LAA Acres of Habitat Removed (Forage/Nesting changed to Non-Habitat) 0.7/1.2	MA/NLAA Acres of Habitat Downgraded (Forage/Nesting changed to Dispersal) 0.7/1.2	MA/NLAA Acres of Habitat Degraded (Forage/Nesting changed to Forage) 0.7/1.2	Post-treatment Habitat Available 0.7/1.2
0673	736/1962	0	0/33	19/0	736/1929
0821	568/1241	0	6/79	0	562/1162
0822	791/2113	0	0	0	791/2113
0824	639/2042	0	2/84	32/89	637/1958
0825	734/1857	0	0	19/43	734/1857
2411	664/1828	6/79	0	0	658/1749
2415	571/1399	0	0	0/28	571/1399
2424	721/2101	29/54	0	1	692/1990
2447	719/1900	0	0/0.1	0	719/1900
2451	570/1670	0	62/64		508/1606
2964	713/1717	0/13	0	0	713/1704

Affects of Alternative B

Spotted Owl Site Number	Existing Habitat Acres (No Action)	MA/LAA Acres of Habitat Removed (Forage/Nesting changed to Non-Habitat)	MA/NLAA Acres of Habitat Downgraded (Forage/Nest-ing changed to Dispersal)	MA/NLAA Acres of Habitat Degraded (Forage/Nesting changed to Forage)	Post-treatment Habitat Available
	0.7/1.2	0.7/1.2	0.7/1.2	0.7/1.2	0.7/1.2
0673	736/1962	0	151/261	0	585/1701
0821	568/1241	0	6/79	0	562/ 1162
0822	791/2113	0	0	0/32	791/2113
0824	639/2042	0	72/454	0	567/1588
0825	734/1857	0	19/101	0	716/1756
2411	664/1828	0	0/59	85/85	664/1769
2415	571/1399	0	0/29	0	571/1370
2424	721/2101	0	222/234	4/96	592/1960
2447	719/1900	0	0/89	8/19	719/1811
2451	570/1670	0	91/75	0/19	577/1629
2964	713/1717	0	0	0	713/1717

Affects of Alternative C

<i>Spotted Owl Site Number</i>	<i>Existing Habitat Acres (No Action)</i>	<i>MA/LAA Acres of Habitat Removed (Forage/Nesting changed to Non-Habitat)</i>	<i>MA/NLAA Acres of Habitat Downgraded (Forage/Nest-ing changed to Dispersal)</i>	<i>MA/NLAA Acres of Habitat Degraded (Forage/Nesting changed to Forage)</i>	Post-treatment Habitat Available
	0.7/1.2	0.7/1.2	0.7/1.2	0.7/1.2	0.7/1.2
0673	736/1962	151/173	0/121	0	585/1668
0821	568/1241	0	6/79	0	562/ 1162
0822	791/2113	0/4	0	0/93	791/2113
0824	639/2042	0/239	60/124	2/121	579/1918
0825	734/1857	19/19	0/48	0/33	715/1814
2411	664/1828	6/138	0	0/87	658/1690
2415	571/1399	0	0/28	0	571/1371

2424	721/2101	251/288	0/150	0	563/1756
2447	719/1900	0/89	0/6	71/98	719/1805
2451	570/1670	29/43	0/9	0/50	639/1716
2964	713/1717	0/30	0	0	713/1687

Table 7b should read:

Table 7b: Total acres of suitable spotted owl habitat affected by alternative (not necessarily within a 1.2 mile home range).

Alternative	Alt A	Alt B	Alt C	Alt D
Acres	469	738	967	0

Table 7C should read:

Table 7c: Total acres of spotted owl habitat altered or removed by alternative (not necessarily within a 1.2 mile home range).

Alternative	Spotted Owl Habitat Degraded	Spotted Owl Habitat Down-graded	Spotted Owl Habitat Removed
Alternative A	103	249	117
Alternative B	26	712	0
Alternative C	7	387	573
Alternative D	0	0	0

Table 8: Unit 22 has been reduced from 47 acres to 22 acres.

Unit 17 has been dropped (64 acres).

Unit 26 has been dropped (93 acres)

Unit 14 has been dropped (98 acres)

American Peregrine falcon section

Action Alternatives: Replace paragraph with: “All of the units, except 1, 13, 29, and 30 fall within the tertiary zone of an eyrie. The creation of different stand structures and alteration of the landscape pattern in this area with the action alternatives is not expected to effect the peregrine falcon. The peregrine falcon feeds on a diversity of bird species that occur in open-structured forests as proposed in all action alternatives which may provide a different prey population, but abundance of prey is not expected to decline.

Conclusion section: add updated consultation information.

Formal consultation with the U.S. Fish & Wildlife Service for effects to the northern spotted owl was initiated in 2002. Re-initiation of consultation occurred for the FY2003/2004 Habitat Modification Projects in the Willamette Province. A Biological Opinion was received that concluded the finding of no jeopardy and no adverse modification of critical habitat. Concurrence with the Biological Assessment (which included the Two Bee project) found that the Two Bee project may affect, but is not likely to adversely affect northern spotted owls. The Biological Opinion expired and a new consultation is ongoing as of September 2006. A Biological Opinion authorizing this activity must be available prior to signing the decision for this project. Seasonal restrictions would be required to comply with the Biological Opinion.

Add to the last page:

Crater Lake Tightcoil (*Pristiloma arcticum crateris*)

Status: Federal: None
 State: ODFW none / Natural Heritage S1
 FS R-6: Sensitive / Survey and Manage Species

The Crater Lake tightcoil has 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).

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: Prior to 2005 the presence of the Crater Lake Tightcoil had not been documented on the Willamette National Forest. However in May 2005 a specimen that has since been confirmed to be *Pristiloma arcticum crateris* was collected on the Middle Fork Range District.

Field reconnaissance: Protocol surveys were conducted for *Pristiloma arcticum crateris* on the proposed units and none were found.

Analysis of effects: Species management strategies include:

Maintaining shading to minimize temperature and humidity fluctuations on and within the ground

Maintain natural understory vegetation and a layer of uncompacted organic litter and material on the ground

Maintain existing logs and other woody material

Cumulative effects: It is expected that habitat connectivity will continue to allow viable local populations to exist.

Conflict determination/risk assessment: This project is not expected to impact local Crater Lake tightcoil populations.

Recommendations: Leave the prescribed levels of large down woody material. If it is not present after logging, trees should be felled to create the prescribed levels.

Communications with U.S. Fish and Wildlife Service: Not required

Prepared by:

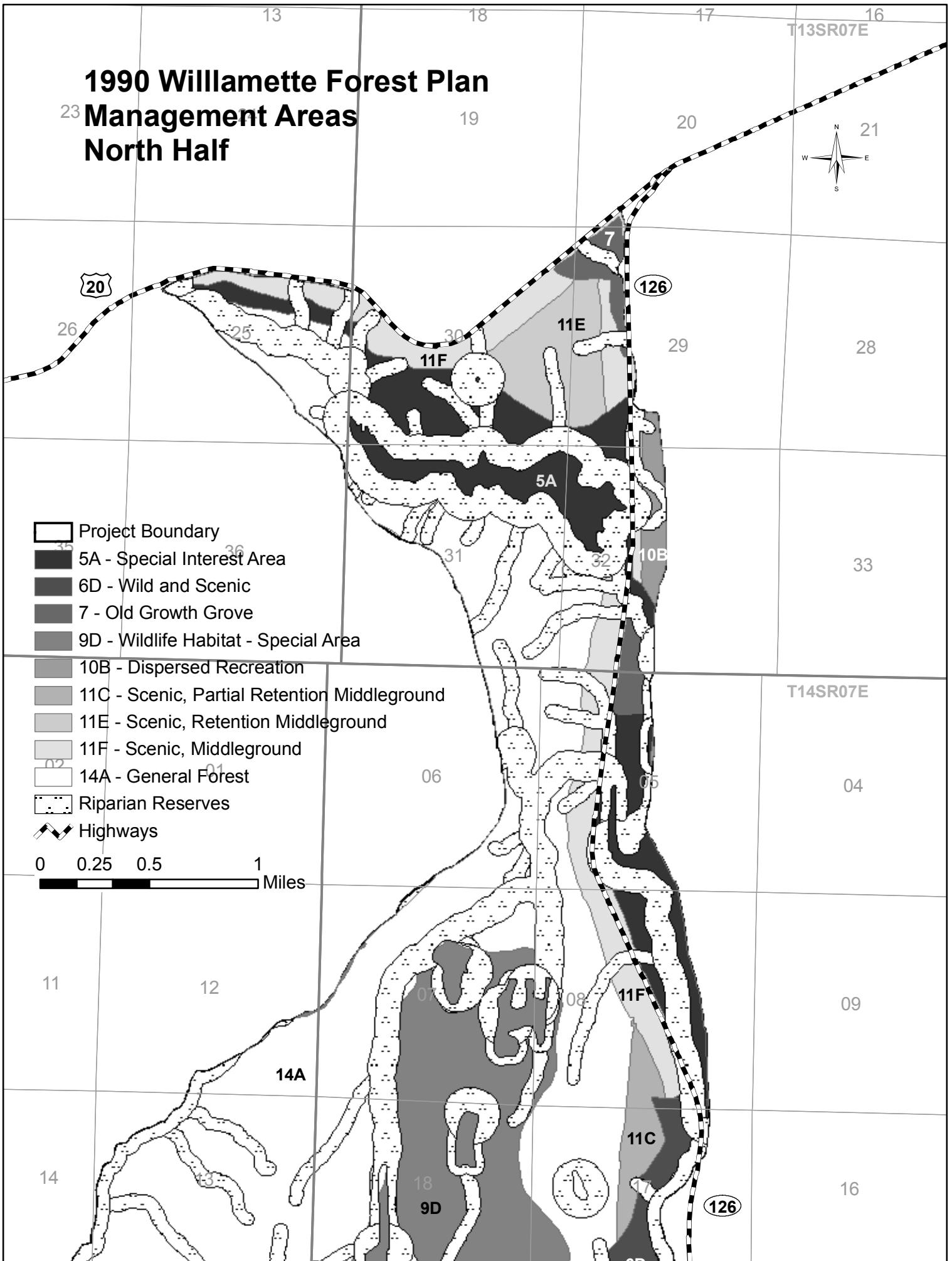
<u>/s/ Shane D Kamrath</u>	<u>9-8-2006</u>
Shane D Kamrath	Date
Wildlife Biologist	

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Appendix E – Project Analysis Maps:

- **1990 Willamette Forest Plan Management Areas, North Half (of project area)**
- **1990 Willamette Forest Plan Management Areas, South Half**
- **Northwest Forest Plan Management Areas, North Half**
- **Northwest Forest Plan Management Areas, South Half**
- **Upper McKenzie Watershed, Key Watershed**
- **Elk Emphasis Areas**
- **Haul Routes and Road Projects, Alternative A**
- **Haul Routes and Road Projects, Alternative B**
- **Haul Routes and Road Projects, Alternative C**
- **Bull Trout and Spring Chinook Salmon Distribution**

1990 Willamette Forest Plan Management Areas North Half

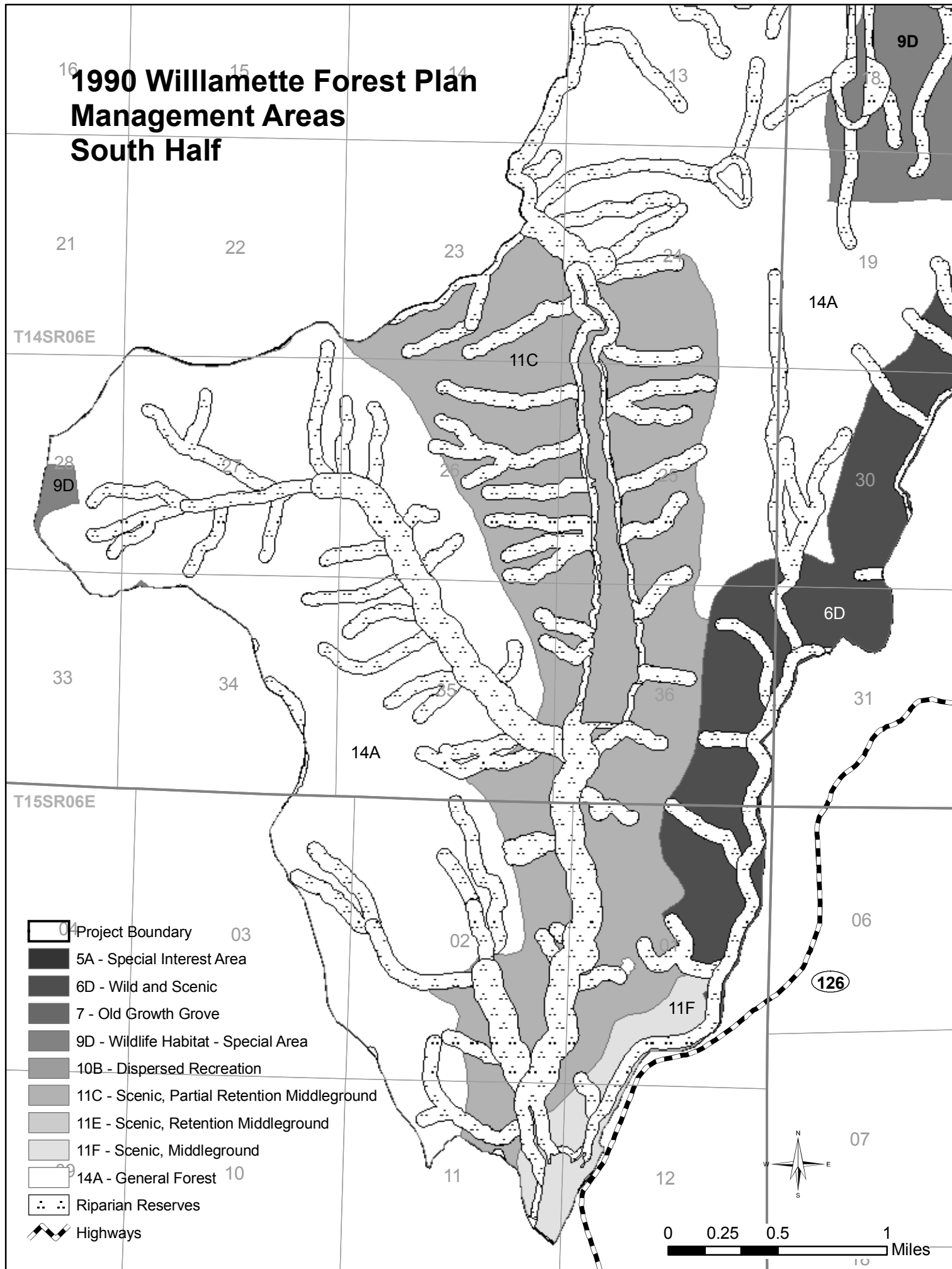
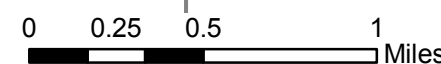
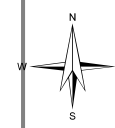


1990 Willamette Forest Plan Management Areas South Half

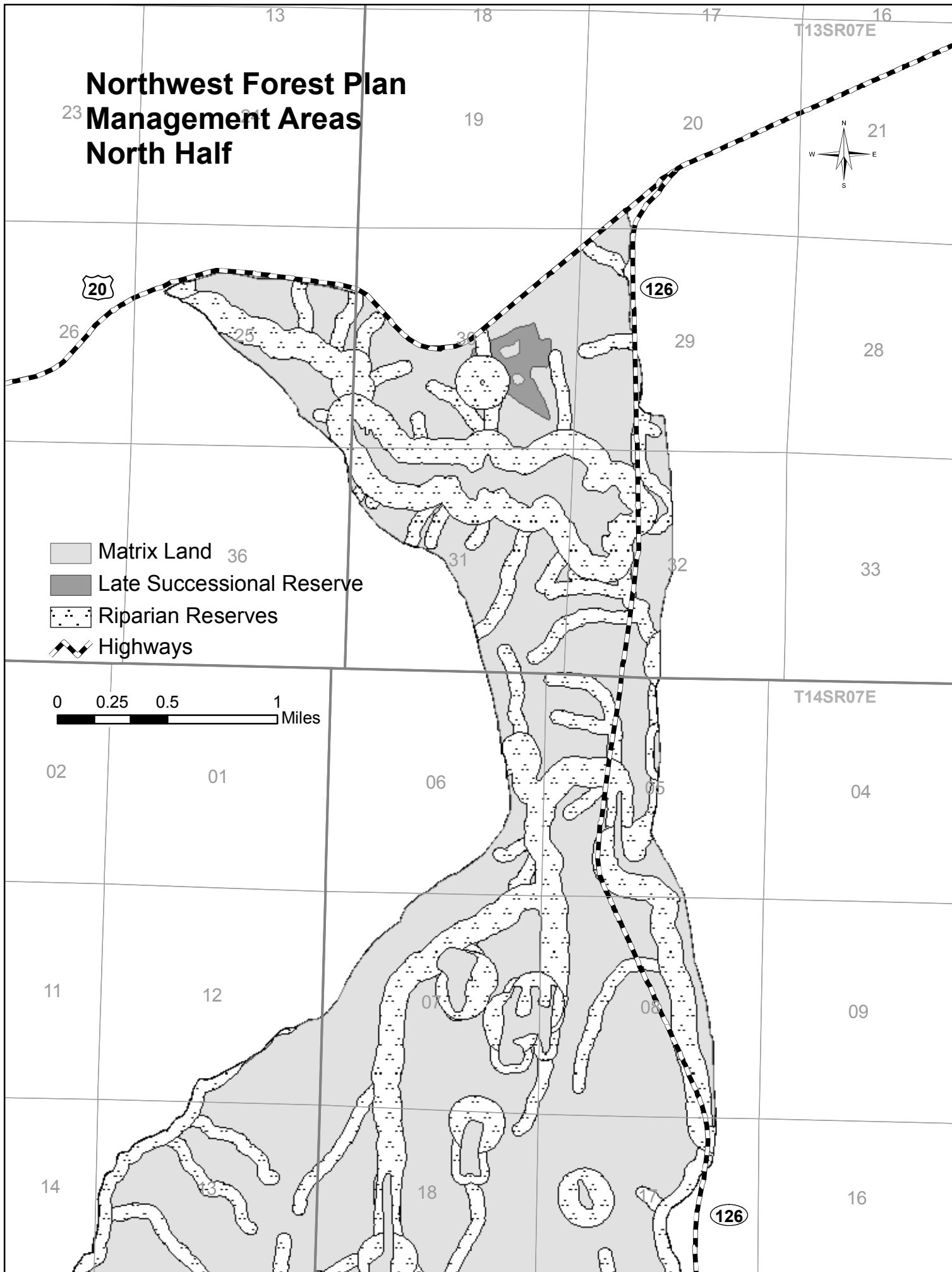
T14SR06E

T15SR06E

-  Project Boundary
-  5A - Special Interest Area
-  6D - Wild and Scenic
-  7 - Old Growth Grove
-  9D - Wildlife Habitat - Special Area
-  10B - Dispersed Recreation
-  11C - Scenic, Partial Retention Middleground
-  11E - Scenic, Retention Middleground
-  11F - Scenic, Middleground
-  14A - General Forest
-  Riparian Reserves
-  Highways



Northwest Forest Plan Management Areas North Half

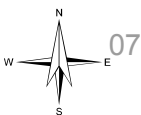


Northwest Forest Plan Management Areas South Half

T14SR06E

T15SR06E

- Matrix Land
- Adaptive Management Area
- Late Successional Reserve
- Riparian Reserves
- Highways



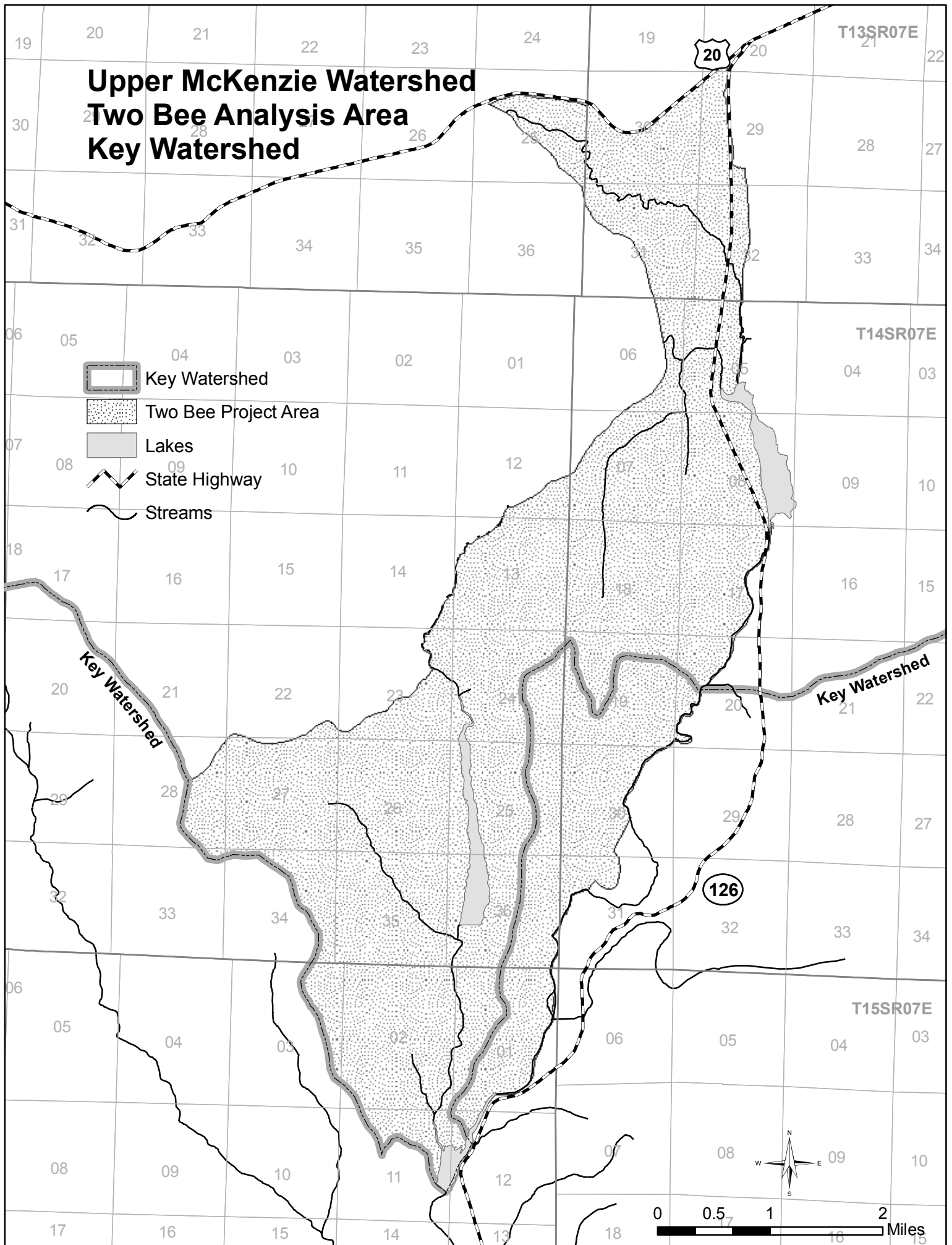
0 0.25 0.5 1 Miles

Upper McKenzie Watershed

Two Bee Analysis Area

Key Watershed

-  Key Watershed
-  Two Bee Project Area
-  Lakes
-  State Highway
-  Streams



Hackleman

Fish Lake

Hwy 20

Two Bee Project Area Elk Emphasis Areas

Clean
Lake

Gate/Ikenick

Smith Res.

**Upper West
Side McKenzie/
Fritz/
Bunchgrass**

Hwy 126

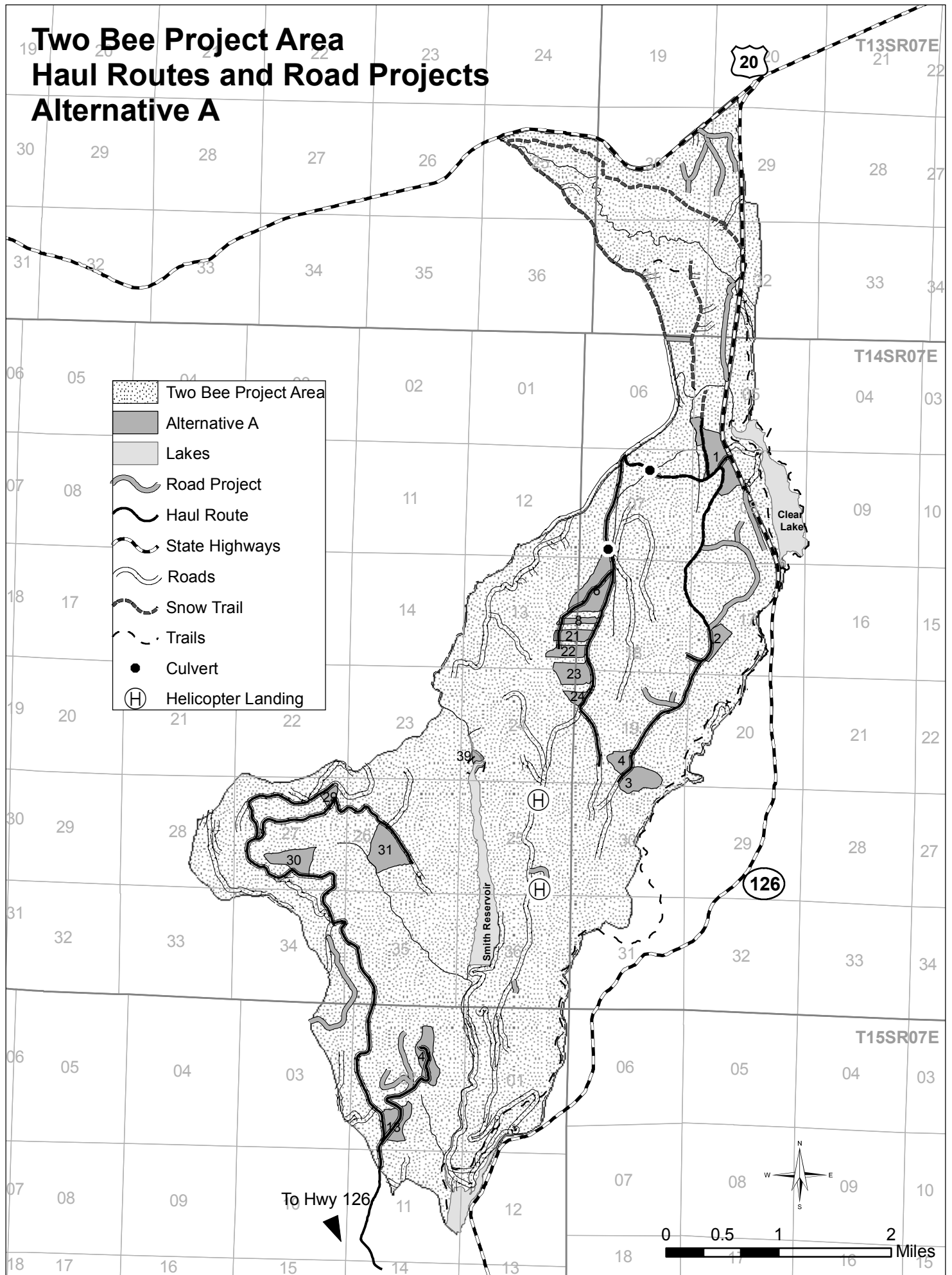
Trail
Bridge
Res.

- Gate/Ikenick
- Hackleman
- UWSideMc
Fritz/Bgrass
- Two Bee Project Area
- Lakes
- State Highway

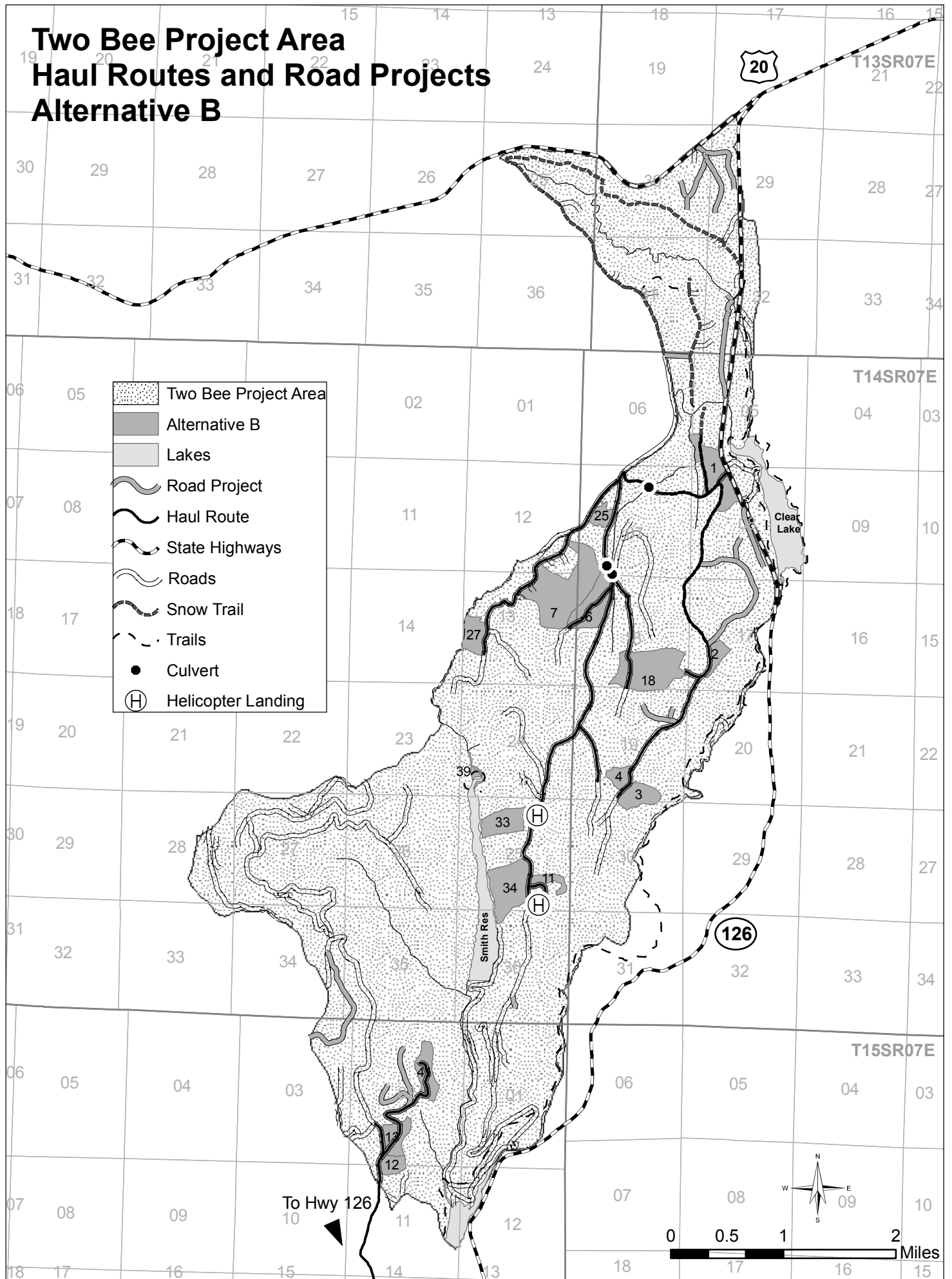


0 0.250.5 1 1.5 2 Miles
Scale = 80000

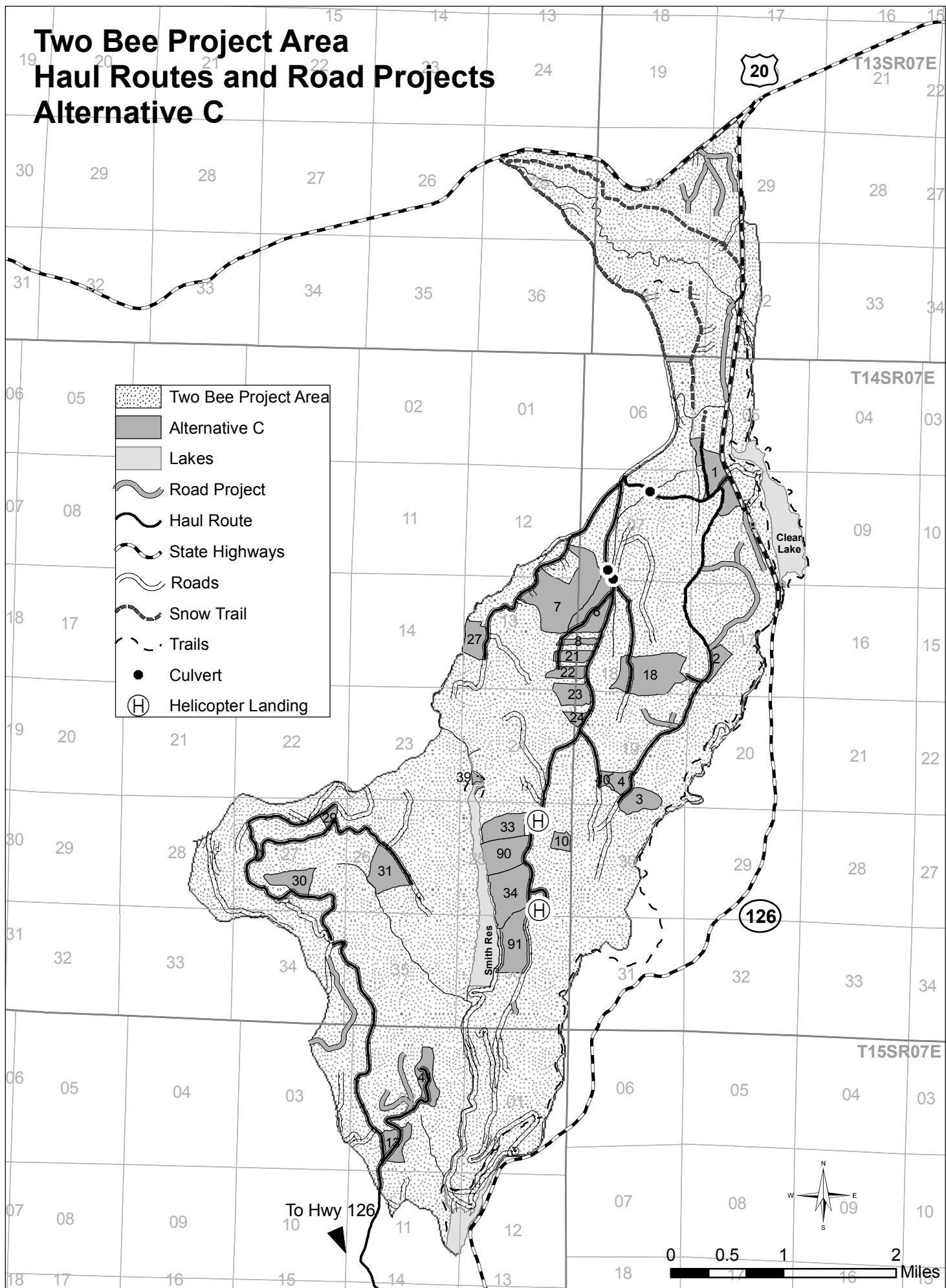
Two Bee Project Area Haul Routes and Road Projects Alternative A



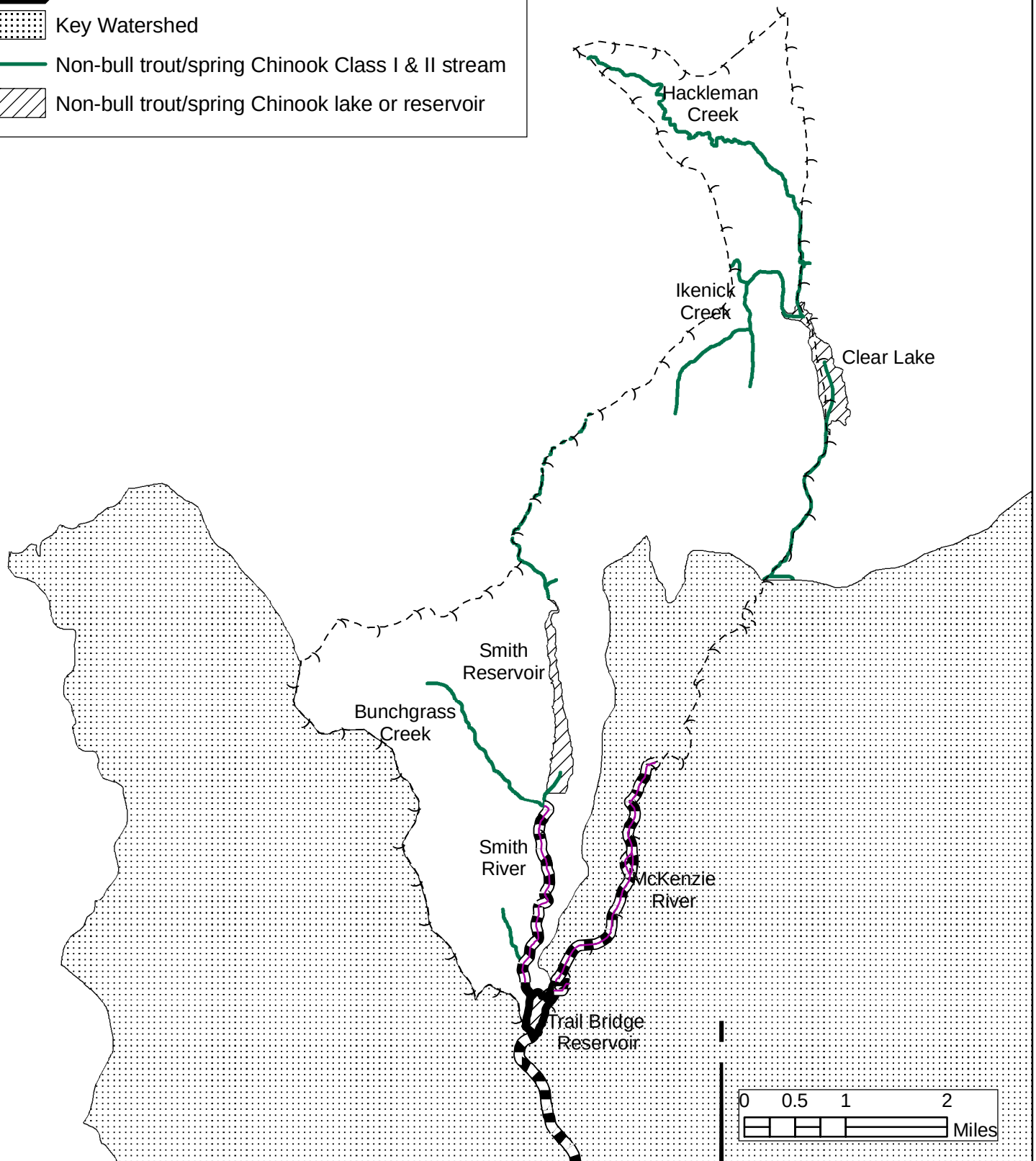
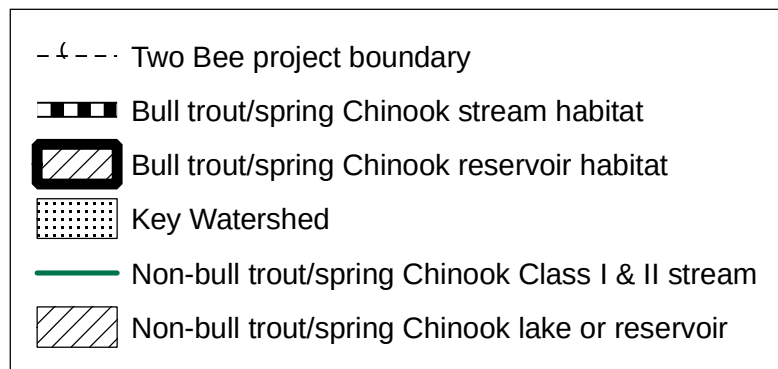
Two Bee Project Area Haul Routes and Road Projects Alternative B



Two Bee Project Area Haul Routes and Road Projects Alternative C



Bull Trout and Spring Chinook Salmon Distribution Near Two Bee Project



Non-Timber Sale, Stand Treatment Projects in Two Bee Project Area

K. Moran, 8/25/2005

PRECOMMERCIAL THINNING

Stand	Sale Name of Original Project	Sale Unit	Acres
7000384	Tattoo	4	2
7000388	Tattoo	7	12
7000394	Tattoo	5	1
7000400	End	1	32
7000410	Tattoo	6	2
7000411	Tattoo	12	6
7000413	Tattoo	11	6
7000417	Tattoo	10	16
7000430	Tattoo	2	9
7000433	End	3	15
7000457	End	4	20
7000461	End	5	20
7000486	End	6	24
7000501	End	7	21
7000516	End	8	27
7000541	Tattoo	9	22
7000698	Hoedown	2	16
7000704	Hoedown	3	32
7000723	Hoedown	1	18
7000761	Hoedown	4	31
7000794	Cradle	1	26
7000889	Raven	2	32
7000912	Basin Salv.	1	7
7001047	Squeeze	2	31
7001085	Change	8	36
7004199	Gill Salv.	5	9
7004200	Gill Salv.	8	1
7004201	Gill Salv.	9	1
7004206	Tattoo	3	1
7004208	Bunchgrass	2	22
7004209	Bunchgrass	3	17
7004210	Bunchgrass	5	20
7004211	Bunchgrass	4	22
7004213	Mal	3	17
7004214	Mal	6	34
7004215	Mal	7	19
7004216	Mal	4	31
7004217	Showboat	1	4
7004218	Showboat	3	12
7004219	Showboat	4	15
7004220	Showboat	2	9
7004224	Gill Salv.	15	1
7004225	Rock Salv.	16	10
7004226	Rock Salv.	18	9
7004227	Rock Salv.	19	1
		Total	719

PRECOMMERCIAL THINNING

Stand	Sale Name of Original Project	Sale Unit	Acres
7004228	Yo Salv.	13	15
7004327	Rock Salv.	14	8
7004328	Rock Salv.	13	4
7004329	Bunchgrass	6	15
7004330	Bunchgrass	7	17
7004331	Bunchgrass	8	19
7004332	Jammer	26	13
7004336	Celtic	21	6
7004376	Squeeze	4	14
7004420	Yo Salv.	9	4
		Total	115
		Total All PCT	834

CONIFER PRUNING

Stand	Sale Name of Original Project	Sale Unit	Acres
7000339	Dusky	1	7
7000351	Ikenick	2	20
7000355	Dusky	1	5
7000359	Dusky	1	3
7001137	Change	7	30
		Total	65

AERIAL FERTILIZATION

Stand	Sale Name of Original Project	Sale Unit	Acres
7000206	Angler Scale	2	41
7000249	Fish Lake F4	4	7
7000250	Angler Scale	1	18
7000258	Angler Bass	3	37
7000277	Fish Lake F1	4	21
7000282	Angler Bass	2	43
7000315	Angler Bass	1	25
7000327	Angler Bass	1	23
7000339	Dusky	1	7
7000348	Ikenick	1	29
7000351	Ikenick	2	20
7000355	Dusky	1	5
7000358	Dusky	2	13
7000359	Dusky	1	3
7000381	Ikenick Salv.	1	44
7000396	Smith	1	38
7000424	Snoose	11	1
7000442	E. Smith	4	9
7000453	W. Ikenick	1	11
7000460	W. Ikenick	2	14
7000473	W. Ikenick	3	15
7000487	W. Ikenick	4	17
7000488	E. Smith	5	6
7000508	E. Smith	6	12
7000518	W. Ikenick	5	8
7000533	Snuffy Salv.	11	5
7000547	Smith Ridge	4	37
7000549	E. Smith	7	13
7000556	W. Ikenick	6	14
7000570	W. Ikenick	7	9
		Total	545

AERIAL FERTILIZATION

Stand	Sale Name of Original Project	Sale Unit	Acres
7000578	Angler Tunnel	2	35
7000580	E. Smith	8	9
7000630	Angler Tunnel	2	28
7000643	Buchgrass	4	16
7000653	Smith Ridge	3	44
7000667	E. Smith	9	11
7000671	Buchgrass	3	17
7000689	Hayrick East	4	56
7000690	Funnel	1	38
7000706	Wildcat Mtn.	2	41
7000715	Smith Ridge	2	49
7000721	Buchgrass	6	6
7000739	Funnel	2	38
7000746	Fritz Wildcat	1	12
7000756	Hayrick East	1	7
7000765	Fritz Cr.	5	64
7000766	Buchgrass	9	8
7000771	Wildcat Mtn.	3	31
7000797	Fritz Wildcat	2	13
7000816	Fritz Wildcat	3	41
7000859	Fawn	1	7
7000864	Fritz Cr.	4	40
7000901	Blitz	5	59
7000930	Blitz	4	19
7000960	Fritz Cr.	1	45
7000969	Fritz Smith	4	47
7000975	Blitz	3	9
7000988	Smith Ridge	1	15
		Total	805
	Total All Aerial Fert.		1350

Appendix G – Soils Specialist Report

Reply To: 2550 Soil Management
2520 Watershed Protection and Management

January 6, 2003

Subject: SOIL AND WATERSHED REPORT
Two Bee Timber Sale

To: District Ranger, McKenzie River Ranger District
ATTN: Cheryl Friesen

I. PURPOSE AND NEED

The District Ranger on the McKenzie River Ranger District proposes timber harvest on several hundred acres on the Upper McKenzie River Watershed, potentially within the drainages of Hackleman, Smith, Browder, and Bunchgrass Creeks. Stand treatments could include commercial thinning, salvage, and post / pole thinning in multiple timber sales over approximately three years. On numerous days throughout the 2001 and 2002 field season, I conducted a field reconnaissance of potential harvest units for this planned timber harvest in order to help implement Willamette National Forest program direction. This specific field review and report was performed at the request of Cheryl Friesen, McKenzie River Ranger District Plans Supervisor, and Al Brown, Planning Coordinator.

The purpose of this field investigation, based on direction in the Forest Wide Standards and Guides, FW-079 and FW-080 and BMP T-1, T-2 and T-3, was to verify the present SRI landtype boundaries; determine the location of unsuited and unmanageable landtypes; prescribe slash treatment and suspension objectives for the possible units; and evaluate potential watershed impacts from management. In summary, existing impacts from prior management are minimal. For most stands, this represents the initial entry. Through the use of suspension and duff retention objectives, short- term impacts will remain within the standards and guides, and off site erosion is not likely. Long- term adverse effects from the loss of productivity or instability will either be within established limits, or are not anticipated.

II. SOIL RESOURCE INVENTORY (SRI) REVIEW

A. Statement of Activities and Description of Process.

One aspect of the field investigation was directed at distinguishing the various identifiable landtype components within and adjacent to possible harvest areas. In general, the field investigation confirmed the original 1973 SRI designations, but some refinement and subdivision of the various boundaries was noted. Many of the landtypes have several components, which were not separated in the original SRI because of the small mapping scale that was utilized (one-inch-equals-one-mile). My field investigation of landtypes and their specific attributes formed the basis for the site-specific recommendations and mitigations that follow in this report.

B. Description and discussion of landtypes

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 unregenerable and those where harvest will cause irreversible impacts. Those landtypes, which 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 nonreforestable 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 nonreforestable 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 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 affect. 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. Other landtype complexes that contain elements of 25 or 35 need to be evaluated on a case-by-case basis as management activities are proposed.

3. The remaining landtypes are adequately discussed in the Soils Resource Inventory. This document, first developed in 1973 and done again 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. This report utilizes the 1973 text, and a copy is on file at the McKenzie River Ranger District.

III. TWO BEE SOILS AND GEOLOGY

The Two Bee project area straddles the boundary between the Western Cascades and High Cascades physiographic provinces and was likely subjected to several Pleistocene glaciations. Consequently, both glacial down cutting and stream scour and erosion of the volcanic formations that comprise the High Cascade parent materials are evident. Upland benches and flats with glacially deposited sediments adjoin steep, stream-incised V-shaped canyons with colluvial volcanic soils. It is likely that glacial ice occupied much of these drainages in the more recent late Pleistocene glaciation, which ended about 10,000 to 12,000 years ago. As the ice melted, a southward flowing, well-established drainage pattern lay on the landscape that formed the headwaters of the McKenzie River. This dramatically changed approximately 3000 to 3500 years ago as outpourings of basalt lava and cinders blocked most drainages to the north of this project location. These relatively recent lava flows extended down the ancestral McKenzie canyon all along the eastern edge of this analysis area.

The Two Bee project area is comprised of relatively gently sloping, upland benches that are separated by moderately steep, shallow-soiled canyons. Most benches are covered with a moderately thick blanket of glacial soils, comprised primarily of ground moraine and some outwash. Occasionally small rock outcrops of basalt protrude through the glacial veneer. On the steep side slopes dropping away from the flats, colluvial soils of both glacial and volcanic origin predominate. As is typical with most High Cascade volcanic and glacial soils, they are productive and stable. Excluding the areas of recent lava flows and the upland meadow complexes, unsuited areas are infrequent and consist primarily of basaltic

rock outcrops.

No evidence of slump type slope failure and very little evidence of debris chute type slope instability (only in Unit 17) and was found with the field reconnaissance. Recent work by John Pearch (OSU Masters Thesis) on the South Santiam has shown that glacial soils are very low in clay content, and the clays present are not the type that contributes to persistent turbidity and water quality problems.

IV. DIRECT EFFECTS DISCUSSION

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 following sections discuss in more detail (1) how the proposed action may effect the soil resource or (2) mitigations that can be utilized to avoid potentially undesirable effects. By defining the terms for soils impacts, setting standards, or establishing limits, these following sections set the stage for the accompanying Detailed Unit Summary Data Table that consolidates the required management constraints on a unit-by-unit basis.

A. **DISPLACEMENT:** The logging suspension requirement for a proposed unit is mandated in the LMRP (1990) to protect the soil from excessive disturbance or displacement (FW-081 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). A definition of harvest system terms that could be utilized in this report is as follows:

Ground: ground based equipment is acceptable with LTSR (locate tractor skid roads) as a minimum requirement (BMP T-11). Also tractor operations should not generally occur on slopes greater than 30% (FW-083). Refer to Section C for a more in depth discussion of ground-based systems.

Cable: Cable yarding, such as high lead, is recommended but log suspension is not required.

Partial: Skyline yarding with one end of the log suspended off the ground.

Full: Full suspension of the log from log bed to landing is required.

B. **COMPACTION:** The major source of compaction (and also much disturbance) is ground based skidding equipment. Unrestricted tractor yarding and tractor piling are not considered an option on those landtypes where sideslopes are gentle enough (generally less than 30%) to support tractor usage (BMP T-9 and VM-1, and FW-083). 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 unacceptable soil compaction and/or disturbance. Restricted tractor yarding from predesignated skid roads is considered an option if the adversely affected area is less than 15%% of the activity area (BMP T-11). When a ground based system is selected, existing tractor skid roads should always be utilized before any new skid trails are developed. 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 reduces soil disturbance and compaction (BMP VM-4). As a minimum mitigating measure, at the completion of harvest activities, tractor skid roads (existing or created) should be adequately subsoiled with a "Forest cultivator" or an equivalent winged ripper in order to return the site to near original productivity. This can be accomplished either by the contractor or through the KV process.

C. NUTRIENT LOSS: Duff Retention is the percent of effective ground cover (generally considered the duff and litter layer and based on the existing premanagement condition) that needs to remain after cessation of management activities (FW-084 and FW-085) in order to minimize nutrient loss, and to protect against erosion (BMP T-2 and F-3). In most cases since fire is a natural component of the west Cascades ecology, broadcast burning appears to be an acceptable slash treatment alternative, but nonburning options should also be considered (FW-250 and FW-251). 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 most instances, PUM yarding is not recommended in order to provide for the retention of additional woody debris to further minimize sloughing and raveling on the steeper slopes (FW-084), and to provide for added nutrient recycling (FW-085) and wildlife habitat (FW-212a). Grapple piling (on the gentler slopes), the minor spot burning of concentrations, or hand pile and burn may be another options to evaluate. This will have to be considered on a case-by-case basis in conjunction with silvicultural and slash treatment objectives.

As was stated previously, fire is a natural ecological component of the west Cascades ecosystem. Fire recurrence intervals of 200 to 400 years are apparent in the natural system, with shorter intervals recorded in many high lightning areas. Most second growth units in the project area are about 100 to 200 years old and resulted from intense wildfires in the 1800s. These natural fires consumed most of the above ground organic matter. Thinning or partial cut harvest of these units will provide opportunities to reintroduce fire into this ecosystem.

Uncontrolled wild fire at low fuel moisture, high fuel loading and adverse weather conditions can result in permanent, detrimental soil impacts. Nearly a century of fire suppression has allowed natural fuel build up from snow down, blow down and disease to increase the amount of down decomposing organic matter to the upper range of historic variability on many sites. Controlled burning under the proper conditions with low to moderate intensity will protect leave trees while reducing fuel loading. Duff retention objectives primarily apply to regeneration and shelterwood harvests. Generally with underburning in partial cuts and thinnings, duff retention is not a concern when an intact overstory with crowns and live, interconnected, root mats are left in place. Side slopes in many areas are generally too steep to consider alternate forms of mechanical slash treatment, and hand treatments are prohibitively expensive. Consequently, prescribed fire is considered an important management tool for this area because fire was once a natural part of the system.

D. INSTABILITY:

Debris chute type slope instability, typical of much of the West Cascades, often occurs on critical highly dissected side slopes with shallow soils and steep sided draws. Sites accumulate material for several hundred years from ravel, slough and creep. Intense stand replacement fires and / or high intensity flood events can precipitate a flurry of debris chutes type failures. Then stream channels and swales begin this process of accumulation all over again. In this project area, many of the steep swales and draws appear to have failed or lost material in the last sequence of fires and severe storms one hundred to two hundred years ago. They are slowly beginning the process of soil accumulation, and little material remains left to fail.

In Unit 17, a thicker deposit of glacial soils and weathered volcanic material is naturally failing by debris chute. The failure site is very small, less than 0.1 acre and the run out ends in the timber at the

base of the slope. Previous failures have not reached the river, but are building up a debris fan on the terrace. Harvest in this area will require a small buffer at the head to maintain root strength and retention of large wood and standing timber at the run out to continue the development of the fan.

No other areas of actively unstable or potentially highly unstable slopes were noted in the reconnaissance.

V. SOIL PROTECTION MEASURES

The various units are located on productive soils as localized unsuited areas of rocks and cliffs or potentially unstable areas were avoided. Recent thinning on similar land types has shown that 1) with canopy closures greater than approximately 40%, slope stability has been maintained after harvest, and 2) with appropriate suspension during logging, soil disturbance is minimal and off site erosion is essentially non-existent.

The following table discusses mitigations, based on direction in the Forest Wide Standards and Guides (primarily FW-079, FW-090 and FW-179), to maintain or enhance soil productivity and stability. This data table addresses suspension requirements and duff retention objectives, as well as pertinent specific comments for particular units (where necessary). This action proposed initial entry for most units. Previous entry was performed primarily by cable yarding systems, and off site erosion, loss of effective ground cover, excessive compaction, or instability did not result. Consequently, cumulative effects from one entry to the next are not a concern. This list may contain some units that were eventually dropped from all action alternatives.

UNIT	LANDTYPE	SUSPENSION	COMMENTS
1	66	ground	
2	66 602	ground Partial-skyline	Major slope change in unit. One or two spurs to ridge for landings.
3	602	Partial	May be helicopter, to avoid landing impacts to S/M sites along road.
4	66	ground	
6	66	ground	
7	66	ground	Several long temp truck roads required.
8	66	ground	Yard to Rd. 667 to avoid S/M sites
10	66	ground	Temp truck road along old fire line for access.
11	66	ground	
12	66	ground	
13	66,	ground	
14	602-605	Partial-skyline	Short spur to landing on logged flat. Small area of ground based near landing.

15 66 ground

17 602 Partial-skyline Long spur to flat on ridge point.

NOTE: May want to helicopter to avoid tail holds near trail at bottom. Also will better meet visual objectives. However, costs will double.

Small natural debris chutes within proposed unit near southeast boundary. Failed material disperses in timber at terrace boundary with slope change. Introduce more large woody debris into debris chute tract. Retain most large trees within one chain along debris chute track from head to runout area.

18 66 ground Access also from Rds. 643 and 657.

20 66 ground

21 66 ground Abandon Rd. 667 from Unit 21 to south – wet. Exclude portion of unit west of Rd. 667. Construct temporary spur to east of Rd. 667 for access.

22 66 ground Abandon Rd. 667 from Unit 21 to south – wet. Exclude portion of unit west of Rd. 667. Construct temporary spur road east of Rd. 667 through Unit 21 to access Unit 22.

23 66 ground Yard to main road.

24 66 ground Yard to main road.

25 66 ground Small area wet soil at SW corner near road, avoid skid rds.

26 602-614 Partial Helicopter yard up hill to landings on road. Tail holds across reservoir not considered an option.

27 614 Partial-skyline Landings on road. Small rocky area about ¼ acre, in NE corner. Leave large trees at margins for seed source.

29 44 Partial-skyline Landings on road.

30 (west side) 615-6 Full Helicopter yard to protect wet soils.

30 (east side) 615, 644 Partial-skyline Landings on road.

31 602-605 Partial-skyline Short spur to landing.
644-446

33 614, 446 Partial Helicopter yard up hill to landings on road. Tail holds across reservoir not considered an option.

34 614,446 Partial Helicopter yard up hill to landings on road. Tail holds
across reservoir not considered an option.

40 66 ground

NOTE: APPROXIMATELY 20 SPECIFIC SOIL AND WATER RELATED MITIGATIONS ARE LISTED IN THE EIS.

On many units, helicopter yarding may be required contractually to reduce the need for an expanded transportation system. This is desirable because it minimizes soil disturbance, but it is not required for adequate soil protection.

V. INDIRECT AND CUMULATIVE EFFECTS ASSESSMENT

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 - compaction, nutrient loss, displacement 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, 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.

Prescriptions for soil protection, watershed considerations and riparian needs of the subbasin take into account past and predicted future land management activities. The soils mitigation measures, as well as the streamside management zones, are designed to provide a level of riparian habitat 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 grass 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. As the proposed project is initiated, it will be monitored to evaluate implementation efficiency, prescription adequacy, and to update sale area rehabilitation needs or protection.

/s/ Douglas C. Shank
DOUGLAS C. SHANK

District Geologist

Appendix H – Response to Comments

Scoping Comments:

On June 10, 2005, the Responsible Official notified the public of the District’s intent to revise the analysis in Two Bee Environmental Assessment. A letter to solicit early scoping comments on the proposed action was sent to elected officials agencies, tribal organizations, and interested public listed in Chapter 4.

Below are ID Team responses to comments received during the scoping period from five commenters.

Submitter	Comment	Response and Where Addressed in the EA
Michael J. McCann, Environmental Specialist, Eugene Water and Electric Board (EWEB), Eugene, OR	Smith-Carmen Project In revising the Two Bee EA, we request that the Forest Service consider potential impacts to the Carmen-Smith Project. Specific issues and concerns previously identified by EWEB with respect to the Two Bee include the use of Carmen-Smith Project roads, including the face of Smith Dam, for hauling timber, impacts to recreation facilities by timber harvest, impacts to soil stability above EWEB reservoirs, and loss of timber and slash to EWEB reservoirs.	All roads used for haul would be maintained or improved to reduce adverse impacts to resources, including the road accessing Smith Dam. Roads would be signed notified the public during log hauling activities. Forest road 2672655, which provides access to EWEB power generating facility from Smith Ridge, is not to be used as an alternate haul route (Mitigation Measure #18.) Recreation facilities would be protected with standard contract language, and timber sale contract requirements would prohibit helicopter flights over Smith Reservoir with suspended logs during yarding operations. See Mitigation Measures in Chapter 2, and Chapter 3 – Recreation. Road construction and timber harvest are not proposed on potentially unstable soils anywhere in the project area. Chapter 3

Submitter	Comment	Response and Where Addressed in the EA
		discussion on Soil Productivity and Slope Stability.
George B. Hutchinson, Newport, OR	Variable Density Thinning The USFS needs to focus on variable density thinning in plantation forests, like in units 13 and 41 and to continue to protect mature and old-growth forests for our healthy watershed future.	This project area is located primarily in the Matrix (General Forest) land management allocation where objectives include management for a sustained yield of timber. Commercial thinning meets multiple use objectives that while providing timber products, also creates structural and species variability. Variable density thinning can be used for creating late successional characteristics in areas where that is the primary objective, but it is not typically used in General Forest areas.
Denise Lytle, Fords, NJ	Two Bee project should focus on variable density thinning in plantation forests (like unit 13 and 41).	
Chandra LaGue, Conservation Associate, Oregon Natural Resources Council (ONRC), Eugene, OR	We are happy that you are planning to thin in units 13 and 41 of this project, as these stands are in need of introduced variability so that they may develop into functional late-successional forests.	
Kate Ritley, Cascadia Wildlands Project (CWP), Eugene, OR	We urge the IDT to include, analyze, and choose a variable density thinning only alternative in the upcoming EA. This method of thinning creates healthier, high quality habitat for wildlife and a healthier forest that is better equipped to reach late-successional conditions.	
Chandra LaGue, ONRC	Unroaded Areas The Two Bee project still plans on harvesting within roadless areas as defined by ONRC. We have asked you to acknowledge these areas and disclose the proposed action's effects on roadless values in the past. We urge you to drop the units (2, 3, 11, 14, 26, 33, and 34) from the roadless areas.	The project area does not include Inventoried Roadless Areas. Areas that are considered unroaded, and which may have roadless values were analyzed in this EA. This includes an analysis of the areas identified and mapped in the unroaded area

Submitter	Comment	Response and Where Addressed in the EA
Kate Ritley, CWP	A number of the proposed Two Bee logging units fall in unroaded areas. Of greatest value to the overall functioning of roadless ecosystems are units 3, 11, 14, 26, 27, 30, 31, 33, 34, and 39, all of which fall partly or entirely within uninventoried roadless areas greater than 1,000 acres in size that were identified in the Willamette Pilot Road Analysis. Logging in these areas has the potential to disturb soil and water, destroy scenic integrity, eliminate reference landscapes, limit primitive recreation, introduce nonnative weeds, and disturb cultural resources, among other impacts.	analysis presented in the Willamette Pilot Roads Analysis in 1998, and made a part of the Willamette Roads Analysis. See Chapter 3 - Roadless and Unroaded Areas.
Kate Ritley, CWP	Logging Mature Forests Will decommissioning old roads offset the detrimental effects of building new roads, particularly with regard to aquatic condition? Do habitat improvement projects adequately compensate for the extensive habitat disruption and destruction associated with mature forest logging? How does aggressive logging immediately above Smith Reservoir factor into the stated goal of enhancing, maintaining, and improving fish habitat? How do you plan to mitigate the damage to riparian areas and water quality with logging projects that border streams, especially those bordering class 2 and 3 streams? The proposed salvage in unit 11 is of particular concern to us. The blow-down in this unit adds structural complexity and provides habitat for a host of species. Forests require pulses of down wood; the maze of logs on this forest floor should be seen as a positive attribute rather than something in need of removal.	No detrimental effects are anticipated from temporary road construction. There would be a net improvement of aquatic conditions within the watershed with the proposed action. See Chapter 2 for riparian reserve guidelines and mitigation measures. See Chapter 3, Water Quality/Aquatic Habitat for effects The Two Bee project proposed action is made up of predominately moderate partial cutting. The prescriptions are not expected to cause extensive habitat disruption for any plant, wildlife, or fish species. Chapter 3 thoroughly discloses effects to, Elk Habitat; Threatened, Endangered, and Sensitive Species; and Migratory Land Birds and

Submitter	Comment	Response and Where Addressed in the EA
Chandra LaGue, ONRC	Units 14 and 18 are healthy native stands. There doesn't appear to be any ecological reason to log these stands. Likewise, the "salvage" proposed in unit 11 would disturb a natural stand (surrounded by clearcuts) with a healthy amount of large down logs.	Management Indicator Species. All harvest unit prescriptions are consistent with Forest Plan standards and guidelines for silvicultural methods and stand level diversity. For instance, harvest treatments would maintain or exceed the required levels of snags and large down wood.
Kate Ritley, CWP	Riparian Area Quality Without an ultimate restoration objective, the short-term increases in erosion and sedimentation violate ACS, particularly in units near bull trout habitat in the McKenzie River. This includes units 2, 3, 4, and 11. The January 2004 DN and FONSI states that "alternative B" would partially cut 130 acres of riparian reserve. Will any mature trees be cut? If so, what justification is there for cutting the very trees that lead are already in late successional condition? We are also concerned with the logging units abutting Smith Reservoir. Units 26, 33, and 34, appear to extend fully or partially down to the reservoir, which provides habitat for numerous fish species, including brook trout. How will these logging activities impact water quality and riparian and aquatic habitat? How will logging mature forests impact stream health? Will there be any risk to water quality? Do these risks violate the Upper McKenzie Watershed Analysis and ACS?	Riparian Reserve widths and mitigation measures are described in Chapter 2. The effects of thinning prescriptions and land management activities are described throughout Chapter 3. Stand composition objectives are described in Chapter 2 – Silviculture Prescriptions, and project effects on stand composition described in Chapter 3 – Forest and Stand Structure. A discussion of project compliance with the ACS is provided in Appendix A.

Submitter	Comment	Response and Where Addressed in the EA
Kate Ritley, CWP	Road Building and Decommissioning Alternative B calls for approximately 0.8 miles of temporary roads [. . .] to access harvest units, [w]e implore you to incorporate an explanation of how these new roads impact surrounding areas into a comparison between alternatives and into the decision-making process. We ask that in the EA you explore alternatives that do not include any new road construction (such as a variable density thinning only alternative.)	These temporary spurs provide access to harvest units 3 and 6 in Alternative A; and for units 3, 6, and 7 in Alternatives B and C. Maps and descriptions of the temporary roads, including why they are needed are found in Chapter 2. The effects of the temporary roads on soil and water are disclosed in Chapter 3.
Chandra LaGue, ONRC	The scoping notice states that about 0.8 miles of temporary roads would be built in association with harvest. We are opposed to any new road building in mature stands. Please disclose the location and need for the proposed roads. In the EA, please provide a stand by stand description of the road spur lengths and the acres each spur accesses for thinning.	
Chandra LaGue, ONRC	Wild and Scenic River Corridor We are concerned with the effects of logging in the Wild & Scenic Corridor (units 2, 3, and 17). Operations and post-operation impacts could affect recreation in the corridor – one of the most popular hiking and mountain biking trails in the region is just down from these units.	Unit 17 and the portion of unit 2 within the Wild and Scenic River Corridor, has been dropped from all action alternatives in response to early public comments. Unit 3, a moderate partial cut, is still included but the unit boundary is separated from the McKenzie River Scenic Trail by over 300 feet (slope distance) of dense forest. See Chapter 3, Recreation.

Submitter	Comment	Response and Where Addressed in the EA
Kate Ritley, CWP	Significant New Information on the Spotted Owl According to the Forest Service, there are at least ten northern spotted owl activity centers in the Two Bee area. New information on the federally-listed Threatened spotted owl indicates significant new uncertainties for the owl's survival and recovery that have not been fully considered by the Forest Service. We request that the EA explore the significance of recent nearby fires, such as the B & B, Clark, Eyerly, and Davis, as they relate to owl populations and Two Bee owl habitat. Please directly address how the Two Bee project and mature forest logging prioritize "species protection and habitat enhancement [. . .] over other practices. Please explore which alternative best meets the stated need to prioritize species recovery over other activities.	The new information on the threatened northern spotted owl has been considered by the U.S. Fish and Wildlife Service and is documented in the FY 2005 and 2006 Biological Opinion on Effects to Northern Spotted Owls and Spotted Owl Critical Habitat from a re-initiation of consultation on likely to adversely affect Timber Sales activities associated with Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service (August 11, 2005). This Biological Opinion considered habitat modification activities and loss of habitat associated with the large fires.
Chandra LaGue, ONRC	Six spotted owl core areas are located within the Two Bee project area, including those adjacent to units 26, 3, and 14. Before proceeding with the project planning, you must consider the [. . .] new information on this threatened species.	

Appendix J

Landscape Analysis

Prior to the alternative development phase of the Two Bee Landscape Project, the interdisciplinary team found it appropriate to complete an analysis of the resources for the entire area within the affected watersheds. The “landscape analysis” included an area of approximately 30,667 acres in the 2B Landform Block identified in the Upper McKenzie Watershed Analysis (1995).

The results of this analysis provided the interdisciplinary team a way to understand and define how disturbances, such as fire and floods, affected this landscape historically. The frequency and intensity of disturbances molded the capability of the landscape to grow and maintain certain habitat types over time. For example, in areas with frequent high intensity fires, old growth forests did not historically provide abundant habitat.

Human expectations and values have been placed on this landscape within the Willamette National Forest Plan and the Northwest Forest Plan. The team identified where our expectations did not match the historic capability of the landscape.

Using a concept called “range of historic variability,” the team described how the landscape has fluctuated over time in response to disturbances, such as fire and floods. The team recognized that the only way to provide the products that are valued by humans on a sustainable basis, was to understand how to fit those needs within the landscape’s historical capabilities. This is the underlying philosophy of ecosystem management.

This process led to the development of “target landscape” descriptions (Tables II-3 through II-6, and Figure II-4). They are subsets of the larger 2B landscape, often defined by smaller scale geographic influences. The target landscapes describe the pattern of forests and non-forest habitats in terms of their types, shapes, sizes, and arrangement on the landscape. They blend the capability of the landscape with human expectations.

Historical Fire Regimes and Target Landscape Descriptions

Table II-3: Fire Regime 2B-1

Fire Frequency	Fire Severity	Patch Size	MFRI (Mean Fire Return Interval)
a. Infrequent	Moderate to High	Large (1000-3000 ac)	200-400 years
b. Intermediate	Moderate to High	Large	80-200 years
c. Intermediate	Low to Moderate	Small to medium	80-200 years

Location: The predominately flat terrain of this area lies between the edge of the McKenzie River valley to the east and the steep, dissected topography of the Old Cascades to the west, including the Hackleman creek drainage.

Historic Disturbances: Lightning ignitions regularly occurred on the mountain flanks to the east of area 2B. However, lightning strikes generally did not result in large, east to west running fires that spread into this area because extensive lava flows broke their path.

Lightning strikes are rare within 2B-1. When lightning ignition did occur, there were limited topographical breaks to interrupt fire spread and protect old growth refugia, so fires are generally large. The lack of lightning also results in minimal creation of very fine-scale diversity that typically can occur when individual trees or patches of trees are killed by very small fires.

The forested landscape was dominated by Douglas-fir tree species, especially in early seral patches.

Large stand-replacing fires (1,000-3,000 acres) occurred under extreme conditions every 200+ years. Small-scale partial burns occurred every 80-200 years, adding to the landscape and stand-level diversity. Partial-stand-replacing fires were quite variable, leaving patches of live stands interspersed with areas of high mortality.

Current Condition: The forests are dominated Pacific silver fir communities, with scattered wetlands, ponds, and lakes. Timber harvest and fire suppression has resulted in a mosaic composed of early, mid and late seral forest. Early seral patches are generally 400 acres in size.

Target Landscape: The forests are composed of early, mid and late seral habitats dominated by mature forest over time. Scattered patches of old growth lie in randomly located blocks from 400-600 acres in size. Early seral habitat infrequently occurs in large patches.

Dry meadow habitat in Smith Prairie has been restored, and wetland habitat on Smith Ridge has been protected and enhanced. Views from Highway 126 have been maintained or enhanced. Interpretive opportunities associated with Fish Lake Remount Depot have been explored. The Santiam Wagon Road has been restored to historic conditions consistent with the draft Management Plan. Protection and restoration of all stream classes, especially those that flow directly into the McKenzie River, result in high quality aquatic, riparian, and terrestrial resources.

Table II-4: Fire Regime 2B-2

Fire Frequency	Fire Severity	Patch Size	MFRI (Mean Fire Return Interval)
a. Intermediate	Moderate-high	Medium-Large	80-200 years
b. Intermediate	Low	Small	80-200 years

Location: This area includes the Smith and Upper McKenzie River drainages

Historic Disturbances: Topography shelters this area to a greater degree than Landform Block 2B-1. This results in a very low probability that east wind fire events would be carried here over the adjacent lava flow from the mountain flanks. It also protected Class 1 and 2 streams from significant fire disturbance. However, the topography enabled fires driven by

southerly winds to run up Class 3 and 4 stream drainages. These stand-replacing fires dominated this area, ranging in size from 800-3,000 acres, and occurring every 80-200 years. This relatively frequent fire return interval resulted in few stands achieving an old growth condition over time. Partial stand-replacement fires were rare so there was little within-stand and landscape-level diversity created by this type of disturbance.

Current Condition: The forests are dominated Western hemlock communities. Timber harvest and fire suppression has resulted in a mosaic composed of early, mid and late seral forest. Large patches of even-aged, mature forested stands dominate the landscape, with scattered individual and clumps of larger remnant trees. Early seral patches are generally 400 acres in size.

Target Landscape: The forested communities include early, mid and late seral forests, dominated by mature forest over time. Large patches of even-aged forested stands with scattered individual and clumps of remnant trees are common. Root-rot creates fine-scale disturbances in the valley bottom. Class 1 and 2 stream riparian areas are dominated by older forest over time. Class 3 and 4 streams were historically not protected from fire disturbances, but because of their contribution to valuable aquatic resources, they are also maintained in a condition dominated by older forest. Outstandingly Remarkable Values of the McKenzie Wild and Scenic River are maintained in accordance with its management plan. Visual objectives surrounding Smith and Trail Bridge Reservoirs are met.

Table II-5: Fire Regime 2B-3a

Fire Frequency	Fire Severity	Patch Size	MFRI (Mean Fire Return Interval)
a. Low to moderate	High	Medium – Large	200 + years
<i>In the non-forest ridgetop grasslands:</i> b. Frequent	Low – Moderate	Small – Medium	20 – 120 years

Table II-6: Fire Regime 2B-3b

Fire Frequency	Fire Severity	Patch Size	MFRI (Mean Fire Return Interval)
a. Low to moderate	High	Medium – Large	200+ years
b. Low to moderate	Moderate to High	Very Small	80-200 years

Location: This landform includes the highly dissected topography of the Old Cascades on places like Wildcat Ridge, Browder Ridge, and Iron Mountain. The steep drainages are topped by non-forested ridgelines

Historic Disturbances: Large, stand-replacement fires, 800-3,000 acres in size, occurred on this landscape very infrequently (>200 years). When fire did occur, its effects were significant in the lower elevations, but small-scale diversity from partial stand-replacement

fires was common as the fires ran toward the cold ridgetops. In the non-forested communities on the ridgetops, fairly frequent fires maintained the grassland communities. Flooding was a major disturbance factor associated with Class 1 and 2 streams in this area. This created a shifting pattern of coniferous and hardwood patches on point bars in the floodplain.

Current Condition: Forest communities are dominated by Pacific silver fir forests. Timber harvest and fire suppression has resulted in a mosaic composed of early, mid and late seral forest. The landscape is dominated by large patches of older forested stands, with scattered individual and clumps of very large remnant trees. Early seral patches are less than 600 acres. Ridgetops are dominated by grassland communities that may be invaded by conifers over time.

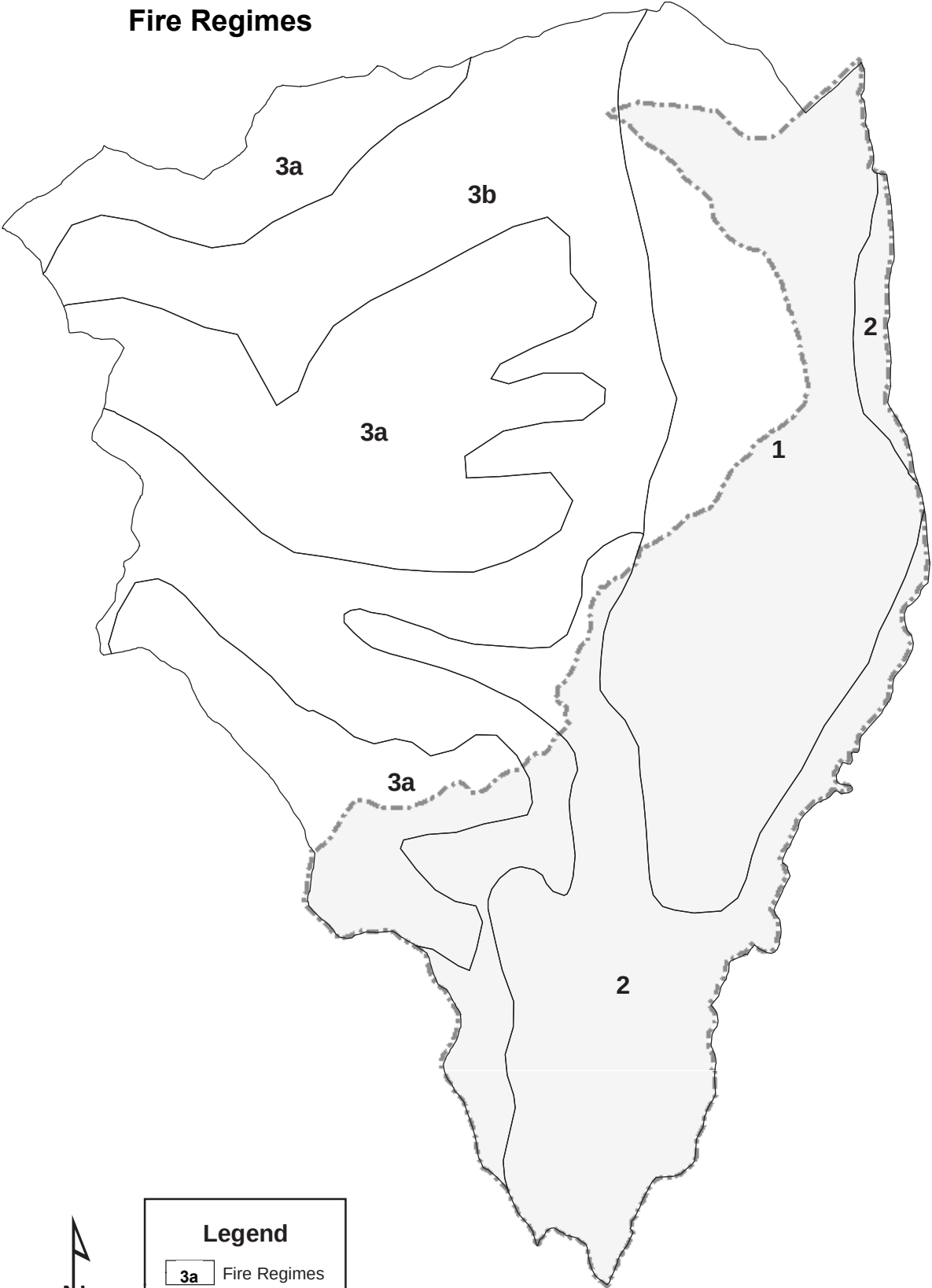
Target Landscape: The forest communities in the higher elevations of this landscape are dominated by small patches of mature forested stands. The non-forested habitats on the ridgetops burn frequently and provide natural fire barriers. Lower elevation forests, including all riparian areas, are dominated by large patches of very old forest. Human use of this environment for recreational experiences is a dominant factor in the area. Maintenance of high visual quality and values associated with the Research Natural Areas and Special Interest Areas are important.

Table II-7: Landscape Analysis Target Landscape Definitions

Frequency		Size		Severity	
Infrequent	> 300 yrs	Small	< 300 acres	Low	0 – 30% Mortality
Intermediate	100-300 yrs	Medium	350 – 700 acres	Moderate	30 – 70% Mortality
Frequent	100 yrs	Large	> 700 acres	High	> 70% Mortality

Two Bee Landscape Analysis

Fire Regimes



Legend

- 3a Fire Regimes
- Project Area

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Appendix K

Two Bee EA

Past Actions and Cumulative Effects

July 19, 2006

This analysis lists and describes management activities that have occurred in the past within the project area, along with reasonably foreseeable future actions. The effects of these actions below could contribute cumulatively to the effects of the proposed actions in the Two Bee Landscape Management Project, and are incorporated in the Two Bee Environmental Assessment.

Vegetation Management

Timber Harvest by Decade

The cumulative effects from past vegetation management activities in the Two Bee EA is based on the entire Two Bee Landscape Analysis Area, and considers most of Landform Block 2B from the Upper McKenzie Watershed Analysis (1995). Both the McKenzie River Ranger District and the Sweet Home Ranger District are within the analysis area. The following tables provide the acreage of past timber harvests on the Two Bee Landscape Area by decade, and also the post-timber sale silviculture treatments. Data was obtained from the Willamette National Forest Vegis Database.

Table 1. Acres of past timber harvest by Regeneration and Non-Regeneration Harvest Methods.

Decade	McKenzie River Ranger District		Sweet Home Ranger District		Total Acres	
	Regen Acres	Non-Regen Acres	Regen Acres	Non-Regen Acres	Regen Acres	Non-Regen Acres
1940-1949	0	0	60	0	60	0
1950-1959	106	0	405	0	511	0
1960-1969	949	0	2,134	0	3,083	0
1970-1979	458	43	783	200	1,241	243
1980-1989	895	471	626	644	1,521	1,115
1990-1999	439	518	278	699	717	1,217
2000-2005	0	0	39	148	39	148
Total Acres	2,847	1,032	4,325	1691	7,172	2,723

Table 2. The following is a list of timber sales, by decade, that contributed to the above timber sale acreage.

Decade	Timber Sales Occurring on McKenzie River Ranger District	Timber Sales Occurring on Sweet Home Ranger District	Acres Harvested
1940-1949		Lava Lake	60
1950-1959	Fish Lake	Tombstone, Smith River, Fish Lake, Browder Cr	511
1960-1969	Fritz, Ikenick, Smith Ridge, Wildcat Mt	Toad Creek, Echo Creek, Heart Lake, Lost Prairie, Browder Ridge Fish Lake/Browder, Wildcat	3,083
1970-1979	Blitz, Bunchgrass, E. Smith, Junction Sant, N. End, Smith, Thinning, West Ikenick, Fresca	Dane, Jaguar, Browder Leave	1,484
1980-1989	Angler, Change, Cradle, Dusky, End, Fawn, Funnel, Hayrick, Hoedown, Raven, Tattoo	Browder Hackleman, Browder Ridge Rem, Cradle, Dane Fish, Dane Prairie, Dane Smith TBV, Gate, Maude	2,636
1990-1999	Celtic, Jammer, Mal, Showboat, Squeeze	Browder, Bunchgrass, Dane Boundary Removal, Prairie, Seven Sides	1,934
2000-2005		Prairie ATV	187
Total			9,895

Post-Timber Sale Silviculture Treatments

Table 3. Pre-commercial Thinning Acres.

Decade	McKenzie River Ranger District	Sweet Home Ranger District	Total Acres by Decade
1970-1979	74		74
1980-1989	1,268	423	1,691
1990-1999	1,005	684	1,689
2000-2006	996	553	1,549
Total Acres	3,343	1,660	5,003

Table 4. Timber Stand Fertilization Acres.

Decade	McKenzie River Ranger District	Sweet Home Ranger District	Total Acres by Decade
1980-1989	126		126
1990-1999	573	474	1,047
2000-2006	957	45	1,002
Total Acres	1,656	519	2,175

Table 5. Pruning Acres.

Decade	McKenzie River Ranger District	Sweet Home Ranger District	Total Acres by Decade
1990-1999	321		321
2000-2006	727	79	806
Total Acres	1,048	79	1,127

Roads, Trails, and Developed Facilities

The Two Bee Project Area includes approximately 2.5 miles of U.S. Highway 20, 3.9 miles of State Highway 126, and 66.0 miles of Forest system roads within the McKenzie River Ranger District, for a total of 72.4 miles of roads. Of the 66.0 miles of Forest system roads, approximately 32.9 miles have been closed with either gates, berms, or other structures in the past. The Forest system roads receive annual maintenance in accordance with established road management objectives. Road maintenance work includes activities to reduce brush, clean out drainages, and repair road surfaces on many of the Key and secondary roads in the project area (Willamette Roads Analysis, 2003).

The McKenzie River National Recreation Trail lies along the east boundary of the project area. Trail maintenance to keep this trail clear of logs and slides occurs annually.

Existing developed recreation facilities constructed within the project area include Fish Lake campground, Clear Lake Campground, Ikenick Sno Park, Carmen Reservoir Day Use Area, Trail Bridge Campground, Smith Reservoir Boat Launch, and Lakes End Campground. Normal facility maintenance activities occur annually at all sites.

The Three Sisters IMPROVE air quality monitoring site is located on Forest road 2600655. This designated EPA air sampling point, maintains a 2 acre area that is cleared of all trees to prevent interference from vegetation.

The Eugene Water and Electric Board (EWEB) operates its Carmen-Smith Hydroelectric Project within this planning area. Major features of this facility include the Carmen Dam and Reservoir, Carmen-Smith diversion tunnel; Smith Dam and Reservoir, Trail Bridge Reservoir, and the EWEB power generation facility at the head of Trail Bridge Reservoir. These three dams and reservoirs were constructed in the early 1960s. Preparation for dam construction required clearcut logging of all trees within the dam and reservoir areas, permanently removing approximately three hundred acres of mid-seral, and late-successional forest in all. In addition, several access roads were also constructed within the project area specifically access facilities (these roads are included in the total miles of road analyzed in Chapter 3, Roads and Access).