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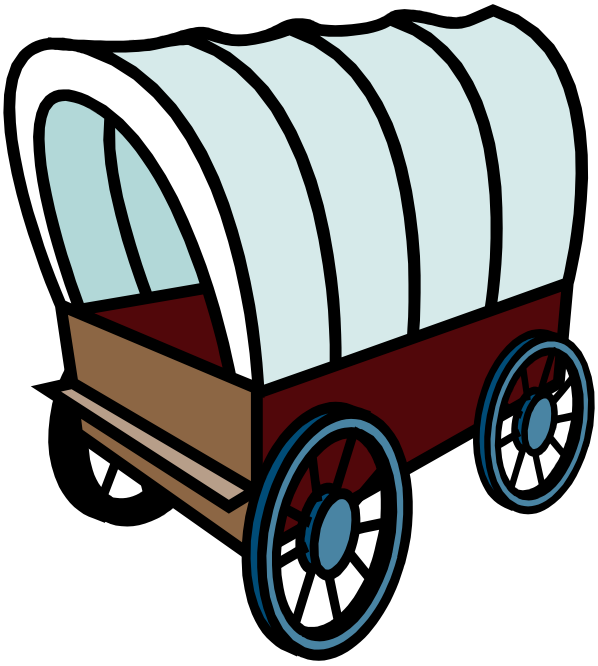
Environmental Assessment

Pioneer Gulch Project

Middle Fork Ranger District, Willamette National Forest
Lane and Douglas Counties, Oregon



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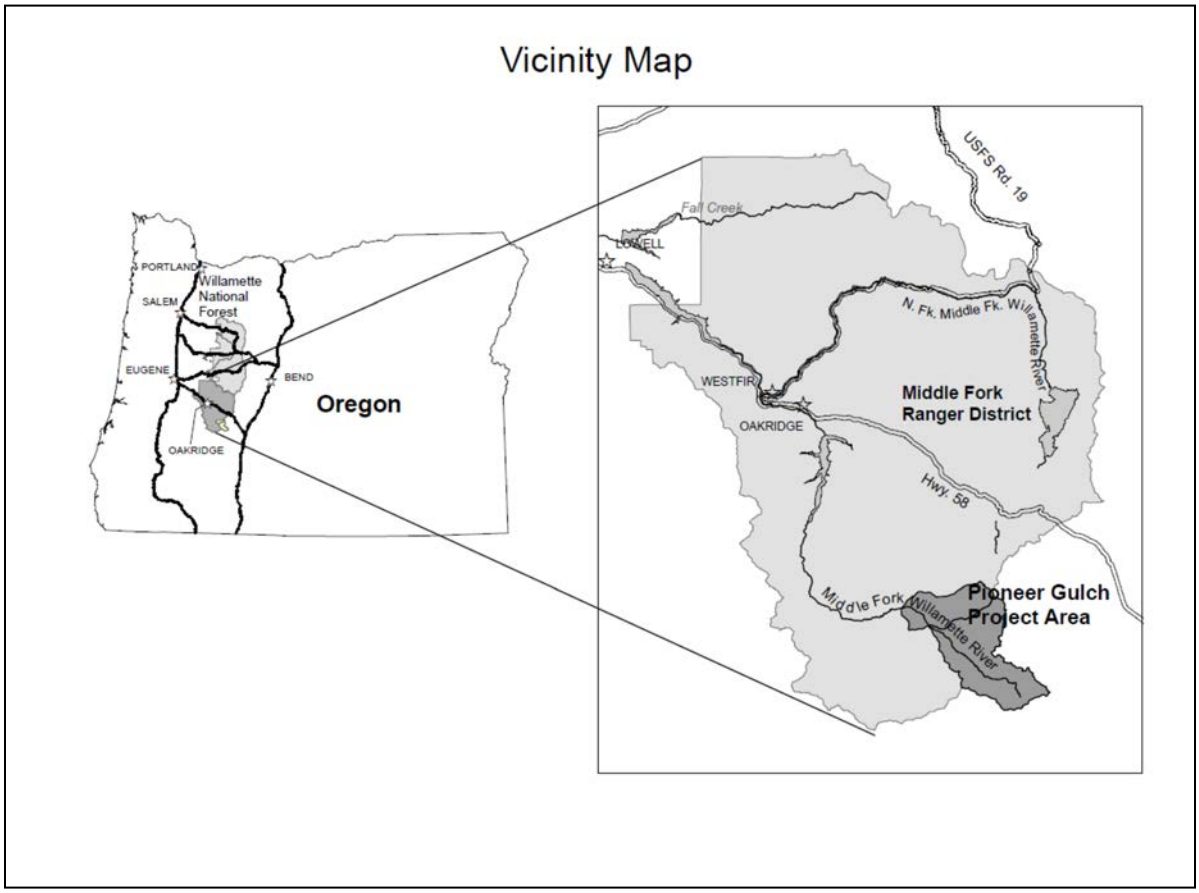
Chapter 1. Introduction

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.

Background

The Pioneer Gulch project area comprises about 37,195 acres in the southern portion of the Middle Fork Ranger District; about 18 air miles southeast of the City of Oakridge (see Figure 1). The area is bounded on the east by Diamond Peak Wilderness Area and the Oregon Cascades Recreation Area, on the north by Bear Mountain, and on the south by the Umpqua National Forest. The project area is within the Upper Middle Fork Willamette River fifth-field watershed, and includes the headwaters of the Middle Fork Willamette River. The project area is comprised of two sixth-field watersheds: Pioneer Gulch and Upper Middle Fork Willamette River/Paddy's Valley. Elevation within the project area ranges from 2500 feet to 6200 feet. Annual precipitation ranges from 65 to 75 inches, in the form of rain and snow accumulations during winter months. In the fall of 2009, the Tumblebug Fire burned into the western portion of the Pioneer Gulch project area.

Figure 1: Vicinity map



The lower elevations of the project area (2500-4300 feet) are within the western hemlock, grand fir, and Douglas-fir plant association zones. These zones are dominated by Douglas-fir with minor amounts of western hemlock, incense cedar, western redcedar, grand fir, white pine, and bigleaf maple. The proposed commercial thinning and some of the proposed forage treatments are located in this zone. The higher elevations of the project area (4600-6200 feet) are within the mountain hemlock and Pacific silver fir plant association zones, dominated by mountain hemlock, Pacific silver fir, noble fir, and Douglas-fir, with minor amounts of grand fir, lodgepole pine, white pine, and chinkapin. The proposed fuelbreak and the remainder of the forage treatment units are located in these zones. The forest understory vegetation within the project area contains a variety of shrubs and herbs common to forests of western Oregon.

Mature conifers can attain ages of 400 years or more and 70 inches in diameter. Forest stands are characterized into four structural/seral stages: stand initiation, stem exclusion, understory re-initiation, and old growth (Oliver and Larson, 1990). About 13% of the project area (4,695 acres) is comprised of stands that are in the stem exclusion stage. Of these stands, about 940 acres have trees of suitable size, density, and species that they are ready to be commercially thinned at the present time. The rest of the project area is comprised of stand initiation stage (about 11% or 4,136 acres), understory re-initiation stage (36% or 13,516 acres), old growth (34% or 12,689 acres), and special habitats, water, and non-forest (combined 6% or 2,159 acres).

History of the Area

In 1852, residents of Lane County donated food, money and livestock to support exploration of the Cascades in an effort to open a route by which emigrants could travel directly into the Willamette Valley. In 1853, approximately 1,000 people and 6,000 head of livestock traveled through the area along the Middle Fork Willamette River to the Deschutes River on the Free Emigrant Road (Williamson, 1857). In 1865, the Oregon Central Military Wagon Road (OCMWR) Company was escorted up the Middle Fork Willamette River corridor by Lt. John M. McCall and a company of army regulars. The OCMWR, built in 1865 and 1866, became a major route through the wilderness for eastward migration and movement of livestock from the Willamette Valley to south-central and southeastern Oregon in the 1870's (Beckham, 1987). Eventually, much of the wagon road was paved and incorporated into the current Forest road system (i.e. FS Road 21). The name Pioneer Gulch was later given to one of the drainages in the area.

Purpose and Need for Action

The purpose of this project is to improve growth and vigor of timber stands and promote forest health in the Upper Middle Fork watershed; restore and improve aquatic condition and processes; improve big game forage habitat in summer range, mitigate potential for future catastrophic wildfires to spread from the Diamond Peak Wilderness, Inventoried Roadless Areas (IRA), and the Oregon Cascades Recreation Area (OCRA); maintain a safe and environmentally sound road network; and provide a sustainable supply of wood products. This action responds to the goals and objectives outlined in the Willamette Land and Resource Management Plan (LRMP, or Forest Plan) as amended by the Northwest Forest Plan, the Upper Middle Fork Willamette River Watershed Analysis (UMFWRWA) and Updates, and the Upper Middle Fork Willamette Watershed Action Plan (UMFWWAP) as referenced below and helps move the project area towards desired conditions described in those documents. This action is needed for the following reasons.

A) Second-growth plantations are overstocked

There are about 940 acres of 40 to 60 year old second growth stands in the project area that would benefit from density reduction. These stands are overstocked, even-aged, uniform, single-story managed plantations. The stocking levels and structure of these stands are beginning to exhibit symptoms of suppressed growth and reduction of crown ratios that could hinder stand growth and health. Understory vegetation density and species composition have been reduced. Crown ratios of conifer trees have become small to the extent that some trees may be at risk of windfall or snow breakage, and the overall stand structure is not as diverse as natural young stands of similar age.

The desired condition for forest stands is to maintain vigor and growth which will increase their resistance to insects, disease and fires and result in healthier forests. Commercial thinning would ensure the growth and vigor of these stands, diversify the species composition and stand structure, provide a supply of raw wood material to the local and regional economies, and provide employment opportunities. Commercial thinning is one of the LRMP proposed stand treatments used to control stocking levels, when stand diameter and basal area make it economically feasible (MA-14s-13).

There is also a need to provide for or accelerate the development of various stand structures or components such as ground vegetation, secondary canopies, large complex crowns, and/or appropriate sources of large dead and down tree habitat in these stands in order to fully accomplish the Northwest Forest Plan (NWFP) objectives for both Matrix and Riparian Reserves (pages B-5, 6, and 9). Such diversification of these habitats would serve to maintain and enhance populations of animals and plants which require multi-storied conifer stands and coarse woody material.

B) Restore and improve aquatic condition and processes

Approximately 30 percent of the acreage in plantations within the project area is within Riparian Reserves. The UMFWRWA has identified the need for silvicultural treatments in these areas to accelerate the development of mature and old growth, or late successional forest characteristics (USDA Forest Service, 1996, pp. 108-109). Desired conditions for late-successional forests include the development of large trees, multi-storied canopies, horizontal patchiness, and species diversification. Treatments in the Riparian Reserves are further guided by objectives established in the Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan. The existing condition of these stands is a result of previous intensive timber management regimes. The stocking levels and structure of these stands could substantially delay the development of late-successional forest characteristics. Treatments could ensure the health and vigor of these stands, diversify the stand structure, and accelerate their development of late-successional forest characteristics.

C) Big game forage levels are falling below LRMP Standards and Guidelines

There is a need to improve and increase the amount of big game foraging habitat in summer range (FW-147-151, Forest Plan p. IV-69). The UMFWRWA projected forage levels in these Big Game Emphasis Areas (BGEAs) to fall below standard and guideline levels in the next decade. There is an opportunity to improve big game habitat effectiveness in this planning area by coordinating forage improvement projects with the commercial thinning, road closures, and sale area improvement projects in young plantations. Many of the project design elements and associated mitigating treatments such as fuel reduction treatments can be integrated to contribute secondary benefits such as improving forage quality.

D) A fuel break would improve options for future fire management in the Wilderness

An assessment of fire condition classes in the stands adjacent to Diamond Peak Wilderness within the project area has determined that many of the forest stands are in Conditions Class 2. Condition Class 2 indicates that stands have missed one or more fire intervals within the natural fire regime. These stands are beginning to accumulate un-natural levels of fuel loading and are developing understory ladder fuels which could lead to increased wildfire intensities and fire severities that increase the risks and impacts to various resources in the area. A wildfire event in the Wilderness may escalate into a larger fire that becomes difficult to control if forest stand conditions adjacent to wilderness landscapes are left untreated in Condition Class 2. A wildfire event in the Wilderness may escalate into a larger fire that becomes difficult to control if forest stand conditions adjacent to wilderness landscapes are left untreated in Condition Classes 2.

The Pioneer Gulch project provides an opportunity to address the problem by proposing treatments along the boundary of the Diamond Peak Wilderness (DPW), Inventoried Roadless Area (IRA) and Oregon Cascade Recreation Area (OCRA). Portions of FS Roads 2160, 2160-406, and 2149 lie along the boundaries of the DPW, IRA and OCRA. These roads provide access and a potential fire line between the wilderness and non-wilderness areas. There is also an opportunity to enhance their effectiveness as a fire line by treating the forest stand adjacent to the road making it into wider fuel break. The fuel break would be part of a containment strategy to mitigate fire spread or escaped fire potential from future wildfires that may take place in either the non-wilderness or in the DPW, IRA and OCRA. Secondary benefits of the treatments include improved fire condition class, returning fire to fire adapted ecosystems, and big game forage enhancement.

E) Roads need to be maintained at safe and environmentally appropriate levels

There is a need to reduce the open road density in the planning area. The current road system was built to access timber and other forest resources in the 1960's – 1980's. Timber sale revenues paid for the majority of past construction and road maintenance. However, timber harvest has declined over the last two decades. Road maintenance operating budgets have also been reduced, limiting the ability to maintain such an extensive road system. Roads are no longer annually inspected for maintenance requirements. Some of the roads in the project area have already or will be closed with previous NEPA decisions. Additional roads may need to be removed from the system, others closed and stored until future access is needed, and many roads managed at the lowest possible maintenance level.

Closure of roads would also reduce the disturbance to big game. Big Game Emphasis Areas (BGEA) in the project area currently have road density values that meet the Forest Plan standards and guidelines, however further reductions in road densities would benefit game.

The closure of roads would also provide the opportunity to store and rehabilitate roads and related aging infrastructure (such as culverts at the end of their design life) to a watershed-safe condition. The reconstruction and maintenance of other roads would provide an opportunity to repair ditches and cutslope failures along roads which may be contributing sediment into the streams and replace culverts which are migration barriers for aquatic species.

F) Provide a sustainable supply of timber products

The Willamette Forest Plan as amended by the Northwest Forest Plan provides the direction to manage timber resources. The majority of this planning area is designated as Management Areas

11a, 11c, 11d (Scenic) and 14a (General Forest) in the Forest Plan and as Matrix in the Northwest Forest Plan. The goals of these management allocations are to produce a sustainable yield of timber based on the growth potential of the land that is compatible with multiple use objectives and meets the environmental requirements of soil, water, air, and wildlife habitat quality. Most of the scheduled timber harvest that contributes to probable sale quantity (PSQ) is conducted on suitable forest lands in Matrix. Pioneer Gulch planning area could potentially contribute about 13 MMBF to the Forest harvest goals in the next 2-5 years.

Proposed Action

The Middle Fork Ranger District proposes to treat approximately 1,237 acres with commercial thinning, fuelbreaks, and big game forage habitat in the Upper Middle Fork Willamette River watershed, in the southern part of the Middle Fork Ranger District. A more detailed description of the Proposed Action with maps and treatment unit lists can be found in Chapter 2.

Commercial Thinning: The project would include variable density thinning of approximately 940 acres of young, previously managed plantations, which would yield about 12.7 million board feet (MMBF). This thinning would include skips and gaps to increase diversity. Gaps of one to three acres are proposed on 15% of the unit acreage to improve big game forage habitat. Gaps would only be placed in areas more than 170 feet from streams. About six dominant or codominant trees per acre would be left in each gap. Skips would comprise about 35% of the original acreage in these plantation stands. Skips would include no-cut riparian buffers, areas where conifer tree density is low, and areas that are not feasible to log. Slash treatments would include yarding logs with tops attached, grapple piling and burning, and prescribed underburning. Ground-based yarding would be used on approximately 536 acres (57% of the harvest area). Skyline yarding would be used on approximately 404 acres (43% of the harvest area). Use of a mechanized harvester for felling and pre-bunching of logs would be allowed on slopes less than 30 percent.

Forage Treatments: Four wildlife forage enhancement units are also proposed on about 164 acres of previously regeneration-harvested units. Treatments in the forage enhancement units would include hand-felling of conifers less than 10 inches d.b.h. (diameter at breast height) in portions of the units, mastication in strips to create openings for forbs to grow, and piling of felled conifers. Some of the piles would be burned and some would be left to benefit upland game birds. There is not enough timber volume in the 7-10” diameter class in the forage units to economically yard, and in some cases it is comprised of low value species (mountain hemlock, true firs). Therefore it would not be included in timber sale volume. In addition, forage habitat enhancement treatments would be coordinated with and incorporated into fuel treatments, road maintenance and road closures, post-harvest rehabilitation of disturbed soil areas, and with the silvicultural prescription using gaps to create one to three acre openings in proposed thinning units. These projects would improve big game habitat by increasing the amount and quality of forage in these areas. All these treatments subsequently would reduce the small diameter tree/brush material and previously existing fuel loads, including ladder fuels and flammable understory vegetation. Projects would be coordinated with post-sale area opportunities and improvements, particularly on those portions of the landscape where the Forest Plan emphasizes big game habitat productivity.

Fuelbreak Treatments: A fuel break is proposed along the west side of FS Rd. 2160, which would provide future options for fire management in and adjacent to] the Diamond Peak Wilderness, Inventoried Roadless Areas (IRA’s), and the Oregon Cascade Recreation Area (OCRA) - all of

which are on the east side of FS Rd. 2160. Understory fuel treatments are proposed in about 88 acres of mature natural stands along this fuel break. These units would receive one or more of a variety of treatments including whipfelling of trees 10 inches d.b.h. and less, and pruning in a width of about 200 feet along the road. About 45 acres of pre-commercial thinning of young plantations in 100 foot widths along FS Rd. 2160 are also proposed to reduce potential fire hazard along the fuel break. In all the fuelbreak units, hazardous fuels material would be hand piled and burned. There is not enough timber volume to economically yard the 7-10 inches d.b.h. material and it is comprised of low value species (mountain hemlock, true firs). Therefore it would not be included in timber sale volume.

Slash Treatments: Slash treatment in the commercial thinning units would include yarding of tops with limbs attached, landing pile burning, and roadside grapple piling/pile burning. Landing piles could be created at any landing area and along roads adjacent to units within the project area. Final roadside/landing cleanup would occur using an excavator (grappler), within 30 feet from the edge of all system roads adjacent to proposed harvest units. Four commercial thinning units (age 55 years and older) would be broadcast/underburned; yarding of tops with limbs attached would not be done on these units. Underburning would be done primarily in the fall/winter/spring seasons (September 1-July 1). Hand firelines would be constructed along the boundaries of these units (where roads do not form the boundaries) or wetline would be used to help prevent the prescribed burn from escaping the activity area as well as to keep fire out of the no-cut riparian buffers.

System Roads: System roads would be maintained to provide for continued safe public and commercial use, or closed and stored to minimize existing and potential road related erosion problems and to improve habitat conditions. Road maintenance and reconstruction (including culvert replacements to facilitate timber hauling, see below) would occur on about 55 miles of roads needed for timber hauling. Road closures with hydrological stabilization treatments are proposed on about 18.42 miles of existing system roads. Of the 18.42 miles, about 4.56 miles are currently closed, would be re-opened for timber hauling, and then would be closed and stored. These road closure prescriptions have been recommended in the UMFWRWA, the 2003 District Supplemental Roads Analysis, and the UMFWWAP. The system roads proposed for closure would be stored for future use. The level of storage for each road is based on needs identified in the field and is identified in the footnote for Table 6. All of the system roads proposed for closure have the potential to be needed again in the future, so none of them would be decommissioned.

Temporary Roads: To facilitate yarding and log haul, about 4.12 miles of spur roads would be constructed on routes previously used for temporary roads and 2.16 miles of spur roads would be constructed in new locations. All temporary roads would be decommissioned after purchaser use is completed.

Culvert Replacement: The proposed Pioneer Gulch timber sales would replace two 48-inch failing culverts at one stream crossing on Estep Creek , located on Forest Service Rd 21 at milepost 14.5, and a tributary to the Middle Fork of the Willamette River. The culverts would be replaced with a stream simulation design structure that would provide fish passage and meet the flow needs of a 100-year flood event with associated debris at the culvert removal site. In addition, nine other culverts would be replaced on the haul route on perennial streams, three culverts on intermittent streams, and 98 culverts on cross-drains. All of the culverts to be replaced are on the haul route, are deteriorating, and need to be replaced to facilitate timber haul.

Decision Framework

The responsible official for this proposal is the District Ranger of the Middle Fork Ranger district, Willamette National Forest. After completion of the EA, there will be a 30-day public comment period. Based on the response to this EA and the analysis disclosed in the EA, the responsible official will make a decision and document it in a Decision Notice. This environmental assessment analyzes a single action alternative and a no action alternative in accordance with 36 CFR 220.7(b)(2)(i). Given the purpose and need, the deciding official reviews the proposed action and the no action alternative in order to make the following decisions:

The responsible official can decide to:

- Select the proposed action, or
- Modify the proposed action, or
- Select the no-action alternative, and
- Identify what mitigating measures will apply

The scope of the project and the decision to be made are whether these stands need to be commercially thinned, what type of log yarding system would be used to remove the trees, which roads need to be maintained or reconstructed to access the treatment units, which roads would be closed after the project, how to manage post-harvest fuel loading, what mitigation measures would be necessary to reduce adverse effects of the project, and what to monitor during and after implementation of the Pioneer Gulch Project.

Planning and Management Direction

Development of this EA follows implementing regulations of the Forest and Rangeland Renewable Resources Planning Act of 1974; Title 36, Code of Federal Regulations, Part 219 (36 CFR 219); Council of Environmental Quality, Title 40; CFR, Parts 1500-1508, National Environmental Policy Act (NEPA).

Many federal and state laws, including the National Forest Management Act (NFMA), Endangered Species Act, Clean Air Act, and Clean Water Act also guide this analysis. A summary of how this project and the design of alternatives comply with the federal and state laws can be found in Appendix A.

The project implements the direction of the Forest Plan as amended by the Northwest Plan. Northwest Forest Plan land allocations amended the Forest Plan Management Areas in 1994. The Northwest Forest Plan supersedes any direction in the Forest Plan, unless the Forest Plan Management Area and or standards and guidelines are more restrictive.

The following table displays the project area allocation to the various Management Areas as well as the proposed Pioneer Gulch project treatment allocations.

Table 1: LRMP Management Allocations within the Pioneer Gulch Project Area

Willamette National Forest LRMP Management Allocations		Acres	Percent of Project Area	Proposed Treatment Acres
1	Wilderness	6,500	17	0
2A	Oregon Cascades Recreation Area-Motorized	676	2	0
2B	Oregon Cascades Recreation Area-Nonmotorized	5,238	14	0
5A	Special Interest Areas	50	<1	0
7	Old Growth Groves	212	1	0
9D	Wildlife Habitat-Special Areas	1,097	3	0
10C	Dispersed Recreation-Semiprimitive Motorized	2,290	6	0
10E	Dispersed Recreation-Semiprimitive Nonmotorized	752	2	0
10F	Dispersed Recreation-Lakeside Setting	461	1	0
11A	Scenic-Modification Middleground	9,937	27	465
11C	Scenic-Partial Retention Middleground	3,411	9	468
11D	Scenic-Partial Retention Foreground	3,905	11	304
12A	Developed Recreation-F.S. Site	5	<1	0
14A	General Forest-Intensive Timber Management	1,914	5	0
16B	Late Successional Reserve - 100 acre	657	2	0
8000	Private Land	77	<1	0
WA	Major Water Bodies	13	<1	0
	Total	**37,195**	**100**	**1,237**

Table 2: Northwest Forest Plan Management Allocations

Northwest Forest Plan Management Allocations	Acres	Percent of Project Area	Proposed Treatment Acres
Administratively withdrawn	4870	13	0
Congressionally withdrawn	12413	33	0
Late Successional Reserve	657	2	0
Major Water Bodies	13	<1	0
Matrix land	19165	52	1,237
NonFS land	77	<1	0
Total	**37,195**	**100**	**1,237**
Riparian Reserves*	6,023	16%	286

*Riparian Reserves overlay other management allocations, so are not included in the total acreage or percent

Management goals and objectives, descriptions of each area, and applicable standards and guidelines can be found in the Forest Plan, Chapter IV, and the Northwest Forest Plan, Attachment A to the Record of Decision. Figure 2 displays the location of the Management Areas in context with the project area and surrounding area. Proposed activities would occur in both the Late-successional Reserve and Riparian Reserves Management Areas.

Tiered Documents and Local Assessments

Forest Plans

This EA is tiered to the Final Environmental Impact Statement (FEIS) for the Land and Resource Management Plan –Willamette National Forest (USDA, 1990) and the Final Supplemental Environmental Impact Statement (FSEIS) on the Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (USDA, USDI, 1994) and applicable environmental analyses for subsequent Forest Plan Amendments. The Willamette National Forest Land and Resource Management Plan (USDA, 1990) as amended by the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and S&Gs for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (Northwest Forest Plan) (USDA, 1994) are incorporated by reference. The Willamette Forest Plan, as amended, provides a forest-level strategy for managing land and resources and the Northwest Forest Plan provides a regional strategy for management of old-growth and late-successional forest ecosystems on federal lands. The plans provide direction, land allocations or management areas (see Figure 2), and standards and guidelines for the management of National Forest lands within the project area as summarized in the preceding section.

Watershed Analysis

The Upper Middle Fork of the Willamette River Watershed Analysis (USDA Forest Service, 1996), the Upper Middle Fork Watershed Analysis Update (USDA Forest Service, 2002) and the Upper Middle Fork and Hills Creek Reservoir Watershed Analysis Update (USDA Forest Service, 2008) are incorporated by reference. These documents provide the Responsible Official with comprehensive information upon which to base land management decisions and establishes a consistent, watershed level context to project level analysis. The watershed analysis provides descriptions of the reference, historic, and existing conditions of the important physical, biological, and social components of the fifth-field watersheds. The study analyzed activities and processes that cumulatively altered the Upper Middle Fork landscape over time and recommended watershed management activities based upon landscape and ecological objectives. The watershed analysis is used to characterize elements of the watersheds, provided background information for the cumulative effects analyses, and provided recommendations for management activities that move the systems toward reference conditions or management objectives.

Watershed Prioritization Process

In 2005 the Forest Leadership Team of the Willamette National Forest directed a team to prioritize fifth-field watersheds to identify the areas of the Forest in the greatest need of protection, and opportunity for enhancement and restoration activities (USDA Forest Service, 2006). The purposes of this effort were:

- To produce measurable watershed restoration outcomes.
- To make most efficient use of restoration funds.
- To plan and design restoration programs that are integrated across resource programs.
- To enhance collaboration with others agencies, watershed councils, stakeholders, and landowners.

The Willamette National Forest's highest priority was the Upper Middle Fork Willamette River and Hills Creek Reservoir fifth-field watersheds for both aquatic and terrestrial values in need of restoration. These two watersheds were classified as Tier 1 watersheds in the prioritization process, meaning that they had substantial high ranking overlaps in all of the resource characteristics that were evaluated. These two fifth-fields were combined into one analysis unit for purposes of this exercise because of the important hydrologic and ecosystem links between the two and were chosen for their unique mixed conifer habitat, meadow restoration and bull trout reintroduction efforts. The watersheds have high ranking for inherent geomorphological risk and past management intensity. The area also has high potential for big game habitat improvement (several 6th-field watersheds were identified as high priorities for big game improvements in the Pilot Roads Analysis). The Upper Middle Fork is ranked as an important watershed for ESA listed fish, including a reintroduced population of bull trout (USDA Forest Service, 2009).

Watershed Action Plan

The Upper Middle Fork Willamette Watershed Action Plan (USDA, 2009) is incorporated by reference. This plan describes the physical and biological setting for the combined Upper Middle Fork and Hills Creek Reservoir fifth-field watersheds, and outlines needs for restoration based on the resource values at risk. At the beginning of the watershed action planning effort, both terrestrial and aquatic resource specialists indicated that road treatments were a high priority in these two watersheds. Restoration goals outlined in this plan are followed by a list of specific planning and implementation actions to accomplish them over the next five years. One of the goals of this plan is to treat high aquatic risk roads, as identified in the Middle Fork Ranger District Access and Travel Management process, to prevent impacts to bull trout and spring

Chinook habitat. Restoration efforts in the two watersheds have been geared towards mixed conifer vegetation type, meadow restoration, bull trout reintroduction, and maintaining a sustainable road system. The goal is to reestablish a collection of diverse and resilient habitats that support historic species and prepare them for future changes that may come (USDA Forest Service, 2009).

Appendix D of the Watershed Action Plan addresses upland riparian and floodplain restoration opportunities. "Priority Restoration Areas" are identified in the headwaters of the Action Plan area. These priority areas are critical source areas for water and wood that contribute directly to bull trout and spring Chinook spawning and rearing habitat. Within these source areas, management units were highlighted where either commercial or pre-commercial thinning could occur to improve forest health and stand complexity and diversity. The largest such area on the upper main stem of the Middle Fork Willamette River is in the Pioneer Gulch project area, affording opportunities to improve stand health to these source areas for wood and water in much of the area proposed for commercial thinning.

Roads Analysis

The Willamette National Forest Road Analysis Report (USDA, 2003) and the Middle Fork Ranger District Supplemental Road Analysis (USDA, 2004) are incorporated by reference. The Forest Road Analysis provides the responsible official with information needed to identify and manage a sustainable road system that is safe and responsive to public needs and desires, is affordable and efficient, has minimal adverse effects on ecological processes and ecological health, diversity, and productivity of the land, and is in balance with available funding for needed management actions. The District road analysis evaluated each individual road segment on the District with criteria relating to terrestrial, aquatic, administrative, and public use factors. Road

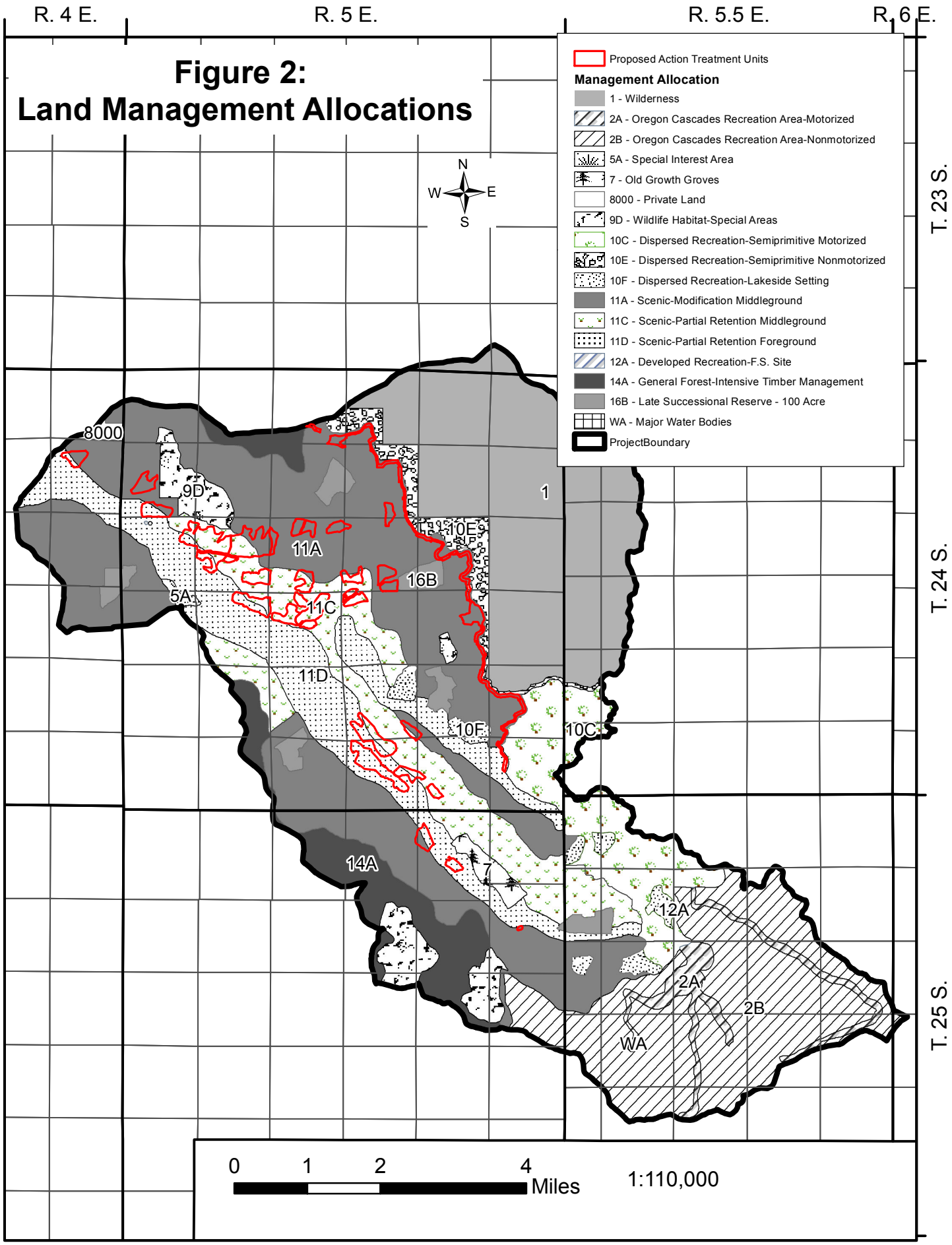


Figure 2:
Land Management Allocations
R. 4 E.
R. 5 E.
R. 5.5 E.
R. 6 E.
T. 23 S.
T. 24 S.
T. 25 S.
N
W
E
S
Proposed Action Treatment Units
Management Allocation
1 - Wilderness
2A - Oregon Cascades Recreation Area-Motorized
2B - Oregon Cascades Recreation Area-Nonmotorized
5A - Special Interest Area
7 - Old Growth Groves
8000 - Private Land
9D - Wildlife Habitat-Special Areas
10C - Dispersed Recreation-Semiprimitive Motorized
10E - Dispersed Recreation-Semiprimitive Nonmotorized
10F - Dispersed Recreation-Lakeside Setting
11A - Scenic-Modification Middleground
11C - Scenic-Partial Retention Middleground
11D - Scenic-Partial Retention Foreground
12A - Developed Recreation-F.S. Site
14A - General Forest-Intensive Timber Management
16B - Late Successional Reserve - 100 Acre
WA - Major Water Bodies
ProjectBoundary
8000
9D
1
10E
11A
16B
5A
11C
11D
10F
10C
14A
7
12A
2A
2B
WA
0
1
2
4
Miles
1:110,000

closure recommendations for the District transportation system were made based on the rating system.

The Forest Road Analysis Report provided recommendations for key roads to be kept open and maintained and for non-key roads that should be considered for closure. The District Supplemental Road Analysis Report provides specific road and closure recommendations for roads within the project area. Copies of these documents are available at the Middle Fork Ranger District office in Westfir, Oregon.

Tribal and Public Involvement

The tribal and public involvement process and planning for this project started with a scoping meeting in August of 2008. A Forest Service interdisciplinary team of resource specialists and Middle Fork Ranger District management staff defined the proposed action elements, identified preliminary issues and project opportunities, identified potentially interested and affected people, and assigned members to the interdisciplinary team. The results of the scoping meeting were used to guide the tribal and public involvement process, establish analysis criteria and explore possible alternatives and their probable effects.

Tribal Consultation

Formal tribal consultation occurred as a distinct process but often interfaced with phases of public scoping. The tribes received advance mailings of the Willamette National Forest's Schedule of Proposed Actions (SOPA). Pioneer Gulch has been listed in the SOPA starting in the Summer Quarter of 2008.

A letter with the description of the proposed action and additional project area information was sent out on August 21, 2008 to tribal representatives (Confederated Tribes of Warm Springs Reservation of Oregon, Confederated Tribes of Siletz Indians of Oregon, Confederated Tribes of Grand Ronde Community of Oregon, and the Klamath Tribe). The letter explained the purpose and need for the project, provided a map of the project area, and asked for comments on the proposed action.

A project update letter was mailed out to four the tribes listed above on October 18, 2011. This letter described several changes to the proposed action that were incorporated since the first letter. These changes included dropping the thinning in mature stands, dropping the harvest of overstory leave trees in previously shelterwood harvested units, and changes to the fuel break proposal along FS Rd. 2160.

The Pioneer Gulch Project has been included in the Annual Program of Work Review with the Grand Ronde, Siletz, and Warm Springs tribes since 2008. No comments from any tribes have been received specific to the Pioneer Gulch Project.

Public Scoping

The Pioneer Gulch Project was first listed in the Willamette National Forest's Schedule of Proposed Action (SOPA) starting in the Summer Quarter of 2008. The SOPA is mailed out to a Forest mailing list of people interested in the management activities of the Forest. The SOPA provides one of the means of keeping the public informed of the progress of individual projects. The SOPA is also made available to the public on the Willamette Forest website.

The scoping record with the description of the proposed action and additional project area information was sent out on August 21, 2008 to the project's mailing list of 44 individuals, interest groups and organizations, elected officials, and other federal and state agencies. The cover letter explained the purpose and need for the project, provided a map of the project area, and solicited comments on the proposed action.

Five written comment letter s were received as a result of these notifications. Copies of the letters can be found in the Public Involvement section of the Analysis File. Letters were received from Rocky Mountain Elk Foundation (RMEF), American Forest Resource Council (AFRC), Oregon Wild (OW), Oregon Department of Fish and Wildlife (ODFW), and Cascadia Wildlands Project (CWP). RMEF comments centered on providing forage for big game. AFRC comment topics included timber sale economic viability, seasonal restrictions for timber sales, fuel treatment objectives, and size of riparian buffers. OW comment topics included logging in natural mature stands, removal of shelterwood overstory, variable density thinning, construction of temporary roads, road closures, fuel reduction treatments in the proposed fuel break, roadless and Wilderness areas, impacts to old-growth related species, survey of special status species, water quality, Aquatic Conservation Strategy objectives, and the range of alternatives. ODFW comment topics included treatments in specific special habitat areas, size of gaps in second growth thinning, shelterwood overstory removal, and road closures/maintenance. CWP comment topics included logging in mature forest, compliance with Survey and Manage requirements, big game forage habitat, and road closures. See Appendix G for detailed record of comments and responses to comments.

Comments from the first scoping effort were incorporated into the project design. After a delay in planning efforts due to personnel work shifting to other priority projects, a scoping update letter (mentioned in the tribal section above) was mailed out to 52 individuals and organizations on October 18, 2011.

Two written comment letters were received as a result of the scoping update. Copies of the letters can be found in the Public Involvement section of the Analysis File. Letters were received from Oregon Wild and Rocky Mountain Elk Foundation. OW comment topics included relative need for a fuelbreak, number of trees to be retained in gaps, unroaded areas, support of road closures, dead wood and snags, thinning in Riparian Reserves, support of big game forage enhancement, and recommendations for thinning young managed stands. RMEF comments included support for thinning to less than 40% crown closure, support for two to three acre gaps, location of gaps, support for planting of gaps with native shrubs, seeding of disturbed areas, and meadow/opening enhancement. See Appendix G for detailed record of comments and responses to comments.

Using the comments from the public, other agencies, and tribes, (see *Issues* section), the interdisciplinary team developed a list of issues to address. Information related to these concerns was either addressed in the discussion of the issues and environmental consequences or can be found throughout the different sections of the EA, Analysis File or Decision Notice.

A public notice will be published in the Eugene Register-Guard requesting comments on the proposed actions and EA. The comment period will be for 30 days. A letter will also be sent to the individuals and organizations who have previously submitted comments to notify them that the EA is available for review and a second chance to comment on the projects.

The responsible official will review all the comments along with their supporting reasons before making the final decision. The final decision on the selected alternative along with the rationale for that decision will be documented in a Decision Notice. This notice of the decision will be

published in The Register Guard newspaper of Eugene, Oregon and sent out to members of the community who have submitted comments.

Additional information on public involvement can be found in the Chapter 4, Consultation and Coordination section of this document. Copies of these various documents and their attached mailing lists can be found in the Analysis File under Public Involvement.

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.

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 all the issues and are used to compare alternatives (Table 9 in Chapter 2).

Key Issues

Key issues describe a dispute or present an unresolved conflict associated with potential environmental effects of the proposed action. Key issues are used to formulate alternatives, prescribe mitigation measures, and focus the analysis of environmental effects. Key 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 key issues that were raised during the initial scoping effort have been addressed by dropping the mature thinning and shelterwood overstory removal units and have been moved to the list of non-key issues. These issues were determined to be non-key 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 and did not influence the formulation of alternatives. Many of the non-key issues are also included in the environmental effects analysis (Chapter 3) because of the relation to meeting Forest Plan S&Gs, laws, regulatory or policy direction, or relevant to resource analyses. The final list of issues was approved by the Responsible Official (Duane Bishop, 2011).

Non-key Issues

1) Big Game Habitat Management

The project area is designated within two Big Game Emphasis Areas (BGEAs). One (Indigo Skunk) is classified as high emphasis and the other (Gorge Echo) is classified as moderate emphasis. Deer and elk have been identified in the Forest Plan as management indicator species that represent groups of other species with similar habitat requirements. One of the types of habitat that deer and elk require is an early seral condition which provides quality foraging habitat. The UMFWRWA has identified a deficit of quality forage areas and high levels of road densities. Harvest treatments may affect quality and function of deer and elk habitat by changing the amount of forage, hiding, and thermal cover. Road management affects open road densities either beneficially, by closing roads to decrease habitat disturbance or negatively, by increasing open road densities and habitat disturbance.

Evaluation Criteria: Acres of gaps, acres of forage treatment units, miles of road closures, open road density.

2) Road Management

The current road system was built in the 1960's to 1980's to access timber and other forest resources and provide for public access. Timber sale revenues paid for the majority of past construction and road maintenance. However, timber harvest has declined with the current emphasis on ecosystem management. The change in forest management has seriously reduced operating budgets and the ability to maintain an extensive road system. A consequence is that most roads are no longer annually inspected for maintenance requirements. Some roads may need to be removed from the system, some upgraded to meet standards, and others closed until future access is needed, which could result in loss of vehicular access to certain areas by the public and for administrative use.

Evaluation Criteria: Miles and levels of road maintenance, reconstruction, and construction, miles and levels of road closures; miles of wet weather haul route, total miles of haul route, number of culvert replacements, road density, and cost in dollars.

3) Economic Benefit and Efficiencies

The high cost of planning and implementing a timber sale project may affect the overall economic efficiency of the project. The economic efficiency is primarily dependent on the cost associated with planning the project, type and cost of log yarding systems used, amount and cost of road management work, the timber benefit produced from the harvest, amount and cost of fuel reduction treatments, cost of mitigating measures to reduce effects. The designs and decisions made on these aspects of timber harvest projects influences the net revenues returned by the project.

Evaluation Criteria: Project benefit cost ratio, project financial present net value, jobs created.

4) Water Quality/Listed Fish and their Habitat

Harvest treatments and associated road management activities may affect water quality and aquatic habitat. Timber harvest and roads interact and influence the production of sediments, and roads intercept subsurface flow, which may also route water more quickly to adjacent stream channels potentially increasing peak flows. Roads within Riparian Reserves potentially affect a host of processes and resources associated aquatic habitat such as the availability of large wood. Tree removal within Riparian Reserves could affect stream shade and large wood recruitment to the channel, resulting in increased stream temperatures, and possibly affecting listed spring Chinook salmon and bull trout populations, along with other aquatic species.

Evaluation criteria: Miles of road work and associated projects (sediment), Aggregate Recovery Percent (Peak/base flows), acres of Riparian Reserve thinned (Stream temperature and large wood recruitment).

5) Threatened, Endangered and Sensitive Species/ Survey and Manage Species

Timber harvest and associated road management activities may affect a variety of wildlife, fish and botanical threatened and sensitive species and their habitats within and adjacent to the project area. These activities may remove or degrade forest or aquatic habitat and create noise above ambient levels which may disturb species at a critical period in their life cycles.

Evaluation Criteria: acres of habitat removed or degraded, number of sites affected by actions, and effects determination from Biological Evaluations (BEs), Biological Assessments (BAs), or Biological Opinions (BOs).

6) Soil Productivity (Cumulative detrimental soil impacts)

Commercial thinning and related road management activities may cumulatively affect the soil conditions in the form of soil compaction and soil displacement. Parts of the project area was initially clear-cut in the 1950's and 60's at a time when approximately 2,000 acres of these stands were owned by Seneca Timber Company. These past practices of tractor and skyline logging have left evidence of detrimental soil conditions in the form of soil compaction in the project area. Detrimental soil conditions can affect site productivity, tree growth, water infiltration, soil erosion, and peak flows. An additional commercial thinning entry could cause an increase in detrimental soil conditions above the Forest Plan standard and guidelines. Management activities associated with the fuel break and forage enhancement treatment units would not contribute to additional detrimental soils conditions.

Evaluation Criteria: Percent cumulative detrimental soil conditions by activity area (individual harvest unit and adjacent roads).

7) Invasive Weeds

Timber sale activities may contribute to the spread or persistence of invasive weeds. The spread of invasive weeds displaces native plants, which may have an effect on biotic communities.

Evaluation criteria: Acres of potential disturbed areas.

8) Fuels treatments

Treatment or non-treatment of fuels either as a post-harvest activity or as the only treatment can affect the potential fire behavior of a stand.

Evaluation Criteria: Percent of harvest treatment areas meeting Standards and Guidelines, acres of different types of fuel treatments, fire regime condition class.

Chapter 2. Alternatives, including the Proposed Action

This chapter describes and compares the alternatives considered for the Pioneer Gulch project. Only one action alternative, the Proposed Action, was given detailed analysis. Forest Service Handbook 1909.15, section 41.22 allows one action to be analyzed without consideration of additional alternatives if there are no unresolved conflicts concerning alternative uses of available resources (36 CFR 220.7 (b)(2)).

This section presents the Proposed Action and No Action 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.

Alternatives Considered but Eliminated from Detailed Analysis

The original proposed action included several treatment areas that have been dropped from the current proposal as follows:

- About 250 acres of young managed plantations originally proposed for commercial thinning were found to have low amounts of timber volume and would not be economically efficient to harvest at this time.
- A proposal for 300 acres of shelterwood overstory removal has also been dropped due the low amount of volume and value remaining in these stands.
- A proposal for 500 acres of thinning with group selection in mature stands has been dropped due to the recent Survey and Manage Settlement Agreement (2011) requiring surveys for red tree voles, the costs associated with red tree vole habitat retention, and the high probability of finding tree vole nests in these stands.
- A portion of the 95 acres of fuelbreak understory treatments was originally proposed for commercial thinning to reduce crown closure in the fuel break, but those acres were changed to a prescription of only treating understory fuels due to the need for red tree vole surveys in some cases and due to low value of merchantable timber in others.
- Two special habitat restoration treatment units were dropped from this proposal: Quail Meadow was dropped from the Pioneer Gulch project but will be included with the Calapooya Meadow Restoration II project, planned for implementation in summer of 2012. Big Swamp restoration was dropped after input was received from Oregon Department of Fish and Game that the swamp is currently receiving considerable winter elk use and is meeting the needs of fish and wildlife in its current condition.
- An alternative (suggested by Oregon Wild) that would leave four to six clumps of live trees per acre in each gap (in commercial thinning units) with three to five trees in each clump and patches of tall shrubs and /or small trees left within gaps was considered. The alternative was eliminated from detailed study because Alternative B, the Proposed Action, would leave about six dominant live trees per acre and small unmerchantable sized trees (less than 7” diameter) and shrubs in the gaps. If four to six clumps of

merchantable size trees per acre were to be left, then the purpose and need to enhance big game forage habitat in the project area would not be met.

- An alternative (suggested by Oregon Wild) that would have provided for 100 foot no-cut buffers on all streams and retaining significant "skips" within the outer portion of Riparian Reserves was considered. It has been determined through the fisheries and hydrology analyses that 60 foot no-cut buffers on Class II and III streams and 30 foot no-cut buffers on Class IV streams would be sufficient to provide protection to the primary shade zone. A 100 foot buffer would be left on Skunk Creek, a Class II stream, to protect a bull trout re-introduction site. These buffers are supported by the TMDL model (see Stream Shade and Stream Temperature in the Hydrology section of Chapter 3. Large, untreated skips within the Riparian Reserves do exist in the portions of commercial thinning units that were dropped from proposed harvest treatments.

- An alternative was considered that would have decommissioned some of the roads proposed for closure, as recommended by Cascadia Wildlands Project. After determining that the roads proposed for closure will all be needed for future access, the roads will be proposed for closure and storage for future use.

- An alternative was considered that would have avoided road construction, as suggested by Oregon Wild. This alternative was not fully developed because it would have resulted in requiring helicopter yarding for a large portion of the commercial harvest. This is a much more expensive method of yarding when compared to temporary road construction and ground-based or skyline yarding. With the long haul distances in this project, the proposed timber sales would not support the extra expense of helicopter yarding. Refer to the Economic section in Chapter 3 and Tables 48 and 49.

- An alternative suggested by Oregon Wild that would not propose any treatments at all in old growth stands was considered. This alternative was not given detailed analysis because it would not have met the purpose and need for a continuous fuel break to reduce understory fuels along FS Roads 2160 and 2149. The Proposed Action proposes only non-commercial fuel treatments in the fuelbreak units. The Proposed Action does not propose any timber harvest within old growth stands.

- An alternative suggested by Oregon Wild was considered that would avoid negative impacts to unroaded areas and focus on restoration surrounding these areas. This alternative was not given detailed study because the Proposed Action only has one small non-commercial fuel treatment unit in an Oregon Wild identified unroaded area in the Proposed Action and only trees less than 10 inches diameter would be cut. These types of treatments are allowed in Inventoried Roadless Areas if they are for the purpose of fuel reduction (see Chapter 3, Potential Wilderness section).

Alternatives Given Detailed Analysis

Alternative A - No Action

Alternative A is the No Action alternative where the proposed project does not take place. The No Action alternative provides a baseline, or a point of reference for describing the environmental effects of Alternative B. Because there are no treatment units in this alternative, no map is provided.

Existing site specific management plans and Standards and Guidelines would continue to be the basis for management of the project area. No further activities would take place to manage the stands by thinning, no fuels would be generated from harvest activity and forested stands would continue on a path of natural succession. Fire suppression policies would continue to dictate fire exclusion from the project area. Road maintenance activities would occur according to established patterns of routine maintenance. No temporary road construction would occur in this alternative.

Timber supply objectives would be met with other areas either on the Middle Fork Ranger District or the rest of the Willamette National Forest.

Alternative B - The Proposed Action

The Middle Fork Ranger District proposes to treat approximately 1,237 acres with commercial thinning, fuelbreak creation, and big game forage habitat improvement treatments in the Upper Middle Fork Willamette River watershed, in the south part of the Middle Fork Ranger District. See Figures 7-9 for maps of the proposed activities and Tables 4 and 5 for a unit by unit description of activities.

Commercial Thinning: The project would include variable density thinning of approximately 940 acres of young, managed plantations, which would yield about 12.7 million board feet (MMBF). This thinning would include skips and gaps to increase diversity. Gaps of one to three acres are proposed on 15% of the unit acreage to improve big game forage habitat. About six dominant or codominant trees per acre would be left in each gap. Gaps would only be placed in areas more than 170 feet from streams. Two and three acre gaps would not be placed within 100 feet of Maintenance Level 2 or 3 roads. Gaps would be placed in root rot pockets when spacing allows. Skips would comprise about 35% of the original acreage in these plantation stands. Skips would include no-cut riparian buffers, areas where conifer tree density is low, and areas that are not feasible to log. Slash treatments would include yarding logs with tops attached, grapple piling and burning, and prescribed underburning. Ground-based yarding would be used on approximately 536 acres (57% of the harvest area). Skyline yarding would be used on approximately 404 acres (43% of the harvest area). Use of a mechanized harvester for felling and pre-bunching of logs would be allowed on slopes less than 30 percent. Three-acre gaps would be replanted with of rust-resistant western white pine and western redcedar (50 trees per acre total). Hardwood mast-producing shrub species such as elderberry, hawthorn, cascara, and serviceberry for wildlife habitat improvement would also be planted in the three-acre gaps (25 trees per acre total). Skips would be comprised of the riparian buffers, special habitat buffers, and areas that are not feasible for logging. See Figures 3 and 7.

Figure 3: Proposed Variable Density Commercial Thinning Unit 2952a

Forage Treatments: Four wildlife forage enhancement units are also proposed on about 164 acres of previously regeneration-harvested units. Treatments in the forage enhancement units would include hand-felling of conifers less than 10 inches diameter in portions of the units, mastication in strips to create openings for forbs to grow, and piling of felled conifers. Some of the piles would be burned and some would be left to benefit upland game birds. There is not enough timber volume in the 7-10 inch diameter class in the forage units to economically yard, and in some cases it is comprised of low value species (mountain hemlock, true firs), so it would not be included in timber sale volume. In addition, forage habitat enhancement treatments would be coordinated with and incorporated into fuel treatments, road maintenance and road closures, post-harvest rehabilitation of disturbed soil areas, and with the silvicultural prescription using gaps to create 1 to 3 acre openings in proposed thinning units. These projects would improve big game habitat by increasing the amount and quality of forage in these areas. All these treatments subsequently would reduce the small diameter tree/brush material and previously existing fuel loads, including ladder fuels and flammable understory vegetation. Projects would be coordinated with post-sale area opportunities and improvements, particularly on those portions of the landscape where the Forest Plan emphasizes big game habitat productivity. The forage treatment units are displayed on the map in Figure 7.

> Unit 2691a (14 acres): Hand-felling of up to 25% of the conifers (≤10 inches DBH) creating more stringers of open habitat interspersed with small clumps of conifers and willow. Hand-felled material would be brush-piled (pile size – 10 feet x 10 feet x 10 feet) and left on sight for wildlife habitat.

Unit 2866(19 acres) and Unit 3162a (40 acres): Mechanically masticate corridors and openings up to 25% of unit area using small masticator (8 foot wheel-base) to enhance the growth of forbs and groundcover forage. Only trees ≤10 inches DBH would be cut. See Figure 4.

Unit 3570 – (91) acres: Hand-fell up to 25% of the conifers (≤10" DBH) creating more stringers of open habitat interspersed with small clumps of conifers and vine maple. Whip-felled material would be brush-piled (pile size -- 10' x 10' x 10') and left on sight for wildlife habitat. See Figure 4.

Figure 4: Proposed Forage Units 2866 (left) and 3570 (right)

Fuelbreak Treatments: A fuel break is proposed along the west side of FS Rd. 2160, which would provide future options for fire management in and adjacent to the Diamond Peak Wilderness, adjacent Inventoried Roadless Areas (IRA's), and the Oregon Cascade Recreation Area (OCRA) - all of which are on the east side of FS Rd. 2160. In all the fuelbreak units, hazardous fuels material would be hand piled and burned.

Understory fuel treatments are proposed in about 88 acres of mature natural stands along this fuel break. These units would receive one or more of a variety of treatments including whipfelling of trees 10 inches diameter and less, and pruning in a width of about 200 feet along the road. See Figures 5 and 8.

About 45 acres of pre-commercial thinning (PCT) of young plantations in 100 foot widths along FS Rd. 2160 to a residual tree spacing of 24 feet X 24 feet are also proposed to reduce potential fire hazard along the fuel break. . See Figures 6 and 8.

Figure 5: Proposed Understory Fuel Treatment Unit 2883

Figure 6: Proposed Fuelbreak PCT Units 2958 (left) and 2687 (right)

Slash Treatments: Slash treatment in the commercial thinning units would include yarding of tops with limbs attached, landing pile burning, and roadside grapple piling/pile burning. Landing piles could be created at any landing area and along roads adjacent to units within the project area. Final roadside/landing cleanup would occur using an excavator (grappler), within 30 feet from the edge of all system roads adjacent to proposed harvest units. Four commercial thinning units (≥55 years old) would be broadcast/underburned; yarding of tops with limbs attached would not be done on these units. Underburning would be done primarily in the fall/winter/spring seasons (September 1-July 1). Hand firelines would be constructed along the boundaries of these units (where roads do not form the boundaries) or wetline would be used to help prevent the

prescribed burn from escaping the activity area as well as to keep fire out of the no-cut riparian buffers.

System Roads: System roads would be maintained to provide for continued safe public and commercial use, or closed and stored to minimize existing and potential road related erosion problems and to improve habitat conditions. Road maintenance and reconstruction (including culvert replacements to facilitate timber hauling, see below) would occur on about 55 miles of roads needed for timber hauling. Road closures with hydrological stabilization treatments are proposed on about 18.42 miles of existing system roads. Of the 18.42 miles, about 4.56 miles are currently closed, would be re-opened for timber hauling, and then would be closed and stored. See the footnotes at the bottom of Table 6 for description of the closure and storage treatments. These road closures were recommended in the UMFWRWA, the 2003 District Supplemental Roads Analysis, and the UMFWWAP. The system roads proposed for closure would be stored for future use. All of the system roads proposed for closure have the potential to be needed again in the future, therefore none of them would be decommissioned. See Figure 9.

Roads proposed for storage would be hydrologically stabilized (as determined by a hydrologist or aquatics professional) and closed to all motorized use (Maintenance Level 1). Access to stored roads would be blocked by a berm, large rocks, or other obstruction. Stored roads would remain in the Forest Service road system because there is an expectation of future administrative need, often related to timber management. There is no expectation that public motorized use would be restored.

There are three levels of storage (1, 2 and 3), determined by the amount of treatment needed to make a road hydrologically stable. With all storage categories, waterbars, culverts and other road drainage structures left in place should continue to function without routine maintenance. All storage categories assume that roads would be encroached by brush and trees over time. The level of storage for each road is based on needs identified in the field and is identified in the footnote for Table 6.

Rock Sources: Road reconstruction and maintenance work proposed for this project would involve use of crushed aggregate, pit run, select borrow and riprap for multiple construction applications. Commercial sources for crushed aggregate or crushing from a Forest Service source would be considered at the project design phase.

All material used from government sources would be within the existing development limits. No additional development would occur. All rock sources would be certified weed-free" to comply with forest S&Gs. If weeds exist they would be treated before the rock source is used. See Table 3 for a list of rock sources available for this project.

Table 3: Material Sources for Pioneer Gulch project

Rock Source	Legal	Road No.	Material Type
Emigrant	T.24 S., R.5 E., Sec. 16, SE/SE	2154382	Crushed, pit run, riprap, select borrow
Pope & Talbot #14	T.24 S., R.5 E., Sec. 17, W/SE	2149396	Crushed, pit run, riprap, select borrow
Knewit	T.24 S., R.5 E., Sec. 16, NE/SW	2149399	Crushed, pit run, riprap, select borrow

Rock Source	Legal	Road No.	Material Type
Pioneer Gulch #2	T.24 S., R.5 E., Sec. 3, NE/SW	2149	Pit run, riprap, select borrow,
Rat #8	T.24 S., R.5 E., Sec. 27, NW/SW	2153	Pit run, riprap, select borrow,

Temporary Roads: To facilitate yarding and log haul, about 4.12 miles of spur roads would be constructed on routes previously used for temporary roads and 2.16 miles of spur roads would be constructed in new locations. All temporary roads would be decommissioned after purchaser use is completed. In addition, the following practices would be implemented:

- Most temporary roads would be “sub-soiled” (a form of soil tillage) to mitigate for compaction in ground based units.

-Seed and mulch sub-soiled roads with genetically local and weed free materials.

-Remove culverts if any are found.

-Close temporary roads in a way that they would not be useable for all=terrain vehicles (ATV’s). Sub-soiling should make it unusable, but it may also be necessary to berm or ditch the beginning of road or conceal it with logs and slash.

-Treat any non-native plants classified as new invaders on the Willamette National Forest before closing temporary roads.

Culvert Replacement: The timber sales resulting from the Pioneer Gulch proposed action would replace two failing 48-inch culverts at one crossing on Estep Creek located on FS Rd. 21 at milepost 14.5. The current Estep Creek culverts are not fish passage culverts and will not meet the flow needs of a 100-year storm event. The culverts would be replaced with a stream simulation design structure that would provide fish passage and meet the flow needs of a 100-year flood event with associated debris at the culverts removal site. Estep Creek is a tributary to the Upper Middle Fork Willamette River. This section of the UMFWR is a migratory route for both bull trout and spring Chinook salmon; however, neither bull trout nor spring Chinook salmon have been known to utilize Estep Creek, due to warmer stream temperatures and a lack of spawning and rearing habitat. The project would also replace culverts at twelve other stream crossings (nine perennial streams and three intermittent streams) and 98 ditch relief culverts. Culvert replacement would occur during the ODFW in-stream work period for the watershed and all BMP’s related to sediment entrainment and culvert replacement would be utilized. All of the culverts to be replaced are deteriorating and need to be replaced to facilitate timber haul. Hauling on these culverts would potentially cause additional damage and road failure.

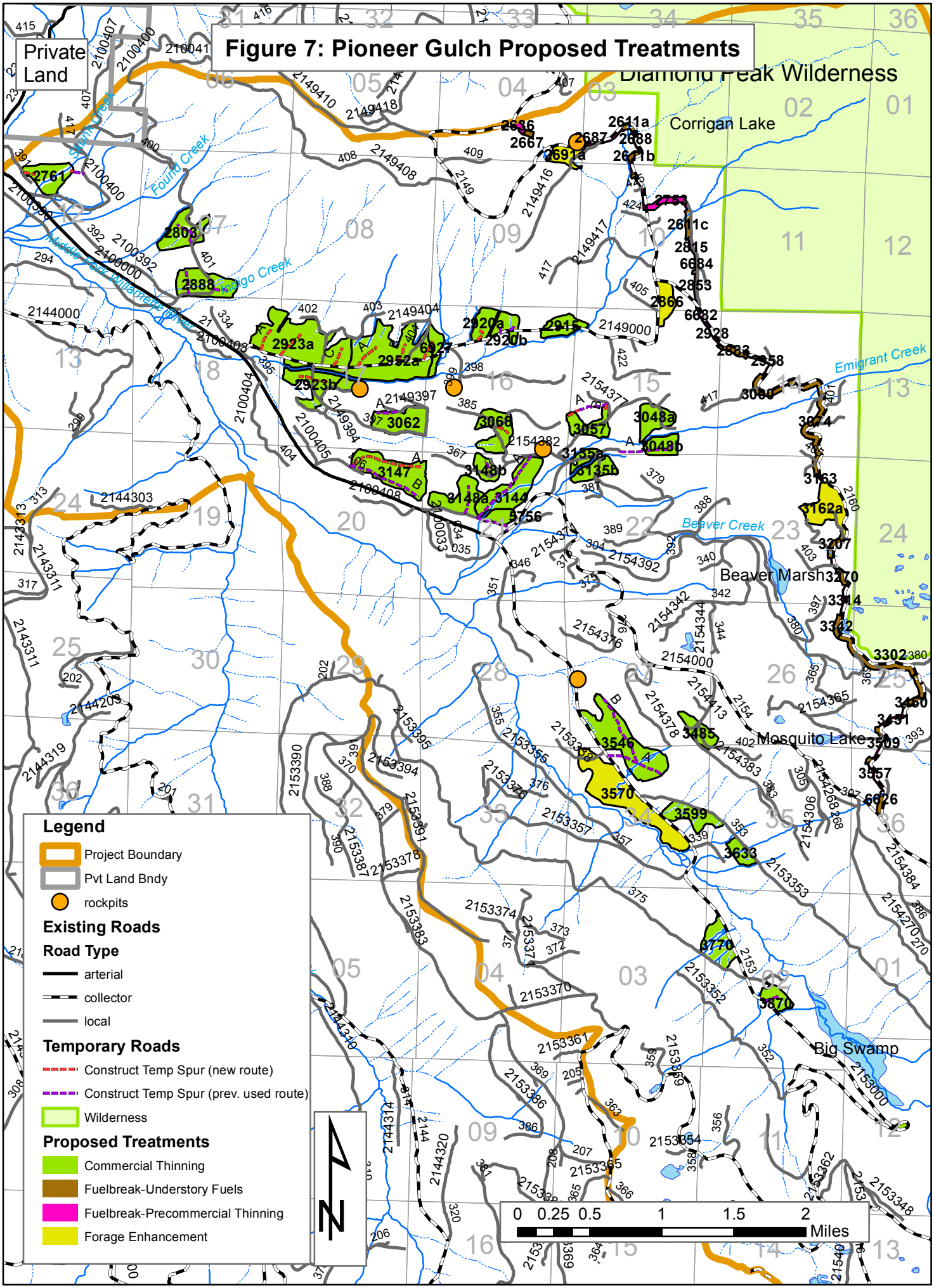


Figure 7: Pioneer Gulch Proposed Treatments
Private Land
Diamond Peak Wilderness
Corrigan Lake
Emigrant Creek
Beaver Creek
Beaver Marsh
Mosquito Lake
Big Swamp
Found Creek
Indigo Creek
Middle Fork Willamette River
Legend
Project Boundary
Pvt Land Bndy
rockpits
Existing Roads
Road Type
arterial
collector
local
Temporary Roads
Construct Temp Spur (new route)
Construct Temp Spur (prev. used route)
Wilderness
Proposed Treatments
Commercial Thinning
Fuelbreak-Understory Fuels
Fuelbreak-Precommercial Thinning
Forage Enhancement
0 0.25 0.5 1 1.5 2
Miles

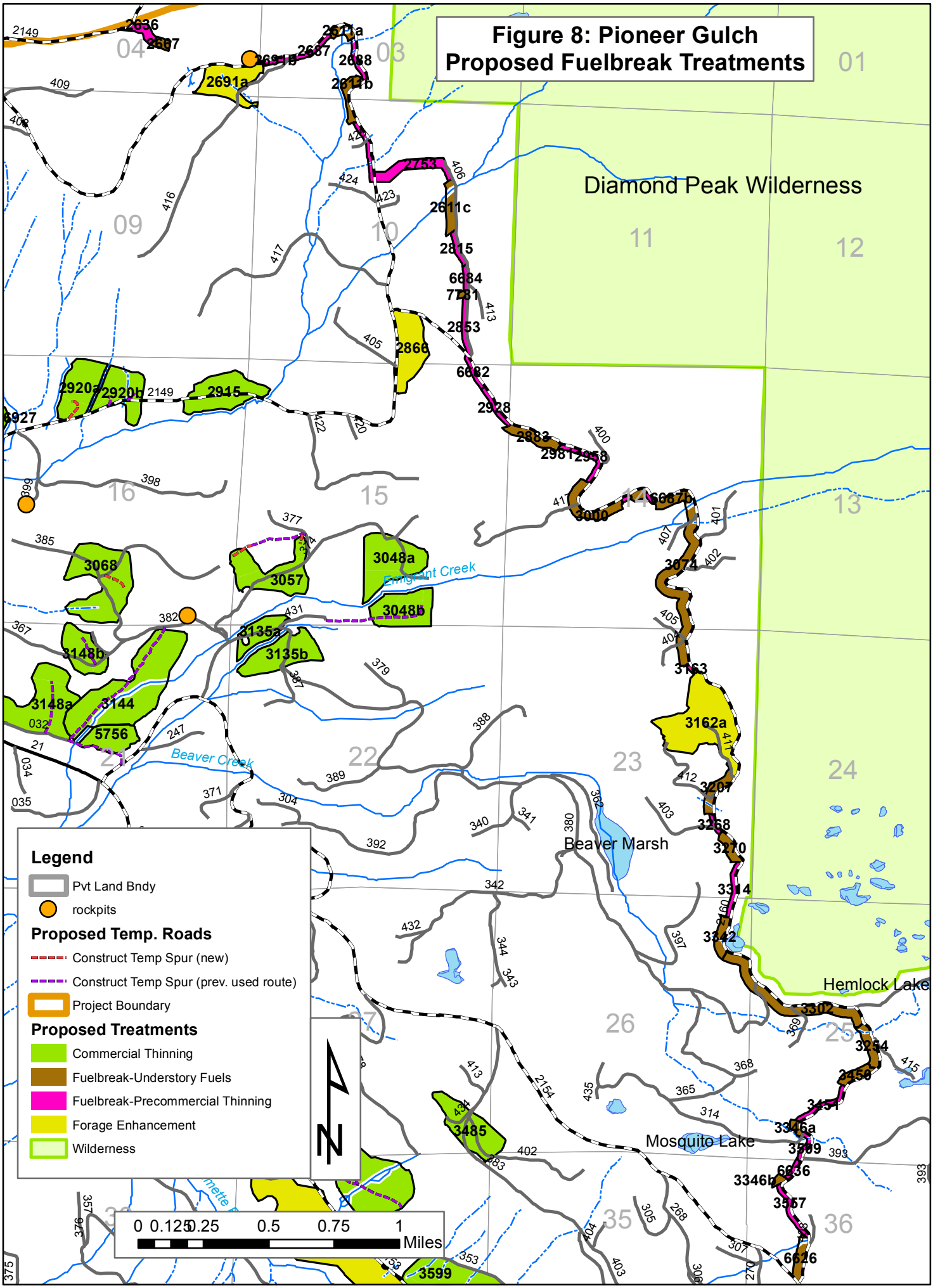


Figure 8: Pioneer Gulch
Proposed Fuelbreak Treatments
Diamond Peak Wilderness
Emigrant Creek
Beaver Creek
Beaver Marsh
Hemlock Lake
Mosquito Lake
Legend
Pvt Land Bndy
rockpits
Proposed Temp. Roads
Construct Temp Spur (new)
Construct Temp Spur (prev. used route)
Project Boundary
Proposed Treatments
Commercial Thinning
Fuelbreak-Understory Fuels
Fuelbreak-Precommercial Thinning
Forage Enhancement
Wilderness
0 0.125 0.25 0.5 0.75 1
Miles

Figure 9: Pioneer Gulch Proposed Road Closure and Storage

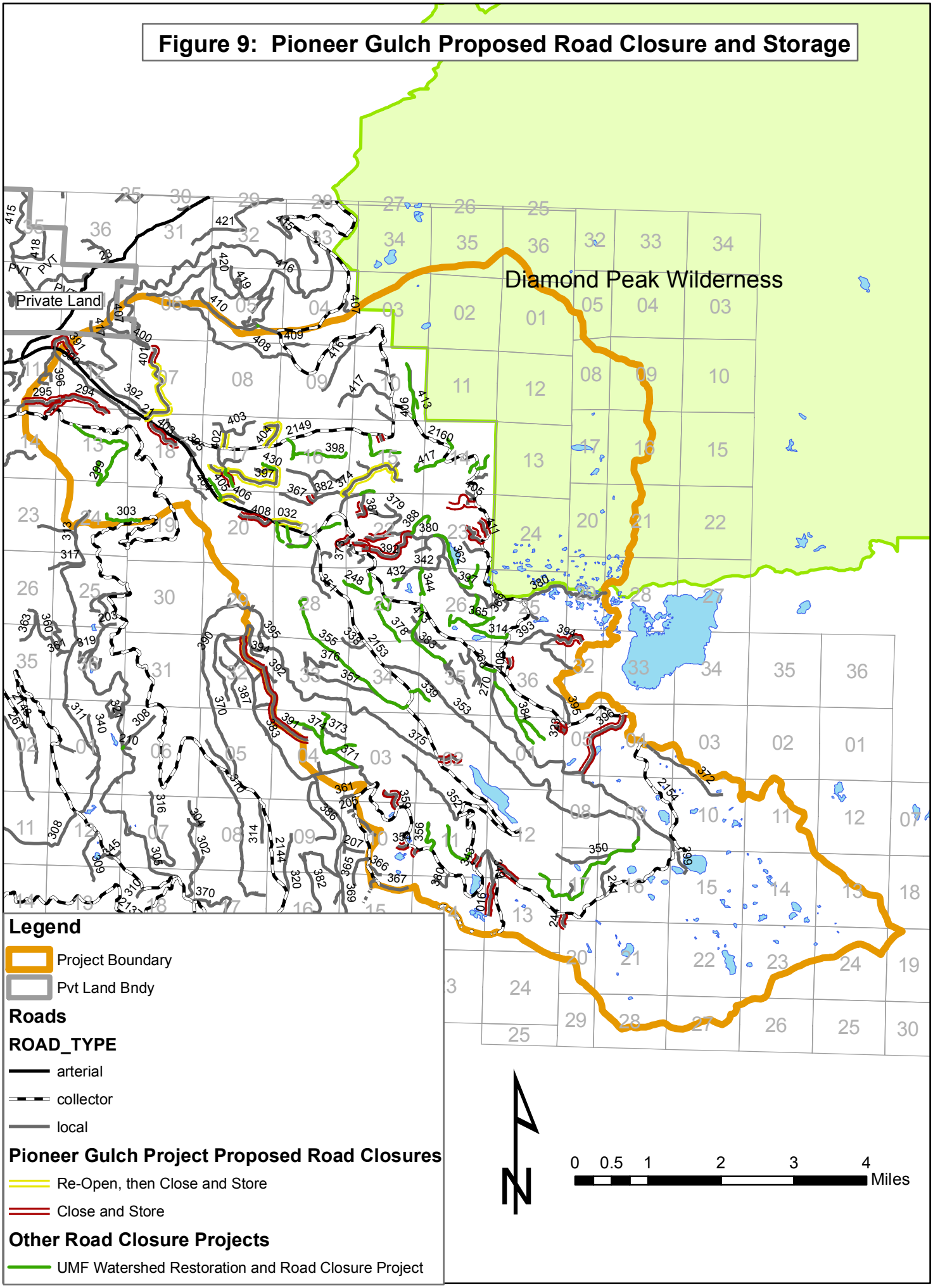


Table 4, below, displays the features of Alternative B.

Table 4: Alternative B Harvest Unit Summary

Unit	Total Acres	Gap Acres	Thinning Rx outside of gaps (spacing of residual trees and trees per acre after harvest)	Volume (MBF)	Logging System	Fuels Prescription	Prop. New Temp Road (miles)	Prop. Temp Rd Constr on Prev. Used Routes (miles)
2761	25	4	22’X22’ (90 TPA)	450	S,G	YT/RGPB	0.12	0.08
2803	32	5	24’X24’ (76 TPA)	320	S	YT/RGPB		0.20
2888	40	6	22’X22’ (90 TPA)	600	S	YT/RGPB		0.28
2915	21	3	27’X27’ (60 TPA)	210	S	YT/RGPB		
2920a	18	3	24’X24’ (76 TPA)	180	S,G	YT/RGPB	0.10	
2920b	16	2	24’X24’ (76 TPA)	160	S,G	YT/RGPB		0.08
2923a	114	17	24’X24’ (76 TPA)	1938	G	UB	0.51	
2923b	33	5	24’X24’ (76 TPA)	561	G	UB	0.21	
2952a	111	17	24’X24’ (76 TPA)	1776	S,G	UB	0.49	
2952b	7	1	24’X24’ (76 TPA)	112	G	UB		
3048a	26	4	21’X21’ (99TPA)	338	S,G	YT/RGPB		
3048b	18	3	21’X21’ (99TPA)	234	S,G	YT/RGPB		0.40
3057	23	3	22’X22’ (90 TPA)	322	S,G	YT/RGPB	0.12	0.22
3062	39	6	22’X22’ (90 TPA)	546	S	YT/RGPB		0.15
3068	33	5	21’X21’ (99TPA)	462	S,G	YT/RGPB	0.10	
3135a	9	1	23’X23’ (82 TPA)	108	G	YT/RGPB		
3135b	19	3	23’X23’ (82 TPA)	228	S,G	YT/RGPB		
3144	46	7	21’X21’ (99TPA)	460	G	YT/RGPB		0.83
3147	61	9	23’X23’ (82 TPA)	915	S,G	YT/RGPB	0.51	0.53
3148a	36	5	21’X21’ (99TPA)	360	S,G	YT/RGPB		0.21
3148b	14	2	21’X21’ (99TPA)	140	S,G	YT/RGPB		0.12
3485	20	3	23’X23’ (82 TPA)	200	S,G	YT/RGPB		
3546	79	12	24’X24’ (76 TPA)	790	S,G	YT/RGPB		0.92
3599	25	4	24’X24’ (76 TPA)	400	S,G	YT/RGPB		
3633	12	2	21’X21’ (99TPA)	156	S	YT/RGPB		
3770	20	3	24’X24’ (76 TPA)	280	S,G	YT/RGPB		
3870	15	2	24’X24’ (76 TPA)	150	S,G	YT/RGPB		0.10
4115	2	0	24’X24’ (76 TPA)	20	G	YT/RGPB		
5756	12	2	20’X20’ (110 TPA)	120	G	YT/RGPB		
6927	14	2	23’X23’ (82 TPA)	140	G	YT/RGPB		
Total	**940**	**141**		**12,676**			**2.16**	**4.12**

TPA = trees per acre
S= Skyline, G= Ground based
YT = Yard tops, pile and burn at landings
RGPB = Roadside grapple pile and burn
UB = Underburn

Table 5: Alternative B Non-harvest Unit Summary

Unit	Total Acres	Gap Acres	Treatment Prescription	Volume (MBF)	Fuels Prescription
Fuelbreak Understory Treatments					
2611a	2	0	Whipfelling, pruning	0	Hand pile and burn
2611b	4	0	Whipfelling, pruning	0	Hand pile and burn
2611c	4	0	Whipfelling, pruning	0	Hand pile and burn
2667	2	0	Whipfelling, pruning	0	Hand pile and burn
2883	5	0	Whipfelling, pruning	0	Hand pile and burn
2927	2	0	Whipfelling, pruning	0	Hand pile and burn
3000	7	0	Whipfelling, pruning	0	Hand pile and burn
3074	22	0	Whipfelling, pruning	0	Hand pile and burn
3207	5	0	Whipfelling, pruning	0	Hand pile and burn
3254	4	0	Whipfelling, pruning	0	Hand pile and burn
3270	3	0	Whipfelling, pruning	0	Hand pile and burn
3302	16	0	Whipfelling, pruning	0	Hand pile and burn
3342	3	0	Whipfelling, pruning	0	Hand pile and burn
3346a	1	0	Whipfelling, pruning	0	Hand pile and burn
3346b	1	0	Whipfelling, pruning	0	Hand pile and burn
3450	3	0	Whipfelling, pruning	0	Hand pile and burn
6626	3	0	Whipfelling, pruning	0	Hand pile and burn
7781	1	0	Whipfelling, pruning	0	Hand pile and burn
Total	**88**	0		**0**	
Fuelbreak – Precommercial Thinning Units (residual tree spacing and trees per acre)					
2636	3	0	24’X24’ (76TPA)	0	Hand pile and burn
2687	2	0	24’X24’ (76TPA)	0	Hand pile and burn
2688	2	0	24’X24’ (76TPA)	0	Hand pile and burn
2691b	1	0	24’X24’ (76TPA)	0	Hand pile and burn
2753	10	0	24’X24’ (76TPA)	0	Hand pile and burn
2815	2	0	24’X24’ (76TPA)	0	Hand pile and burn
2853	3	0	24’X24’ (76TPA)	0	Hand pile and burn
2928	2	0	24’X24’ (76TPA)	0	Hand pile and burn
2958	2	0	24’X24’ (76TPA)	0	Hand pile and burn
2981	1	0	24’X24’ (76TPA)	0	Hand pile and burn
3163	1	0	24’X24’ (76TPA)	0	Hand pile and burn
3268	1	0	24’X24’ (76TPA)	0	Hand pile and burn
3314	2	0	24’X24’ (76TPA)	0	Hand pile and burn
3451	3	0	24’X24’ (76TPA)	0	Hand pile and burn
3509	1	0	24’X24’ (76TPA)	0	Hand pile and burn
3557	3	0	24’X24’ (76TPA)	0	Hand pile and burn
6636	1	0	24’X24’ (76TPA)	0	Hand pile and burn
6682	2	0	24’X24’ (76TPA)	0	Hand pile and burn
6684	1	0	24’X24’ (76TPA)	0	Hand pile and burn

Unit	Total Acres	Gap Acres	Treatment Prescription	Volume (MBF)	Fuels Prescription
6687a	1	0	24'X24' (76TPA)	0	Hand pile and burn
6687b	1	0	24'X24' (76TPA)	0	Hand pile and burn
Total	**45**	0		**0**	
Forage Treatment Units					
2691a	14	0	Whipfelling	0	Handpile, leave piles for wildlife
2866	19	0	Mastication in strips	0	None
3162a	40	0	Mastication in strips	0	None
3570	91	0	Whipfelling	0	Handpile, leave piles for wildlife
Total	**164**	0		**0**	

Table 6: Alternative B Road Treatment Summary

Road Number	Miles	Current MVUM Status	Proposed Storage Level*	Reason for Closure	Closure location
2100032	0.41	Closed	1	Aquatic Risk	
2100391	0.55	Closed	1	Aquatic and Terrestrial Risk	
2100401	1.44	Closed	2	Aquatic and Terrestrial Risk	
2100403	0.52	Closed	1	Aquatic and Terrestrial Risk	
2100405	0.02	Open	1	Aquatic Risk	
2100406	0.25	Open	1	Aquatic and Terrestrial Risk	
2100408	0.49	Closed	1	Terrestrial Risk	
2144294	1.05	Closed	2	Aquatic and Terrestrial Risk	
2144295	0.56	Closed	2	Aquatic and Terrestrial Risk	
2149393	0.30	Closed	1	Aquatic and Terrestrial Risk	
2149394	0.22	Closed	1	Aquatic Risk	
2149397	1.16	Open	1	Aquatic and Terrestrial Risk	Junction with 2149393. First 0.34 mi. would remain open.
2149402	0.21	Closed	1	Aquatic and Terrestrial Risk	
2149404	0.55	Closed	1	Aquatic and Terrestrial Risk	
2149420	0.10	Closed	1	Low Administrative Use	
2153340	0.30	Closed	1	Aquatic and Terrestrial Risk	
2153343	0.14	Closed	1	Low Administrative Use	
2153348	0.35	Closed	1	Aquatic and Terrestrial Risk	
2153354	0.15	Open	1	Terrestrial Risk	
2153358	0.09	Open	1	Terrestrial Risk	
2153359	0.41	Open	2	Low Administrative Use	
2153391	1.89	Closed	1	Aquatic Risk	
2154016	0.47	Closed	1	Aquatic and Terrestrial Risk	
2154244	0.20	Closed	1	Low Administrative Use	
2154304	0.22	Closed	1	Aquatic Risk	

Road Number	Miles	Current MVUM Status	Proposed Storage Level*	Reason for Closure	Closure location
2154323	0.14	Closed	1	Aquatic and Terrestrial Risk	
2154324	0.17	Closed	1	Terrestrial Risk	
2154371	0.23	Closed	1	Aquatic Risk	
2154374	0.95	Closed	1	Aquatic and Terrestrial Risk	
2154387	0.27	Closed	2	Aquatic and Terrestrial Risk	
2154389	0.36	Closed	1	Aquatic and Terrestrial Risk	
2154390	0.17	Closed	1	Aquatic and Terrestrial Risk	
2154392	0.96	Closed	1	Aquatic and Terrestrial Risk	
2154396	1.14	Open	1	Aquatic and Terrestrial Risk	
2154430	0.12	Closed	1	Low Administrative Use	
2160394	0.49	Open	1	Terrestrial Risk	
2160404	0.56	Closed	1	Terrestrial Risk	
2160408	0.12	Closed	1	Terrestrial Risk	
2160411	0.26	Closed	1	Terrestrial Risk	
2160412	0.43	Closed	1	Terrestrial Risk	
Total	18.42				

*Storage levels:

1 - To hydrologically stabilize the road and minimize aquatic risk, the road typically requires non-drivable waterbars strategically placed to assure proper drainage in the absence of maintenance. Existing drainage structures and bridges can often remain in place.

2 - To hydrologically stabilize the road and minimize aquatic risk, the road has non-drivable waterbars and as necessary for hydrologic stability, includes the removal of most culverts with low to moderate fills on perennial and intermittent streams. Treatments may also include pull back of unstable side cast material on outside shoulders. In rare cases, it may include reducing fills over hydraulically appropriate and structurally sound culverts. Large drainage investments that present little to no aquatic risk may be retained in place. Costs to reopen these roads are higher than the low level of storage but are not cost prohibitive for temporary administrative access needs.

3 - To hydrologically stabilize the road and minimize aquatic risk, most/all drainage structures in perennial and intermittent streams are removed and the remainder of the road is waterbarred (non-drivable). Removal of these drainage structures may include excavation of deep fills. Where there is little to no aquatic risk to leaving them in place, high investment structures such as bridges and large culverts may be retained.

Mitigation and Design Features

In response to public comments and recommendations by District resource professionals on the proposal, mitigation measures were developed to ease some of the potential impacts the various alternatives may cause. The mitigation measures would be applied to the action alternative.

Special Habitats

See Table 7 for specific prescriptions for units. In all special habitat areas;

-All special habitats will have no-cut buffers of 50 feet to provide some microclimate temperature modulation and cover for wildlife species.

-Trees should be directionally felled away from and not yarded through any special habitat areas.

-Landings, temporary roads, ground based logging and skyline corridors will not pass through or intersect with these areas.

-Invasive species will be treated within special habitat areas.

-Habitat features such as rock outcroppings will not be disturbed by logging operations or related activities.

-No-cut buffers of 50 feet are adequate for thinning prescriptions; if gaps are placed on the border of a special habitat area the buffer should be increased to 150 feet.

Table 7: Special Habitat Buffers

Unit Number	Special Habitat	Acres to be buffered	Yarding system(s) (%)	Management Recommendations
2671	Wet Meadow	1.6	Skyline and/or ground based	No-cut buffer of 50 feet to provide shading to this wet area. Do not install skyline yarding corridors in this area.
2691a	Wet Meadow	3.1	Forage Unit/	No-cut buffer of 50 feet to provide shading to this wet area.
2691a	Mesic meadow	2	Forage Unit/whipfell	No buffer is needed in this area since the treatment is handfelling of conifers under 10”.
2803	Shrub	2	Skyline	Do not cut or enter this area no buffer is needed. Do not put skyline corridor through this area.
2803	Dry Meadow	.2	Skyline	Do not cut or enter this area no buffer is needed. Do not put skyline corridor through this area.
3057	Dry Rock Garden	.05	Ground based	No-cut buffer of 50 feet to maintain microsite.
3135a	Swamp, Wet Meadow	.05	Ground based	No-cut buffer of 50 feet to maintain microsite.
3135b	Swamp, Wet Meadow	.2	Ground based	No-cut buffer of 50 feet. Half of the buffer is in a designated Riparian Reserve buffer area.
3770	Skunk Cabbage Swamp	NA	Skyline	Included in Riparian Reserve buffer area. Do not install Skyline corridors through this area.
3546	Wet meadow	.7	NA	2 locations buffer both by 50 feet each.
3870	Swamp	.2	Skyline and/or ground based	No-cut buffer of 50 feet. On edge of unit. Do not place skyline corridors, or equipment here. No ground based machinery through the area.
TOTALS		10.1		

Invasive Plant Species

The following are required to help reduce risk of invasive plant establishment in the Pioneer Gulch project area. The effects analysis assumes that these measures are followed.

-Pre-treat known new invader sites.

-Require standardized cleaning of all off-road timber harvest, fuel treatment and road maintenance machinery entering the work area to reduce weed spread.

-Require weed-free gravel for road restoration/reconstruction and landing construction.

-Pre-treat roadsides (within 10-20 feet of roads used for haul) using chemical, manual or mechanical control to remove sources of weed seed prior to harvest and road work. Survey commercial quarry sources to ensure weed free crushed aggregate is used on roads.

-Treat and monitor road systems, landings, fuel breaks, forage areas, gaps and other disturbed areas for 5 years following thinning and fuels treatments.

-De-compact and plant native species in temporary spur roads and landings.

-In the year before quarries are used, District Botanist or representative will inventory and arrange for pre-treatment of quarries for invasive plants where rock extraction will take place.

-Use genetically local, weed-free native straw and grass seed for revegetating closed roads

-Eradicate known new invader weed populations prior to closing roads

Soils

-Skyline corridor roads shall be designated by the TSO and agreed upon by purchaser prior to felling. There will be no yarding across streams and skyline corridors are not allowed within Riparian Reserves. Skyline corridor roads shall be as narrow as practicable and spaced approximately 150 feet apart.

-Predesignated skid trails and landings are required and will be approved in advance of use by the Timber Sale Officer (TSO) and will generally be 150 to 200 feet apart.

-Ground-based equipment used for yarding, processing, fuel treatment, or other project activities shall operate only when soils are relatively dry where water is not pooling. Over the snow operations may occur when there is a continuous snow pack of at least eighteen inches deep or when soils are sufficiently frozen to support equipment. Operations shall be suspended before rainfall or precipitation results in off-site movement of sediment into drainage courses. Off-site movement of sediment typically can occur with 1.5 inches of rain in a 24-hour period. There is a Remote Automatic Weather Station (RAWS) located within the Pioneer Gulch project area at 3600 feet elevation in Section 21, T24S, R5E.

-Designated skid trails shall be required in all ground-based yarding units. Skid trails shall 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 shall be used wherever possible. No skid trails will be within the no-cut buffers or within the 50 foot non-mechanized buffer on Class IV streams.

-Ground-based equipment, including feller bunchers and ground based yarding equipment, shall be limited to slopes of 30 percent or less. All pre-bunching trails will be pre-located and pre-approved. Undesirable soil damage from skidding shall be avoided through skid trail layout and use of alternative yarding systems.

-With entry, evident existing skid trails, landings, and/or tractor fire lines are required to be utilized in any ground-based unit before any new skid road is approved.

-Soil restoration work that will be required by the purchaser includes sub-soiling of compacted primary skid trials within units that will have after harvest detrimental soil conditions between 16% and 20% (20.6 acres) (refer to the units with shaded rows in Table 21 and Appendix D), all landings (17.6 acres) and all existing and newly constructed temporary spur roads (9.1 acres) totaling 47.3 acres.

-All bare ground associated with sub-soiling will be seeded with weed-free native grass seed at a rate of 15 lbs per acre. Any temporary spur roads that will not be sub-soiled by the purchaser must be agreed and consulted on by the TSO, fuels specialist and hydrologist. Landings, temporary roads and skid trails shall be sub-soiled to a depth of 20 inches, and to lesser depths where soils are shallow and have a high rock content. It should be emphasized that the desired treatment of the compacted soil is to be slightly lifted and well fractured rather than plowed, mixed, or displaced. The treatment area shall span the total width of the compacted skid trail. There are two exceptions to this 1) when the primary skid trail has defined track or wheel ruts and the center of the skid trail was not compacted, only subsoil the ruts and 2) do not subsoil where the roots of an existing tree, located along the edge of the skid trail, would be damaged. A set radius around such trees would be determined by the TSO, normally approximately 15 feet. One mile of skid trail with a width of 10 feet equals approximately 1.2 acres.

-Temporary spurs roads will be maintained as native surface roads. Spot rocking would be allowed if these roads are used during the wet season, between November 1 and May 31, but purchaser may be asked to remove spot rock.

-Operating season for tractor yarding is from July 1 to September 15th to minimize detrimental soil compaction and puddling.

-One end suspension of logs will be required during yarding.

-All areas of exposed soil, such as landings, skyline corridor trails, burned piles, decommissioned temporary roads, and cut and fill slopes associated with road construction or maintenance and disturbance from yarding will be seeded with native grass species.

- Fire line will be constructed with appropriate water drainage using natural contours and waterbars to shunt water. On completion of broadcast burning and mop-up operations, constructed fire line will be rehabilitated by pulling duff and organic matter back over the exposed mineral soil to the original contour.

-Units or portions of units where a harvester (or feller-buncher) cannot be used because of steep side slopes and other resource concerns are listed in the following table. The table also displays where gaps will not be placed due to high erosion potential.

Table 8: Units or portions of units where a harvester (feller-buncher) cannot be used

Unit	Location / Description	Rationale
2761	Entire unit	Proximity to Listed Fish Habitat
2803	Upper unit, above spur road A	Proximity to Listed Fish Habitat, steep side slopes, steep road cut/fill slopes and high erosion potential
2888	Upper unit, above FS Rd 2100-401	Proximity to Listed Fish Habitat, steep slopes and high erosion potential
2915	Upper unit, above FS Rd 2149 in eastern half	Steep side slopes and high erosion potential
2920a	Skyline portion of unit	Steep side slopes and high erosion potential
2920b	Northern half of unit	Steep side slopes, high erosion potential and skyline corridors not aligned with fall line of slope
2952a	Skyline portion of unit	Steep side slopes, skyline corridors not aligned with fall line of slope
3048a	Side slopes over 30%	Steep slopes, high erosion potential
3048b	Side slopes over 30%	Steep side slopes, high erosion potential
3057	Side slopes over 30% , skyline portion of unit	Steep side slopes, high erosion potential
3062	Entire unit	Steep side slopes, steep road cut/fill slopes and high erosion potential
3068	Below FS 2154-385 Rd in southern portion of unit and on side slopes over 30%	Steep side slopes, steep road cut/fill slopes
3147	Side slopes over 30%. No gaps allowed in the middle section of unit having steeper side slopes and a southern aspect	Steep side slopes, high erosion potential
3546	Side slopes over 30%.	steep side slopes, steep road cut/fill slopes and high erosion potential
3599	Skyline portion of unit	steep side slopes, steep road cut/fill slopes and high erosion potential
3633	Entire unit.	steep side slopes, steep road cut/fill slopes and high erosion potential
3770	Skyline portion of unit	High stream density, steep side slopes, steep road cut/fill slopes and high erosion potential
3870	Southeastern skyline portion of unit	Several incised swales, steep side slopes, steep road cut/fill slopes and high erosion potential

Hydrology/Fisheries

-No-cut stream buffers within Riparian Reserves have been established within the Pioneer Gulch Project area and will be afforded special protection. The no-cut stream buffers are as follows:

- Class I streams (provide a source of domestic water or used by large numbers of anadromous fish or significant sports fish) - 100 foot no-cut buffer on both sides of the stream (there are no Class I streams within or adjacent to commercial thinning units)

- Class II and III streams (fish bearing and perennial non-fish bearing) - 60 foot no-cut buffers on both sides of the stream (except Skunk Creek, a Class II stream, will have a 100 foot no-cut buffer, providing additional protection to a bull trout reintroduction site).
- Class IV streams (seasonal non-fish bearing) - 30 foot no-cut buffers on both sides of the stream with a 50 foot non-mechanized equipment buffer that includes: ground based skid trails, harvesters/feller bunchers, and skyline yarding.

-In units containing stream channels, all existing large down wood within the no harvest riparian buffers will be retained to maintain aquatic objectives.

-Perennial seeps, springs, or wetlands would retain a minimum of 30-35 feet (10 meters) no-treatment buffer where obligate vegetation (vegetation only capable of surviving in wet environments) exists.

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

-Native surfaced roads shall be restricted from hauling when soils are saturated or run-off occurs, to minimize erosion and sedimentation.

-Construction or maintenance of roads shall not be done when soils are saturated or run-off occurs, to minimize erosion and sedimentation. Stable fill and culvert crossings shall be constructed across all streams crossings on new temporary and reconstructed roads.

-All cut slopes and ditches will be maintained during and after logging operations.

-All haul roads would be maintained in stable condition. Wet weather haul shall be monitored by the Timber Sale Administrator, the District Road Manager, Fisheries Biologist, and/or Hydrologist. When necessary, haul may be suspended during rainfall to prevent sedimentation if road use is causing rutting of the road surface, ponding of water on the road, failure of any drainage structure, or any other action that increases the sediment delivery to a stream.. Wet weather hauling may also be allowed when the road surface is either covered with a relatively continuous snow pack or frozen. Dust abatement (water only) of road surfaces shall be used if roads become excessively dusty during the summer.

-Prior to the wet weather season, all landings and temporary roads will be water-barred.

-Install erosion and sediment control devices such as biologs or weed free straw mulch near road stream crossings should there be winter haul road sediment generated.

-Mechanical ground-based equipment shall not be permitted within 60 feet of the stream channel of Class II and III streams, with the exception of Skunk Creek, a Class II stream that has a 100 no-cut buffer to protect a bull trout reintroduction site. Mechanized ground-based equipment shall not be permitted within 50 feet of the stream channel on Class IV streams.

-No yarding shall occur over stream channels or within the no-cut buffers of Riparian Reserves. No skyline anchors shall be within the no-cut buffers of streams.

-All skid trails and landings shall be water-barred to provide adequate drainage. Water bar location shall occur where local terrain facilitates effective drainage of the skid trail or landing while avoiding unnecessary soil disturbance. Construct water bars every 100 feet on slopes less than 15 percent, and every 50 feet on slopes greater than 15 percent. Water bars shall be keyed into the cut bank and have a clear outlet on the downhill side. Where available in concentrations, slash shall be scattered on skid trails and landings.

-Scarification and waterbars may be limited or suspended on feller buncher/ processor/ forwarder roads when the skid road is sufficiently covered with slash to form an effective mat to minimize soil compaction and erosion.

-Water sources used by project operations shall be reconstructed or maintained as necessary to protect stream bank stability, riparian vegetation, and water quality.

-No lignin sulfonate shall be used as part of the dust abatement plan for the Pioneer Gulch Project. Only water will be used for dust abatement purposes. Water shall not be drafted from stream reaches inhabited by ESA-listed species. Any water withdrawal will not reduce flow at the time of withdrawal by more than 10% in stream reaches inhabited by ESA-listed species, or by more than 50% in other streams

Wildlife

General

-Protect all existing legacy trees (generally large diameter mature or old growth trees that remained on site after the first harvest entry) throughout project activities.

-Ensure that existing snags ≥ 10” dbh and down logs ≥ 20” diameter which may occur in or adjacent to treatment areas are protected throughout proposed activities within safety tolerances.

-Apply measures such as contour falling, strategic placement, or piling to maximize wildlife use potential for dead wood when safety or logistic reasons prevent protection of existing features.

-Consider “high stumping” trees or snags ≥ 24” diameter that must be felled for safety reasons. Creating stumps one to two meters in height would mitigate the loss of some existing roosting habitat more quickly than the delayed snag recruitment associated with natural or fire-induced mortality.

Northern spotted owl

-Ensure that all standards listed in the USFWS BO are applied to the Pioneer Gulch project.

-Minimize short and long term impacts to spotted owl habitat by ensuring that existing legacy trees and large snags are protected within logging safety tolerances throughout proposed activities.

-Restrict burning activities that generate smoke from occurring between March 1st – July 15th on the following units: 2803, 2888, 3000, 3048.

-If blasting is used, seasonal and spatial restrictions will be enforced to avoid disturbance to spotted owls at nest sites during the breeding season.

Bald eagle

-Ensure that potential bald eagle nest, roost, and perch trees (legacy trees and snags within 1.1 mile of the Middle Fork Willamette River) are protected.

-In the event bald eagles are detected using habitat in an area which may be subject to disturbance from project activities during the breeding season, incorporate standard spatial and/or temporal measures to ensure the potential disturbance is mitigated.

American peregrine falcon

-No activities (timber, fuels, road-related, etc.) shall be conducted in and around Units 2761, 2803, 2888, and 2923 between January 15th and July 31st. This seasonal restriction could be waived annually if Wildlife Biologist monitors the nest site and determines it is unoccupied.

-In the event peregrine falcons are detected using habitat in another part of the project area which may be subject to disturbance from project activities during the breeding season, incorporate standard spatial and/or temporal measures to ensure the potential disturbance is mitigated as defined in Peregrine Falcon Nest Site and Habitat Management Plan (USDA 2000).

-If blasting or helicopters are used, seasonal and spatial restrictions will be enforced to avoid disturbance to spotted owls at nest sites during the breeding season.

Fringed myotis bat and Townsend's big-eared bat

-In the event a substantial bat roost is located within the project area, the ID Team biologist, District wildlife biologist and Regional bat taxa specialist should be contacted to inspect the site, assess any project activities for their potential to impact bats, and formulate site specific management guidelines to ensure protection of the site.

Management indicator species (Willamette LRMP)

-Retain a high percentage of green trees having crown abnormalities and/or obvious indicators of wildlife use such as pileated woodpecker foraging trees.

Land birds/neotropical migrants

-Defer all treatment for individual trees where sign of nesting activity is detected by workers conducting project activities.

Fire/Fuels

-Pile burning and underburning will be conducted in accordance with the Oregon Smoke Management Plan.

-Machine used to grapple pile the slash shall stay on the road surface only. Machine/grapple piles should be piled such that the heights of piles are approximately equal to their widths. Care should be taken to make piles so as to minimize damage to standing trees during the burning phase. Piles will be burned during the fall/winter.

-Handlines for underburning shall be constructed using hand tools along no-cut riparian buffer areas of units 2923a, 2923b, 2952a, and 2952b. Fire shall not be allowed to back into the no-cut buffers of Riparian Reserves.

Road Work and Logging Operations

-Best Management Practices (BMPs) of the Pacific Northwest Region (USDA, 1988), including placement of sediment barriers, provision of flow bypass, and other applicable measures, will be included in project design as necessary to control off-site movement of sediment. (BMPs R-2, 3, 4, 5, 7, 8, 9, 12, 13, 14, 18, 19, 20 and 23).

-For any perennial stream crossing culvert replacement, a specific dewatering plan shall be included with the contract design provisions (BMP R-13).

-All road reopening, reconstruction and temporary road building will occur during the dry season between June 1 and October 31 to avoid potential surface erosion of exposed soil (BMP R-3).

-Any road maintenance along haul routes, including placement of additional surface rock, blading, brushing, ditch relief culvert cleaning or addition of ditch relief culverts shall occur prior to project implementation (BMPs R-18, 19).

-At the completion of harvest activities, reopened roads and new temporary roads shall be closed, water barred, seeded with approved forest mix design and closed to vehicle travel to reduce potential for surface erosion and sedimentation (LRMP FW-101, 314-316, BMP R-23). Closure of temporary roads may include: blocking the entrance, removal of culverts, out-sloping the road surface, pulling back displaced material onto the road way, and/or the subsoiling of compacted surfaces when necessary.

-Winter haul will be allowed on roads 2100, 2149, 2153, 2154 between November 1 and May 31. (BMPs T-5, R-18, 20).

-Stream crossings removed as part of road storage shall lay back side slopes to a 1½:1 ratio, and extent of fill removal should be done to match natural topography of hill slopes and floodplains above and below the fill removal (BMP R-23).

Recreation

-Camp Marsh, a dispersed campsite at the junction of Roads 2100406 and 2100405 is to remain accessible following the proposed closure of FS Rd. 2100406. FS Rd. 2100406 will be closed at the junction of FS Rd. 211405 in order to maintain access to this site from Road 21. If the Camp Marsh dispersed site is required as a landing for this project, do not increase the size of the open area. Upon project completion, rehabilitate the camp by removing logging slash and debris, as well as replanting or reseeding with native vegetation. If the camp area is not needed as a landing, project activities will be restricted to weekdays for this unit during the summer to minimize the impact of use during the fall hunting season.

-Rehabilitate all landings and pullouts to maintain visual quality, by replanting, seeding, and removing slash and log debris, and to prevent these areas from becoming dispersed camping sites. Additionally, utilize natural objects (rock/wood) and place them in naturally-appearing arrangement to prevent creation of dispersed camping sites where they do not currently exist.

-Fuelbreak precommercial thinning unit #2636 would occur adjacent to a small initial portion of the Bear Mountain Trail #3602 on the south side of the trail at the trailhead along FS Rd. 2149. Thinning is allowed adjacent to the trail corridor along the southerly side, but operations must not occur on weekends. Additionally, operations must not create hazards immediately along the trail. Stumps within 10 feet of the trail must be flush-cut (cut flush with ground level) for safety purposes. The results of management activities must not be evident to the casual observer within

300 feet of either side of the trail. Additionally, stumps must be flush-cut for a distance up to ten feet from the trail corridor. Access to the trailhead should remain open for hikers during operations as well as posting signs warning trail users during project activity.

-In Forage Treatment Unit #3570, forage treatment activities are restricted within 300' of the trail. Forage treatment activities must strive to maintain the VQO of Retention, where management activities within 300' of either side of the trail must not be evident to the casual observer using the Middle Fork National Recreation Trail #3609. Operations should not occur on weekends and signs must be posted warning trail users during times of project activity.

-Restrict timber hauling operations to weekdays from the beginning of the July 4th weekend until the end of the Labor Day weekend, which is when forest visitor traffic for the summer recreation season is expected to be highest. Also restrict timber hauling operations to weekdays during the one-week General Cascade Bull Elk Season, which is when the fall hunting season traffic is expected to be highest.

-All mixed use, level 2 roads that are open used for log/commercial hauling will be signed to indicate commercial hauling is occurring. As per the Motorized Mixed Use Analysis completed in support of the Travel Management decision, non-street legal vehicle use is prohibited on these roads during log haul. Within the project area during commercial hauling activities, the following roads and junctions are required to be signed by haulers with traffic safety signs that state, "Log Haul", "Trucks", or similar language.

- FS Road 21, Spur 21-400, at the north boundary of Unit #2761 (facing the sign towards traffic traveling down 400 toward Forest Road 21)
- FS Road 2149, at the Junction of Spur 2149-422 (facing the sign towards traffic traveling down 2149 toward the junction of 21 and 2153)
- FS Road 2153, Spur 2153-375, at the northwesterly boundary of Unit #3770 (facing the sign towards traffic traveling down 375 toward Forest Road 2153)
- FS Road 2153, at the boundary of Unit# 4115 (beyond the hairpin turn, facing the sign towards traffic traveling down 2153 toward Forest Road 21)
- FS Road 2154, at the Junction of Spur 2154-380 (facing the sign towards traffic traveling down the 380 spur to 2154)
- FS Road 2154, at the Junction of Spur 2154-383 (facing the sign towards traffic traveling down Forest Road 2154 toward the junction of 2154/2153)

Heritage Resources

-Changes to current treatment unit configurations and/or the addition of any new treatment units will require consultation with the district archaeologist in order to protect known and unknown heritage resources.

-Project activities planned outside of the area defined in the heritage resource inventory plan must be coordinated with the district archaeologist prior to initiation. This includes the establishment of new harvest landings, spur roads, guy-line equipment anchors, slash burning, removal of roadside danger trees, and ripping of spur roads.

-Prior to cultivating/ripping skid roads post-harvest a re-entry survey should be conducted in those areas deemed high probability for the occurrence of heritage resources. Coordination with the district archaeologist is vital to ensure the continued protection of heritage resources.

-Presale personnel will adhere to design requirement identified in the Heritage Resources Report (Godin and Hamilton, 2012).

-All National Register of Historic Places (NRHP) eligible sites and potentially eligible sites must be avoided during all project activities.

-There remains the possibility that buried prehistoric or historic cultural resources are present and could be uncovered during project activities. If cultural resources are encountered during the course of this project, earth-disturbing activities in the vicinity of the find should be suspended, in accordance with federal regulations, and the district archaeologist notified to evaluate the discovery and recommend a subsequent course of action.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in Table 9 is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. The information in the column labeled "Need or Issue Addressed" relates to discussions in Chapter 1. Purpose and Needs A through F are discussed in the Purpose and Need section and Issues 1 through 7 are discussed in the Issues section of Chapter 1.

Table 9: Comparison of Alternatives

		Unit of Measure	Need or Issue Addressed*	Alt. A	Alt. B
ACTIVITIES					
Proposed Treatments					
Commercial Thinning with Gaps		Acres	P&N A,B,C	0	940
Forage Treatments		Acres	P&N C, Issue 1	0	164
Fuelbreak Understory Treatments		Acres	P&N D	0	88
Fuelbreak Precommercial Thinning		Acres	P&N D	0	45
Total Acres of Treatments		Acres		0	1,237
Estimated Timber Volume		MBF	P&N F	0	12,700
Yarding Systems					
Ground-based		Acres	N/A	0	536
Skyline		Acres	N/A	0	404
NON-KEY ISSUES					
1) Big Game Habitat Management					
Habitat Effectiveness Component	BGEA Emphasis Level and Minimum Desired Value				
HEs (size and spacing of forage areas)	Mod - 0.4	HE value	Issue 1	0.88 Paddy's	HE values would be the same since the differ-
	Mod - 0.4			0.91 Gorge Echo	
	High - 0.5			0.89 Indigo Skunk	

		Unit of Measure	Need or Issue Addressed*	Alt. A	Alt. B
HEr (road density)	Mod - 0.4	HE value	Issue 1	0.51 Paddy's	ences in roads, cover and forage on a land-scape scale are minor. Would provide additional forage for 10-15 yrs until the canopy closes in thinning units
	Mod - 0.4			0.53 Gorge Echo	
	High - 0.5			0.56 Indigo Skunk	
HEc (cover)	Mod - 0.4	HE value	Issue 1	0.78 Paddy's	
	Mod - 0.4			0.83 Gorge Echo	
	High - 0.5			0.70 Indigo Skunk	
HEf (forage)	Mod - 0.4	HE value	Issue 1	0.27 Paddy's	
	Mod - 0.4			0.24 Gorge Echo	
	High - 0.5			0.19 Indigo Skunk	
HEI (overall)	Mod - 0.4	HEI value	Issue 1	0.51 Paddy's	
	Mod - 0.4			0.53 Gorge Echo	
	High - 0.5			0.51 Indigo Skunk	
Enhanced forage in thinning unit gaps		Acres	Issue 1	0	141
Enhanced forage in forage treatment units		Acres	Issue 1	0	164
2) Road Management					
Haul Road Reconstruction and Maintenance		Miles	Issue 2	0	55.45
Temporary Road Construction (on previously used routes)		Miles	Issue 2	0	4.12
Temporary Road Construction (new)		Miles	Issue 2	0	2.16
Road Closures (currently open)		Miles	Issues 1 and 2 P&N E	0	13.86
Road Closures (re-open, then re-close)		Miles	Issue 2	0	4.56
Wet weather haul roads		Miles	Issue 2	0	42.81
Stream Culvert Replacements		Number	Issue 2	0	13
Ditch Relief Culvert Replacements		Number	Issue 2	0	98
Open Road Density within Project Area		Sq. mi./mi.	Issue 2, P&N E	2.53	1.99
Cost of Road Work		Dollars	Issue 2	0	2,008,317
Landings		Acres	Issue 2	0	22
3) Economics					
Present Net Value (Benefits – Costs)		Dollars	Issue 3	(-95,250)	$1,041,457
Benefit/Cost Ratio		Dollars	Issue 3	0	1.24
4) Water Quality/Listed Fish Habitat					
Road Work and Assoc. Projects		See #2) Roads and Access, above			
Aggregate Recovery Percent	Pioneer Gulch 6th Field Watershed	Percent	Issue 4	76	75
	Paddy's Valley 6th Field Watershed	Percent	Issue 4	85	81
Commercial Thinning in Riparian Reserves		Acres	Issue 4, P&N B	0	286
5) TES Species					
Spotted owl suitable habitat removed		Acres	Issue 5	0	0

	Unit of Measure	Need or Issue Addressed*	Alt. A	Alt. B
Spotted owl dispersal habitat removed	Acres	Issue 5	0	117
Spotted owl sites with project effects within 1.2 mile home range	Number	Issue 5	0	4
Spotted owl sites with project effects within 0.5 mile of core area	Number	Issue 5	0	2
Spotted owl sites with project effects within 300 meter nest patch	Number	Issue 5	0	0
Rare Botanical Species	Number of sites impacted	Issue 5	0	0
6) Soil Productivity				
Percent cumulative detrimental soil conditions by activity area	Percent	Issue 6	See Table 21	See Table 21
7) Invasive Weeds				
Potential Disturbed Areas	Acres	Issue 7	0	1,799
8) Fuel Treatments				
Percent of harvest treatments meeting Standards and Guides	Percent	Issue 8	100	100
Fire Regime Condition Class within proposed treatment units	Class	Issue 8	2	1
Harvest Units – Yard Tops, Hand Pile and Burn, Roadside Grapple Pile	Acres	Issue 8	0	675
Harvest Units - Underburning	Acres	Issue 8	0	265
Fuelbreak PCT Units – Hand Pile and Burn	Acres	Issue 8, P&N D	0	45
Fuelbreak Understory Trt Units – Whip-felling, Pruning, Hand Pile and Burn	Acres	Issue 8, P&N D	0	88
Forage Trt. Units - Hand Pile Whip-felled Trees and Leave Piles	Acres	Issue 8, P&N C	0	105
Forage Trt. Units - Mastication	Acres	Issue 8, P&N C	0	59

*P&N = Purpose and Need. P&N's A - F are discussed in Chapter 1, Purpose and Need section.

Issues 1 – 8 are discussed in Chapter 1, Issues section.

PCT = precommercial thinning

HE = Habitat Effectiveness

HEI – Habitat Effectiveness Index

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 Table 9.

The cumulative effects discussed in this chapter 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 proposed action and its alternatives may have a continuing, additive and significant relationship to those effects. The cumulative effects of the proposed action in this analysis are primarily based on the aggregate effects of the past, present and reasonably foreseeable future actions. Individual effects of past actions have not been listed or analyzed and are not necessary to describe the cumulative effects of this proposal or alternatives (CEQ Memorandum, Guidance on the Consideration of Past Actions in Cumulative Effects Analysis, June 24, 2005).

Refer to Appendix B for a list of past, present and reasonably foreseeable future actions included in the assessment of cumulative effects. Refer to Appendix C for consistency of the Proposed Action with direction and regulations.

Specialist Reports

This EA hereby incorporates by reference the following analyses that together comprise the Upper Middle Fork Watershed Restoration and Road Closure Analysis.

Ornberg, 2012. Silvicultural Prescription

Juillerat, 2011. Botanical Resources Report

Juillerat, 2011. Botanical Evaluation

Dixon, 2011. Soils Report

Kurian, 2011. Hydrology Report

Langum, B., 2011. Fisheries Report

Langum, B., 2011. Fisheries Biological Assessment

Ferland, 2012. Wildlife Specialist Report and Biological Evaluation

USDA, USDI, 2010. Biological Assessment of LAA Projects with Potential to Modify the Habitat and or Disrupt Northern Spotted Owls. Willamette Planning Province. FY 2011-2012. .

Mercado 2012. Fire and Fuels Management Report

Langum, Z. 2011. Transportation Report

Dietzler, 2012. Recreation Report

Godin and Hamilton, 2012. Heritage Resources Report

Specialist Reports in their entirety are contained in the Project Record, on file at the Middle Fork Ranger Station. These reports contain the detailed data, methodologies, analyses, conclusions, maps, references, and technical documentation that the resource specialists relied upon to reach the conclusions in this EA.

Summary of Effects Determinations.

Table 10 summarizes the effects determinations by resource area for Threatened, Endangered, and Sensitive (TES) species and Critical Habitat.

Table 10: Summary of Effects Determinations for Fish, Wildlife, and Botanical Resources

Species	Status	Alt. 1	Alt. 2
Rare Botanical Species			
Vascular Species		NI	NI
Bryophytes		NI	NI
Lichens		NI	NI
Fungi		NI	NI
TES Fish			
Spring Chinook Salmon	Threatened	NA	LAA
Spring Chinook Salmon Critical Habitat	Designated	NA	LAA
Essential Fish Habitat	NA	Not present in project area	Not present in project area
Bull Trout	Threatened	NA	NLAA
Bull Trout Critical Habitat	Designated	NA	LAA
TES Wildlife			
Northern Spotted Owl	Threatened	Habitat – NE Disturbance - NE	Habitat – NLAA Disturbance - NLAA
Northern Spotted Owl Critical Habitat	Designated	NE	NE
Northern Bald Eagle	Sensitive	NI	NI
American Peregrine Falcon	Sensitive	NI	MIIH
Northern Waterthrush	Sensitive	NI	NI
North American Wolverine	Sensitive	NI	NI
Fisher	Sensitive	NI	MIIH
Fringed Myotis (bat)	Sensitive	NI	MIIH
Townsend's Big-eared Bat	Sensitive	NI	MIIH
Oregon Slender Salamander	Sensitive	NI	MIIH
Western Pond Turtle	Sensitive	NI	NI
Mardon Skipper	Sensitive	NI	NI
Johnson's Hairstreak	Sensitive	NI	NI
Crater Lake Tightcoil	Sensitive	NI	NI
Cascade Axetail Slug (formerly Salamander Slug)	Sensitive	NI	MIIH
Evening Fieldslug	Sensitive	NI	MIIH

TES = Threatened, Endangered, and Sensitive

NE = No effect

NI = No impact

MIIH = May impact individuals or their habitat but the action will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.
LAA = May affect, likely to adversely affect
NLAA = May affect, not likely to adversely affect.
NA = Not applicable

Table 11 displays the Willamette National Forest Management Indicator Species (MIS) presence of habitat and species.

Table 11: Management Indicator Species Presence

SPECIES	Known or suspected presence?	Suitable habitat present?
American Marten	Yes	Yes
Deer and Elk (Big Game)	Yes	Yes
Pileated Woodpecker	Yes	Yes
Cavity Excavators	Yes	Yes
Spring Chinook salmon	Yes	Yes
Bull trout	Yes	Yes
Coastal cutthroat trout	Yes	Yes
Whitefish	Yes	Yes
Rainbow trout	Yes	Yes
Brook Trout	Yes	Yes

Vegetation

Existing Condition – Forest Types and Structure

The average stand proposed for commercial variable density thinning is 49 years old, 14 inches in diameter, and 80 feet tall. These second growth managed stand are classified as being in the stem exclusion seral development stage (Oliver and Larson, 1990). Stands in this seral stage have dense crowns which block out the light to the forest floor, and limit additional tree regeneration in the understory. Typically, shade-tolerant understory trees that are present persist but grow very slowly. Intermediate or suppressed trees that do not tolerate shade well suffer from competition and have high mortality rate. Shade-intolerant shrubs and forbs frequently disappear at this stage. These stands have stand densities that range from 108 to 322 trees per acre. The relative densities range from 41 to 89 with an average of 74. Stand vigor and growth is declining in these stands. Some trees have begun to die due to overcrowding and competition between trees for nutrient and light as evidenced by competition-induced mortality. Crown ratios have become small to the extent that some trees may be at risk of windfall or snow breakage, and the overall stand structure is not as diverse as natural young stands.

There are many methods of expressing or evaluating density or stocking levels of plantations. The method used for determining the timing of commercial thinning treatments in the proposed units was Curtis's Relative Density (Curtis, 1982). This relative density method relates existing or planned density to some maximum biological potential density, hence the term "relative". The two factors used in the formula are the quadratic mean diameter and stand basal area per acre. For Douglas-fir a relative density of 50 and above has been determined to be a stand density sufficient to cause competition mortality. The recommended density for managing Douglas-fir to

maximize stand vigor and growth is within the range of 35 to 50. Based on these guidelines, the majority of the proposed units have relative densities greater than 50. The growth and yield projection model - Forest Vegetation Simulator (FVS) (USDA 2002) was used to model the growth of the stands. Table 12 displays the pre-harvest conditions for the commercial thinning units.

Table 12 – Pre-harvest Conditions – Commercial Thinning Units

Units	Acres	Age	DBH	HGT	TPA	BA	RD	CC
2761	25	55	15.1	99	247	306	79	79
2803	32	54	12.4	60	187	167	59	65
2888	40	50	13.8	75	262	271	76	78
2915	21	36	16.5	95	108	160	49	56
2920a	18	43	15.9	86	168	230	85	84
2920b	16	43	15.9	86	168	230	85	84
2923a	114	56	14.7	82	251	290	79	77
2923b	33	56	14.7	82	251	290	79	77
2952a	111	55	15.5	87	215	281	74	76
2952b	7	55	15.5	87	215	281	74	76
3048a	26	50	12.1	64	322	226	83	85
3048b	18	50	12.1	64	322	226	83	85
3057	23	50	14.5	73	248	282	78	82
3062	39	50	15.1	82	224	278	72	78
3068	33	39	14.4	76	251	282	74	74
3135a	9	50	13.4	74	287	285	89	83
3135b	19	50	13.4	74	287	285	89	83
3144	46	50	11.9	62	175	115	41	57
3147	61	42	14.4	92	250	284	82	78
3148a	36	42	15.3	80	154	198	51	67
3148b	14	42	15.3	80	154	198	51	67
3485	20	39	12.9	68	189	199	57	67
3546	79	45	13.8	73	272	176	86	81
3599	25	43	13.8	71	272	287	86	81
3633	12	43	12.3	64	313	261	83	84
3770	20	42	15.0	67	221	272	77	77
3870	15	48	13.8	70	221	250	77	77
4115	2	49	13.5	70	221	250	77	77
5756	12	42	12.1	69	271	216	62	78
6927	14	44	13.5	81	147	147	57	67
Total	940							

DBH = average diameter at breast height in inches, HGT = average tree height in feet, TPA = trees per acre, BA = basal area (square feet per acre), RD = relative density, CC = percent canopy cover.

The average stand proposed for fuelbreak understory treatments is 163 years old, 16 inches in diameter, and 83 feet tall. These stands are higher elevation stands and therefore have small

diameters and heights for their age. These stands are generally in the understory re-initiation development stage (Oliver and Larson, 1990) and have considerable understory vegetation (small conifers and shrubs) contributing to ladder fuels which could carry a ground fire into the crowns of the dominant and codominant trees in the stand.

The average stand proposed for fuelbreak pre-commercial thinning treatments is 24 years old, 3 inches in diameter, and 15 feet tall. These stands are also higher elevation stands. They are densely stocked and would be very flammable in the event of a fire due to the low height to the base of the crowns and the close proximity of the crowns to each other. These stands have stand densities that range from 300 to 500 trees per acre.

The stands proposed for forage treatments are of two types. The first type (three of the forage units) was previously shelterwood harvested. They have a sparsely stocked overstory with an average age of 117 years, about 20 trees per acre, averaging 27 inches in diameter and 120 feet tall. They have a variably stocked understory of conifer seedlings and saplings and some chinkapin (a hardwood species) up to 20 feet tall, dense in some areas, and understocked in others. The understory trees average 2-3 inches in diameter and 10-15 feet tall. The second type (one of the forage units) is a clearcut that failed to regenerate adequately. The seedlings and saplings in this unit average 5 inches in diameter and 21 years old. There are about 150 trees per acre in this unit, with pockets of regeneration interspersed with open, understocked areas.

Table 13 displays the pre-treatment conditions for the non-harvest units.

Table 13 – Pre-treatment Conditions – Non-harvest Units

Units	Acres	Age	DBH	HGT	TPA	CC
Fuelbreak - Understory Treatment Units						
2611a	2	175	20.9	100	121	86
2611b	4	175	20.9	100	121	86
2611c	4	175	20.9	100	121	86
2667	2	81	9.0	60	200	90
2883	5	146	26.0	126	101	67
2927	2	170	24.0	95	40	50
3000	7	148	19.0	95	173	80
3074	22	144	14.9	66	151	89
3207	5	165	11.0	70	150	45
3254	4	225	16.0	80		60
3270	3	151	17.5	120	173	90
3302	16	149	14.5	60	150	53
3342	3	101	16.0	100	173	70
3346a	1	169	9.0	45		25
3346b	1	169	12.0	60		40
3450	3	293	11.5	60		30
6626	3	204	13.0	70		50
7781	1	101	14.0	90		60
Total	88					

Units	Acres	Age	DBH	HGT	TPA	CC
Fuelbreak – Precommercial Thinning Units						
2636	3	30	6.0		300	60
2687	2	20	2.0		400	30
2688	2	20	1.0		400	25
2691b	1	31	4.0		300	40
2753	10	16	1.0		500	40
2815	2	29	4.0		300	40
2853	3	30	4.0		300	40
2928	2	31	4.0		300	40
2958	2	31	4.0		300	40
2981	1	20	2.0		400	25
3163	1	28	4.0		300	40
3268	1	30	4.0		300	40
3314	2	21	2.0		400	25
3451	3	30	3.0		300	30
3509	1	27	4.0		300	40
3557	3	35	5.0		300	70
6636	1	29	4.0		300	50
6682	2	13	2.0		500	25
6684	1	17	3.0		500	30
6687a	1	12	2.0		500	25
6687b	1	12	2.0		500	25
Total	45					
Forage Enhancement Units						
2691a	14	101	25.0		20	20
2866	19	101	31.0		12	15
3162a	40	150	25.9		26	25
3570	91	21	5.0		150	50
Total	164					
Grand Total All Units	1,237					

Environmental Consequences – Forest Types and Structure

Direct and Indirect Effects

Alternative A – No Action

Over-stocked stands would continue to grow, but at slower rates as trees compete with each other for growing space. Diameter growth would be slow or would decline and live crown ratios would get smaller. These trees would become less vigorous and more susceptible to insects and diseases. Competition-induced mortality would increase thus increasing both snag and down

wood levels. The down material would increase fuel loadings making the stands more vulnerable to wildfire and insect infestations. The competition-induced mortality would not be available for commercial wood products. Low light levels in un-thinned stands would suppress development of shade-tolerant trees and limit understory vegetation. The diameter and product value of trees harvested in the future would be reduced without treatment.

Stands along the fuelbreak would not be treated to reduce potential fire behavior. Ladder fuels in the mature stands would become even more dense and taller, growing even closer to the base of the crowns in the overstory. Plantations along the fuelbreak may eventually receive a traditional pre-commercial thinning under the pre-commercial thinning program in the next five to ten years but the spacing would probably be tighter so would not result in as great of a reduced potential fire behavior compared to Alternative B.

Stands proposed for forage treatments under Alternative B would not receive mastication treatments to reduce the small conifer cover. The understory conifers would continue to grow and fill in, and big game forage quality would continue to decline.

Alternative B – Proposed Action

Commercial variable density thinning of 940 acres (with gaps) would reduce stand densities, resulting in reduced competition for limiting resources such as light, water, and soil nutrients. Thinning would maintain or improve stand growth rates, promote stem quality and tree vigor, diversify the species composition and stand structure, capture competition-induced mortality for use as commercial wood products, and reduce long-term fuel buildup.

Alternative B would also create one to three acre gaps in about 15% of the proposed commercial variable density thinning area outside of 170 from streams. The tree canopies around the one and two-acre gaps would close in faster than the three-acre gaps so one and two-acre would not be planted with seedlings. This would allow these openings to persist for a longer period of time than if they were planted with seedlings and would benefit big game. The three acre gaps would be planted with western redcedar, blister rust resistant western white pine (50 trees per acre total), which would contribute toward continued presence of these important species on the landscape, but still allow for quality forage conditions. The gaps would also be planted with hardwoods such as elderberry, cascara, serviceberry, and hawthorn (25 trees per acre total) to improve conditions for other wildlife species. The small patch cuts would also introduce spatial heterogeneity into the stand structure.

Included in the thinning acres mentioned above, are 286 acres of thinning in the upland portion of the Riparian Reserves. Treatments would meet the purpose and need to ensure the health and growth of stands in Riparian Reserves, to diversify the stand structure, and to accelerate their development of late-successional forest characteristics.

Thinning would promote the development of diverse, multi-layered stands (Bailey and Tappeiner, 1998, Muir et all 2002), primarily by providing conditions that favored the establishment of shrubs, hardwoods, and conifer in the understory after thinning, and by releasing saplings and intermediate-crown class trees in the stand.

Thinning would maintain or enhance stand level, plant species diversity. Species richness for herbaceous species and total species richness across trees, shrubs, and herbaceous vegetation (Bailey et al 1998) were greater in thinned stands than in un-thinned and old-growth stands. A portion of the increased species richness was associated with exotic species, but grasses and nitrogen-fixing species also were more abundant in thinned stands

The thinning would open up the tree canopy allowing more sunlight and precipitation to reach the forest floor. This would result in changes in the microclimate (increased air and soil temperatures, relative humidity, and air movement) (Chan, 1995), under the main canopy for 10 to 20 years until the canopy closes back in. These changes in microclimate stimulate an increase in favorable growing conditions for most plant species.

Thinning promotes the crown differentiation by allowing overstory trees to develop deep canopies and larger diameter branches in open stands (McGuire et al 1991).

A short-term negative effect to understory vegetation and below ground fungi would be the mechanical damaged from logging. The removal of host trees and soil disturbance from the yarding operation impacts below ground fungi (Courtney et al 2004). This negative effect would be mitigated by the use of designated skid trail with ground –based yarding systems and log-suspensions capabilities of skyline yarding systems.

Thinning may help these stands to develop resistance to environmental variables. Studies have compared live-crown ratio and height to diameter (H:D) ratios of trees in young stands managed for timber production to those of trees in old-growth stands (Poage 2001). Live crown ratios averaged about 50 percent or higher in the old trees, and 30 percent or less in trees in young stands, depending on stand density and whether or not the trees had been thinned. Old trees also had low H:D ratio (often <40-50), which suggests that they are resistant to disturbances by agents such as wind, fire, and ice (Wilson and Oliver 2000, Wonn and O'Hara 2001). In young stands, these ratios were often closer to 70, which suggest that these trees are relatively, unstable, and have relatively low resistance to wind, fire, and ice. Thinning reduces the densities and promotes greater diameter growth of residual trees that increases the stability of these stands over time by making them more resistant to windthrow and snow breakage. However, the heavier thinning could possibly make the residual trees more susceptible to windthrow initially (Garmen, et al. 2003). Following thinning, some trees may blow down as a result of increased exposure to wind. Windthrow creates canopy gaps and supplies coarse woody material as a fine-scale distance (Hayes et al 1997).

Stands along the fuelbreak would be treated to reduce potential fire behavior. Ladder fuels in the mature stands would be cut, lower branches of mature trees would be pruned, and the average base canopy height of the stand would be raised, resulting in lower potential fire behavior if a ground fire were to be ignited. Plantations along the fuelbreak would be thinned to a 24X24 foot spacing, resulting in considerable distance between crowns, reducing the chances of fire spreading from crown to crown.

Stands proposed for forage treatments under Alternative B would receive mastication treatments to reduce the small conifer cover, improving growing conditions for big game forage species.

Table 14 below compares stand conditions for pre and post treatments in thinned units for the proposed action.

Table 14- Pre and Post Stand Treatment Conditions for Proposed Commercial Thinning Units

Unit No.	Acres	Treatment Portion of Unit	Canopy Cover Percent		Trees Per Acre		Relative Density		Basal Area (sq. ft. per ac.)	
			Pre	Post	Pre	Post	Pre	Post	Pre	Post
2761	25	Thinning+Gaps	79	43	247	78	79	30	306	126
		ThinningOnly	79	50	247	90	79	35	306	147
2803	32	Thinning+Gaps	65	35	187	66	59	32	167	80
		ThinningOnly	65	41	187	76	59	36	167	92
2888	40	Thinning+Gaps	78	42	262	78	76	31	271	112
		ThinningOnly	78	49	262	90	76	36	271	130
2915	21	Thinning+Gaps	56	35	108	52	49	30	160	90
		ThinningOnly	56	41	108	60	49	35	160	105
2920a	18	Thinning+Gaps	84	40	168	66	85	32	230	100
		ThinningOnly	84	45	168	76	85	36	230	115
2920b	16	Thinning+Gaps	84	40	168	66	85	32	230	100
		ThinningOnly	84	45	168	76	85	36	230	115
2923a	114	Thinning+Gaps	77	*34	251	66	79	31	290	111
		ThinningOnly	77	*40	251	76	79	35	290	128
2923b	33	Thinning+Gaps	77	*34	251	66	79	31	290	111
		ThinningOnly	77	*40	251	76	79	35	290	128
2952a	111	Thinning+Gaps	76	*36	215	66	74	30	281	118
		ThinningOnly	76	*41	215	76	74	35	281	137
2952b	7	Thinning+Gaps	76	*36	215	66	74	30	281	118
		ThinningOnly	76	*41	215	76	74	35	281	137
3048a	26	Thinning+Gaps	85	43	322	85	83	33	226	95
		ThinningOnly	85	50	322	99	83	37	226	110
3048b	18	Thinning+Gaps	85	43	322	85	83	33	226	95
		ThinningOnly	85	50	322	99	83	37	226	110
3057	23	Thinning+Gaps	82	45	248	78	78	31	282	114
		ThinningOnly	82	52	248	90	78	36	282	133
3062	39	Thinning+Gaps	78	44	224	78	72	30	278	127
		ThinningOnly	78	51	224	90	72	35	278	148
3068	33	Thinning+Gaps	74	46	251	85	74	30	282	123
		ThinningOnly	74	53	251	99	74	35	282	143
3135a	9	Thinning+Gaps	83	37	287	71	89	33	285	90
		ThinningOnly	83	43	287	82	89	37	285	104
3135b	19	Thinning+Gaps	83	37	287	71	89	33	285	90
		ThinningOnly	83	43	287	82	89	37	285	104

Unit No.	Acres	Treatment Portion of Unit	Canopy Cover Percent		Trees Per Acre		Relative Density		Basal Area (sq. ft. per ac.)	
			Pre	Post	Pre	Post	Pre	Post	Pre	Post
3144	46	Thinning+Gaps	57	42	175	85	41	31	115	85
		ThinningOnly	57	49	175	99	41	35	115	99
3147	61	Thinning+Gaps	78	38	250	71	82	32	284	103
		ThinningOnly	78	44	250	82	82	37	284	119
3148a	36	Thinning+Gaps	67	46	154	83	51	31	198	121
		ThinningOnly	67	53	154	99	51	35	198	141
3148b	14	Thinning+Gaps	67	46	154	83	51	31	198	121
		ThinningOnly	67	53	154	99	51	35	198	141
3485	20	Thinning+Gaps	67	38	189	71	57	32	199	93
		ThinningOnly	67	44	189	82	57	36	199	108
3546	79	Thinning+Gaps	81	37	272	66	86	32	176	91
		ThinningOnly	81	43	272	76	86	36	176	105
3599	25	Thinning+Gaps	81	37	272	66	86	32	287	95
		ThinningOnly	81	43	272	76	86	36	287	110
3633	12	Thinning+Gaps	84	42	313	85	83	34	261	95
		ThinningOnly	84	48	313	99	83	37	261	110
3770	20	Thinning+Gaps	77	39	221	66	77	32	272	109
		ThinningOnly	77	45	221	76	77	37	272	126
3870	15	Thinning+Gaps	77	39	221	66	77	32	250	125
		ThinningOnly	77	45	221	76	77	37	250	125
4115	2	Thinning+Gaps	77	45	No gaps	no gaps	77	76	250	125
		ThinningOnly	77	45	221	76	77	37	250	125
5756	12	Thinning+Gaps	78	46	271	95	62	29	216	106
		ThinningOnly	78	53	271	110	62	33	216	123
6927	14	Thinning+Gaps	67	38	147	71	57	32	147	86
		ThinningOnly	67	44	147	82	57	36	147	100
Total	940									

Note: Pre and post conditions only consider merchantable trees (>7" dbh). "Post" means immediately after harvest.

*Includes 10% reduction crown cover due to expected mortality from underburning

**"Thinning +Gaps" averages the parameters for the thinning portion of a unit with the gaps portion of the unit using a weighted average. "Thinning Only" gives the parameters just for the thinning portion of a unit.

Table 15 - Pre and Post Stand Treatments for Proposed Non-harvest Treatment Units

Unit	Acres	Silvicultural Prescription	Canopy Cover %		Trees Per Acre*	
			Pre	Post	Pre	Post
Fuelbreak - Understory Treatment Units						
2611a	2	Whip felling, pruning, pile and burn	86	80	121	112
2611b	4	Whip felling, pruning, pile and burn	86	80	121	112
2611c	4	Whip felling, pruning, pile and burn	86	80	121	112
2667	2	Whip felling, pruning, pile and burn	90	80	200	178
2883	5	Whip felling, pruning, pile and burn	67	60	101	90
2927	2	Whip felling, pruning, pile and burn	50	45	40	36
3000	7	Whip felling, pruning, pile and burn	80	75	173	162
3074	22	Whip felling, pruning, pile and burn	89	80	151	135
3207	5	Whip felling, pruning, pile and burn	45	40	150	133
3254	4	Whip felling, pruning, pile and burn	60	50	125	104
3270	3	Whip felling, pruning, pile and burn	90	80	173	154
3302	16	Whip felling, pruning, pile and burn	53	48	150	136
3342	3	Whip felling, pruning, pile and burn	70	65	173	161
3346a	1	Whip felling, pruning, pile and burn	25	20	85	68
3346b	1	Whip felling, pruning, pile and burn	40	35	85	74
3450	3	Whip felling, pruning, pile and burn	30	25	85	71
6626	3	Whip felling, pruning, pile and burn	50	45	125	113
7781	1	Whip felling, pruning, pile and burn	60	50	121	101
Total	88					
Fuelbreak – Precommercial Thinning Units						
2636	3	24x24’ spacing	60	30	300	76
2687	2	24x24’ spacing	30	15	400	76
2688	2	24x24’ spacing	25	15	400	76
2691b	1	24x24’ spacing	40	15	300	76
2753	10	24x24’ spacing	40	15	500	76
2815	2	24x24’ spacing	40	15	300	76
2853	3	24x24’ spacing	40	15	300	76
2928	2	24x24’ spacing	40	15	300	76
2958	2	24x24’ spacing	40	15	300	76
2981	1	24x24’ spacing	25	15	400	76
3163	1	24x24’ spacing	40	15	300	76
3268	1	24x24’ spacing	40	15	300	76
3314	2	24x24’ spacing	25	15	400	76

Unit	Acres	Silvicultural Prescription	Canopy Cover %		Trees Per Acre*	
			Pre	Post	Pre	Post
3451	3	24x24' spacing	30	15	300	76
3509	1	24x24' spacing	40	15	300	76
3557	3	24x24' spacing	70	35	300	76
6636	1	24x24' spacing	50	15	300	76
6682	2	24x24' spacing	25	15	500	76
6684	1	24x24' spacing	30	15	500	76
6687a	1	24x24' spacing	25	15	500	76
6687b	1	24x24' spacing	25	15	500	76
Total	45					
Forage Enhancement Units						
2691a	14	Hand fell conifers< 10" , leave piles for wildlife	20	20	20	20
2866	19	Mastication in strips	15	15	12	12
3162a	40	Mastication in strips	25	25	26	26
3570	91	Hand fell conifers< 10" , leave piles for wildlife	50	25	150	75
Total	164		20	20	20	20

WF = Whip Felling, P = Pruning, P&B = Pile and burn

*Trees per acre for Fuelbreak Understory Treatment units and Forage Treatment units 2691a, 2866, and 3162) **does not** include trees < 7" dbh. Trees per acre for Fuelbreak Precommercial Thinning units and Forage Treatment unit 3570 **does** include trees < 7" dbh.

Cumulative Effects

The area analyzed for cumulative effects was the project area. The project area consists of the Pioneer Gulch and Paddy's Valley subwatersheds. This area provides a logical analysis area to assess stand conditions based on the plant association series and the approximate size (5,000 to 10,000 acre) of the typical natural wildfire disturbance event. Cumulative effects were assessed based on past, present, and reasonably foreseeable future action listed in Appendix B of this EA.

Past timber harvest and road construction have been the dominant management activities which have had a cumulative effect on the vegetation. Appendix B of the Pioneer Gulch EA provides a summary of the history of past timber harvest and road management.

As a result of past management actions, the current development stage distribution in the planning area is 4,136 acres of stand initiation, 4,695 acres of stem exclusion, 13,516 acres of understory reinitiation, 12,689 acres of late-successional forest. There are no present actions that would affect the seral stage distribution in the analysis area. The only reasonably foreseeable future action affecting vegetation is timber stand improvement treatments such as pre-commercial thinning in managed plantations. This young stand thinning would not change the seral class condition in these stands.

The cumulative effects on development stage distribution in the analysis area that would be caused by the alternatives being considered are displayed in Table 16 below.

Table 16 – Project Area Development Stages and Effects by Alternative

Development Stage	Current Conditions	Alternative A	Alternative B
Stand Initiation	4,136 ac (11%)	4,136 ac (11%)	4,277 ac (12%)
Stem Exclusion	4,695 ac (13%)	4,695 ac (13%)	4,554 ac (12%)
Understory Re-Initiation	13,516 ac (36%)	13,516 ac (36%)	13,516 ac (36%)
Old Growth	12,689 ac (34%)	12,689 ac (34%)	12,689 ac (34%)
SHAB, Water, and Non-forest	2,159 (6%)	2,159 (6%)	2,159 (6%)

Alternatives A and B would have no cumulative effects on development seral stages. Proposed thinning in Alternative B would not alter the development stage but it does changes the number of trees per acre and the canopy density, in treated stands. The treatments would move these stands along the successional pathway toward the understory re-initiation stage. Proposed gap creation in thinning units in Alternative B would set about 141 acres back to the stand initiation stage. Past and reasonably foreseeable future young stand precommercial thinning would not change the seral class condition of these stands.

Cumulative effects to growth rates would be the same as described in direct effects except for the contribution of accelerated growth from past reasonably foreseeable future young stand pre-commercial thinning in the second-growth plantations.

Conclusions and Rationale

The project area has been altered by almost 60 years of timber management. The larger second growth stands were harvested when they were privately owned (by Seneca). These stands create large contiguous patches (300 acres) of even-aged closed canopy forest on the landscape. The more recent harvest of the 1970s to 1990s created smaller (20-40 acres) patches in a dispersed pattern across the landscape. Inter-disperse among these managed stands are natural stands of understory reinitiation and old-growth forest conditions.

The stands proposed for commercial thinning are in a condition based on stocking levels, average stand diameters, and crown ratios that would respond and benefit from commercial thinning. Commercial thinning would improve the growth and maintain the health of the residual trees by reducing the competition between trees, develop the understory and diversify the species composition by opening up the tree canopies, and provide for an intermediate harvest of merchantable size trees from the excess trees which would normally die out from competition.

Commercial thinning does not change the seral stage classifications of these stands (except for the portions in gaps). The treatments would move these stands along the successional pathway toward understory re-initiation and the development of late-successional forest characteristics. The treatments promote the development of large trees, multi-storied canopies, horizontal patchiness, and species diversification.

The overall percentage of seral conditions within the project area does not change substantially. The treatments move these stands toward the desired conditions of sustained growth and development of late-successional forest conditions.

Existing Condition - Rare Botanical Species

A pre-field review located 6 rare plant sites in the 6th field watersheds. *Buxbaumia aphylla*, a Region 6 Strategic bryophyte; *Rhizopogon truncates*, a Survey and Manage fungus; and *Rhizopogon atroviolaceus*, a Survey and Manage and Strategic fungus are all located adjacent to the Indigo Lake trail in the south end of the watershed. A known site of *Rhizopogon atroviolaceus* is located off of the trail to Ruth Lake approximately half a mile from the nearest Pioneer Gulch proposed fuel break unit. *Sarcospheara coronaria*, a Survey and Manage fungus is located in T24S, R5E Section 7, approximately a half mile from Pioneer Gulch unit 2803. *Gomphus clavatus*, another Survey and Manage fungus is located in T24S R5E Section 21 approximately half a mile from the nearest Pioneer Gulch unit (unit 3144, a commercial thinning unit). No known sites were found within the proposed treatment units.

Potential habitat for several species was identified in the project area. Intuitive controlled surveys were conducted June through September 2009 through 2010. No sensitive, strategic, or Survey and Manage botanical species were found during these surveys. See the Pioneer Gulch Botanical Evaluation (in the project Analysis File) for more information and a list of species that were surveyed for. See the Survey and Manage Compliance form (also in the project Analysis File) for more information on Survey and Manage species.

Environmental Consequences – Rare Botanical Species

Direct and Indirect Effects

Alternative A – (No Action)

There would be no effects or impacts to rare botanical species under the no action alternative because no sites were found in the proposed treatment units and no actions would take place.

Alternative B (Proposed Action)

There would be no effects or impacts to vascular, bryophyte or lichen botanical species under the no action alternative or action alternative because none were found within the proposed treatment units.

Rare fungi were given a May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species (MIIH) because there could be direct, indirect and/or cumulative effects to fungi under the proposed alternative. Surveys were not done for fungi (except *Bridgeoporus nobilissimus*) under the Proposed Action because under the Survey and Manage and Sensitive Species guidelines pre-disturbance surveys were not found to be a verifiable way to detect the presence or absence of rare fungi species.

Direct effects to fungi, if they are present, include soil compaction and disturbance from the machines used for ground based logging. Ground based logging (including pre-bunching) would potentially be used on up to 57% (536 acres) of the proposed harvest acres. Removal of host trees for mycorrhizal species and soil disturbance and compaction would occur. In the short term this would result in the disruption of mycelial networks (Kranabetter and Wylie, 1998; Amaranthus and Perry, 1994).

Culvert replacement on 26 acres (13 stream culverts) may cause some disturbance to soil-dwelling fungi through direct disturbance and potential removal of habitat, but in a small

localized area. Development of landing areas could have a similar localized direct effect on mycelia in the soil.

Indirect effects of tree removal to fungal habitat include the short-term loss of moisture retention capabilities due to the drying effect of over-story shade removal, and the reduction of water storage with the disturbance of forest floor organic material and large wood. Removal of host trees reduces available nutrients and possible inoculum source for future fungal regeneration and expansion (Amaranthus and Perry, 1994). The retention of large down wood would help maintain the production of ectomycorrhiza. In the long term these effects would be ameliorated by the retention of host species and habitat.

Cable yarding of trees (404 acres) would result in soil compaction and localized disturbance along yarding corridors. This causes a loss of ectomycorrhizal root tips (Amaranthus et al, 1996) and can disturb litter-dwelling and saprophytic fungi within the corridors.

Understory burning would be implemented on 265 acres in the project area. Approximately 3% of the two subwatersheds in the project area were burned in the Tumblebug Fire in 2009. Effects of burning on fungi have been the subject of many scientific investigations. Broadcast burning may cause the loss of litter, so it could reduce substrates for litter-dwelling fungi. Bruns (2002) studying short-term effects of ground fire in the Sierra Nevada found a short-term reduction in the biomass of ectomycorrhizal fungi correlated with incineration of the litter layer but that lower layers, where the greatest species richness occurs, were preserved. Stendell, et al (1999) found a similar pattern in a Sierra Nevada ponderosa pine forest after prescribed fire where litter/organic species biomass decreased eightfold but no difference was detected in mineral layers.

In the forage treatment areas, indirect effects to fungi could be caused from proposed mastication treatments. The continuous and compact layer of masticated material on the soil causes a decrease in the amount of nitrogen and a decrease in soil moisture (Graham, McCaffery, and Jain, 2004). A study in southern Oregon showed the abundance of mycorrhizae per soil volume decreased following brush mastication and burning. Species richness of mycorrhizae decreased following mastication, and increased slightly following burning (Southward et al 2007).

Cumulative Effects

The analysis area for cumulative effects for rare botanical species is the two 6th field watersheds (Pioneer Gulch and Paddy' Valley) - a total of 37,195 acres. Cumulative effects were assessed based on past, present, and reasonably foreseeable future action listed in Appendix B of this EA. Spores, the method by which fungi propagate, may travel some distance so an area larger than the project area is appropriate for analysis. The span of time considered was 20 years. Past actions including timber harvesting over the past 20 years have had the most severe effects on mycorrhizal diversity within the analysis area. Fungal diversity declines with clear-cutting and fire (Byrd, et al 2000, Bruns, et al 2002) and stands were typically burned after harvest. Recovery of fungal diversity in these types of sites has been correlated to the proximity of remnant forested stands to the harvested stands and the recovery of habitat conditions favored by fungi species (Outerbridge, Trofymow 2004).

Cumulative Effects - Alternative A (No Action)

There would be no cumulative effects on rare botanical species under the no action alternative because no actions are proposed.

Cumulative Effects - Alternative B (Proposed Action)

There could be short term cumulative effects to fungi as a result of the Pioneer Gulch project. The proposed action would reduce 1799 acres (or 5% of the two watershed area) of habitat for fungi species in the short term. In the last 20 years 3% of the analysis area has been harvested. The proposed action would add 5% more disturbance to equal approximately 8% of the analysis area is affected and would not (in the short term) provide habitat for rare fungi. In the long term, effects to fungi sites and habitat would be neutral as forested stands recover and develop more old growth characteristics that are favorable for fungi. The exception would be areas in the fuel break and the forage areas, these 252 acres would not develop into habitat for rare fungi as long as these areas are maintained as early seral forage areas or fuelbreaks.

Conclusions and rationale

Rare vascular, lichen and bryophyte species were given a No Impact (NI) determination for both alternatives because no sites were found. Because no surveys were completed to determine effects on fungi, the action alternative was given a May Impact Individuals or Habitat (MIIH), But Will Not Likely Contribute to a Trend Towards Federal Listing or Loss of Viability for the population or species rating.

Because there were no rare botanical species sites found in proposed treatment units, Issue #5 (TES Species) was not tracked in this section.

Existing Condition - Special Habitats

Within the two 6th field watersheds (Pioneer Gulch and Paddy's Valley) there are 129 special habitat areas (2447 acres total) as identified by GIS (Geographic Information System). Four distinct types of special habitats (as described in the Willamette Special Habitat Guide, May (Lippert et al, 2010) were located and mapped. Eleven wet meadows, skunk cabbage swamps, dry rock gardens and rocky outcrops were found within the project area. See Table 7 in the Mitigations section of Chapter 2 for a description of special habitats within the project area, their locations, and site-specific management recommendations for each.

Wet habitats, including meadows, seeps and swamps, and the forested edges around them provide herbaceous forage and cover for wildlife and may provide key habitat for amphibian species. Wet soils are especially susceptible to compaction from logging and roads. Key environmental factors to maintain are water quality and quantity.

Dry Habitats include rock outcrops and rock gardens that provide roosting habitat for raptors. Key environmental factors to maintain include insolation because reduced cover from the surrounding edge could increase evaporation during the growing season.

Environmental Consequences - Special Habitats

Direct and Indirect Effects

Alternative A -No Action

There would be no direct effects to special habitats under the no action alternative. An indirect effect is that the meadow in unit 2691 would not have encroaching conifers cut out of it and may become forested – no longer a functioning special habitat.

Alternative B -Proposed Action

Under the proposed action there would be no direct or indirect effects to special habitat areas because they would be buffered from thinning and fuels projects. Microclimate and hydrological conditions would remain the same. The treatment proposed in unit 2691 would have beneficial impacts to the meadow because it would cut encroaching conifers.

Cumulative effects

The analysis area for cumulative effects for special habitats is the two 6th field watersheds (Pioneer Gulch and Paddy' Valley) - a total of 37,195 acres. Cumulative effects were assessed based on past, present, and reasonably foreseeable future action listed in Appendix B of this EA. In Pioneer Gulch and Paddy's Valley 6th field watersheds there are approximately 2,447 acres (6%) of land categorized as special habitat. Within in the last 20 past actions in this area years include timber harvest on 3% (989 acres) and road construction which affected special habitats by ground disturbance, introduction of weeds and changing of the hydrologic regime. The Tumblebug fire burned only 2 acres of special habitats in the Paddy's Valley 6th field watershed and so did not have much of an effect on the special habitats in the area. Present and future foreseeable actions include the Upper Middle Fork Stormproofing and Restoration project, the Echo Staley Road Storage and Illegal Household Trash Site Management project, and the Upper Middle Fork Watershed Restoration and Road Closure Project, which, combined, would close about 132 miles of road in the Upper Middle Fork watershed. These projects would help special habitats that have been hydrology modified by road construction. The foreseeable future Calapooya II Meadow Restoration project would restore approximately 200 acres of special habitats in the analysis area (north of and adjacent to units 2923a and 2952a) and would improve conditions in these areas.

Alternative A- No Action

Under the No Action alternative there would not be any cumulative effects to special habitat areas since there would not be any actions taken that would change the current situation in the analysis area.

Alternative B- Proposed Action

There would be small but positive cumulative effect to special habitats under the proposed action. Forage unit 2691a in the Pioneer Gulch project would restore 2 acres of special habitats and the Calapooya II project would restore approximately 200 acres of special habitats in the analysis area.

Conclusions and rationale

Given the proposed project design features, the action alternative would maintain or enhance the ecotone and microclimate of the special habitat areas within the Pioneer Gulch Project area meeting the intent of the Willamette National Forest LRMP (USDA 1990).

Existing Condition – Invasive Plants

Invasive species considered to be established were found throughout the area. St. John's wort (*Hypericum perforatum*), Armenian blackberry (*Rubus aremeniacus*), bull and Canada thistle (*Cirsium vulgare* and *C. arvense*) were the most prevalent invasive species found in the project area. Spotted knapweed (*Centaurea stoebe*) and false brome (*Brachypodium sylvaticum* were the only new invader species found in the analysis area along proposed haul routes. Total acreage of

new invaders was estimated at 10 acres in the analysis area. No new invaders were found along roads proposed for closure.

Spotted knapweed is a perennial aster species that can move quickly into disturbed areas and establish large, dense populations. Knapweed invasions cause losses averaging up to 63% of available forage (Spotted Knapweed Fact Sheet). It is found scattered throughout the analysis area and is very likely to spread to disturbed soils. Knapweed was found on several locations on road 21 and near unit 3870.

False brome sites are considered outlier populations that are a high priority for eradication. One site was found near the fuel break units at the trail head to Corrigan Lake. The only other known sites in the analysis area are on the edge of road 21 and near Dome rock.

St. John's wort, bull and Canada thistle are found throughout the analysis area. All are considered established species under the 2010 Willamette National Forest Invasive Species list and are not considered a high priority for treatment. They are both commonly spread along roads by people and animals. From the roadside they can disperse into adjoining (especially disturbed) plant communities. After one year St. John's wort is able to out-compete most nearby plants because of its extensive root system. We do not track established species by acres on the forest because they are common and widespread. This analysis assumes that newly disturbed ground has one or more invasive plant species.

Noxious weed species are a local and global problem. In the US they are costing millions of dollars to eradicate and control. They cause the loss of native habitats that are important for economic, ecological and historic reasons. They can change fire regimes, eliminate food for native animal species, change soil composition, and alter nutrient cycling and hydrologic systems. (Kelly 2008). Ground disturbance, decreasing canopy cover, and road maintenance, as proposed in this project, can all increase susceptibility to invasion and colonization from noxious weed species.

Environmental Consequences - Invasive Plants

Direct and Indirect Effects

Alternative A -No Action

Under the No Action alternative no ground disturbing activities would take place. There would be no direct or indirect effects to invasive plants under the no action alternative.

Alternative B- Proposed Action

There would be direct and indirect effects to invasive species populations. There would be a total of 1799 acres of ground disturbance under the proposed alternative. Not all of these acres would be affected by invasive plants but, it is the maximum amount of acres that would be more susceptible to colonization, spread or establishment of invasive plant species. All of these acres have the potential to be colonized by invasive plant species especially in the short term.

Thinning would take place on 940 acres in the project area. Ground based methods would be used on about 536 acres, skyline methods would be used on about 404 acres. A ground based feller-buncher could be used in units that have less than 30% slope and as specified in the Pioneer Gulch soils report (Dixon, 2011). Direct effects related to logging would come from ground disturbance. There would be more ground disturbance as a result of ground based logging than

skyline logging. Indirect effects from logging would result from the canopy being reduced and disturbed ground being more susceptible to colonization and establishment of invasive species. Invasive species may be introduced by logging equipment and personnel. In the short term these areas would be highly susceptible to colonization and establishment of invasives. In the longer term these sites could be shaded out by trees that are planted or are naturally occurring in the units. Invasive species would need to be treated to ensure that they do not establish and persist and spread into adjacent areas.

Construction of landings and new temporary spurs would cause new ground disturbance on about 22 acres from landings and about 6 acres from temporary roads. Direct effects of temporary roads would occur on about 28 acres that would be open for weed establishment. Indirect effects would be the spread of weeds into units from these roads that would act as vectors for weed populations. In the short term these areas would see an increase of invasive plants. In the long term these areas could have an increase as well unless steps are taken to mitigate this situation.

Up to 13 stream culverts (causing approximately 26 acres disturbance) would be replaced and road maintenance activities including ditch cleaning, hazard tree falling and brushing would take place along the haul route (55.5 miles or 391 acres). Road maintenance activities spread roadside weed populations by moving plant material or seeds. Ground disturbance caused by road maintenance provides a ready seed bed for invasive species. Known sites of invasive species are found along these haul roads and would have a high likelihood of being spread by these activities.

Fuel treatments are proposed in a linear area in matrix land bordering the Diamond Peak Wilderness Area and would receive one or more of a variety of treatments, including whip-felling, pruning, and handpiling/burning. All these treatments subsequently would reduce slash and previously existing fuel loads, including ladder fuels and flammable understory vegetation. In fuel break areas, invasives would have an advantage to establish and spread as long as those areas are kept in early seral forage areas or fuelbreaks. The long term effects depend on management actions taken to mitigate the establishment of invasive species and can be mitigated by following project design features.

Forage treatments are described completely in the wildlife report. They would consist of hand cutting of small trees in previously thinned stands. Two units would be masticated using ground based machinery. Treatments would affect approximately 164 acres total and about 25% of each unit creating openings for colonization by plants that provide forage for large game animals. All of the forage areas already contain common non-native “weedy” species (St. John’s wort, bull thistle and Canada thistle). Additional disturbance could cause and increase in these and introduce other non-native plant species. To address this, these areas would be planted with native forage species after treatment and monitored and treated for non-native species. Table 17 displays the acres of ground disturbing activities.

Table 17: Comparison of Ground Disturbing Activities by Alternative

Activity	Alternative A No Action (ac)	Alternative B Proposed Action (ac)	Description
Ground Based Yarding	0	536	Commercial thinning with skips and gaps with gaps of 1 to 3 acres. Whole tree yarding, grapple piling and underburning
Skyline Yarding	0	404	
Fuelbreak Understory	0	88	Whipfelling of conifers under 10" dbh, pruning, piling and burning.
Landings	0	22	Clearing areas for skyline and groundbased logging operations.
Fuelbreak Pre commercial Thinning	0	45	Thinning of young plantations in 100 ft widths
Forage Enhancement	0	164	Whipfelling of conifers under 10" dbh, mastication, woodpiles, and seeding.
Understory Burning	0	288	Understory prescribed burning in spring like conditions when soil moistures are damp or wet to mitigate severely burned soil conditions.
Total Treatment in Units	**0**	**1547**	
Road Treatments	0		
Temp Road Construction (new)	0	10.8	Roads would be constructed for timber sale and then closed and decommissioned.
Temp Road Construction (on previously used routes)	0	20.6	Roads would be reconstructed for timber sale and then closed and decommissioned
Closure of System Roads	0	92	Hydrological stabilization
Culvert Replacement	0	26	Replace with fish passage culvert
Road Maintenance	0	391	Brushing, ditch cleaning, seeding
Total Road Treatments	**0**	**540**	
Total Area*	0	**1799***	

*1799 acres is the total acres where activities would take place. This figure omits the 288 acres of understory burning since it would take place in areas that have other treatments.

Cumulative effects

The Pioneer Gulch and Paddy's Valley 6th field watersheds (37,195acres) make up the spatial analysis area because the introduction and establishment of weed species is most likely to enter through the roads or through people or equipment. The temporal scale for this analysis is 20

years because this likely represents the time period in which adequate data is available for known occurrences within the areas as well as time periods for re-establishment if impacted in the past. Cumulative effects were assessed based on past, present, and reasonably foreseeable future action listed in Appendix B of this EA.

Past actions include large scale logging and burning that left disturbed ground. According to GIS data, 1,416 acres are less than 20 years old: 491 acres had the overstory removed, 357 acres were commercially thinned, 142 acres had shelterwood cuts, and 426 acres were partially cut in the last 20 years. Much of this was colonized by invasive species like St. John's wort and oxeye daisy. Past and present road maintenance activities have likely spread invasive species along roadsides. The Upper Middle Fork Watershed Restoration and Road Closure Project plus other past and current road closure projects will close 120 miles (840 acres of road) in the Upper Middle Fork Watershed. Road storage and closures could help reduce the spread of invasive species by vehicles. Calapooya II will restore special habitats and reduce invasive plants on 200 acres in the analysis area.

Alternative A- No Action

Under the no action alternative there would not be any additional cumulative effects because the ground disturbing activities would not take place.

Alternative B- Proposed Action

Under the proposed action there would be a potential increase of new invader species from approximately 10 (.02%) acres of land to a maximum of 1799 acres (5%) in the analysis area at least in the short term. Established invaders are harder to track but an increase in the analysis area is expected since these species are already well established on haul routes and previously disturbed areas.

Conclusions and rationale

The proposed project has the potential to increase the number of acres of invasive plant species from its current acreage of approximately 10 acres by 1799 acres in the short term because of ground disturbing activities (Issue #7). Project Design Features and Mitigation measures listed in the Mitigations section in Chapter 2, when implemented, could reduce the potential spread of weeds by 50% (USDA EIS 2005) from 1799 acres (5%) to 899 acres (2.5%). The priority would be to treat new invader sites first so they do not get established in this area.

Soils

Background

The project area lies within the High Cascade physiographic region that is characterized by gentle constructional volcanic slopes comprised of lava flows and shield volcanoes as well as prominent volcanic cones such as Diamond Peak. Glacial activity has modified many of the volcanic cones, formed lakes, deposited till on the plateau, and widened and deepened most of the stream valleys. More recent volcanic activity has left deposits of volcanic ash, sands, cinders, and pumice in many areas of the High Cascades.

Soils within project area have been greatly influenced by glaciation and have developed primarily from glacial deposits with some areas having additional surface inputs of volcanic pumice and ash. The rocks and glacial deposits are generally quite stable in this area. Residual soils are often relatively coarse grained, occasionally rocky, and usually contain few clays. Soils of the Pioneer

Gulch project area are predominantly found on the high elevation glacial flats and benches that transition to lower elevation wide glacial valley bottoms that are contained in steep, smooth to moderately dissected glacial valley side slopes.

Soil quality, water quality, and general site productivity are maintained when ecosystems are managed to protect site productivity. Soil and water quality can be maintained or improved by avoiding the creation of detrimental soil conditions (defined on page IV-60 of the Forest Plan, USDA, 1990a), on greater than 20 percent of the area. These conditions include compaction, puddling (similar to compaction, but can be very shallow), displacement, and severe burning. Standards for detrimental soil conditions have been set to meet the direction in the National Forest Management Act of 1976 and other legal mandates. Detrimental compaction is defined as a 15 percent or more increase in bulk density and/or a reduction of macropore space of 50 percent over the undisturbed soil, over more than 20 percent of an activity area and includes roads (FW-081). Activity areas are synonymous with harvest units.

The soils information comes from the Willamette National Forest Soil Resource Inventory (SRI) originally prepared by Legard and Meyers in 1973 (USDA, 1972). The basic SRI data provides information to determine effects on the soil and water resources and evaluate the capabilities of soil for various uses. Field reconnaissance and surveys were completed to verify current conditions and SRI values.

There are eleven predominant SRI map units represented within the commercial thinning units, forage enhancement units, and fuel break units. The following table displays the predominant SRI map units and important soil characteristics and interpretations by proposed treatment.

Table 18: Soil Characteristics and Interpretations of the Predominant Soils by Treatment

Treatment	Soil Resource Inventory Map Unit	Percent Project Area	Natural Stability Rating	Surface Soil Erosion Potential	Infiltration Rate
Commercial Thin	13	41	Stable	Slight to Moderate	Rapid
	56	25	Very Stable	Moderate	Rapid
	91	17	Stable	Severe	Rapid
	63	9	Very Stable	Moderate	Moderate
	23	3	Stable	Moderate	Moderate
	93	2	Very Stable	Moderate	Rapid
	57	2	Stable	Severe	Rapid
Forage Enhancement	16	54	Stable	Moderate	Rapid
	94	23	Stable	Severe	Rapid
	91	12	Stable	Severe	Rapid
	56	11	Very Stable	Moderate	Rapid
Fuel Break	93	18	Very Stable	Moderate	Rapid
	94	17	Stable	Severe	Rapid
	57	16	Stable	Severe	Rapid
	91	16	Stable	Severe	Rapid

Treatment	Soil Resource Inventory Map Unit	Percent Project Area	Natural Stability Rating	Surface Soil Erosion Potential	Infiltration Rate
	92	15	Very Stable	Moderate	Rapid
	56	11	Very Stable	Moderate	Rapid
	95	7	Very Stable	Moderate	Rapid

Existing Condition – Slope Stability and Surface Erosion

In the proposed treatment units, the natural stability is rated as very stable to stable, which includes any soil movement in the form of slumps, slides and deep-seated failures (and does not account for surface erosion).

The various soils associated with the numerous land types in the proposed treatment units are predominantly well drained where infiltration is rapid in the surface soil and moderately rapid in the subsoil. Because of high infiltration rates, overland flow is very uncommon except during periods of high rainfall and snow melt. Off-site erosion is generally not a concern because of the duff and vegetative ground cover, the high infiltration rates, and the gentle to moderate side slopes.

The surface soil erosion potential rating of the proposed units is predominantly slight to moderate with a small fraction of the soils having a severe to very severe soil erosion potential. These elevated erosion potential ratings are for soils that have had more recent surface deposits of coarse grained volcanic ejecta comprised of sands, cinders and pumice, which has very little inherent cohesion due to lack of fine grained soil textures that bind soils. The soil erosion potential rating is a worst case scenario, which is based on expected losses of surface soil when all vegetative cover, including litter is removed. The removal of all the vegetation and the soil litter layer in a managed area rarely occurs. If it does occur, it is a small percentage of the total activity area.

Side slopes range from 0% to 20% on the gentler valley bottoms and up to 30%, and rarely exceed 40% on the moderate lower valley side slopes and higher elevation glacial benches. Gentle side slopes dominate, 88% of the project area has side slopes below 30% and less than 1 percent of the project area has side slopes greater than 45 % (Table 19). Field observations indicate that these soils are not prone to surface or subsurface erosion. No evidence of surface erosion was observed under forested areas where the surface is covered with conifer or deciduous tree litter, mosses or other low ground vegetation. No evidence of surface erosion was observed for soils that had been compacted and surface litter layers displaced from past logging skid trails and temporary roads. The only observed pathway for sediment transport is along roadways to adjacent streams. Field observations during the winter, 2010 document water movement along some road ditch lines which contribute minor amounts of sediments transported to stream channels. Roadways have cross drain pipes installed approximately every 500 feet where any ditch line water is dispersed onto the forest floor where it immediately infiltrates and there is no direct pathway of sediment to streams.

Table 19: Pioneer Gulch Project Percent Side Slope for Proposed Treatments

Percent Side Slope	Proposed Treatments			
	Commercial Thin	Forage Enhancement	Fuel Break	All Treatments
	% of acres	% of acres	% of acres	% of acres
0 - 30	85	98	100	88
30 - 45	14	2	0	11
45+	1	0	0	1
Totals	100	100	100	100

Air photo interpretation and field reconnaissance has not detected any unstable areas or recent roadside land failures. There are four historic debris slides which were initiated from roadside fills on over steepened valley side walls with shallow soils. Road construction practices prior to 1980 included side cast fills, generally poor construction techniques and inadequate aggregate surfacing. This was also an era when most roads on steep ground were built. The result is a delayed reaction for road related land failures as buried wood decays, weakening the side cast fills (USDA, 1996). Current road building standards and practices provide much less risk of this occurring. These failure sites are no longer active and the roads have been stabilized.

Environmental Consequences – Slope Stability and Surface Erosion

Direct and Indirect Effects

Alternative A – No Action

The stands would continue to develop as intermediate and suppressed trees would slowly be removed from the stand through mortality and decay. The natural stability, which includes any soil movement in the form of slumps, slides and deep-seated failures, would be maintained and continue to be stable to very stable. In areas that have already been disturbed by the initial entries, the soil building process would continue to return the soil to near pre-harvest conditions in the longer term. Short-term to intermediate term impacts from harvest that could occur and result in surface erosion, such as soil disturbance, dust (or mud), slash accumulation and disposal, would not occur. Consequently, no effects to slope instability are anticipated whether the units are managed or not. Since there would be no ground disturbing activities, surface erosion would continue to be nonexistent as these soils are not prone to surface erosion.

Alternative B – Proposed Action

Off-site surface erosion is generally not a concern for these soils because of the gentle to moderate side slopes, high water infiltration rates , and low to moderate surface erosion hazard (see Tables 17 and 18). To minimize off-site movement of soil, management activities shall be planned to retain the soil duff and litter with the following limits; Mineral soil exposed on soils classed as low to moderate surface erosion hazard should not exceed 40% (FW-084 USDA, 1990). Ground disturbing activities that would expose mineral soil is estimated to be 6 percent, well below the Forest Standards and Guidelines.

Surface erosion would increase as a result of ground disturbance associated with logging systems, road building, and fuels treatments. Landings associated with skyline and ground-based logging could disturb approximately 17.6 acres. Primary skid roads associated with ground-based logging could disturb approximately 27.8 acres. Temporary road construction could disturb approximately

9.1 acres. These activities would result in a short term increase in localized (several feet distance) surface erosion for up to 3-5 years as these areas would be mitigated through sub-soiling and seeding.

Fuels treatments include underburning, pile burning, and fire handline construction. Underburning would occur on 288 acres when soil duff moisture levels are above 30% to ensure a predominantly low intensity and low severity burn. This would result in low soil heating, consumed or partially consumed needle litter, and would not alter the soil infiltration rate. As a result, there would be a short term increase in surface erosion in localized areas that burned at a greater intensity and severity for two to three years, decreasing yearly, as these areas become re-vegetated. Hand piling and burning slash is proposed on 88 acres, resulting in approximately fifteen 4'x4' slash piles per acre that would result in a short term increase in surface erosion in localized areas that would last two to three years, decreasing yearly, as these areas become re-vegetated. To facilitate underburning, approximately 3 miles of fire handline would be constructed that could disturb approximately 0.5 acres. As a result, there would be a short term increase in surface erosion in localized areas for one to two years. Mitigation measures would ensure that fire handline would be constructed with appropriate water drainage using natural contours and waterbars to shunt water. On completion of broadcast burning and mop-up operations, fire line would be rehabilitated by pulling duff and organic matter back over the exposed mineral soil to the original contour.

In addition, mitigation measures such as log suspension, new road building practices, Best Management Practices (USDA, 1988), Northwest Forest Plan guidelines (USDA, 1994) and Willamette National Forest Land and Resource Management Plan Standards and Guidelines (USDA, 1990) further reduce the likelihood of surface erosion occurring.

Thinning would reduce evapo-transpiration somewhat in the short-term, through canopy reduction, so soils would remain wetter over longer periods (Swanston, 1971; Helvey, 1980; Swanson, 1981; McNabb and Swanson, 1990). Consequently, the threshold of storm magnitude needed to bring the soil to saturation and trigger landslides can be reduced somewhat after harvest (Wondzell and King, 2002). Also, research has suggested that the decrease in internal soil cohesion caused by loss of mechanical cohesion, as roots of harvested trees stumps decompose, can also decrease the effective soil strength, making slopes more susceptible to debris sliding (Swanston 1971, Swanson 1981, McNabb and Swanson 1990). As observed in the H.J. Andrews forest, most hill slope failures in clearcut areas occurred in the first 12 years after cutting (Swanson and Dyrness 1975). The proposed harvest method is to commercially thin stands so effects would be reduced compared to clearcutting.

The reduction of a portion of these stands' root system could create conditions resulting in an acceleration of landslide frequency but such a risk would be low considering that a minimum 60 to 70 largest trees per acre would be retained and the understory would respond to the additional light provided. The retained trees, being the largest, would have the most extensive root systems, and dead tree roots retained their strength for several years before they begin to weaken enough to cause slope failure concerns, which would typically occur approximately 5 to 10 years following harvest (Megahan et al., 1978). There is less likelihood of slope failure due to the proposed thinning than research or the watershed analysis indicates, since both those sources looked at past clearcut harvesting.

In the proposed treatment units, the natural stability is rated as very stable to stable, which includes any soil movement in the form of slumps, slides and deep-seated failures. The expected mass movement rating of these soils resulting from management activities as compared to the

inherent stability under natural conditions is unchanged. This rating is based on soil and bedrock characteristics, slopes, revegetation potential, and effects of timber removal, road construction, and fire (USDA, 1972). The various soils associated with the numerous land types in the proposed treatment units are predominantly well drained where infiltration is rapid in the surface soil and moderately rapid in the subsoil. These soils would be less likely to retain additional soil moisture and become saturated as a result of thinning and reduced evapo-transpiration rates and maintain their inherent stability.

Cumulative Effects

The geographic area considered for surface erosion cumulative effects area (CEA) for the Pioneer Gulch Project is the Pioneer Gulch and Paddy's Valley 6th field sub-watersheds totaling 37,195 acres. The temporal scale for this analysis is 5 years because this likely represents the time period in which various types of soil disturbances that could result in surface erosion has re-vegetate and stabilize. Cumulative effects were assessed based on past, present and reasonably foreseeable future actions listed in Appendix B of this EA. Reasonably Foreseeable actions include The Upper Middle Fork Watershed Restoration and Road Closure Project and the Tumblebug Fire Roadside Treatment Project. The road closure project would store 34 miles of road in a hydrologically stable manner primarily through waterbar construction and removal of some "at risk" culverts. Road storage and closure actions would result in a short-term, two to three year increase, in surface erosion at stream culvert removal locations and result in a long-term reduction, three years and beyond, in surface erosion. The Tumblebug Fire roadside Treatment project is scheduled for implementation in 2012 and is within both sub-watersheds. There are a total of 62 acres of roadside tree removal, 51 acres would be helicopter logged and would not have an effect on surface erosion and 11 acres would be skyline logged. Skyline logging would increase surface erosion for 2 to3 years, over approximately 2 % of the acres or .2 acres.

There would be no cumulative effects to slope stability because there would be no direct or indirect effects.

Existing Condition – Detrimental Soil Conditions

Most of project area has been previously harvested, by tractor yarding or cable yarding systems. Residual compaction within the proposed commercial thinning units from the original harvest in the 1960's is still evident as these older existing plantations were primarily harvested with ground-based systems, when no standards were in place and designated skid roads were not required. Large crawler tractors were utilized on slopes gentle enough for their use, typically everything less than a 30 percent slope although some much steeper areas were logged with tractors in some areas. In many of the areas slash was also piled using large, heavy machinery. Compacted soils can affect site productivity, tree growth, water infiltration, soil erosion, and peak flows. There is little evidence of off-site soil movement, or substantial loss of productivity within the project area.

Severely burned soils, where the top layer of mineral soils is substantially changed in color, usually a reddish color are considered to be a detrimental soil condition. Field investigations have determined that there are no areas displaying any severely burned conditions in the Pioneer Gulch project area.

Current detrimental soil conditions for the Pioneer Gulch project units combined are estimated at 2.2 % from existing roads and 11.1 % from previously managed harvest units. The following

table displays each commercial thin harvest unit and forage enhancement unit (activity areas) and the estimation of current detrimental soil conditions from past harvest activities and existing roads. Detrimental soil conditions as a result of existing roads range from a low of 0.6% to a high of 5.6% and from past harvest range from a low of 1.8 % to a high of 14.8 %. Current detrimental soil conditions for all units are all below the Willamette National Forest LRMP standard and guidelines of 20% (FW-081), and range from a low of 3.8% to a high of 17.6%.

Table 20: Pioneer Gulch Project Current Detrimental Soil Conditions for Commercial Thinning and Forage Enhancement Units from Existing Roads and Past Harvests

Unit* (Activity Area)	Existing System and previously used temporary roads** (%)	Past Harvest Detrimental Soil Conditions (%)	Current Total Detrimental Soil Conditions (%)
2761	1.7	11.6	13.3
2803	2.3	10.3	12.6
2888	2.8	14.8	17.6
2915	2.4	6.7	9.1
2920a	1.0	8.0	9.0
2920b	2.7	13.0	15.7
2923a	1.6	11.8	13.4
2923b	1.9	10.5	12.4
2952a	1.4	11.8	13.2
2952b	4.4	10.5	14.9
3048a	1.6	9.7	11.3
3048b	3.1	12.9	16.0
3057	3.1	7.0	10.1
3062	3.8	14.0	17.8
3068	2.5	13.0	15.5
3135a	2.2	9.5	11.7
3135b	0.7	6.0	6.7
3144	1.8	14.0	15.8
3147	1.6	8.5	10.1
3148a	2.4	11.7	14.1
3148b	3.5	12.0	15.5
3485	4.8	11.0	15.8
3546	2.3	13.0	15.3
3599	2.4	6.0	8.4
3633	2.6	4.0	6.6
3770	2.1	7.5	9.6
3870	2.4	11.0	13.4
4115	5.6	7.0	12.6
5756	3.1	13.0	16.1
6927	1.0	11.8	12.8
2691A (F)	3.1	1.8	4.9

Unit* (Activity Area)	Existing System and previously used temporary roads** (%)	Past Harvest Detrimental Soil Conditions (%)	Current Total Detrimental Soil Conditions (%)
2866 (F)	3.6	8.0	11.6
3162A (F)	2.0	1.8	3.8
3570 (F)	1.9	8.0	9.9

* Unit number followed with an (F) identifies it as a forage enhancement unit. All other units are commercial thinning units.

** Road calculations are only for those roads adjacent and within the activity area.

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

Environmental Consequences – Detrimental Soil Conditions

Existing and cumulative detrimental soil conditions were evaluated only within the commercial thinning and forage enhancement units. These units have proposed mechanical ground-based and skyline harvest methods and temporary road construction activities that would result in additional cumulative detrimental soil conditions. A combination of air photo interpretation and field transects was used to calculate the existing percent cumulative detrimental soil conditions for the proposed activity areas (harvest units). Previous harvest entries by unit were either ground-based yarded using tractors or skyline yarded using cable, or a combination of both. Field observations indicate that most of the legacy impacts, both compaction and displacement, comes from existing roads of the area and past ground-based logging operations. The degree of soil compaction is mainly dependent on the amount of soil moisture present and the number of passes a machine makes over a site. The loamy texture (similar parts of clay, silt and sand size soil particles) of the finer-grained subsoils retains soil moistures moderately well when wetted up from fall and winter rains and snowmelt. Summer (July 15th to September 15th) soil moistures are more conducive to minimizing soil compaction from ground-based yarding.

Direct and Indirect Effects

Alternative A – No Action

Within the no action alternative, soils within the project area would have no additional ground-based activities or ground disturbing impacts that would cause a change in the current condition of detrimental soil conditions. This would include: no new system or temporary road construction; no timber harvest soil disturbance; no road reconstruction; or no road maintenance activities. Current soil structure would likely continue to recover in the uppermost 2-4 inches, while the lower layers of soil would likely remain compacted for many more decades. Soil recovery mechanisms in the Westside Cascades are often slow as there is not a deep freeze thaw cycle but a reliance on vegetation root penetration and mixing by soil biology (both slow processes). Some of the existing compacted soils have remained for up to 50-60 years. Portions of these deeply compacted detrimental soil conditions could persist for the long-term up to 100 years or more.

No soil restoration would occur within the project area to alleviate any compacted soil conditions from past timber harvests and road construction. Detrimental soil conditions would essentially stay the same as described under the current conditions. Refer to Tables 20 and 21 for a comparison of existing conditions and after proposed harvest with soil restoration implemented under alternative B.

Alternative B – Proposed Action

It is estimated that there would be an additional 27.9 acres of detrimental soil conditions within the activity areas (units) from harvest activities, landings, and temporary spur road construction. About 24.8 of those acres would be attributed to the yarding operations that include landings and about 3.1 acres from temporary spur roads. Soil restoration of skid trails, landings, existing and new temporary spur roads by sub-soiling would result in a greater decrease (55 acres) in detrimental soil conditions compared to post-harvest and existing levels.

About 536 acres of planned commercial thinning is proposed for ground-based logging systems (on slopes not to exceed 30%) and 404 acres are proposed for skyline cable systems. The ground-based yarding would use existing skid trails and landings, a few new landings, and minimize the creation of new skid trails (only adding minor amounts of detrimental soil conditions).

The ground-based and skyline yarding systems could include a harvester to cut and directionally place the trees (minimal repeated ground trafficking to avoid increases to detrimental soil conditions). Units or portions of units where a harvester cannot be used because of steep side slopes and other resource concerns are listed in Table 8 in the Mitigations section of Chapter 2.

Each ground-based yarded unit has varying degrees of addition detrimental soil conditions, typically 3%, which is based on a proposed harvest plan considering the location of existing skid trails and need for additional skid trails. Predesignated skid trails and landings are required and approved in advance of use by the Timber Sale Officer and are generally 150 to 200 feet apart. Evident existing skid trails, landings, and/or tractor fire lines are required to be utilized in any ground-based unit before any new skid road is approved. Skyline cable yarding is anticipated to result in a minor increase in detrimental soil conditions of 1.8% (Allen, 1997) primarily from new landings. The majority of landings associated with skyline yarding would use existing wide spots along roads. Predesignated skyline corridors are required and approved in advance of use by the Timber Sale Officer and are generally 150 feet apart. Detrimental soil conditions resulting from compaction recover over time due to freeze/thaw action, wetting/drying action, burrowing by animals, plant root growth and soil microbial activity. Compaction can persist for decades, 50 to 60 years, particularly at depths from 12 to 20 inches below the soil surface. Portions of these deeply compacted detrimental soil conditions are likely to persist for the long-term, up to 100 years.

The following table (Table 21) displays each harvest unit (activity area) and proposed activities that would change current detrimental soil conditions for Alternative A. Percent detrimental soil conditions from past harvest (current condition); from system roads including temporary road construction (within or adjacent to harvest units); and from proposed timber harvest; and total detrimental soil conditions after thinning harvest and soil restoration (sub-soiling) are listed in the table. For all proposed commercial thinning units (activity area) estimated detrimental soil conditions increase but remain below the Willamette National Forest LRMP standard and guidelines of 20 % (FW-081).

Table 21: Detrimental Soil Conditions for Proposed Commercial Thinning Units and Forage Units

Unit (Activity Area) *	Current Total Detrimental Soil Conditions (%)	Proposed New Temporary Spur Roads (%)	Proposed New Timber Harvest with Landings (%)	Total Detrimen-tal Soil Condi-tions After Harvest (%)	Proposed Temporary Spur Road Restora-tion (%)	Proposed Soil Restora-tion (Sub-soiling) (%)	Total Detrimen-tal Soil Conditions After Proposed Restora-tion (%)
2761	13.3	0.5	2.1	15.8	0.8	2.8	12.2
2803	12.6	0.0	1.8	14.4	0.6	1.5	12.3
2888	17.6	0.0	1.8	19.4	0.9	1.5	16.9
2915	9.1	0.0	1.8	10.9	0.0	1.5	9.4
2920a	9.0	0.9	2.6	12.6	0.9	3.0	8.7
2920b	15.7	0.0	2.2	17.9	0.7	3.4	13.8
2923a	13.4	0.7	3.0	17.1	0.7	7.0	9.4
2923b	12.4	1.0	3.0	16.4	1.0	7.0	8.4
2952a	13.2	0.6	2.9	16.8	0.6	6.6	9.5
2952b	14.9	0.0	3.0	17.9	0.0	7.0	10.9
3048a	11.3	0.0	2.0	13.3	0.0	5.8	7.5
3048b	16.0	0.0	2.8	18.8	3.1	6.3	9.5
3057	10.1	0.8	2.6	13.5	2.1	5.3	6.1
3062	17.8	0.0	1.8	19.6	0.5	1.5	17.6
3068	15.5	0.4	2.1	18.0	0.4	2.9	14.7
3135a	11.7	0.0	3.0	14.7	0.0	7.0	9.1
3135b	6.7	0.0	1.8	8.5	0.0	1.5	6.3
3144	15.8	0.0	3.0	18.8	1.6	7.0	10.2
3147	10.1	1.2	2.5	13.8	2.5	4.7	6.7
3148a	14.1	0.0	2.8	16.9	0.9	6.2	9.9
3148b	15.5	0.0	2.9	18.4	1.3	6.6	10.6
3485	15.8	0.0	3.0	18.8	0.0	6.9	11.9
3546	15.3	0.0	1.9	17.2	1.6	2.0	13.6
3599	8.4	0.0	1.9	10.3	0.0	1.9	8.4
3633	6.6	0.0	1.8	8.4	0.0	1.5	6.9
3770	9.6	0.0	2.3	11.9	0.0	3.7	8.2
3870	13.4	0.0	2.2	15.6	0.7	3.3	11.6
4115	12.6	0.0	3.0	15.6	0.0	7	8.6
5756	16.1	0.0	3.0	19.1	3.1	7	9.0
6927	12.8	0.0	3.0	15.8	0.0	7	8.8
2691A(F)	4.9	0.0	0.0	4.9	0.0	0.0	4.9
2866(F)	11.6	0.0	0.0	11.6	0.0	0.0	11.6
3162A(F)	3.8	0.0	0.0	3.8	0.0	0.0	3.8
3570(F)	9.9	0.0	0.0	9.9	0.0	0.0	9.9

Notes: Shaded rows indicate units in which the purchaser would be required to sub-soil primary skid trails.

* Unit number followed with an (F) identifies it as a forage enhancement unit. All other units are commercial thinning units.

The proposed restoration mitigation measure of soil tillage or sub-soiling would alleviate some of the new and past legacy soil compaction created from past timber harvest, landings, and road construction activities on approximately 55 acres. This would reduce detrimental soil conditions in units that currently approach the standard and would further reduce compaction to more acceptable levels. Due to post harvest mitigation measures requiring subsoiling, there would not only be no net additional detrimental soils conditions from yarding, landings, and temporary road construction but a net reduction. Sub-soiling is planned for new and old landing areas for both skyline and ground-based logging (17.6 acres) along with some associated primary skid roads (27.8 acres), temporary roads constructed on previously used routes (6.0 acres) and new temporary roads (3.1 acres) (Appendix B). Sub-soiling restoration acres were calculated by assuming ground based landings account for 2% of detrimental soil conditions and 1.5% for skyline landings and 5% for primary ground-based skid trails.

Fuels treatments would not change the detrimental soil conditions because the methods proposed would not add additional amounts to existing detrimental soil conditions. Grapple slash piling is proposed within 40 feet of all roads and temporary spurs on about 71 acres where the slash piling machine would work only from the road surface. Other fuels treatments would include 265 acres of underburning in spring like conditions when soil moistures are damp or wet, eliminating the potential for severely burned soil conditions. Hand piling and burning slash is proposed on 88 acres, resulting in approximately fifteen 4’x4’ slash piles per acre.

Forage enhancement treatments would not change the detrimental soil conditions as the methods proposed for mastication would not compact or displace soils. Mastication of understory vegetation, primarily comprised of chinkapin and ceonothus, as well as trees less than or equal to 10” diameter, is proposed on approximately 10 acres having side slopes less than 30%. Mastication would be done with a small rubber tracked machine having an 8’ wheel base with a ground pressure that does not exceed 5 lbs. per square inch.

Cumulative Effects

The geographic area considered for detrimental soil condition cumulative effects area (CEA) for the Pioneer Gulch Project is the entire area of harvest units (activity area). Cumulative effects were assessed based on past, present, and reasonably foreseeable future action listed in Appendix B of this EA. The project effects and extent of past, present, reasonably foreseeable future project effects are overlapped and portray the extent and duration of the cumulative effects of detrimental soil conditions. Cumulative effects from the present actions include the effects of the Pioneer Gulch Project in conjunction with past and foreseeable actions. For past projects, the detrimental soil analysis includes effects from road building, tractor logging and cable logging that occurred in the 1950’s and 1960’s and later, as well as current roads and landings within the project activity areas (harvest units). The Forest standard for detrimental soil compaction is 20% of the unit area, including all roads and landings. Without the implementation of best management practices (BMPs) and mitigation measures, the potential exists for compaction from this entry to exceed those standards. To minimize the potential for cumulative adverse compaction, all skid road locations would be approved prior to use, and existing skid roads would be utilized as much as possible. After harvest, primary skid roads, landings and temporary roads are proposed for sub-soiling to reduce compaction levels. Based on professional experience, it is estimated that upon completion of activities, compaction would remain at or below the existing levels. These results fall within the range permitted by Willamette National Forest standards and guidelines. There are

no reasonably foreseeable future actions that would add additional soil impacts to the cumulative effects of past actions along with this proposed action .

Hydrology

Background

The Upper Middle Fork Willamette Watershed is bisected by the Middle Fork Willamette River and drains 177 square miles. The watershed ranges in elevation from 2,000 feet to 8,744 feet at Diamond Peak. The watershed contains approximately 493 miles of perennial and intermittent streams.

As water flows off Diamond Peak, it disappears and reappears many times in small headwater streams that flow through the porous landscape of the High Cascades. Where the more recent lava flows of the High Cascades transition into the older Western Cascades, several springs deliver cold water that originates from the snow pack upslope. Many cold water springs surface adjacent to the Middle Fork Willamette River. The largest of these cold water springs are Indigo, Iko, and Chuckle. Chuckle Spring lies within the Tumblebug fire (Sept 2009) perimeter and experienced a moderate to high intensity burning. Cold subsurface flow also contributes to the Middle Fork Willamette River directly in the lower portions of Swift Creek. In the Western Cascades portion of the mid to lower watershed, older volcanic flows, intrusions and pyroclasts have been altered by years of shearing, freezing and thawing to produce gentler slopes, finer grained soils and a more developed stream network.

Glaciation through this watershed produced U-shaped valleys with steep side slopes that are prone to debris slides, the historic contributor of large wood and coarse soil material to streams and flats below (USDA, 1996, USDA 2008).

The climate of the watershed is typical of the Western Cascades with a Mediterranean weather pattern of hot dry summers and cool wet winters. Annual average precipitation ranges between 65 to 75 inches. Over half of the floods occur during the months of December and January, and another third during the months of November and February, predominantly in response to rain-on-snow events. Similarly, average monthly mean discharges are consistently higher December through May (USDA, 1996).

Unless otherwise noted, the geographic scale used to assess direct, indirect, and cumulative effects for Water Quality/Aquatic Resources includes the project activity units and the Pioneer Gulch and Paddys Valley 6th Field sub-watersheds which encompass the Pioneer Gulch Project area. Cumulative effects were assessed based on past, present, and reasonably foreseeable future action listed in Appendix B of this EA

Existing Condition - Stream Shade and Stream Temperature

Water quality standards have been established by the state of Oregon, including temperature standards, in Chapter 340, Division 41 of the Oregon Administrative Rules. Water bodies that do not meet these standards are deemed “water quality limited”, and are placed on a list by the Oregon Department of Environmental Quality (ODEQ) in accordance with Section 303(d) of the Federal Clean Water Act (303(d) list). Portions of the Upper Middle Fork Willamette River within the project area were listed for temperature but were removed in 2008 when the Willamette National Forest completed the Northwest Forest Plan Temperature TMDL Implementation strategies. Within this project area the summer standard set by ODEQ is 16 º C,

measured as an average of the daily maximum water temperatures over a seven-day consecutive period. This designation is a reflection of temperature sensitive species and life stages within the watershed including salmonid spawning, rearing and migration.

Stream temperature and land-use has long been a concern for aquatic species health. Land-use and management of water shading vegetation has been shown to be a dominate factor contributing to native aquatic species health in relation to appropriate in-stream temperatures (Holtby 1988, Borman and Larson 2003, Poole and Berman 2001). Stream temperature data has been collected on an annual basis from June to September at numerous locations along the Middle Fork of the Willamette River and its tributaries between the Staley Creek confluence and Paddys Valley. From 2000 to 2010 the 7-day average maximum stream temperature (º C) in the Middle Fork near the Staley Creek confluence ranged from 13.7 º C to 15.2 º C. Cold water springs such as Iko Springs ranged from 7.1 º C to 7.5 º C, while tributaries, including Noisy Creek and Echo Creek ranged from 12.6 º C to 16.4 º C and from 11.2 º C to 13.0 º C. Changes in the range of maximum temperatures from one water year to the next are attributable to inter annual differences in precipitation and stream flows. The annual timing of the maximum temperature occurred between July and August in all instances. This suggests that management has impacted only the increased value for maximum temperature and has not affected inter-annual variability or annual timing of peak temperatures.

The existing conditions for stream temperatures in the Pioneer Gulch Project area fall out into two categories, those influenced by cold springs and those that are not. Snowmelt from Diamond Peak (8,744ft) often goes subsurface in the porous landscape of the young High Cascades. Where the more recent lava flows of the High Cascades transition into the older Western Cascades several springs emerge as well as a portion of the snowmelt flows subsurface, contributing flow to tributaries of the Middle Fork. There are abundant intermittent streams throughout the project area as a result of the porous landscape. Due to the intermittent flow pattern of these streams, sensor deployment has not been attempted.

The Oregon Department of Environmental Quality's (DEQ) turbidity standard states: No more than a ten percent cumulative increase in natural stream turbidities shall be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity. However, there are exceptions for limited duration activities which cause the standard to be exceeded if all practicable turbidity controls are applied. A new draft revised turbidity standard that better addresses beneficial uses, ponds, and other systems will become effective upon EPA approval.

Environmental Consequences - Stream Shade and Stream Temperature

Direct and Indirect Effects

Alternative A – No Action

Direct and indirect effects of this alternative on stream temperature are not anticipated. Therefore, there would be no cumulative effects on stream temperature. No action would allow the riparian vegetation to recover at its current pace and not at a potentially increased rate that could result from thinning. The no action alternative would allow water temperatures in streams in the project area to continue to recover toward more natural levels, as previously disturbed riparian vegetation re-grows and re-establishes streamside shade.

Alternative B – Proposed Action

The natural and anthropogenic removal/loss of shading vegetation can greatly alter stream temperatures by changing the amount of direct solar radiation reaching the water's surface. Solar radiation is the greatest factor controlling stream temperature (Brown and Krygier 1970, Johnson, 2004, Lee and Rinne, 1980, Sinokrat and Stefan 1993, Webb and Zhang, 1997). For this project all perennial streams (Class 1, 2 and 3) are provided with at least a 60 foot no-treatment buffer to retain effective stream shade. Prescriptions for these buffers are outlined in the Northwest Forest Plan Temperature TMDL Implementation Strategies (USDA and USDI 2005). This document provides a description of the Rapid Shade model used to analyze shade and makes recommendations for the width of riparian protection adjacent to perennial stream channels that provides stream shade for the period of greatest solar loading (between 1000 and 1400 hours), known as the **primary shade zone**. It also provides the recommendation for the width of the riparian area that has potential to provide shade in the morning and afternoon (0600-1000 hours; 1400-1800 hours), considered to be the **secondary shade zone**. In over-dense riparian areas like the ones in this project area, optimum shade can be provided by the primary shade zone alone, and the secondary shade zone may contribute little to shade since trees in the primary shade zone are already blocking the sun's solar radiation (USDA and USDI 2005).

In all of the units with proposed thinning in Riparian Reserves, vegetation density is high and would benefit from thinning. Thinning would not occur in the primary shade zone of any perennial stream and would not result in less than 50% canopy cover in the secondary shade zone. The width of the primary shade zone in the action area varies depending on slope, aspect, stand density, stream width and canopy cover. Taking all these variables into consideration at the site-specific scale, the designated (Class 1 and Skunk Creek-100ft, Class 2 and 3-60 ft) no-treatment buffer protects the primary shade zone on all perennial streams. Intermittent (Class 4) streams are dry during the portion of the year when elevated temperatures occur and therefore temperature is not a key issue. However, a 30 foot no-treatment buffer is in place to protect bank stability and retain trees for other resource objectives, providing substantial shade regardless. In addition, no gaps would be placed closer than 170ft, outside both the primary and secondary shade zones.

Based on implementation of the design criteria outlined in the preceding discussion and field observations during project reconnaissance, no measurable direct or indirect increases of stream temperatures are anticipated within the project area as a result of this alternative.

Cumulative Effects – Alternatives A and B

Since there would be no direct or indirect effects to stream temperature with either alternative, there would be no cumulative effects to stream temperature with either alternative.

Existing Condition - Stream Flows/Disturbance History

Traditionally, projects involving timber harvest on the Willamette National Forest are analyzed for their cumulative impact on the quantity and timing of peak flows and water yields using an accounting methodology known as Aggregate Recovery Percentage or ARP, as specified by the Forest Plan. The ARP model compares the acres 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 substantial alteration of peak flow regimes as a result of management activities. Recovery generally occurs when stand diameters average 8" dbh and canopy covers exceed 70%. The

analysis is based on data extracted from the Forest's VEGIS database, which includes information about all past harvest activities and recent fires that have occurred in the sub-watershed. Currently, ARP levels in the Pioneer Gulch and Paddys Valley sub-watersheds are 83% and 75% as of 2010, (above the Forest Plan Midpoints of 70% and 69%).

Environmental Consequences - Stream Flows/Disturbance History

Traditionally, projects involving timber harvest on the Willamette National Forest are analyzed for their cumulative impact on the quantity and timing of peak flows and water yields using an accounting methodology known as Aggregate Recovery Percentage or ARP, as specified by the Forest Plan. The ARP model compares the amount of an analysis area within the transient snow zone that is recovered against a threshold value (Midpoint) that was calibrated for the area during development of the Forest Plan. The midpoint values were developed based on the soil, geology, vegetation, climate, and stream channel conditions of each sub-watershed, and are intended to represent a minimum safe level of vegetative recovery in the sub-watersheds to prevent substantial alteration of peak flow regimes as a result of management activities. This mid-point value is used as a threshold of concern; when current conditions or planned conditions drop below the mid-point value, there is the potential for an increase in peak flows which may result in channel scour or stream bank erosion. 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 4,500 feet respectively. The analysis is based on data extracted from the Forest's vegetation database, which includes information about all past harvest activities in the sub-watershed.

Direct and Indirect Effects

Alternative A – No Action

Alternative A, No Action, would result in no changes to existing peak flows as there would be no change to the current condition of any over story vegetation. Existing stands would continue to recover to hydrological functioning conditions and stream flows would remain at near natural levels. No direct, indirect, or cumulative effects on streams flow are expected in the project area.

Alternative B – Proposed Action

Table 22 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 existing condition values. Completion of implementation is estimated to occur by 2018.

Table 22: Aggregate Recovery Percent (ARP) levels (harvest estimated 2018).

Sub-watershed	2010 (Existing Condition)	Alternative A (No Action)	Alternative B	Midpoint ARP
Pioneer Gulch	75	76	75	70
Paddy's Valley	83	85	81	69

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

implementation of the proposed actions. There are no additional reasonably foreseeable future actions within the project area that would result in effects that differ from those already disclosed.

Cumulative Effects – Alternatives A and B

Since there would be no direct or indirect effects to stream temperature with either alternative, there would be no cumulative effects to peak flows with either alternative.

Existing Condition - Sedimentation and Roads

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 construction and use of roads can be a substantial source of sediment in forested basins (Swanson and Dyrness 1975, Reid and Dunne 1984). Roads have three primary effects on water routing and yield: they intercept rainfall directly on the road surface and road cut banks and intercept subsurface water moving down the hill slope; they concentrate flow, either on the surface or in an adjacent ditch or channel; and they divert or reroute water from flow paths that it would take were the road not present. Roads modify natural drainage patterns and can increase hill slope erosion and downstream sedimentation. Often times improperly designed or maintained road ditch lines and road fills would input substantial amounts of fine sediment into the stream system. Undersized and/or improperly maintained culverts have a greater risk of failure than properly sized and maintained culverts (Robison et al., 1999). Sediments from road failures at stream crossings are deposited directly into stream habitats and can have both local and downstream effects to aquatic organisms. These include alterations of the channel pattern or morphology, increased bank erosion and turbidity, changes in channel width, substrate composition, stability of slopes adjacent to the channels, and riparian vegetation. All of these changes result in important biological consequences that can affect the entire stream ecosystem (USDA, 2000).

There are approximately 147 miles of system roads within the project area. The project would utilize 55.59 miles of haul routes; of this, 38.81 miles are asphalt surface, 14.28 miles are aggregate surface and 3.0 miles are native surface. Haul route roads would receive maintenance that could consist of brushing of roadside vegetation, falling of danger trees, blading of roadbed, cleaning of ditches and culvert inlets and outlets, removing slough and slide material, and placing aggregate and/or asphalt surfacing. Many culverts are deteriorating and need to be replaced to facilitate timber haul. Culvert replacement would occur at 10 perennial and 3 intermittent stream road crossings. In addition, ditch relief culverts would be replaced as needed. These standard maintenance activities occur on all roads when commercial activity occurs or on a rotating basis determined by use and need. Of the 147 miles within the project area, 4.8 miles are currently closed, 13.62 miles would be closed and stored as part of this project and an additional 5 miles will be closed and stored under the 2011 Upper Middle Fork Watershed Restoration and Road Closure Project decision. Currently there are 4.1 miles of existing spur roads and another 2.26 miles of new spur road construction would take place within the project area. Temporary road construction has been kept to a minimum, utilizing the existing system wherever possible. Temporary roads that are constructed for this project would be decommissioned at the end of the sale. Wet weather haul would occur on 42.81(38.81 paved and 4.5 aggregate) of the 55.59 miles of haul roads, as identified in the Pioneer Gulch Transportation Report (Langum Z, 2011, Analysis File). Roads identified for wet weather haul would have a surfacing depth (engineer's professional judgment) to hold up to wet weather haul and all drainage maintenance would be completed prior to any haul.

Environmental Consequences - Sedimentation and Roads

Direct and Indirect Effects

Alternative A – No Action

Alternative A, continues the current management situation regarding road maintenance in the project area. This alternative would result in none of the road improvements that are included in Alternative B, leaving the roads in their existing condition. Current sediment delivery from road segments in need of maintenance would continue to increase stream turbidity, particularly during rain-on-snow events. The potential for a road failure to deliver large quantities of sediment to stream channels and the connectivity of the road ditches to the stream network could be increased. Such failures are usually the result of clogged, undersized culverts or inadequate ditch line maintenance.

Alternative B – Proposed Action

Road work associated with the Pioneer Gulch Project includes replacement of a number of culverts that are currently in poor repair. Replacement would require in-stream work in these locations. Work would be done during non-flow periods for intermittent streams, and engineering practices such as sediment barriers and flow bypass would minimize impacts on perennial streams. 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 1.5 cubic yards per perennial and intermittent installation and between 0.25 and 0.5 per cross-drain culvert installation, based on professional experience. The average fill volume is estimated to be 200 cubic yards per perennial and intermittent culverts and approximately 25 cubic yards per cross-drain. This material is at risk of entering the streams and potentially generating debris torrents if the existing culvert fails. Table 23 provides a summary of these replacements and the potential amount of fill material that would have a reduced risk of entering streams, as well as estimates of the amount of sediment produced from the culvert replacements. The maximum estimate of sediment yield from the culvert replacements would be 68.5 cubic yards for Alternative B. In comparison, the estimated volume of fill stabilized is 5,050 cubic yards.

Table 23: Approximate Culvert Replacements in Perennial and Intermittent Streams by Alternative.

	Stream Type	Number of Culverts Installed/Replaced/ Removed	Cubic Yards of Fill Stabilized	Sediment Yields from Culvert Replacements (Cubic Yards)
Alternative A	None	0	0	0
Alternative B	Perennial	10	2,000	5.0-15.0
	Intermittent	3	600	1.5- 4.5
	Cross-drain	98	2,450	24.5-49.0
	Total	111	5,050	31.0-68.5

During the construction of the new aquatic organism passage structure at the Estep Creek crossing on road 21, there would be minimal sediment input reaching Estep Creek. It is not

possible to replace a culvert without some sediment delivery to the stream. During a field visit in October 2011 base flow was measured at 1cfs, As part of the design, the channel would be seeded with appropriately sized sediment including a certain amount of fines which are necessary to keep flow on the surface and to pass aquatic organisms. Once water is reintroduced into the channel and flowing through the new structure a small sediment plume would be expected as some of the fines are redistributed by the initial flows. It is estimated that between 5 and 15 cubic yards of sediment could reach the side channel of the MFWR during the initial flows following culvert replacement and would be of short duration. Additional fines would be entrained within the channel during high storm flows and would be occurring at the same time all streams are experiencing high flows and turbidity, making any contribution from Estep Creek indiscernible

The road management activities, at a minimum, 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 on the road translates to less sediment-carrying capacity.

Cumulative Effects

Alternative A – No Action

There would be no direct or indirect effects on sedimentation from No Action. Therefore there would be no cumulative effects.

Alternative B – Proposed Action

The geographic area considered for cumulative effects for the Pioneer Gulch Timber Sale is the Upper Middle Fork Willamette River fifth-field watershed. This area was selected because it represents the extent in which this project and other Forest Service activities result in modification of vegetation, hydrology and soil properties that would cause impacts to these watersheds. Additional past, present and reasonably foreseeable actions within the 5th field that have the potential to contribute sediment cumulatively are the Tumblebug Fire (2009), the Tumblebug Fire Roadside Treatment Project, and road closure projects. The road work involved with these projects has the potential for initial small sediment increases that would be short-term (one to five years depending on the action). These short-term increases would not all occur at the same time, minimizing the overall impact. Other actions (i.e. timber sales, road maintenance and trail construction) within the 5th field have occurred in the past but have occurred at a time that the project is no longer contributing sediment.

The Tumblebug fire occurred in 2009, burning 14,560 acres. The fire area has good soil stability, minimizing the potential for large scale sediment movement. In addition, to mitigate erosion and promote revegetation; wood mulch was applied to the highest severity burned area (Royal Creek), 4.5 miles of road were seeded and mulched, roads were maintained, fills stabilized and culverts replaced. While the Pioneer Gulch road work actions have the potential for small short-term (one to five years) increases in sediment yield, the long term reduction potential combined with the other mitigation actions would result in a beneficial decrease to sediment yield. Other potential short-term (one to three years) sediment increases that were the result of the fire are not considered a cumulative effect, as the timber sale would occur more than 3years after the 2009 fire.

The Tumblebug Fire Roadside Treatment Project is scheduled to be implemented in 2012. The project consists of felling dead trees from the Tumblebug fire that were deemed hazardous trees due to their proximity to roads. Trees within 150 feet on the lower side and 300feet on the upper side of the road will be felled and removed in high mortality areas and left in low mortality areas. Since only dead trees will be cut and equipment will not leave the road prism, the potential for increased sediment yield is minimal. Road maintenance that will occur as part of the timber sale including ditch cleaning, culvert replacement and road closure will temporarily disturb soils and will result in short-term increases in sediment delivery. This will occur during and immediately after road work has occurred and after the first measurable rainfall event. These effects will be localized and will be minimized by mitigation measures and best management practices. This project will be completed in 2012 and would not still be contributing to cumulative effects during the time period when the Pioneer Gulch project would be contributing sediment. While the Pioneer Gulch road work actions have the potential for small short-term (1-5 years) increases in sediment yield, the long term reduction would be beneficial.

Road closure projects within the 5th field include two past road closure projects (Echo Staley Road Storage and Illegal Household Trash Site Management Project and Upper Middle Fork Watershed Road Stormproofing and Restoration Project) and one current road closure project (Upper Middle Fork Watershed Restoration and Road Closure Project). The two past projects included closing and stabilizing approximately 40 miles of roads and the current project would result in 25 miles of road closures within the Upper Middle Fork Willamette River 5th field watershed. Road treatments would store or decommission roads in a hydrologically stabilized condition through a variety of methods including culvert and fill removal, lowering fill heights, side cast pull back, road sub-soiling, waterbar installation and ditch cleaning. Like the road work for the salvage sale, there is the potential for small short-term increases in sediment due to road closure and stabilization work, occurring during and immediately after road work has occurred and after the first measurable rainfall event. However, long term stability and decreases in potential sediment yield would be achieved.

Cumulatively, the past, present, and reasonably foreseeable future actions result in short-term effects that occur at times when they would no longer be generating measureable sediment during the Pioneer Gulch project and as a result would not contribute to a negative cumulative effect.

Existing Condition – Riparian Conditions

Road construction and timber harvest peaked 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 the provided large wood and shade to streams in the project area. The purpose of this analysis is to disclose the effects of this project as well as other recent projects which begin to address the need to restore the large wood component to riparian stands.

Several disturbance systems have affected the riparian habitat within the Pioneer Gulch Project area. See Figure 10 for a map of current Riparian Reserve vegetation developmental stages in the Pioneer Gulch project area. Much of the action area is located within previously managed timber stands and fire regenerated stands. Two hundred years ago prior to these events (before European influence at least in terms of the vegetation and fire frequency), about 90% of low elevation stands and 70% of high elevation stands were mature and old growth stands. Early seral stands were produced mainly by fires, and to a lesser extent, by windthrow and mass wasting. In the mid-19th century three to five percent of the Upper Middle Fork Willamette watershed experienced a stand-replacing burn in a series of fires. Another series of fires occurring in the

early 20th century burned an additional five to ten percent of the watershed. These percentages do not include large areas which experienced lower intensity underburns (Upper Middle Fork W.A., 1996). Approximately 2,000 acres of these stands were owned by Seneca Timber Company when they were clearcut harvested. The last regeneration harvest that occurred in the project area was the Ambush Timber Sale in 1998.

The existing condition of these stands (second growth, even-aged, closed canopy 40 to 55-year-old plantations) is a result of previous intensive timber management regimes. The stocking levels and structure of these stands could substantially delay the development of late-successional forest characteristics. About 30 percent (286 acres) of the area in plantations is within Riparian Reserves. The Upper Middle Fork Willamette River Watershed Analysis has identified the need for silvicultural treatments in these areas to accelerate the development of late-successional forest characteristics. Treatments could improve the health and vigor of these stands, diversify the stand structure, and accelerate their development of late-successional forest characteristics. As a result of past disturbance, approximately 35 percent of Riparian Reserves have been impacted based on current conditions on both private and Forest Service lands. Fragmentation within the Riparian Reserves is a concern as are current roads in riparian areas and lack of large wood potential to the stream network. For the vast majority of streams in the project area the Riparian Reserves have recovered to the point where they are providing the channel with adequate shade.

Environmental Consequences – Riparian Conditions

Direct, Indirect, and Cumulative Effects

Alternative A – No Action

Implementing Alternative A, would have no immediate effect on riparian condition. It would, however, increase the risk of loss of riparian stands to fire, insect infestation and disease, all carried more efficiently through dense riparian stands.

Alternative A would provide a higher rate of in-stream recruitment compared to the action alternative. This recruitment would be provided mostly by stem mortality from competition, disease, wind and snow downed trees. Most riparian stands in the project are composed of small diameter trees (<24 inches diameter). The aquatic benefit of small diameter trees is limited, namely through the reduced ability to store sediments and contribute to habitat forming processes (e.g. scour). The longevity of recruited small diameter tress is short-lived, as they break down through abrasion and decomposition more rapidly compared to large trees (>24 inch diameter). Small diameter trees are also more likely to be transported out of the system. Compared to the action alternative, no action would provide a greater volume of in-stream wood in the short term, but the wood would be small. Natural stem development of even-aged riparian trees may be expected to exceed 40 years and delay the availability of large wood to stream channels. Development of future sources of in-stream wood would depend on natural thinning events (stem exclusion mortality and disturbance) to achieve stand diversity.

Alternative B – Proposed Action

This action alternative would variable density thin 286 acres of Riparian Reserve within the project, incorporating needed diversity and complexity back into these riparian areas while using no-cut primary shade zone protection to retain shade and micro climate near streams. Under burning within Riparian Reserves of units 2923a, 2923b, 2952a and 2952b is proposed. Underburning would occur outside the no-cut buffers. Tree mortality from heat in areas with

high lichen accumulations would be minimized by utilizing a lighting pattern such that the fire behavior is limited to creeping on the ground. Handlines would be created or wetline used around all harvest unit boundaries (that are not adjacent to roads) which are prescribed for underburning. Gaps of one to three acres would be created in 15 percent of the total unit stands outside of secondary shade zones (170 feet from the stream, or one site potential tree) and only within the Riparian Reserves of Class II streams.

One of the expected results of thinning in Riparian Reserves is the development of diverse stand structure and the acceleration of forests toward late-successional conditions. Thinning can also accelerate development of large diameter trees that would 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. Riparian stand thinning within the design of the Pioneer Gulch Project is expected to maintain aquatic habitat quality. The removal of thinned trees capable of contributing immediately to in-stream habitat (and influenced by action alternatives) are generally located between 60 and 100 feet distance from the channel and are composed of small diameter trees of minor longevity and sediment storage value to current habitat. A similar rate of recruitment from among stands 0-60 feet from perennial channels is expected (compared to Alternative A), where no thinning occurs.

Introduction of low severity fire into Riparian Reserves is also anticipated to increase the plant species and stand structural diversity. 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 and lightly burned sites. In the unburned portions, the existing understory vegetation, including conifers, would be retained. In lightly burned areas, understory 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 increased growth in response to the disturbance. The net result would be increased plant species and stand structural diversity, with a closer resemblance to historic stand condition than non-thinned plantations. Riparian Reserve effects discussion, summarized here, is further described in the Fisheries Biological Assessment (Analysis File) and the Aquatic Conservation Strategy Consistency (Appendix C of this EA).

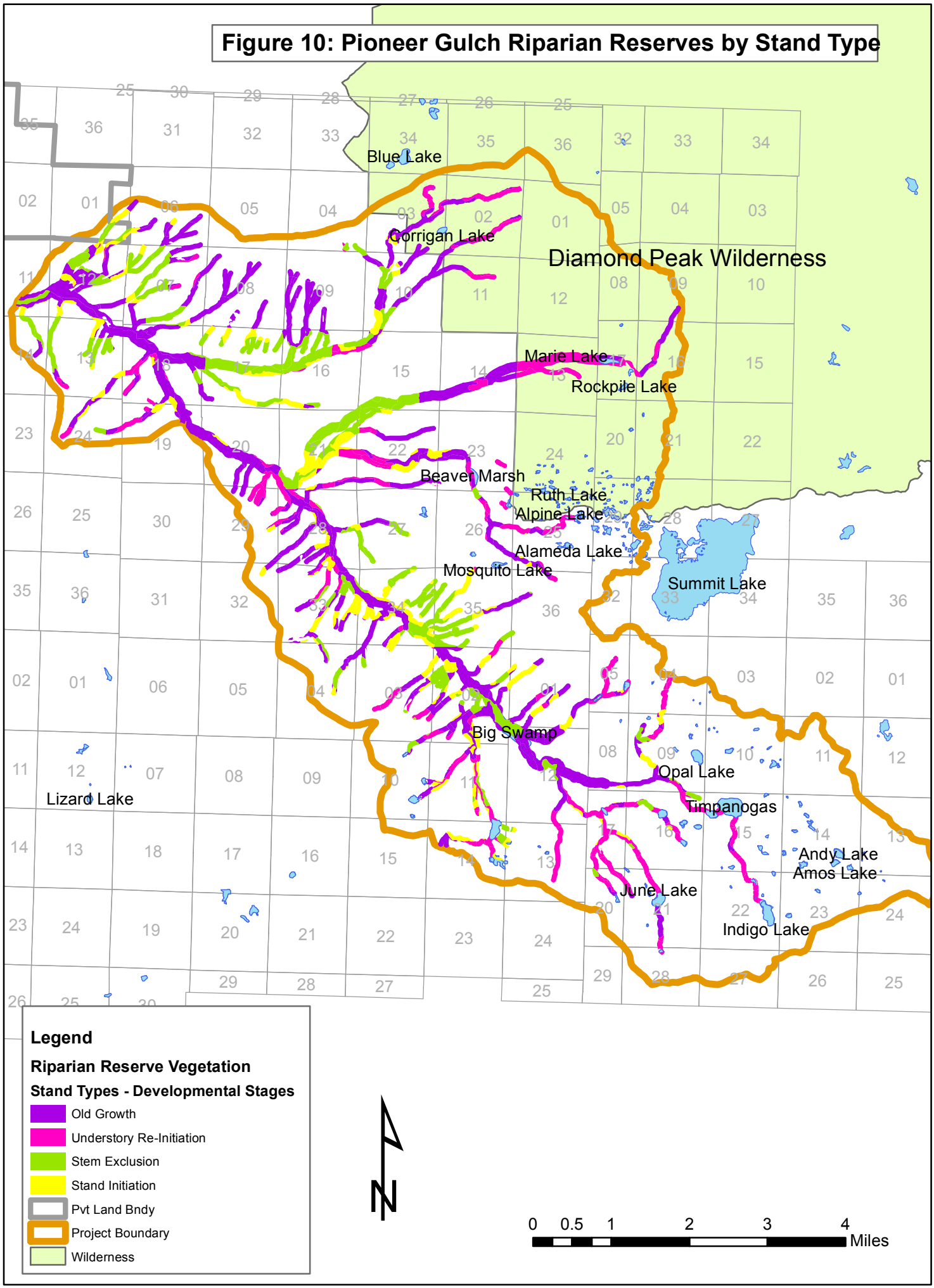


Figure 10: Pioneer Gulch Riparian Reserves by Stand Type
Blue Lake
Corrigan Lake
Diamond Peak Wilderness
Marie Lake
Rockpile Lake
Beaver Marsh
Ruth Lake
Alpine Lake
Alameda Lake
Mosquito Lake
Summit Lake
Big Swamp
Opal Lake
Timpanogas
Andy Lake
Amos Lake
June Lake
Indigo Lake
Lizard Lake
Legend
Riparian Reserve Vegetation
Stand Types - Developmental Stages
Old Growth
Understory Re-Initiation
Stem Exclusion
Stand Initiation
Pvt Land Bndy
Project Boundary
Wilderness
N
0 0.5 1 2 3 4
Miles

Fisheries

Background

The watershed features described in the Hydrology section above are unique for this region providing habitat for unique aquatic organisms. Bear, Swift, Skunk and Found creeks along with Iko, Indigo and Chuckle Springs are all bull trout reintroduction areas and are listed along with the Upper Middle Fork Willamette River as critical habitat for bull trout and spring Chinook salmon. Bull trout have been released in the watershed since 1997 and today there is a small reintroduced population that inhabits the watershed. Spring Chinook salmon have also been reintroduced in the watershed. They rely on an Oregon Department of Fish and Wildlife (ODFW) trap and haul operation that originates at Dexter Dam, Lowell Oregon. The number of pre-spawned adults released into the Middle Fork Willamette River above the dam depends on the run size from year to year.

Water quality standards have been set in various agreements and memoranda and are summarized below. Full details can be found in the Pioneer Gulch Fisheries Report (Langum, B., 2011).

- A watershed action plan (5 Year Action Plan) has been completed for the Middle Fork Willamette River, including five years of fisheries habitat restoration and enhancement project work in the watershed.
- The Oregon Department of Environmental Quality's (ODEQ) turbidity standard states: No more than a ten percent cumulative increase in natural stream turbidities shall be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity. However, there are exceptions for limited duration activities which cause the standard to be exceeded if all practicable turbidity controls are applied. A new draft revised turbidity standard that better addresses beneficial uses, ponds, and other systems will become effective upon EPA approval.
- The Oregon Department of Environmental Quality (ODEQ) lists beneficial uses of the streams in the project area as: fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, and aesthetic quality. In addition, other uses downstream of the project area include: public domestic water supply, industrial water supply, irrigation, livestock watering, and hydro power.

Existing Condition – Fisheries

Bull Trout (*Salvelinus confluentus*) utilize the upper Middle Fork Willamette River and several cold water tributaries. Spawning, rearing, and forage habitat is provided for bull trout in the section of the river and is exclusive adjacent to the project area, including Skunk and Found creeks, and Indigo, Iko, and Chuckle springs. The bull trout population is part of the Columbia River Distinct Population Segment (DPS), and have been designated as a Threatened species under the ESA by the U.S. Fish and Wildlife Service (63 FR 31647). This listing decision was effective as of July 10, 1998. Bull Trout critical habitat is listed for the main-stem Upper Middle Fork Willamette River and other tributaries that contain bull trout.

As of October, 2010 Critical Habitat for bull trout includes all sections of the Middle Fork Willamette River upstream of the Forest boundary on the Willamette National Forest. The designation also includes Lookout Point Reservoir, Hills Creek Reservoir, and several tributaries of the Upper Middle Fork Willamette River.

Spring Chinook salmon (*Oncorhynchus tshawytscha*) occupy much of the same habitat as bull trout in the Upper Middle Fork Willamette River, and a portion of the highest use section of the river is adjacent to the project area. The Upper Middle Fork Willamette River provides high quality spawning habitat and expansive areas of prime rearing, refuge, and forage habitat for juveniles. Middle Fork Willamette River salmon are part of the Upper Willamette Spring Chinook Salmon Evolutionarily Significant Unit (ESU), and have been designated as a Threatened species under the ESA by the National Marine Fisheries Service (NMFS) (64 FR 14308). This listing decision was effective as of May 24, 1999. While spring Chinook are native to the area, their natural migration routes were impeded by three mainstem dams, eliminating access to all historic Middle Fork Willamette River habitat. Since 1993, Chinook salmon have been reintroduced above Hills Creek Dam into the Upper Middle Fork Willamette River.

Many of the streams in the Pioneer Gulch Project area are spring fed with cold clear water. The ground in this area is also very porous and many of the creeks with the exception of Skunk, Swift, and Estep creeks have portions of flow that go sub-terrain and demonstrate characteristics of a Class IV stream with dry stream beds where anthropogenic water is flowing upstream only a few feet away. In many of these streams there are resident cutthroat populations that are connected in the spring, winter, and fall months when the flows increase from snow melt or rain events raising the water table.

Several specific factors can be identified in the decline of bull trout and spring Chinook salmon in the Middle Fork Willamette, as well as their subsequent federal listings under the Endangered Species Act. Past timber management activities included removing large wood from streams and clear-cutting in riparian areas. Road building practices damaged bull trout spawning and rearing habitat or precluded access to suitable habitat. Construction of Dexter, Lookout Point, and Hills Creek dams modified stream temperatures downstream and restricted migrations to and from spawning grounds. Rotenone poisoning to remove undesirable fish above Hills Creek Dam in 1960 had a profound impact on all aquatic organism populations within the Upper Middle Fork Willamette Watershed.

Additional resident fish species that occupy this reach of the river and tributaries include: rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*Oncorhynchus clarkii*), brook trout (*Salvelinus fontinalis*), mountain whitefish (*Prosopium williamsonii*), largescale sucker (*Catastomus macrocheilus*), speckled dace (*Rhinichthys osculus*), torrent sculpin (*Cottus rhotheus*), Paiute sculpin (*Cottus beldingi*), and shorthead sculpin (*Cottus confusus*).

Aquatic Management Indicator Species (MIS)

The Final EIS for the Willamette National Forest, Land and Resource Management Plan recognizes anadromous and resident salmonids (i.e. members of the salmon, trout, char, whitefish, and grayling taxonomic family) as economically important species and designated them as management indicator species (MIS) for riparian habitat and water quality. The most common sport fish that have habitat on the Middle Fork Ranger District are spring Chinook salmon, bull trout, rainbow trout, and coastal cutthroat trout. The Upper Middle Fork Willamette River (UMFWR) does provide habitat for mountain whitefish.

Riparian ecosystems occur at the margins of standing and flowing water, including intermittent stream channels, springs, and ephemeral ponds/seeps. The aquatic MIS were selected to indicate healthy stream and riparian ecosystems across the landscape. Attributes of a healthy aquatic ecosystems include: cold and clean water; clean channel substrates; stable streambanks; healthy streamside vegetation; complex channel habitat created by large wood, cobles, boulders,

streamside vegetation, and undercut banks; deep pools; and waterways free of barriers. Healthy riparian areas maintain adequate temperature regulation, nutrient cycles, natural erosion rates, and provide for instream wood recruitment. All the MIS listed above can be found in the Pioneer Gulch planning area, and in general have these similar habitat requirements.

Spring Chinook – Based on adult return counts to Dexter Dam, the spring Chinook salmon population in the UMFWR and within the Pioneer Gulch planning area varies from year to year depending on the return numbers. Spring Chinook are out-planted above Hills Creek Reservoir by ODFW via a trap and haul operation at Dexter Dam. The UMFWR provides excellent habitat for portions of the salmon life history (migration, spawning, incubation, and juvenile rearing habitats) but Chinook do not use the many of the tributaries that are within the Pioneer Gulch planning area, with the exception of Swift Creek.

Bull trout –The majority of the bull trout population in the UMFWR is adfluvial. A small portion of bull trout in the UMFWR exhibit fluvial and resident characteristics. Bull trout redds have only been documented in the UMFWR and several small springs, since 2005. Annual redd counts, have averaged 7 redds for the past 6 years (2005-2011). Based on the redd counts, the adult bull trout population numbers is estimated to be below 50 fish. Therefore the population size in the UMFWR basin is considered functioning at risk.

Coastal Cutthroat, Rainbow Trout, and Mountain Whitefish– Rainbow trout and mountain whitefish are both migratory river fish in the UMFWR River. They move between spawning, rearing, and over-wintering areas during the year. Coastal cutthroat are resident species to all Class I and II streams in the UMFWR drainage. Most of the resident salmonid habitat in the project area can be categorized as low gradient (<4%) or moderate gradient (<6%). Swift Creek is a medium sized stream with approximately 5-8m bankfull widths, and Skunk, Found, Emigrant, Beaver and Estep creeks are typically small streams. Pioneer Gulch Creek is a small stream that transcends from surface flow to sub-terrain flow. Resident cutthroat only have access to the entire creek during high flows. Table 24 displays the presence of MIS species and their habitat in the planning area.

Table 24 - MIS Fish and Habitat Description for the Pioneer Gulch planning area

Habitat Description	MIS	Habitat Present	Species Present
Riparian habitat and water quality	Spring Chinook salmon	Yes	Yes
	Bull trout	Yes	Yes
	Coastal cutthroat trout	Yes	Yes
	Whitefish	Yes	Yes
	Rainbow trout	Yes	Yes
	Brook Trout	Yes	Yes

Methods used to document fish distribution include field presence/absence surveys, aquatic inventory surveys, PIT tag interrogation data and redd surveys. The origin of this data has come from several sources including Forest Service field surveys and monitoring, Forest Service Level II stream survey reports on fish-bearing streams. Presence/absence surveys have been completed for coastal cutthroat, rainbow trout, and mountain white fish in the project area.

Environmental Consequences - Fisheries

Direct and Indirect Effects

Alternative A – No Action

In the No Action alternative the proposed project would not occur. No thinning of Riparian Reserve trees would occur. This alternative would allow for the continued slow rate of recovery toward natural condition. Most Riparian Reserves within the Pioneer Gulch Project area are overstocked with plantation trees of uniform age, and stand with limited successful diversity, which would benefit from employing Riparian Reserve thinning. An overcrowded canopy condition is occurring within many of these uniformed units. This would continue to contribute to a lack of LWD in the stream channels for aquatic habitat and on the forest floor for terrestrial habitat. The no-action alternative also has the potential for indirect and direct impacts to fish if a wildfire occurred, under both surface and crown fire scenario due to the substantial fuel loading that is occurring within these Riparian Reserves. The two-48 inch culverts on Estep Creek, as well as the eleven other stream crossing culverts and 98 ditch relief culverts that are in need of replacement would not be replaced.

Alternative B – Proposed Action

This action alternative would thin 286 acres of Riparian Reserve within the project area. Variable density thinning (VDT) would incorporate needed diversity and complexity back into these riparian areas while using no-cut primary shade zone protection to retain shade and micro climate near streams. Typical Riparian Reserve distance in this area is one to two site potential tree heights and a typical tree height is 170 feet (USDA, ROD 1994). Therefore, the Riparian Reserve width recognized on Class I and II streams would typically be 340 feet and Class III and IV Riparian Reserve widths would be 170 feet wide on each side of the stream channel. These distances are measured from each edge of the stream bank. The distances above are the generally recognized as Northwest Forest Plan Riparian Reserve widths for this region. Treatments would ensure the health, improve the growth, diversify the stand structure, and accelerate the development of late-successional forest characteristics in the stands in Riparian Reserves. The average spacing of trees thinned in these Riparian Reserves outside the no-cut buffers would maintain an average of 50 percent or greater canopy cover.

Under burning within Riparian Reserves of units 2923a, 2923b, 2952a and 2952b is proposed. Under burning would occur outside the no-cut buffers, within the Riparian Reserves (see established no-cut stream buffers within Riparian Reserves, page 34). Fire lines would be constructed by hand around all boundaries of units proposed for underburning (except where roads are the boundaries), including no-cut buffers to ensure that the fire does not enter the no-cut buffer zone. Fire would not be allowed to back down into the established no-cut buffers. During a project site visit with the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration in September 2011, it was determined that hand-lines around the no-cut riparian buffers in these units would be the best method for restricting fire from the no-cut buffer. Tree mortality from heat in areas with high lichen accumulations would be minimized with strip burning and allowing the fire to creep on the ground.

On 687 acres tops and limbs would be yarded, piled and burned at landing sites and roadsides or in Dominant Tree Release (DTR) areas, also known as gaps. No yarding, piling or burning would occur within the Riparian Reserves or within the gaps that are created in Riparian Reserves of these acres.

Two-48 inch culverts on Estep Creek and eleven other stream crossing culverts (nine on perennial, two on intermittent streams) that are in need of replacement would be replaced with an aquatic organism passage structure.

Stream Temperature

The primary shade zone for all units is 60 feet and the secondary extends to 170 feet. Thinning would not occur in the primary shade zone of any perennial stream and the secondary shade zone canopy cover would remain above the 50 percent canopy cover requirements within the TMDL Implementation Strategy. Gaps would be outside the secondary shade zone of 170 feet. It is unlikely that gaps would result in an increase in stream temperature, due to the primary and secondary shade zones having no gaps placed in them. Additional light reaching the forest floor would help promote a second cohort of trees. Both shade-tolerant and intolerant species may be established; however, shade-tolerant species would likely maintain longer growth within the forest canopy as the overstory crown closes. The canopy cover is estimated to increase two-percent per year (Chan et.al). This second cohort is expected to provide vertical, horizontal, age, and species diversity in the treated stand.

Thinning within Riparian Reserves of non-permanent flowing streams (Class IV) would not have any effect on stream temperature since these streams do not contribute to stream heating during the peak temperature time period of July through September (USDA and USDI 2005).

Wood Recruitment to Streams

Riparian Reserves would be thinned using a combination of light to moderate thinning, maintaining 50% or greater canopy cover within the Reserves. Riparian Reserves would increase the health and vigor of the residual trees and help to increase the stands ability to adapt to future environmental changes. There would be no negative effects on stream shade and no measurable changes to water temperatures as a result from the Riparian Reserve thinning. Over the long-term trees treated within the Riparian Reserves would grow larger and would become more useful as functioning wood when they are recruited within perennial streams. Trees in thinned riparian stands would grow to a larger size than untreated areas, by reducing competition for light and nutrient resources therefore, potentially providing larger sized in-stream and floodplain wood than in the untreated areas. Residual trees in riparian areas would more effectively stabilize stream banks (by root systems) and would create a more abundant supply of large woody debris (LWD) to improve future stream habitat diversity, in addition to creating more diversity in the secondary canopy and ground vegetation. LWD is important for stream channel morphology by controlling the storage and routing of sediment and substrate, engaging floodplains and reducing stream temperatures. Fish populations are positively correlated with abundance of LWD. LWD promotes pool formation and helps to maintain functioning pools, creating cover and pocket protection areas for aquatic organisms, and helps to control and moderate the stream gradient, sorting gravel necessary for spawning.

Sediment in Streams

Living tree roots help stabilize soil and live trees remove soil water through evapotranspiration. Felling of live trees results in the loss of root strength and paired with soil saturation can lead to increased slope failure and potential increased sediment delivery to surface water. While the felling of trees results in less soil stabilization, it also decreases competition for the remaining trees allowing them to experience rapid growth and increased soil stabilization. The prescription is to thin overstocked stands from approximately 280 trees per acre to 90 trees per acre, which

would allow the remaining trees to grow at an increased rate, replacing root strength in the soil that was lost during timber harvest. Thinning is not expected to result in any sedimentation to the stream channel due to the absence of overland flow in forested soils. The creation of gaps in Riparian Reserves creates the potential for an increased probability of slides or wasting events. However, there would be a maximum of six acres of gaps placed outside 170 feet on Class II streams. Gaps would be placed on stable slopes ranging from 5-25% gradient. All units have been surveyed for unstable soils and unstable slopes and neither condition were found in any of the units. Overland debris flows, slides, or mass wasting events in gaps is highly unlikely given the porous soil, hydraulic conductivity of forested soils, and characteristics of sub-surface flows and flow paths in the proposed action area. Given the stable slopes, low gradient, and soil characteristics, there is a discountable probability that debris flows, slides, or mass wasting events would occur as a result of gap creation and hand-lines.

Sedimentation from haul, road work, or thinning is not likely in any measurable amounts. The majority of culverts replaced under the road maintenance schedule would be on intermittent streams and the construction would be completed on a dry stream channel. Culverts (Estep Creek) replaced on perennial streams would have an approved de-watering plan and would be completed and implemented to protect water quality downstream of the construction sites. Habitat of importance to listed species could be subjected to short-term increases in turbidity immediately following the Estep culvert replacement. It is not possible to do this work without some sediment displacement. However, such increases are likely to be of local extent and of short duration. It is probable that work associated with the Estep culvert replacement would affect suspended sediment/turbidity and substrate embeddedness within LFH.

The potential effects to spring Chinook salmon and bull trout using a habitat approach is discussed in detail in the Fisheries Biological Assessment, in the Pioneer Gulch Analysis File (Langum, 2011). The effect determinations for listed fish in this project are Likely to Adversely Affect (LAA) for spring Chinook salmon, Not Likely to Adversely Affect (NLAA) bull trout, Likely to Adversely Affect spring Chinook salmon Critical Habitat and bull trout Critical Habitat. Essential Fish Habitat is not in the project area.

Aquatic Management Indicator Species (MIS)

By following the Standards and Guidelines in the NWFP (USDA and USDI 1994: C-31 to C-33) and the Pioneer Gulch Project Design Criteria there would be no negative indirect effects to MIS. The Pioneer Gulch Project would maintain habitat conditions for aquatic MIS in the project area. Riparian design measures and the natural geology of the area would serve to prevent and direct impacts to MIS and their habitat in the UMFWR and its tributaries. Therefore, the Pioneer Gulch Project would not contribute to a negative trend in viability on the Willamette National Forest for these species.

Cumulative Effects

The cumulative effect analysis area is the Upper Middle Fork Willamette River fifth-field watershed. Cumulative effects were assessed based on past, present, and reasonably foreseeable future action listed in Appendix B of this EA.

Alternative A – No Action

There would be no cumulative effects because there would be no direct or indirect effects.

Alternative B – Proposed Action

For the cumulative effects discussion on the fisheries resource indicators the entire Upper Middle Fork Willamette fifth-field was analyzed, including the Estep Creek sub-watershed. Existing conditions are a result of past management and these effects have been described in a previous section. Cumulative effects were assessed based on past, present and reasonably foreseeable future actions listed in Appendix B of this EA.

Stream Temperature

Increases in stream temperature were found to have no measurable impacts with the established no-treatment buffers and would not be affected by this proposed alternative. Therefore, taken into account with past, present, and future actions the proposed action would have no cumulative effects on stream temperature.

Wood Recruitment to Streams

The proposed action was found to have no measurable impacts on wood recruitment with the established no-treatment buffers. Therefore, taken into account with past, present, and future actions there would be no cumulative effects to wood recruitment in streams.

Sediment in Streams

Overall the net long-term effects of the Pioneer Gulch Project would be beneficial to the aquatic environment when considered in context with past (Tumblebug Fire) and reasonably foreseeable future road stabilization projects (Upper Middle Fork Watershed Restoration and Road Closure project and the Tumblebug Fire Roadside Salvage) within the analysis area due to the fact that roads that are closed are put in a hydrologically stable condition before they are no longer maintained on a regular basis. The long-term and overall cumulative effects would be beneficial to improving road stability, system drainage, and provide a better opportunity to prevent large scale road failures in the future which also creates a more stable environment for fish and other aquatic organisms with less sedimentation into streams.

Aquatic Management Indicator Species (MIS)

Effects of the proposed action on MIS or their habitat across the project area, when considered cumulatively with other activities in the project area, would be beneficial to some of the important habitat indicators. Thinning densely stock Riparian Reserve stands improves vegetation conditions, which leads to increased large wood recruitment and creates more fire resilient stands along streams.

Wildlife

Existing Condition - General Wildlife

The following discussion briefly summarizes what is known or inferred about terrestrial wildlife species and their associations within the Westside Lowlands Conifer-Hardwood Forest (WLCH) habitat type (CHAPPELL et al., 2001). Although the Pioneer Gulch project area contains Montane Mixed Conifer (MMC) habitat type along with WLCH, most project activities would be limited to locations best described as WLCH habitat.

Where it occurs in Washington and Oregon, 232 wildlife species have been identified as associated with the Westside Lowlands Conifer-Hardwood Forest Habitat type (O'Neil et al., 2001). This includes 120 bird, 72 mammal, 26 amphibian, and 14 reptile species. Only a small percentage of those species however are listed as closely associated with this type of habitat. That list includes 23 bird, 23 mammal, and 2 amphibian species.

Closely associated species are those that are widely known to depend on a specific structural condition or habitat type for part or all of its life history requirements and are displayed in Table 3 of the Pioneer Gulch Wildlife Report (in Analysis File).

Environmental Consequences - General Wildlife

Direct and Indirect Effects

Alternative A – No Action

Alternative A would not have an effect on terrestrial wildlife assuming that current habitat proposed for diversity thinning, and other habitat treatments would continue to provide suitable habitat for wildlife species that may be present as it evolves without human management activities. No short or long-term changes to habitat would occur and no disturbance would result from management activities.

Alternative B – Proposed Action

Activities proposed under the Action Alternative for this project should have no effect on closely associated species to the extent their ability to persist throughout the project area or adjacent home ranges would be compromised.

Cumulative Effects

Alternative A – No Action

There would be no cumulative effects because there would be no direct or indirect effects.

Alternative B – Proposed Action

Project effects would result in a positive supplementary contribution, with respect to restoring historic habitat conditions in some previously treated portions of the project area, to cumulative effects that have occurred from past actions. Additional effects to specific habitat or groups of wildlife species are considered in subsequent sections of this report.

Existing Condition - Dead Wood Habitat

Standards and Guidelines (S&Gs) for managing snag and down wood (coarse woody debris – CWD) habitat are provided by the Willamette Forest Plan as amended by the ROD. Consideration of dead wood levels is based on whichever Forest Plan or ROD S&G is more restrictive or provides greater benefits to late-successional forest related species. S&Gs pertaining to CWD levels are directed at retention and recruitment associated with regeneration harvest (i.e. clear-cutting), while recognizing opportunities to apply the same basic guidelines, but modified to reflect stand potential associated with other harvest prescriptions. The general standard for CWD if proposing traditional regeneration harvest would be to leave 240 linear feet of logs/acre which are ≥ 20" diameter and ≥ 20' in length. Under the Willamette Forest Plan as amended by the ROD, snag habitat under matrix allocation shall be managed at levels within harvest units capable of providing for at least 40% or greater potential populations of cavity-nesting species. The 40%

level is influenced by vegetation zones and equates to ≥ 1.5 snags/acre for the western hemlock zone, and ≥ 1.7 snags/acre for the true fir zone (Neitro et al, 1985).

Forest Plan guidelines relevant to the Pioneer Gulch Project are FW-199 and FW-200 pertaining to changed environmental conditions. These forest-wide standards reference direction under other S&Gs to manage snag and down wood habitat under an approach that is generally considered less than sufficient based on current science. 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-McLean et al. 2011). DecAID has been created to help managers decide how much dead wood to provide for this part of a species habitat needs, and is designed to apply to salvage as well as green tree projects. See Appendix E for detailed discussion of the DecAID analysis for the Upper Middle Fork Willamette River watershed.

The benefit of DecAID applied to projects involving removal (harvest) of trees is in evaluating affected habitat types during the planning process to determine if current dead wood levels are consistent with reference conditions, and to aid in identifying dead wood management goals for projects that affect dead wood habitat throughout dominant habitat types. Dead wood amounts in DecAID are addressed in terms of tolerance levels which reflect what percent of a wildlife population can be expected to associate with particular sizes or amounts of snags and down wood. However, even in simplest terms, DecAID tolerance levels for an appropriate wildlife habitat type in a specific size class and structural condition cannot be used as a surrogate to estimate dead wood levels to support a given population potential. They simply suggest that a specific level of dead wood habitat is being utilized by a corresponding percentage of a population afforded use by that habitat.

This project proposes thinning in previously managed stands. It also proposes fuels treatments in both the thinned stands as well as in some natural stands in order to create a fuelbreak along the wilderness boundary. The majority of these activities occur in the Westside Lowland Conifer Hardwood (WLCH) habitat type – approximately 985 acres (89%) of treatments. Only 88 acres (11%) of treatments would occur in the Montane Mixed Conifer (MMC) habitat type. Reference information extrapolated from DecAID will suggest how current size, abundance, and distribution of snags and down wood compare to average historic levels for the dominant habitat types throughout the watershed.

In the fall of 2009, about 13,400 acres of forest burned in the 14,560 acre Tumblebug Fire (TF) perimeter within the UMF watershed. Current dead wood condition for the watershed was derived prior to that event (referred to as Pre-TF here). Changes in large down wood abundance and distribution as a result of the fire have not been modeled. Some down logs were directly lost to the fire, and additional down wood will accumulate over the next several decades as trees killed by the fire deteriorate and fall. Overall, down wood cover is expected to increase as this occurs. Estimated changes in snags (Post-TF) were derived using the following assumptions.

Photo interpretation with field verification indicated that about 7,840 acres of natural (unmanaged) forest and 13,400 acres of total (managed and unmanaged) forest burned in the Tumblebug Fire. It was assumed that the acres burned were proportional to the acres of wildlife habitat type (WHT) within the watershed. About 20% of the forest land in the watershed is estimated to be WLCH of the Oregon Cascades and 61% is estimated to be MMC. It was estimated that 1,552 and 4,814 acres of natural forest burned in these two WHTs respectively. It

was estimated that 2,582 and 8,007 acres of total forest land burned in these two WHTs respectively.

For large snags (≥ 20” dbh) it was assumed that the current acres with 0 snags represented managed stands and that the TF had no effect on creating large snags on this category as the stands have few large trees to produce large snags post-fire. The amount of natural forest that burned in each WHT was assumed to be proportional to the acres in each large snag distribution category excluding the 0 snag/acre category and that 80% of the acres that burned in categories with less than 10 snags/acre were shifted upward to categories with 10 or more large snags/acre. This distribution was used to represent the post-TF large snag distribution and to calculate changes in median density and tolerance levels. These estimates are coarse and conservative. However because they are based on median and percentiles it is not necessary to know precise densities of snags (which would be required if estimating mean values). The values shown reflect a known fact that the Tumblebug fire created a large number of snags on a substantial amount of the natural forest lands that were burned, and the post TF condition coarsely estimates this shift in snag distribution. These figures do not reflect acres in the burn where large snags were felled for safety reasons during suppression and initial post-fire rehabilitation work.

For total snags (≥ 10” dbh) the amount of total forest land that burned in each WHT was assumed to be proportional to the acreage in each snag distribution category. About 50% of the estimated acres burned in the 0 snag/acre category; and 80% of the estimated acres that burned in the other categories from > 0 to 18 snags/acre were shifted upward to categories with more than 18 snags/acre. This distribution was used to represent the post-TF total snag distribution and to calculate changes in median density and tolerance levels. These estimates are considered coarse and conservative.

Environmental Consequences - Dead Wood Habitat

Summary of Effects

This analysis indicates snag habitat across the UMF watershed ranges from broadly limiting to locally abundant for snag dependent species. The analysis has shown that down wood habitat ranges from comparable to historic levels to well above average for down wood dependent species. Post-fire snag and down wood levels within the project area portion of the watershed are recognized to exceed estimated reference levels, and should remain in that condition for the next several decades.

Total acreage treated under the Proposed Action would be about 3% of the Pioneer Gulch project area. The proposed action includes a provision to retain all current large down wood throughout the project area, and also includes measures that would ensure disturbance to existing down wood is minimized. Felled danger trees would only be removed from designated treatment units based on the silvicultural prescription. Danger trees felled outside designated units would be left on site as large down wood.

Effects associated with Alternative B on current and future dead wood habitat would occur on a spatial and temporal scale such that there is no reason to consider the ability of any dead wood dependent species to persist or become established in the UMF watershed would be influenced.

Direct and Indirect Effects

Alternative A – No Action

Alternative A is the alternative under which no action is proposed. It serves as a baseline against which the Action Alternative is evaluated for effects. No treatments are associated with this alternative that would have any direct effect on dead wood habitat. Habitat would continue to develop on a path of natural succession. Suppression mortality would continue to provide limited amounts of near and long-term snag and down wood habitat as an indirect effect of no action. Such stands would be subject to an unknown number and frequency of wildfires that may influence their ability to indirectly affect future levels of dead wood throughout the area. Speculating on these events and subsequent indirect or cumulative effects is considered beyond the scope of this analysis.

Alternative B – Proposed Action

Under Alternative B, commercial thinning, fuels treatments, and forage enhancement activities would occur throughout about 1% of WLCH habitat within the UMFW watershed. Treatment areas represent less than 1% of the entire UMFW watershed, or 3% of the Pioneer Gulch planning area. Project activities would be focused within WLCH habitat (89%). The contribution of individual project activities to total acreage affected is thinning harvest 76%, fuels treatments 11%, and forage enhancement 13%. Wildlife forage enhancement would not have any effect on snag or large wood habitat.

The influence of direct and indirect effects on dead wood as they apply to terrestrial wildlife species dependent on this habitat component is addressed in subsequent sections of this report.

Treatment prescriptions call for protection of existing snags and down logs (legacy wood). However some amount of loss or disturbance of legacy wood is inevitable as a result of safety and logging feasibility issues. Measures are identified to address this loss or disturbance. Implementing the proposed action in conjunction with additional design criteria would result in dead wood levels associated with treated areas that remain stable or slightly elevated in the near-term. Direct and indirect effects would be limited to an undeterminable number of snags and logs that may be unavoidably affected or created within treatment units. Long-term effects of project activities would influence an overall decline in total snag and down wood habitat associated with treated portions of the project area as a result of reduction in recruitment potential.

While standing and down dead wood is an important aspect of diversity associated with the Pioneer Gulch project, it is only one aspect. Management more strongly focused on maintaining existing and near-term dead wood levels would prevent attainment of other important diversity objectives such as increasing bole and crown sizes, development of a more dense and diverse understory layer, and releasing minor canopy tree species. Effects of the Pioneer Gulch project reflect a balance between maintaining existing and near-term levels of dead wood (particularly snags) in managed second-growth stands, against management focused on promoting the development of structural diversity associated with the living overstory and understory components in such stands. A Pioneer Gulch thinning objective is to stimulate stand development with one outcome being the long-term recruitment (> 40 years) of larger snags and down wood compared to unthinned stands (Friesen, 2009). Under the Action Alternative the average dbh for thinned stands would increase at a greater rate than under the No Action Alternative. Thinned units would provide the opportunity for large (≥ 20”) dead wood recruitment in larger numbers over a shorter timeframe.

SNAGS

Any loss of existing snag habitat would occur quite suddenly under the Action Alternative, and is unavoidable due to safety issues. Some existing snags in proximity to harvest activities would present a serious safety risk to workers involved with implementing the silvicultural prescription. Snag loss would be greatest among sizes <10" dbh, intermediate for snags ≥10" - <20" dbh, and lowest among snags ≥20" dbh. All felled snags would be left as down wood. Depending on decay class and burning conditions, some felled snags may be fully or partially consumed during subsequent fuels reduction and prescribed underburning in selected areas.

Under the silvicultural prescription for this project green trees would be harvested from specified areas by variable density thinning. Implementing this prescription would result in an average of about 85 trees per acre being retained, some of which may have current defects or sustain damage that would provide a future dead wood habitat component distributed throughout the project area – especially within Riparian Reserves. Additionally, skips would provide opportunities for the development of snags on about 35% of the original stand acreage in the plantations proposed for harvest.

Implementing the fuels treatment prescription under the proposed action (Alternative B) would affect current snag habitat in two ways. Snag loss and snag creation can both be expected. Broadcast underburning is likely to result in direct or indirect loss of some current snags which would be converted to down wood, or potentially consumed for advanced decay class snags. However measures are prescribed to minimize these effects. The project fuels report and silvicultural prescription discuss aspects of prescribed burning in greater detail. Snag creation would also be associated with broadcast underburning proposed under Alternative B. The proposed action would treat fuels in such a manner on about 265 acres across the planning area. Prescribed burning on these acres is estimated to result in 5-15% mortality of overstory trees. It is also reasonable to assume some level of partial or full mortality associated with trees immediately adjacent to pile burning activity. Any such mortality would add to an existing patchy distribution of snag habitat across about 1% of the planning area.

Project effects would occur in WLCH and MMC habitat types within the UMFW watershed. Modeling output shows current overall snag levels in WLCH habitat to be lower than modeled reference levels (i.e., 2.1 snags/acre versus 5 snags/acre). With respect to snag levels, the creation of additional snags discussed above would supplement retained levels and offset inevitable loss of some snag habitat associated with project activities. According to DECAID, current snag levels within the WLCH and MMC habitats of the watershed are in the 30-50% tolerance range (DecAID Figures WLCH_OCA_S.15 and MMC_S.15). Under the Action Alternative, the total amount of WLCH and MMC habitat throughout the UMFW watershed affected by project activities would be about 1%. Within both treated and untreated areas, current and future snag habitat throughout the project area would remain patchy in distribution.

DOWN WOOD

Existing down wood would be protected to the greatest extent feasible under the silvicultural and fuels treatment prescriptions. Some disturbance of existing down wood associated with the proposed action is inevitable. Recruitment of some existing snags, retained trees, sub-merchantable tops and debris not yarded to landings during commercial thinning, newly created stumps, along with old stumps would result in levels of down wood that are stable or slightly elevated across areas treated prior to fuel treatments.

Implementing the fuel treatments prescribed under the proposed action (Alternative B) would result in about 2/3 of coarse wood > 3” diameter being consumed by the activity. Most of the reduction would be in the 3” to 6” diameter range, but would also affect large diameter advanced decay class material. This affect would occur over approximately 350 acres (see Pioneer Gulch Fuels Report).

Project effects would occur in both WLCH and MMC habitat types in the UMFW watershed. Modeling output shows current levels in WLCH habitat to be consistent with modeled reference levels for large (≥ 20” diameter) down wood and somewhat lower for total (≥ 5” diameter) down wood. In MMC habitat, current modeled levels for both large (≥ 20” diameter) and total (≥ 5” diameter) down wood are substantially higher than reference levels. Under the Action Alternative, the total amount of WLCH and MMC habitat throughout the UMFW watershed affected by project activities would be about 1%. Within both treated and untreated areas, current and future dead wood habitat throughout the project area would remain patchy in distribution. Also with respect to DecAID down wood levels, the creation of additional amounts as discussed above would supplement retained levels and to some extent offset the loss of down wood habitat associated with broadcast underburning.

Cumulative Effects

Alternative A – No Action

There would be no cumulative effects from Alternative A because there would be no direct or indirect effects.

Alternative B – Proposed Action

The analysis area for Cumulative effects on dead wood habitat is the Upper Middle Fork Willamette River 5th field watershed. Cumulative effects were assessed based on past, present, and reasonably foreseeable future action listed in Appendix B of this EA.

Past management actions related to timber harvest activity have influenced the current condition of dead wood habitat throughout much of the planning area. These actions have affected the overall amount and distribution of dead wood habitat by reducing the amount of old-growth habitat and increasing the amount of early and mid seral habitat. The effect from decades of wildfire suppression has also influenced dead wood habitat by limiting the frequency, amount, and distribution of snag and down wood habitat across portions of the planning area and elsewhere throughout the UMF watershed. Currently foreseeable future actions that would affect dead wood habitat in this area include Tumblebug salvage, ongoing road maintenance (hazard tree removal), and road closure projects. The changing trend in timber management that has occurred within the past two decades, and projected for the future, should positively influence management of decaying wood in untreated areas as previously harvested stands redevelop, and more emphasis is placed on retention of key structural components in unharvested stands throughout the project area and across the adjacent landscape.

Dead wood is a habitat component important to many members of the wildlife community, and the presence of some species may be limited on a small scale by the amount and distribution of such habitat in portions of the watershed. Considering the overall percent of acres proposed for treatment against habitat at the UMF watershed scale, dead wood should exist in a sufficient amount and distribution across this landscape to support the local wildlife community including MIS and species dependent on dead wood. Although the long-term overall ability for species dependent on dead wood habitat to disperse across, persist within, or become established within

the project area would not be optimized by cumulative effects associated with the proposed action, these opportunities would still remain.

Threatened, Endangered, Proposed, and Sensitive (TES) Species

A summary of effects or impacts for federally listed, proposed, and sensitive (PETS) animal species on the 2008 Regional Forester's Special Status Species List with documented or potential occurrence in the Willamette National Forest is displayed in Table 25. Effects to designated critical habitat for federally listed terrestrial species are summarized in Table 26. This evaluation considers effects or impacts associated with the project's action alternative (Alternative B – Proposed Action) and the no action alternative (Alternative A).

Species indicated as having no habitat present or with a "no impact" rationale will not be discussed further in this document. The rationale for excluding species from further analysis in this BE is based on results of prefield review, local knowledge, and project field reconnaissance conducted from 2008 through 2011. See table below.

Table 25. Willamette TES (or Proposed) fauna and rationale for not carrying certain species forward for analysis.

SPECIES	Known or suspected pres.?	Suitable hab. present?	Rationale if not carried forward for analysis
Northern Spotted Owl *Strix occidentalis caurina*	Yes	Yes	
Bald Eagle *Haliaeetus leucocephalus*	Yes	Yes	Though bald eagles forage in the project area mainly along the Middle Fork Willamette River, roost trees would be protected, thus there would be no impact to eagles.
American Peregrine Falcon *Falco peregrinus anatum*	Yes	Yes	
Bufflehead *Bucephala albeola*	No	No	Field visits confirmed no suitable habitat is present.
Harlequin Duck *Histrionicus histrionicus*	No	No	Field visits confirmed no suitable habitat is present.
Yellow Rail *Coturnicops noveboracensis*	No	No	Field visits confirmed no suitable habitat is present.
Northern Waterthrush *Seiurus noveboracensis*	No	Yes	There is suitable habitat in the project area, however northern waterthrush are rare on the district, have never been documented in the project area, and there are no activities proposed in suitable habitat. Thus there would be no impact to waterthrush
Black Swift *Cypseloides niger*	No	No	Field visits confirmed no suitable habitat is present.
Purple Martin *Progne subis*	No	No	Field visits confirmed no suitable habitat is present.
Lewis' Woodpecker *Melanerpes lewis*	No	No	Field visits confirmed no suitable habitat is present.

SPECIES	Known or suspected pres.?	Suitable hab. present?	Rationale if not carried forward for analysis
White-headed Woodpecker *Picoides albolarvatus*	No	No	Field visits confirmed no suitable habitat is present.
North American Wolverine *Gulo gulo luscus*	No	Yes	There is suitable habitat in the project area, however wolverine has not been documented on the forest in the past 20 years and is very unlikely to occur in the project area, thus there would be no impacts to wolverine.
Fisher *Martes pennanti* (West Coast)	Low Potential	Yes	
Fringed Myotis (bat) *Myotis thysanodes*	Yes	Yes	
Townsend's Big-eared Bat *Corynorhinus townsendii*	Yes	Yes	
Pallid Bat *Antrozous pallidus*	No	No	Field visits confirmed no suitable habitat is present.
Oregon Slender Salamander *Batrachoseps wrighti*	Yes	Yes	
Foothill Yellow-legged Frog *Rana boylii*	No	No	Field visits confirmed no suitable habitat is present.
Oregon Spotted Frog *Rana pretiosa*	No	No	Field visits confirmed no suitable habitat is present
Pacific Pond Turtle *Actinemys marmorata*	No	No	Field visits confirmed no suitable habitat is present.
Mardon Skipper *Polites mardon*	Low Potential	Yes	Though suitable habitat does exist in the project area, mardon skipper have never been documented on the forest, despite surveys, thus it is unlikely they occur here and likewise there would be no impacts to skippers.
Johnson's Hairstreak *Callophrys johnsoni*	Low Potential	Yes	Though suitable habitat does exist in the project area, mardon skipper have never been documented on the forest, despite surveys, thus it is unlikely they occur here and likewise there would be no impacts to skippers.
Crater Lake Tightcoil *Pristiloma arcticum crateris*	Low Potential	Yes	Although suitable habitat is present, no Crater Lake tightcoils have been documented on the forest and they are not likely to occur in the project area. Regardless, mitigation measures would ensure there would be no impacts to tightcoils, if present.
Cascades Axetail Slug *Carinacauda stormi*	Low Potential	Yes	
Evening Fieldslug *Deroceras hesperium*	Low Potential	Yes	

Table 26: Summary of effects determination for Federally listed designated critical habitat associated with Pioneer Gulch Project.

Critical Habitat - Effect	Alt. A (No Action)	Alt. B (Proposed Action)	USFWS Consultation BA / BO
Northern Spotted owl *Strix occidentalis caurina*	NE	NE	NA

NE = No Effect
NA = Not Applicable

The planning area is situated on a landscape bounded on the north and west by large blocks of LSR/MOCA/CHU habitat (Western Oregon Cascades South CHU-12). It is bounded on the east and southeast by large blocks of congressionally withdrawn lands (Diamond Peak Wilderness and Oregon Cascades Recreation Area). The planning and analysis areas consist of habitat providing a high level of connectivity between these large blocks of habitat. The 2009 Tumblebug Fire (14,560 acres) did result in a landscape level impact, affecting 13% of the watershed, however it only overlaps 6% of the western edge of the Pioneer Gulch owl analysis area. Nesting, roosting, foraging, and dispersal opportunities for spotted owl are all functions associated with that connectivity.

Existing Condition - Threatened Species (Northern Spotted Owl)

Results from previous survey history reveal 13 historic spotted owl activity centers (sites) meet the known site criteria. The USFWS occupancy template generated no predicted sites within the Pioneer Gulch analysis area. Collectively the Pioneer Gulch planning area plus the surrounding area associated with home ranges for these sites defines the Pioneer Gulch spotted owl habitat analysis area. The spotted owl analysis area is also referred to as the action area, and encompasses about 51,348 acres.

Knowledge of spotted owl activity center (site) locations within the Pioneer Gulch project owl analysis area is a result of past survey efforts associated with Regional population monitoring and District timber sale planning. Most of the status and survey information is from the 1980's and 1990's.

Certain thresholds for the amount of suitable habitat within spotted owl provincial home ranges have been recognized as indicators of conditions that support successful nesting, roosting, and foraging (NRF). Spotted owl home ranges in the Willamette Province are typically considered to incorporate a 1.2 mile radius, along with a 0.5 mile radius core area around a nest site. Associated with these two areas are values that suggest at least 40% and 50% suitable habitat respectively is required to ensure successful NRF for spotted owls (USDI Fish and Wildlife Service 2011). Assessing suitable habitat against 40% within 1.2 mile and 50% within 0.5 mile standards was once considered a viability threshold for individual owls. But along with considering habitat capability (long-term potential to provide suitable habitat) and land allocation status (protected vs. unprotected) these standards are more recognized as measures of fitness and indicators for the likelihood of incidental take of spotted owl associated with modification of habitat within core areas and provincial home ranges (Courtney et al, 2004) (USDI Fish and Wildlife Service et al, 2008).

In order to evaluate effects to northern spotted owls (spotted owl) and their habitat from proposed activities associated with the Pioneer Gulch project, consideration needs to address an appropriate scale of analysis. The Pioneer Gulch project spotted owl habitat analysis area consists of the

project area plus additional acreage within 1.2 mile radius home ranges for spotted owl whose territories overlap portions of the project area where proposed activities would modify habitat or result in disturbance to nesting spotted owl. Under recent methodology established for estimating the number of spotted owls affected by proposed federal actions, spotted owl home ranges may be associated with known or predicted owl sites (USDI Fish and Wildlife Service et al, 2008). Known sites are in reference to a site occupied by a pair or resident single as defined by 1990 through 2008 survey protocol results. Predicted sites are used for determining effects to spotted owl where survey data are insufficient. A predicted site is defined as an area able to support resident spotted owl (i.e. a potential breeding pair) and the location is generated by applying the USFWS (2008) spotted owl occupancy template.

There are activities associated with the Pioneer Gulch proposed action that would modify spotted owl habitat within 1.2 miles of activity centers but the habitat that would be modified is all dispersal habitat modified by thinning (684 acres; Table 27). There is suitable habitat within project activity areas for forage (1 acre; Table 27) and fuels treatments (87 acres; Table 27) however the function of this habitat would be retained as suitable. Activities proposed that would result in habitat modification are thoroughly described and discussed in the Pioneer Gulch project silvicultural and fuels treatment prescriptions as well as the project EA and other supporting documents.

The location and type of noise-generating or other activities that affect the ambient environment associated with the proposed action were reviewed for their potential to affect northern spotted owl sites within the analysis area during the breeding season. Some activities are proposed that could disturb spotted owls during this timeframe. Effects associated with disturbance are addressed in the environmental consequences section of this analysis.

Habitat refers to both suitable and dispersal habitat (unless specifically identified as either suitable or dispersal habitat). Non-habitat refers to land which is capable of growing habitat, but does not currently function as either suitable or dispersal habitat.

Suitable habitat: Consists of forested stands used by spotted owls for nesting, roosting and foraging. Features that support nesting and roosting typically include a moderate to high canopy closure (60-90%); a multi-layered, multi-species canopy with large overstory trees (with dbh of greater than 30 inches); a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly. This habitat is described as nesting and roosting habitat in the revised northern spotted owl recovery plan (USFWS 2011c, p. A-10).

Foraging habitat generally has attributes similar to those of nesting and roosting habitat, but such habitat may not always support successfully nesting pairs (USFWS 2011c, p. A-10). Together, these comprise suitable habitat in this document.

Dispersal habitat: At a minimum, dispersal habitat consists of stands with adequate tree size and canopy closure to provide protection from avian predators and at least minimal foraging opportunities (USFWS 2011c, p. A-10). It is comprised of conifer and mixed mature conifer-hardwood habitats with a canopy cover greater than or equal to 40 percent and conifer trees greater than or equal to 11 inches average diameter at breast height (dbh) with open space beneath the canopy to allow spotted owls to fly. Generally, spotted owls use younger stands to move between blocks of suitable habitat, roost, forage and survive until they can establish a nest territory. Juvenile owls also use dispersal habitat to move from natal areas. Dispersal habitat thus

includes habitat that would provide some roosting and foraging opportunities during the colonization phase of dispersal, but not at a scale that would support nesting pairs (in which case it would be classified as suitable habitat). Suitable habitat can also function as dispersal habitat as it supports both territorial and dispersing spotted owls. However, in this document, dispersal habitat generally refers to stands that are 40-79 years old.

Known Owl Site: A site that was or is occupied by a pair or resident single as defined by the survey protocol (1990-2011). The specific site location is determined by the unit biologist based on the best and/or most recent information. A known site may be determined to be inactive only in accordance with the current survey protocol (USFWS 2011b).

Predicted Owl Site: An area able to support resident spotted owls (i.e. a potential breeding pair) as determined by the USDI et al. (2008) northern spotted owl occupancy template. This is used for determining effects to spotted owls where survey data are insufficient.

Nest Patch (or Stand): 300 meters (radius circle) around a known or predicted owl site, where a spotted owl would be likely to select a nest tree. This is based on habitat usage of spotted owls within the Central Cascades Study Area, located on the Willamette National Forest.

Core Area: 0.5 mile (radius circle) around a known or predicted owl site, which delineates the area most heavily used during the nesting season for nesting, foraging and rearing young. Bingham & Noon (1997) defined the core area as that portion of a northern spotted owl home range that received disproportionately high use for nesting, roosting and access to prey; they suggested that 60-70% of owl reproducing season activity occurred in about 20% of the home range. Although Courtney et al. (2004:5-5) observed that core area sizes varied greatly among owls, Thrailkill (pers. com.) determined that Bingham & Noon 1997, Wagner & Anthony 1999, Franklin et al. 2000 and Irwin et al. 2004 collectively suggested a core area of about 500 acres

Home Range: An estimated area for habitat use of a spotted owl pair. For the Oregon Cascades, this estimate is 1.2 miles (radius circle) around a known or predicted owl site (Thomas et al. 1990, USDI et al. 2008) and is also referred to as the Provincial Home Range in this document, since other provinces have different estimates for home ranges (USDI et al. 2008).

Table 27: Amount and type of spotted owl habitat affected by treatment units under Pioneer Gulch project Alternative B (proposed action).

Unit Number	Spotted Owl Dispersal Habitat Acres	Spotted Owl Suitable Habitat Acres	Spotted Owl Unsuitable Habitat Acres	Total Unit Acres
COM THIN UNITS	**684**	**0**	**256**	**940**
2761	25			25
2803	31		1	32
2888	40			40
2915			21	21
2920			34	34
2923	145		2	147
2952	110		8	118
3048	44			44
3057	23			23

Unit Number	Spotted Owl Dispersal Habitat Acres	Spotted Owl Suitable Habitat Acres	Spotted Owl Unsuitable Habitat Acres	Total Unit Acres
3062	39			39
3068			33	33
3135	28			28
3144	46			46
3147	61			61
3148			50	50
3485			20	20
3546	78		1	79
3599			25	25
3633			12	12
3770			20	20
3870			15	15
4115			2	2
5756			12	12
6927	14			14
FORAGE UNITS	**40**	**1**	**124**	**165**
2691			15	15
2866		1	18	19
3162	40			40
3570			91	91
FUELBREAK UNDERSTORY TRTS	**0**	**87**	**1**	**88**

Unit Number	Spotted Owl Dispersal Habitat Acres	Spotted Owl Suitable Habitat Acres	Spotted Owl Unsuitable Habitat Acres	Total Unit Acres
FUELBREAK PCT	**2**	**0**	**43**	**45**
			3	3
			2	2
			2	2
			1	1
			10	10
			2	2
			3	3
			2	2
			2	2
			1	1
			1	1
			1	1
	2			2
			3	3
			1	1
			3	3
			1	1
			2	2
			1	1
			2	2
Grand Total	**726**	**88**	**424**	**1,238**
% of Treatment Acreage	**59%**	**7%**	**34%**	**100%**

Environmental Consequences - Threatened Species (Northern Spotted Owl)

Direct and Indirect Effects

Direct effects to spotted owl are considered short-term (< 10 years) and range from not likely to adversely affect to none for habitat modification, disturbance, and Critical Habitat, as described below. Indirect effects to spotted owl are long-term (> 10 years) and range from negative to neutral for this proposed project.

Habitat Modification – Direct and Indirect Effects

Alternative A – No Action

There would be no direct or indirect effects resulting in habitat modification because no treatments would be implemented.

Alternative B – Proposed Action

Direct effects connected with habitat modification activities would be associated with project activities as they occur across the planning area over a staggered timeframe (estimated 4 – 6 years) as logging and fuels treatments would not all occur within one year or even a few years. Direct effects would occur throughout initial thinning and fuels treatments and also during subsequent limited maintenance underburning. Table 28 reveals current and post-treatment spotted owl habitat conditions within the Pioneer Gulch spotted owl analysis area.

Table 28: Current and Post-treatment spotted owl habitat (OHAB) conditions within Pioneer Gulch Spotted owl Analysis Area based on effect of proposed action (Alt B).

OHAB condition	Current Acres	% Current total	Post-treatment Acres	% Post-treatment Total
Suitable Habitat	24,800	48.30%	24,800	48.30%
Dispersal Habitat	10,748	20.93%	10,631	20.70%
Unsuitable Habitat	15,800	30.77%	15,917	30.99%
Total Acres	51,348	100%	51,348	100.00%

Table 29: Spotted owl habitat pre- and post- treatment by activity unit for the Pioneer Gulch Project Area Action Alternative.

Unit Number	Total Unit Acres	Spotted owl Dispersal Habitat Pre-treat	Spotted owl Unsuitable Habitat Pre-treat		Spotted owl Dispersal Habitat Post-treat	Spotted owl Unsuitable Habitat Post-treat	Type of Treatment Modifying Habitat
COM THIN UNITS	940	684	256		567	373	Gaps ~ 15% of unit acres
2761	25	25			21	4	Gaps
2803	32	31	1		26	6	Gaps
2888	40	40			34	6	Gaps
2915	21		21			21	n/a
2920	34		34			34	n/a
2923	147	145	2		123	24	Gaps
2952	118	110	8		92	26	Gaps
3048	44	44			37	7	Gaps
3057	23	23			20	3	Gaps
3062	39	39			33	6	Gaps
3068	33		33			33	n/a
3135	28	28			24	4	Gaps
3144	46	46			39	7	Gaps

Unit Number	Total Unit Acres	Spotted owl Dispersal Habitat Pre-treat	Spotted owl Unsuitable Habitat Pre-treat		Spotted owl Dispersal Habitat Post-treat	Spotted owl Unsuitable Habitat Post-treat	Type of Treatment Modifying Habitat
3147	61	61			52	9	Gaps
3148	50		50			50	n/a
3485	20		20			20	n/a
3546	79	78	1		66	13	Gaps
3599	25		25			25	n/a
3633	12		12			12	n/a
3770	20		20			20	n/a
3870	15		15			15	n/a
4115	2		2			2	n/a
5756	12		12			12	n/a
6927	14	14				14	Gaps & Thinning

The overall effect of the proposed action (Alternative B) would be:

- 0 acres of suitable habitat modified (removed or downgraded)
- 88 acres of suitable habitat treated with function maintained (all suitable habitat is within forage and fuels treatment units)
- 117 acres of dispersal habitat removed (most of the removal is due to gaps rather than canopy closure reductions from thinning)
- 609 acres of dispersal habitat treated with function maintained.
- Data in Table 29 show that all of the suitable habitat within the analysis area would be maintained; 0.23% of dispersal habitat would be removed and converted to unsuitable habitat.

Table 30 summarizes how direct effects on spotted owl habitat across the analysis area apply to individual spotted owl sites. There is no change in suitable habitat conditions at any of the owl sites within the 1.2 mile home range, 0.5 mile core area, nor the 300 meter nest patch. Site 3236 is highlighted to note that the current condition of suitable habitat within the home range is below the 40% threshold. This may be due to the large percentage of private land within the home range of this site. Additionally site 4544 has less than 50% suitable habitat within its core area. This is most likely influenced by the fact that the site straddles the Willamette and Umpqua National Forests and habitat assessments differ slightly between jurisdictions.

Owl Sites with project effects within 1.2 mile home range:

- Site 1075 – 2 acres dispersal thinning with function retained (Unit 4115)
- Site 2994 – 262 acres dispersal thinning with function retained, plus 53 acres of dispersal habitat removed in gaps (Units 2803, 2888, 2923, 2952)
- Site 3012 – 96 acres dispersal thinning with function retained, plus 14 acres of dispersal habitat removed in gaps (Units 3048, 3057, 3135)

- Site 3064 – 55 acres dispersal thinning with function retained, plus 16 acres of dispersal habitat removed in gaps (Units 3546, 3599)

Table 30: Effects of the Pioneer Gulch project proposed action (Alt B) on suitable habitat for known spotted owl sites (no predicted sites within the project analysis area).

Spotted Owl Site ID #	Suitable Habitat Condition for Spotted Owl Sites						Effects From Action? Take? Y / N
	Home Range 1.2 mile radius = 2,895 acres		Core Area 0.5 mile radius = 503 acres		Nest Patch 300 meter radius = 70 acres		
	Pre-action acres / %	Post-action acres / %	Pre-action acres / %	Post-action acres / %	Pre-action acres / %	Post-action acres / %	
1071	1,973 68%	No Change	385 77%	No Change	43 62%	No Change	No Effect No
1075	1,172 40%	No Change	366 73%	No Change	40 57%	No Change	NLAA* No
1324	1,462 50%	No Change	345 69%	No Change	70 100%	No Change	No Effect No
2994	1,605 55%	No Change	266 53%	No Change	61 87%	No Change	NLAA* No
3012	1,860 64%	No Change	395 79%	No Change	38 54%	No Change	NLAA* No
3063	1,561 54%	No Change	384 76%	No Change	68 98%	No Change	No Effect No
3064	1,388 48%	No Change	308 61%	No Change	38 55%	No Change	NLAA* No
3072	1,556 54%	No Change	278 55%	No Change	40 57%	No Change	No Effect No
3073	1,884 65%	No Change	341 68%	No Change	33 48%	No Change	No Effect No
3081	1,865 64%	No Change	268 53%	No Change	54 78%	No Change	No Effect No
3236	1,132 39%	No Change	378 75%	No Change	31 45%	No Change	No Effect No
4525	1,966 68%	No Change	284 56%	No Change	28 40%	No Change	No Effect No
4544	1,274 44%	No Change	179 36%	No Change	55 79%	No Change	No Effect No

*No suitable habitat modified, however proposed activities involve thinning and removal of dispersal habitat in core and/or home range areas

Owl Sites with project effects within 0.5 mile of core area:

The proposed action would not change the current condition of suitable habitat within a core area for any spotted owl site within the analysis area. Dispersal function would be retained for thinning treatment units within core areas with the exception of gaps.

- Site 2994 – 75 acres dispersal thinning with function retained, plus 13 acres of dispersal habitat removed in gaps (Units 2803, 2888)

- Site 3012 – 20 acres dispersal thinning with function retained, plus 3 acres of dispersal habitat removed in gaps (Units 3048)

Owl Sites with project effects within 300 meter nest patch:

No owl sites would have project activities occurring within a nest patch.

Indirect effects associated with habitat modification activities are considered negative or neutral for spotted owls for the following reasons. Estimates of current down wood as well as snag size and distribution for the watershed when compared to DecAID data indicate that 34-40% of the habitat in the watershed is within the 50% tolerance level for northern flying squirrel (key prey species for spotted owl). High levels of snags and down wood are key components of suitable spotted owl habitat, particularly in the capacity to provide foraging habitat. Dispersal habitat throughout the planning area is on a trajectory to suitability as foraging habitat over the next 20 to 50 years. Project activities would likely delay that trajectory and result in maintenance of quality dispersal habitat within treated stands. This indirect effect is a result of suppressed snag and down wood recruitment as growth and development in dispersal habitat responds to thinning and fuel treatments. Although it is recognized that prescribed burning activities would result in some level of green tree mortality that would provide snag and down wood habitat at stable or possibly increasing levels in some areas, the response would not override the overall effect of thinning on dead wood habitat for the next three to five decades. Despite the decrease in recruitment, the size of trees available for long-term snag and down wood recruitment would be larger within thinned stands.

Disturbance – Direct and Indirect Effects

Alternative A – No Action

There would be no direct or indirect effects resulting in habitat modification because no treatments would be implemented.

Alternative B – Proposed Action

Direct effects associated with project activities that may result in disturbance to spotted owls are considered as short-term, and summarized as follows.

Any activity proposed by the Pioneer Gulch Project resulting in disturbance between September 30 – March 1, or conducted beyond disturbance distances described in the Willamette Province FY2011-2012 Habitat Modification BA (USDA et al. 2010) (Table 13), would have no effect on spotted owls.

Disturbance activities such as those associated with timber harvest, road work, or other resource improvement projects involving use of chainsaws, heavy equipment, hauling, and prescribed burning are considered as a may affect, but not likely to adversely affect (MA-NLAA) spotted owls if conducted from March 1 – July 15 or July 16 – September 30 beyond the disruption distance but within the disturbance distances displayed in Table 31 for the Willamette Province FY2011-2012 Habitat Modification BA (USDA et al. 2010). There is no helicopter work proposed under this project.

In order to avoid all situations that would result in disruption to spotted owls during the breeding season, the Pioneer Gulch Project would restrict activities from occurring under the Action Alternative from March 1 – July 15 as follows:

- Restrict burning activities that generate smoke from occurring between March 1 – July 15 on the following units: 2803, 2888, 3000, 3048

Table 31: Disturbance and disruption distances for the northern spotted owl during the breeding period (USFWS 2010).

Source of Disturbance/ Disruption[1]	Disturbance Distance	Disruption Distance	
	Entire Breeding Period (March 1 – September 30)	Critical Breeding Period (March 1 – July 15)	Late Breeding Period (July 16 – September 30)
Blasting	1,760 yards (1 mile)	1,760 yards (1 mile)	440 yards (0.25 mile)
Burning	440 yards (0.25 mile)	440 yards (0.25 mile)	0 yards
Chainsaw use	440 yards (0.25 mile)	65 yards	0 yards
Hauling on open roads	440 yards (0.25 mile)	0 yards	0 yards
Heavy equipment	440 yards (0.25 mile)	35 yards	0 yards
Helicopter – Type I[2]	880 yards (0.5 mile)	440 yards (0.25 mile)	440 yards (0.25 mile)
Helicopter – other[3]	440 yards (0.25 mile)	120 yards	0 yards
Rock crushing	440 yards (0.25 mile)	180 yards	0 yards

[1] Noise distances were developed from a threshold of 92 dB (USFWS 2003). Smoke disturbance distances are based on a FWS white paper (USFWS 2007b)

[2] Type I helicopters seat at least 16 people and have a minimum capacity of 5,000 lbs. Both a CH-47 (Chinook) and UH-60 (Blackhawk) are Type I helicopters. Note that disruption distance is the same vertically as horizontally, but is measured from the top of the canopy.

Kmax helicopters are considered "other" for the purposes of disturbance. Sound readings from Kmax helicopter logging on the Olympic NF registered 86 dB at 150 yards (Piper 2006).

[3] All other helicopters (including Kmax). Note that disruption distance is the same vertically as horizontally, but is measured from the top of the canopy.

The Pioneer Gulch Project proposed action does involve some activities that would result in disturbance to spotted owls during the breeding season. Some disturbance associated with project activities would occur at 2 of 13 nest sites across the analysis area during the spotted owl breeding season. Eleven of 13 sites would not be subject to any level of disturbance.

There are no recognized indirect effects to spotted owls from disturbance associated with this project. Activities associated with mitigating or resource opportunity projects have not been identified for areas where disturbance to spotted owls would be a concern. Any unforeseen related activity would be subject to review, and would not be conducted within the defined disturbance or disruption distance during the breeding season.

Critical Habitat– Direct and Indirect Effects

Alternatives A and B

There is no spotted owl critical habitat within the Pioneer Gulch planning area, thus there would be no direct or indirect affects to critical habitat under either alternative.

Cumulative Effects – Spotted Owl Habitat Modification, Disturbance, and Critical Habitat

Alternative A – No Action

Because there would be no direct or indirect effects under Alternative A, there would also be no cumulative effects to spotted owls or their habitat.

Alternative B – Proposed Action

Beyond the direct/indirect effects addressed associated with proposed activities under the Pioneer Gulch project proposed action (Alternative B), there are no future State or private activities that are reasonably certain to occur within the owl analysis area that would result in cumulative effects to spotted owl habitat. There is 1,429 acres of private land in the owl analysis area (2.7%), which is predominantly unsuitable habitat. However, future road closure/restoration projects, fish habitat improvement, ongoing roadside danger tree removal, as well as salvage logging the Tumblebug fire would contribute to cumulative effects which may affect but are not likely to adversely affect spotted owls.

Current Standards and Guidelines governing management of this and surrounding areas provide direction that should provide for the long term maintenance of amount and distribution of potentially suitable habitat for the spotted owl. The changing trend in forest management that has occurred within the past decade, and projected for the future, should positively influence occupancy of suitable habitat for the spotted owl as previously harvested stands redevelop and more emphasis is placed on recruitment of key structural components missing from harvested stands, retention of key structural components present in unharvested stands, and restoration/maintenance of special habitats as key components of biodiversity at a landscape level.

This project would not optimize near-term development or maintenance of suitable spotted owl habitat, but would result in long-term maintenance of quality dispersal habitat and development of suitable habitat. Because of the present condition and location of current harvest, restricted harvest, and non-harvest allocations, cumulative effects of past or present actions such as the Pioneer Gulch project should not influence the ability of the local spotted owl population to persist, or become established in the surrounding landscape by eliminating demographic linkages beyond the species dispersal capabilities.

Determination – Spotted Owl Habitat Modification and Disturbance

Current conditions in the Pioneer Gulch project spotted owl analysis area are sufficient to support occupancy and dispersal of owls across the landscape, and should increase as capable and dispersal habitat develops. However the Pioneer Gulch project proposed action does involve short and long-term degrading or removal of dispersal habitat in matrix land allocations. This habitat modification would affect dispersal habitat within 4 spotted owl home ranges. Activities associated with the proposed action would result in disturbance to two spotted owl sites during the breeding season. Critical habitat would not be affected by any activity.

The following determination is made in assessing the impact of activities under the Pioneer Gulch proposed action (Alternative B) on spotted owls and their habitat, or on spotted owl critical habitat.

For Habitat Modification

- Light/moderate thinning and prescribed fuels treatment where the function of dispersal habitat is retained and where dispersal habitat is removed may affect, but is not likely to adversely affect northern spotted owls.
- Fuels and forage treatments in suitable habitat would retain function of that habitat, thus there is may affect, but is not likely to adversely affect suitable spotted owl habitat.

For Disturbance

- Prescribed burning in several of the units within the project area has the potential to disturb two spotted owls sites, thus may affect, but is not likely to adversely affect northern spotted owls

For Critical Habitat

- There is no critical habitat within the project area, thus no effect to critical habitat.

Communication with US Fish and Wildlife Service

Consultation with USFWS is required based on analysis of the proposed action. Consultation for effects associated with the Pioneer Gulch proposed action has been incorporated into the Willamette Planning Province FY 2011-2012 Biological Assessment for LAA Projects with the Potential to Modify Habitat of Northern Spotted owls (USDA Forest Service et al, 2010)

The USFWS issued their Biological Opinion (BO) for fiscal years 2011-2012 habitat modification activities within the Willamette Province (FWS Reference Number 13420-2010-F-0157) in February 2011. Effects stated in the BO are no greater than those stated in this analysis. Based on the initial Pioneer Gulch Project actions, the determination for affects to spotted owls was Likely to Adversely Affect (LAA) habitat. However, due to project modifications that occurred after consultation, the final determination of affects is May Affect, Not Likely to Adversely Affect (NLAA) spotted owl habitat. Formal consultation will remain in place, and the change in determination will be addressed in the annual monitoring reports.

The Pioneer Gulch project will comply with all standards, reasonable and prudent measures pertaining to project activities described in the BO. Compliance with standards and measures ensures consultation requirements under the ESA have been met for the proposed action under Pioneer Gulch project EA Alternative B.

Alternative A Summary for All Species in the Following Sections

For all fauna species addressed in the following sections, there are no direct or indirect effects because there are no actions to cause effects. Because there are no direct or indirect effects, Alternative A would not add to effects of past, present and future actions so there would be no cumulative effects. However, under No Action as stands age and develop with competition mortality, they will provide better habitat for cavity excavators, pileated woodpeckers, fisher, marten, Oregon slender salamander, red tree voles, bats, and some landbirds. Conversely, habitat for big game, great gray owl, and some landbirds will not improve and will likely decline unless there are large-scale wildfires or other natural disturbances that create early seral habitat.

Riparian habitat will likely improve as it ages and develops complexity, which will benefit species such as the bald eagle, peregrine falcon, Crater Lake tightcoil and evening fieldslug.

Sensitive Species – Existing Condition and Environmental Consequences

The analysis area for direct, indirect, and cumulative effects for Sensitive Species is the Pioneer Gulch Project Area (37,195 acres). Cumulative effects were assessed based on past, present, and reasonably foreseeable future action listed in Appendix B of this EA.

Peregrine Falcon - Existing Condition -

There is one peregrine falcon nest site (OE-23) within the Pioneer Gulch project boundary. The site is managed consistent with Region 6 policy (USDA Forest Service, 1999). Under that policy, three management zones serve to define spatial and temporal measures that guide activities that modify habitat or would result in disturbance. The zone represents an area of about a three mile radius around the site. Since the project area contains a peregrine nest site, it is likely that on occasion the entire planning area may be used as foraging habitat by this species. It is also likely that young dispersing from nest sites may utilize habitat within the planning area. Effects associated with Pioneer Gulch Action Alternative are considered relative to the planning area by addressing how habitat may be used by peregrines and by considering the potential for project activities to disturb nesting behavior.

Field Reconnaissance: The peregrine nest site has been monitored 4 of the past 5 years (2006-2011). It was occupied all four of the monitoring years and successfully fledged young 3 of those years. Thinning activities are proposed under the Action Alternative that would modify or disturb habitat in the vicinity of the nest location. Thinning Units 2803 and 2888 are in the peregrine primary management zone.

It is assumed that the current composition of habitat throughout the planning area supports a wide range of avian species and functions as foraging habitat for peregrines from nearby nest sites. Natural events, as opposed to human activities, generally define the ambient noise baseline which influences behavior of potential avian prey throughout the area.

Peregrine Falcon – Direct, Indirect, and Cumulative Effects

Alternative B – Direct and Indirect Effects

Thinning activities are proposed under the Action Alternative that would modify or disturb habitat in the vicinity of the nest location. Therefore short term direct and indirect effects to peregrine falcons are anticipated as a result of the Action Alternative. Thinning Units 2803 and 2888 are in the peregrine primary management zone. Forest Service policy regarding management of peregrine falcon nest areas post-delisting is defined in the 1999 Regional Forester's letter (USDA Forest Service, 1999). This guidance states that "projects planned within the Primary Zone should enhance or be neutral in effects on peregrine nesting activity and prey habitat." The current condition of the units to be thinned is a dense canopy, stem exclusion condition providing limited opportunity for abundance and diversity of peregrine prey species, thus thinning the stand will improve habitat conditions for avian prey and thus enhance habitat surrounding the peregrine nest site in the long-term. In order to avoid disturbance to nesting falcons, activities would be seasonally restricted in these two units (2803 and 2888) between January 15th and July 31st (USDA Forest Service, 1999). Regional policy also states that projects within secondary and tertiary zones should be carefully screened for potential disturbance effects during the nesting

season. Numerous thinning units are within the secondary and tertiary zones of the OE-23 peregrine falcon, however, only a few units are within line of sight of the eyrie. These units should have seasonal restrictions on all activities between January 15th and July 31st – Units 2761 and 2923.

As an indirect effect, foraging habitat for peregrines will improve as a result of this project's influence on habitat responding to silvicultural, fuels, and forage enhancement objectives such as increasing growth, structure, and overall diversity to the benefit of a variety of birds known to be preyed upon by peregrines.

Beyond the direct/indirect effects addressed associated with proposed activities under the Action Alternative, there are projects that will contribute to cumulative effects such as: road closure/restoration projects, fish habitat improvement, ongoing roadside danger tree removal, as well as salvage logging the Tumblebug fire. These activities may impact individuals or their habitat, but the action will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

The changing trend in timber and habitat management that has occurred within the past decade, and projected for the future, should positively influence successful utilization of foraging habitat for peregrines as more emphasis is placed on recruitment of key structural components missing from previously harvested stands, retention of key structural components present in unharvested stands, treatment in riparian systems to promote structure, and restoration and maintenance of special habitats as key components of biodiversity at a landscape level.

Alternative B – Cumulative Effects

Cumulative effects from the Pioneer Gulch project should be positive as overall habitat diversity increases in response to the treatments proposed within the planning area. These treatments should encourage a long-term increasing trend in the quality of foraging and dispersal habitat for peregrine falcons that may utilize this area.

Alternative B – Effects Determination

There are proposed activities that would disturb peregrines at a known nest site during the breeding season, thus seasonal restrictions would be imposed. Additionally activities would affect habitat within the primary management zone of a peregrine nesting site. However, this project would not likely influence the ability of peregrines to forage or disperse through habitat across the project area. Therefore it is determined Alternative B (Action Alternative) **may impact individuals or their habitat (MIIH), but the action will not likely contribute to a trend towards Federal listing** or loss of viability to the population or species.

Fisher – Existing Condition

Though no confirmed sightings have occurred recently within the planning area, this evaluation assumes the potential for fisher to utilize habitat associated with this project for one or more of its biological requirements. It also assumes the likelihood of occupied habitat is exceptionally low. Habitat associated with the Pioneer Gulch project currently considered best capable of serving as breeding/denning, resting, foraging and dispersal habitat for fisher falls outside areas proposed for treatment activities under the Action Alternative. Assuming any historic fisher population in this area was low to begin with, the likelihood that fisher may occur even in the most optimal remaining habitat in this portion of its former range based on current known distribution is considered extremely low.

Fisher – Direct, Indirect, and Cumulative Effects

Alternative B – Direct and Indirect Effects

The Pioneer Gulch project does not propose activity within treatment units that is considered to directly affect the ability of fisher to utilize habitat throughout the planning area for denning, resting, foraging, or dispersal. Noise disturbance potential is considered low because of daily activity patterns, the wide-ranging daily movements of fisher, the low density of any potential population, and the spatial and temporal aspects of activities across the planning area.

Implementing the silvicultural prescription as proposed should result in accelerating the transition from managed stands in a structurally simplified seral condition, to habitat having large tree characteristics as released trees respond by increasing size and structural diversity, and as additional levels of down wood continue to accumulate in the near-term. Such developmental effects in riparian habitat would be beneficial to fisher. However long-term indirect effects would trend towards neutral or negative as treated stands recover. While understory development and an increase in average dbh and structural diversity of overstory trees is realized, harvest treatments can be expected to reduce overall dead wood recruitment potential by capturing natural suppression mortality for the next several decades. Only 2.5% of the entire project area would be influenced by activities and most of the activity areas would be classified as foraging and dispersal habitat for fisher.

Alternative B – Cumulative Effects

There are no proposed activities under the Action Alternative that would contribute to long-term cumulative effects related to past and current disturbance activities.

Alternative B – Effects Determination

Because of effects associated with developmental aspects of habitat components important to the species, it is determined the Pioneer Gulch project **may impact individuals or their habitat (MIIH), but the action will not likely contribute to a trend towards Federal listing** or loss of viability to the population or species for fisher under the Action Alternative.

Fringed Myotis – Existing Condition

No recent formal bat surveys within the planning area have been conducted. There are no mines or abandoned buildings that would serve as suitable hibernacula nor are there known roost sites associated with other structures (such as bridges) within 250 feet that would be affected by proposed activities. There are numerous small and larger cliffs scattered throughout the project area. Some of these cliffs contain cavy features considered to have potential for roosting use by bats. The area also contains a number of legacy trees and snags (Douglas-fir>36” and incense cedar >24”) with structural defects. Recent data associated with a study of fringed myotis day roosts (Weller, T.J. and C.J. Zabel 2001) suggests some snags and decadent trees occurring within or adjacent to proposed treatment areas contain features suitable for roost use by this and other species of bats.

Fringed Myotis – Direct, Indirect, and Cumulative Effects

Alternative B – Direct and Indirect Effects

Implementing the silvicultural prescription as proposed should result in accelerating the transition from managed stands in a structurally simplified seral condition, to habitat having large tree characteristics as released trees respond by increasing size and structural diversity. Snags and

down wood continue to accumulate in the near-term, albeit at a reduced rate associated with lower suppression mortality. Although minor in scale relative to the project area, forage enhancement would result in restoration of open forest and edge habitat at key locations. Such developmental indirect effects, particularly in riparian habitat, would be beneficial to fringed myotis.

One anticipated long-term result of the Pioneer Gulch project under the Action Alternative would be that post treatment habitat offers a greater amount of edge habitat, an overall reduced clutter yet with greater complexity in open habitat, and with abundant roost sites in both living and dead trees. Such habitat would be expected to provide good overall foraging opportunities for most bat species including fringed myotis

Alternative B – Cumulative Effects

Beyond the direct/indirect effects addressed associated with proposed activities under the Action Alternative, there are projects that would contribute to cumulative effects such as: road closure/restoration projects, fish habitat improvement, ongoing roadside danger tree removal, as well as salvage logging the Tumblebug fire. These activities may impact individuals or their habitat, but the action will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Alternative B – Effects Determination

It is determined that activities proposed under the Action Alternative could result in a situation that **may impact individuals or their habitat (MIIH), but the action will not likely contribute to a trend towards Federal listing** or loss of viability to the population or species for fringed myotis.

Townsend's Big-eared Bat – Existing Condition

Most commercial thinning units are lacking large snags and live trees with cavities that could provide roosting habitat for *C. townsendii*. Mature stands adjacent to these units do however provide such habitat. In addition, there are snags and live trees in the fuels and forage enhancement units that are considered for their potential to provide day or night roosting habitat for *C. townsendii*. No attempt was made to quantify or document the location of trees or snags with roosting potential. The silvicultural prescription includes measures to address protection of this type of habitat feature.

Townsend's Big-eared Bat – Direct, Indirect, and Cumulative Effects

Alternative B – Direct and Indirect Effects

Implementing the silvicultural prescription as proposed should result in accelerating the transition from managed stands in a structurally simplified seral condition, to habitat having large tree characteristics as released trees respond by increasing size and structural diversity. Snags and down wood continue to accumulate in the near-term, albeit at a reduced rate associated with lower suppression mortality. Although minor in scale relative to the project area, forage enhancement would result in restoration of open forest and edge habitat at key locations. Such developmental indirect effects, particularly in riparian habitat, would be beneficial to fringed myotis.

One anticipated long-term result of the Pioneer Gulch project under the Action Alternative would be that post treatment habitat offers a greater amount of edge habitat, an overall reduced clutter

yet with greater complexity in open habitat, and with abundant roost sites in both living and dead trees. Such habitat would be expected to provide good overall foraging opportunities for most bat species including fringed myotis

Alternative B – Cumulative Effects

Beyond the direct/indirect effects addressed associated with proposed activities under the Action Alternative, there are projects that would contribute to cumulative effects such as: road closure/restoration projects, fish habitat improvement, ongoing roadside danger tree removal, as well as salvage logging the Tumblebug fire. These activities may impact individuals or their habitat, but the action will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Alternative B – Effects Determination

It is determined that activities proposed under the Action Alternative could result in a situation that **may impact individuals or their habitat (MIIH), but the action will not likely contribute to a trend towards Federal listing** or loss of viability to the population or species for fringed myotis.

Oregon Slender Salamander – Existing Condition

Suitable habitat for this species occurs throughout portions of the planning area, including areas proposed for thinning and fuels treatment activities under Alternative B. Based on what is known about habitat preferences for Oregon slender salamander the most likely locations within the planning area where this species may occur is in old-growth habitat along with previously harvested stands where higher concentrations of large down wood and stumps still exist – especially if composed of Douglas-fir. No treatments are proposed in any old-growth habitat within the Pioneer Gulch planning area.

Oregon Slender Salamander – Direct, Indirect, and Cumulative Effects

Alternative B – Direct and Indirect Effects

Consideration of direct effects to Oregon slender salamanders from implementing the silvicultural prescription under the proposed action is directed to habitat disturbance associated with activities such as falling and yarding, plus a limited amount of broadcast underburning and the subsequent potential disturbance resulting in loss or displacement of individuals that may be occupying affected habitat during these activities.

Direct effects to this species are the amount of habitat modified or disturbed against that which is available throughout the Pioneer Gulch project planning area. About 99% of natural stands in the planning area would be unaffected by proposed activities. Natural stands affected (< 1%) by activities are those associated with fuels treatment units. Thinning and fuels treatment activities would affect about 3% of the planning area.

Implementing the silvicultural prescription as proposed should result in accelerating the transition from managed (and some unmanaged) stands in a structurally simplified seral condition, to habitat having large tree characteristics as released trees respond by increasing size and structural diversity, and as additional levels of larger down wood continue to accumulate in the near-term. Developmental effects that contribute to current and future coarse woody debris would be beneficial to Oregon slender salamander.

Alternative B – Cumulative Effects

Beyond the direct/indirect effects addressed associated with proposed activities under the Action Alternative, there are projects that would contribute to cumulative effects such as: road closure/restoration projects, fish habitat improvement, ongoing roadside danger tree removal, as well as salvage logging the Tumblebug fire. These activities may impact individuals or their habitat, but the action will not likely contribute to a trend towards Federal listing or loss of viability to the population or species. Cumulative effects from the Pioneer Gulch project in conjunction with past actions are considered neutral or negative as some components of habitat important to Oregon slender salamander improve in response to silvicultural treatments while other components decline in response to forage enhancement and fuel treatments within treated portions of the project area.

Alternative B – Effects Determination

It is determined that activities as proposed under the Action Alternatives could result in a situation that **may impact individuals or their habitat (MIIH), but the action will not likely contribute to a trend towards Federal listing** or loss of viability to the population or species for Oregon slender salamander.

Cascade Axetail Slug (formerly Salamander Slug) – Existing Condition

This species appears to occupy a broad range of age classes in Douglas-fir forest habitat. Within that habitat they seem closely associated with microsites defined by specific leaf (vine maple) and needle litter (Douglas-fir) and moisture (very wet) conditions (Doerr and Young 2009). At most about 3.5% of the planning area may be subject to proposed activities that could disturb habitat deemed potentially suitable for the salamander Cascade Axetail Slug. This estimate is based on an assumption that up to one-third of acres treated contain habitat components that favor use by this slug species.

Cascade Axetail Slug (formerly Salamander Slug) – Direct, Indirect, and Cumulative Effects

Alternative B – Direct and Indirect Effects

Direct effects to this species are the amount of habitat modified or disturbed against that which is available throughout the Pioneer Gulch project planning area. About 99% of natural stands in the planning area would be unaffected by proposed activities. Natural stands affected (< 1%) by activities are those associated with fuels treatment units, and little of this habitat is considered suitable habitat for this slug. Thinning and fuels treatment activities would affect about 3% of the planning area.

This project would result in unavoidable and incidental disturbance or modification of some habitat features known to be associated with use by these slugs. Direct effects associated with project activities may therefore result in a short-term adverse effect to an undeterminable number of individuals. Protecting existing large down wood and minimizing ground disturbance during all proposed activities, as stated in the silvicultural prescription would ensure any negative direct effect to this species is moderated.

Implementing the silvicultural prescription as proposed should result in accelerating the transition from managed (and some unmanaged) stands in a structurally simplified seral condition, to habitat having large tree characteristics as released trees respond by increasing size and structural diversity, and as additional levels of larger down wood continue to accumulate in the near-term.

Developmental effects that contribute to current and future coarse woody debris would be beneficial to the slug. This effect is considered minor relative to the amount of undisturbed habitat throughout the project area.

Alternative B – Effects Determination

Beyond the direct/indirect effects addressed associated with proposed activities under the Action Alternative, there are projects that would contribute to cumulative effects such as: road closure/restoration projects, fish habitat improvement, ongoing roadside danger tree removal, as well as salvage logging the Tumblebug fire. These activities may impact individuals or their habitat, but the actions will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Alternative B – Cumulative Effects

It is determined that activities as proposed under the Action Alternatives could result in a situation that **may impact individuals or their habitat, but the action will not likely contribute to a trend towards Federal listing** or loss of viability to the population or species for Cascade Axetail Slug.

Evening Field Slug – Existing Condition

There are currently no known locations for this species on the Willamette National Forest. Given the current distribution of known sites, the likelihood of occurrence within the planning area is considered low. Nevertheless suitable habitat for this species is considered to exist at locations throughout the planning area and is associated with perennially wet terrestrial areas within Riparian Reserves. Surveys for evening fieldslug are not considered to be required for this project because all of the activities prescribed that may overlap suitable habitat are exempted for survey under the 2006 Pechman Exemption for the 2001 Survey and Manage Standards and Guidelines. (for details, see Chapter XV in Pioneer Gulch Wildlife Report in Analysis File for more details).

Evening Field Slug – Direct, Indirect, and Cumulative Effects

Alternative B – Direct and Indirect Effects

Due to protection measures listed in the silvicultural prescription that apply to riparian habitat associated with all treatments under the Action Alternative, some management activities are proposed that would affect unsurveyed suitable habitat. Class 1 streams as well as Skunk Creek would all have 100’ buffers. Thus, these areas would provide sufficient protection for D. hesperium habitat zone (i.e. 30 m from perennial areas). However, Class II and III perennial streams would have only a 60 foot buffer, thus there is the potential to impact this mollusk if suitable habitat exists outside the 60 foot buffer zone. Thus, Pioneer Gulch project activities may impact individuals or their habitat, but the action will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

As an indirect effect, suitable habitat for evening fieldslug would likely improve under this project's influence on riparian habitat responding to treatment objectives such as increasing growth, structure, and overall biodiversity.

Alternative B – Cumulative Effects

Beyond the direct/indirect effects addressed associated with proposed activities under the Action Alternative, there are projects that would contribute to cumulative effects such as: road closure/restoration projects, fish habitat improvement, ongoing roadside danger tree removal, as

well as salvage logging the Tumblebug fire. However these activities should have appropriate riparian buffers enforced so there would be little to no impact on evening fieldslug or their habitat.

Management Indicator Species (MIS) – Existing Condition and Environmental Consequences

Summary

The Willamette Forest Plan has identified a number of terrestrial wildlife species with habitat needs that are representative of other wildlife species with similar habitat requirements for survival and reproduction. These management indicator species (MIS) include spotted owl, bald eagle, peregrine falcon, cavity excavators, pileated woodpecker, deer, elk, and marten. Most of these species are either known to occur or have potential to occur in or near the project area. Spotted owl, bald eagle, and peregrine falcon were previously discussed (or rationale was given for not carrying them forward in the analysis) in the TES Species section, above, and will not be addressed in this section. Activity associated with the proposed action is consistent with, or exceeds Willamette Forest Plan Standards and Guidelines as they pertain to MIS management (USDA Forest Service 1990).

In addition to individual species habitat requirements, proposed activities are recognized to be spatially and temporally influenced in their subsequent effect to individual MIS. Although proposed activities would modify some suitable habitat, and likely disturb some individual terrestrial MIS that may be present, they should not threaten the capability of any local population of these species to persist or become established in the project area. Project effects considered negative relative to disturbance would be short-term and minimal compared to the amount of habitat available in the surrounding landscape. Project effects considered negative relative to habitat modification would extend into a long-term timeframe due to the gradual reduction in recruitment of dead wood habitat associated with treatment areas. Long-term beneficial effects are associated with habitat having a higher level of structural and floristic diversity, and the capability of providing larger sizes of snag and down wood habitat.

Unless indicated otherwise, the analysis area for MIS for direct, indirect, and cumulative effects was the Pioneer Gulch Project Area (31,795 acres). Cumulative effects were assessed based on past, present, and reasonably foreseeable future action listed in Appendix B of this EA. Table 32 displays the presence of MIS wildlife species and their habitat.

Table 32: Willamette National Forest Wildlife MIS (not already addressed).

SPECIES	Known or suspected presence?	Suitable habitat present?
American Marten	Yes	Yes
Deer and Elk (Big Game)	Yes	Yes
Pileated Woodpecker	Yes	Yes
Cavity Excavators	Yes	Yes

American Marten - Existing Condition

Marten occupy a narrow range of habitat types found in or near coniferous forests. More specifically, they associate closely with late-successional stands of mesic conifers – especially

those with complex physical structures near the ground such as large low snags and down wood (NatureServe 2012, (Ruggiero et al, 1994), (Verts, B.J. and L.N. Carraway 1998), (Zielinski et al, 2001). Current habitat throughout portions of the planning area can be described as having such characteristics, and may support use by this species. Prior to initial harvest activity, habitat across most of the planning area would have provided canopy cover and ground level structural complexity favored by this species for selection as optimum breeding/denning habitat. Marten are known to occur in the Middle Fork watershed. It is assumed that marten are a likely resident of the local faunal community within the planning area.

Currently the Oregon Biodiversity Information Center (ORBIC) shows the status of this “watch” species to be sensitive and vulnerable yet widespread, abundant, and secure throughout its range - which suggests species viability may be assured as long as adequate protection measures such as Standards and Guidelines governing activities proposed by this type of project continue to be implemented. The changing trend in timber management that has occurred within the past decade, and projected for the future, may positively influence occupancy of suitable habitat for marten as previously harvested stands redevelop, and more emphasis is placed on recruitment of key structural components missing from harvested stands and retention of key structural components present in unharvested stands.

American Marten - Environmental Consequences

Direct and Indirect Effects – Alternative B

Project effects (direct and indirect) to this species are considered relative to the large home range size and the amount of habitat modified or disturbed against the amount available throughout the area. Effects associated with activities are considered for their near and long-term potential. Suitable foraging along with denning habitat would continue to be provided throughout the project area both during and after commercial thinning, fuels and forage enhancement treatments are completed.

Natural forested stands represent over 30% of the Pioneer Gulch planning area. These stands offer the highest potential to provide suitable habitat for marten. Considering the spatial and temporal variability associated with prescribed activities, the proposed action should not limit the ability of this species to disperse through or persist within the project area.

Units proposed for commercial thinning involve previously managed stands where habitat is recovering from seral simplification as a result of intensive harvest activity. This thinning would affect about 2.5% of the planning area, or about 10% of habitat associated with previously managed stands within the planning area. Commercial thinning under the silvicultural prescription would encourage development of structural diversity throughout, and adjacent to areas treated. The variable density thinning proposed by this project is believed to influence accelerated development of many aspects of biodiversity where it is lacking as a result of previous management (Franklin et al, 1997), (Debell et al, 1997).

Proposed management activities would involve modification or disturbance of suitable habitat for marten. Commercial thinning activities would occur within stands that are well distributed across the planning area. Removal of standing green trees, loss of snags that pose a risk to worker safety, and disturbance of some large down wood from effects of harvest activities and prescribed burning would occur in these stands. The snag and down wood section of this report provides a thorough discussion of how dead wood habitat important to this species may be directly, indirectly, or cumulatively affected by the proposed action.

Marten are more likely to associate denning or resting activity in late successional, old-growth, or other complex habitat found in portions of the planning area than in previously harvested stands proposed for thinning and fuels treatment activities. Silviculture and fuel treatment prescriptions include measures for protecting key features of potential denning or resting habitat such as existing legacy overstory trees, snags, and large down logs. Yet unintentional loss of some such features is inevitable due to operational or safety reasons associated with work areas. The Pioneer Gulch project does not propose activity within treatment units that is considered to directly affect the ability of marten to utilize habitat throughout the planning area for denning, resting, foraging, or dispersal.

Noise generating activities are considered to have some potential for disturbance to this species should it occur in close enough proximity. If all proposed activities are considered – harvest, fuels treatment, stream restoration, road work, and forage enhancement – about 10% of the entire planning area would be subject to some level of disturbance. However because of daily activity patterns, wide-ranging daily movements, low density of any potential population, plus the spatially and temporally dispersed aspect associated with activities across the planning area (not all 10% would be affected at any one time), disturbance potential is considered low. Any direct effects in this regard should not compromise the suitability of overall habitat throughout the planning area for use by marten to any estimable extent.

Implementing the silvicultural prescription as proposed should result in accelerating the transition from managed stands in a structurally simplified seral condition, to habitat having large tree characteristics as released trees respond by increasing size and structural diversity, and as levels of down wood continue to accumulate in the near-term. Such developmental effects in riparian and upland habitat would be beneficial to marten. However longer-term indirect effects would trend towards neutral or negative as effects from thinning alter suppression mortality rates and decrease associated snag and down wood recruitment potential.

Cumulative Effects – Alternative B

Beyond the direct/indirect effects addressed associated with proposed activities under the Action Alternative, there are projects that would contribute to cumulative effects such as: road closure/restoration projects, fish habitat improvement, ongoing roadside danger tree removal, as well as salvage logging the Tumblebug fire. However these activities will be staggered spatially and temporally and are not likely to reduce the overall amount and quality of habitat for American marten across the planning area.

Management of the planning area under the Willamette Forest Plan as amended by the Northwest Forest Plan and the Upper Middle Fork Willamette Watershed Action Plan should provide a long-term stable or increasing trend in amount and distribution of habitat capable of providing for the ecological requirements of marten and would ensure current and future viability of any local population. Cumulative effects from the Pioneer Gulch project in conjunction with past actions are considered neutral or negative as some components of habitat important to marten improve in response to silvicultural treatments while other components decline in response to thinning and fuel treatments within portions of the project area.

Deer and Elk (Big Game) - Existing Condition –

The Willamette Forest Plan (1990) selected deer and elk as MIS because of their economic and aesthetic value to local communities, hunters, and recreationists. The desired future condition for big game habitat is stated as follows: Elk habitat would be improved or maintained in areas managed for a high emphasis objective for big game. Forage enhancement projects, well

distributed mature conifer stands for optimal cover, and controlled road access in the winter ranges would be evident in the high emphasis areas. The basic habitat components of forage and cover would be provided in areas with moderate or low emphasis objectives also, but in lesser quantity, distribution and quality (USDA Forest Service 1990).

The Pioneer Gulch project area encompasses all or portions of three Big Game Emphasis Areas (BGEAs). Current standards dictate that effects to habitat within a BGEA are to be considered in the context of the entire BGEA. That is the effects of treatments are not limited to evaluating only that portion of a BGEA included within a project area. The BGEAs, their associated emphasis levels, and overall location relative to the planning area are displayed in Table 33 and Figure 11. Collectively the three BGEAs define the analysis area for deer and elk relative to the Pioneer Gulch project.

The big game analysis area consists of 52% moderate and 48% high emphasis BGEA acres. The majority of the analysis areas are within identified winter range for deer and elk.

ODFW biological data are not sufficient to provide an accurate estimate of the black-tailed deer population in western Oregon (ODFW 2002). Despite a perceived decline, ODFW has identified areas such as those in the vicinity of the project area as being more productive and achieving higher population densities than elsewhere in northwestern Oregon.

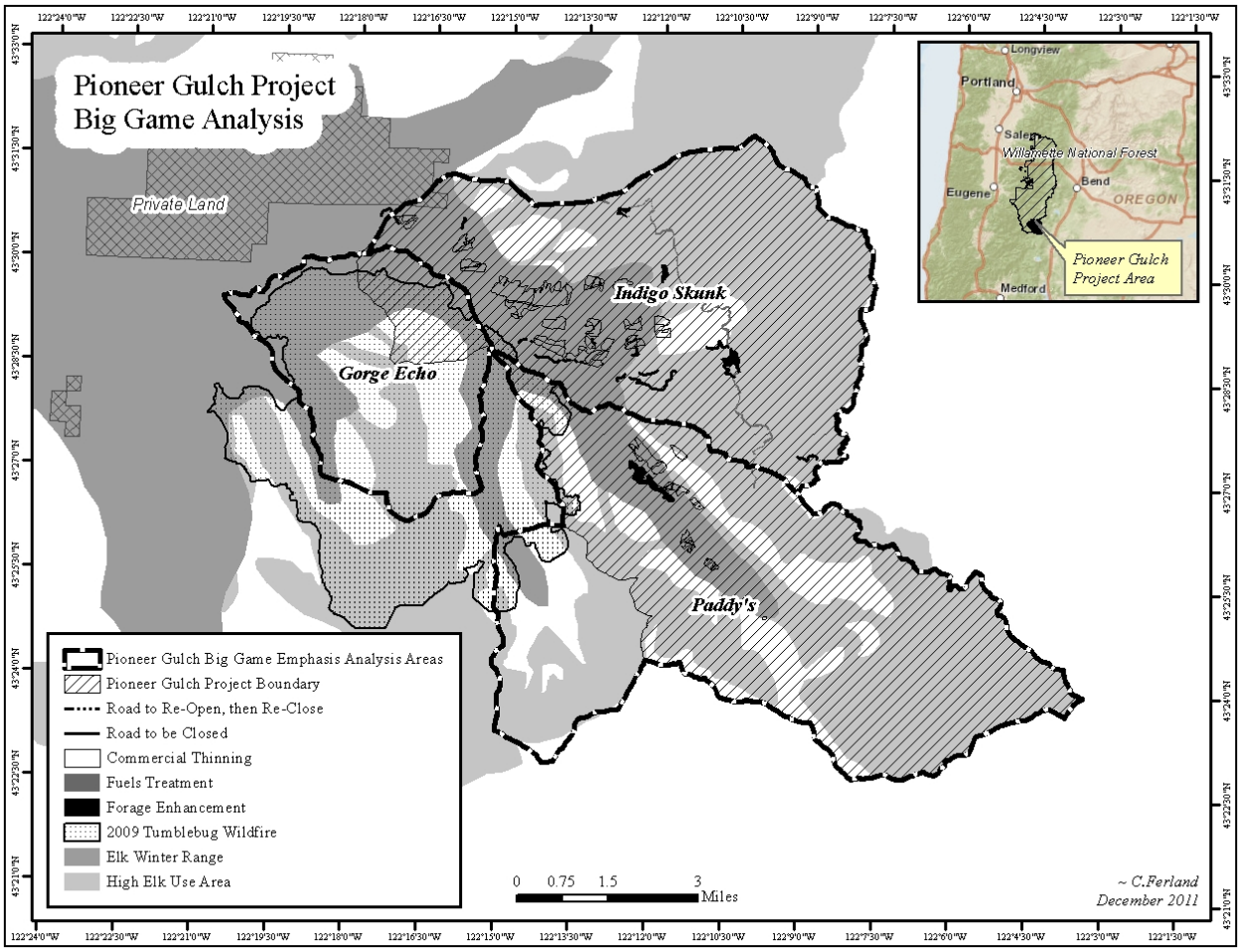
BGEAs associated with the Pioneer Gulch project are located within the ODFW Indigo Wildlife Management Unit (WMU). Per discussion with ODFW biologist, Chris Yee, elk use in the planning area is most concentrated in the southern portion near Big Swamp and within the riparian corridor and flats along the Middle Fork Willamette. The area is capable of supporting up to 50-100 head on an annual basis. ODFW feels that overall, populations of deer and elk in the area have been declining, however the adjacent Tumblebug Fire, Jim's Creek Project, and private timber lands, are likely having a positive influence on elk and deer survival and productivity. Sightings of deer and elk and their sign are common throughout the Pioneer Gulch project area.

Habitat quality was modeled for BGEAs for use as baseline consideration when comparing project actions and current conditions. Habitat effectiveness (HEI) modeling is based on Wisdom et al (Wisdom et al, 1986) as directed by the Willamette Forest Plan (USDA Forest Service 1990). Table 33 displays results of model output for BGEAs that define the Pioneer Gulch project big game analysis area.

Table 33: 2008 elk habitat effectiveness modeling results for BGEAs within Pioneer Gulch big game analysis area.

BGEA Name (Emphasis Level)	HEs	HEr	HEc	HEf	HEI	Open Road Miles
Paddy's (Moderate)	0.88	0.51	0.78	0.27	0.55	62.4
Gorge Echo (Moderate)	0.91	0.53	0.83	0.24	0.53	19.3
Indigo Skunk (High)	0.89	0.56	0.70	0.19	0.51	35.6

Figure 11. Big Game Emphasis Areas, treatment units, and roads to be closed within the Pioneer Gulch planning area.



The HE indices in Table 33 represent values considered important to elk habitat quality. The first four column values represent individual indices that relate to the overall “HEI” or “Habitat Effectiveness Index. “HEs” is an index of habitat size and spacing; “HEr” is an index of open road density; “HEc” is an index of cover quality; and “HEf” is an index of forage quality. The Willamette National Forest Plan minimum objective level for HEI in high emphasis BGEAs is 0.6. The minimum objective HEI for moderate emphasis BGEAs is 0.5.

All three BGEAs show low HEf values. The high emphasis level BGEA (Indigo Skunk) remains below current Forest Plan standards and despite low HEf values for the other BGEAs, they are currently above Forest Plan standards for their HEI levels. Additionally a large portion of the Gorge Echo BGEA was burned in the 2009 Tumblebug Fire which would greatly increase its HEf if modeled post-fire. While quality habitat is in decline in most of the Pioneer Gulch project area, the influence of the 2009 Tumblebug Fire as well as proposed activities such as improving big game forage habitat, thinning with gaps, fuels treatments, and road closures would improve big game habitat. However, the amount of harvest activity, fuels treatments, forage enhancement, and road closures that would occur across the big game analysis area is so small (i.e. 2.6% of the big game analysis area), the overall HEI modeling results would not change substantially.

Oregon Department of Fish and Wildlife has projected a downward trend in local HEI due to the loss of forage habitat as it is converted to cover habitat based on effects from shifts in management practices under the Northwest Forest Plan (Oregon Department of Fish and Wildlife 2003). Other influences include decades of fire suppression and lack of natural disturbance which have contributed to a decline in native forage habitat in this area important to the local deer and elk population. Recent HEI modeling associated with habitat management across the Middle Fork District has confirmed the decreasing trend in forage habitat (HEf) as harvest activity and methods have changed, and as previously managed stands redevelop into forested habitat. The Pioneer Gulch project has confirmed that trend continues in the Upper Middle Fork Willamette Watershed.

The Wisdom (1986) elk habitat model is being updated to reflect research conducted in the last two decades. Declines in elk populations in the 1990s led researchers to pay more attention to factors such as summer nutrition, which was previously not considered a limiting factor for elk populations. An interagency team of researchers has been developing a new, regional elk habitat model that incorporates new knowledge about elk habitat requirements, especially nutritional conditions. This model is called the Westside Elk Habitat Model and this addendum addresses the model in relation to the Pioneer Gulch Planning Area Wildlife Analysis.

After developing and evaluating several versions, the Westside Elk Habitat Model team found that the model that performed best in initial validation tests was based on four habitat covariates:

- Distance to open public road
- Dietary digestible energy (DDE)
- Distance to cover-forage edge
- Slope

In general, the lower the canopy closure and the higher the elevation, the greater the abundance of high quality forage species and dietary digestible energy (DDE). The model is explicitly designed to evaluate summer range conditions because this is the time that substantially affects year-round animal performance.

The model is designed for application at the same spatial extents at which it was developed and validated. In general, the minimum size of area appears to be approximately 25,000 acres. The model is not scaled to the project level, i.e., it may not accurately reflect results of specific management treatments across a few acres. For example, model resolution would miss the impact of management prescriptions such as variable density thinning (“skips and gaps”). The model can be helpful for is laying out landscape scale habitat enhancement scenarios such as determining what general areas would yield the most promising results from silvicultural activities.

While Pioneer Gulch proposed activities would have a small positive effect on elk forage improvement, it would not be detectable at a landscape scale. Only 2.5% of the entire analysis area would be impacted by activities and only a fraction of those activities would have the potential to improve DDE (i.e. gaps in thinned stands and forage enhancement acres) and only in the short-term (i.e. 10-15 years until canopies begin to close in again).

DDE was modeled for the Pioneer Gulch Big Game Analysis Area and is displayed in Table 34. For a more complete discussion of the use of the Westside Elk Habitat Model in the Pioneer

Gulch analysis, refer to the Pioneer Gulch Wildlife Report Addendum in the Project Analysis File (Ferland, 2012b).

Table 34: Westside Elk Model Modeled DDE values for each Pioneer Gulch Big Game Analysis Area.

BGEA	% DDE Poor (<2.45)	% DDE Marginal (2.45-2.74)	%DDE Good (2.75-3.04)	% DDE Excellent (≥ 3.05)
Paddy's	1%	79%	7%	4%
Indigo Skunk	11%	70%	3%	1%
Gorge Echo	13%	12%	19%	56%
TOTAL Big Game Planning Area	9%	65%	9%	15%

Note that percentages do not add up to 100 due to some areas with no data.

Deer and Elk (Big Game) - Environmental Consequences –

Direct and Indirect Effects – Alternative B

In similar habitat, thinning has been shown to immediately stimulate the development of understory vegetation – much of which is recognized for its contribution to foraging habitat for deer and elk (Hagar, J.C., W.C. McComb, and W.H. Emmingham 1996), (Suzuki, N. and J.P. Hayes 2003). Understory vegetation data associated with a study of thinning effects on habitat similar to Pioneer Gulch project showed an average 467% increase in grass, forb, and shrub coverage between thinned and unthinned stands (Artman 2003). Increases such as this can be expected to occur within stands treated forage enhancement, thinning, and prescribed burning throughout about 3% of the planning area.

Action Alternative activities that would improve big game forage include: thinning with gaps, gap plantings of hardwood shrubs, forage enhancement actions, fuels treatments, and road closures. The majority of these treatments would take place in the Indigo Skunk (high emphasis) BGEA (1,010 acres). Two hundred and twenty-eight acres fall into the moderate emphasis Paddy's BGEA and the only treatment in the Gorge Echo BGEA is one road closure.

Direct and indirect effects from proposed activities are considered in the context of disturbance and habitat modification. Individuals that are within close proximity to proposed activities are likely to leave the area while the disturbance is underway. Disturbance may include falling, yarding, hauling, fuels treatment, and other prescribed activities. If all proposed activities were to occur simultaneously they would have the potential to create above ambient disturbance across about 2.6% of the project analysis area for deer/elk. However those activities are expected to occur at a spatial and temporal extent such that they should not result in negative direct or indirect effects to individuals or the local population.

The combined effect of habitat modification and disturbance to local deer and elk can only be surmised. Visual or noise generating activities such as logging/yarding and hauling on the local deer/elk herd is not likely much of a disturbance issue. Observations of deer and elk responding to logging operations associated with an active Middle Fork project (Jim's Creek) indicate animals do not leave the vicinity. Animals simply move into adjacent cover during active operations and re-emerge to forage and loaf in treatment areas during periods of inactivity. There is nothing to suggest an overall behavioral change would occur as a result of disturbance from operations associated with proposed Pioneer Gulch activities.

Commercial thinning and fuels treatment activities in forested cover habitat resulting in forage habitat benefits are considered variable in outcome. In general, benefits are likely greater on southerly and westerly slopes as opposed to northerly or easterly slopes based on vegetation conditions and animal use patterns. The seasonal importance and variability in digestibility of forage for big game is the subject of much interest and recent investigation (Cook 2002). One to three acre gaps would occur in some of the thinning units and the three-acre gaps would be planted with a variety of hardwood shrubs, such as elderberry, hawthorn, cascara, and serviceberry. Additionally, road closures would improve the quality of elk habitat in all BGEAs.

It should be noted that the Wisdom (1986) modeling method is considered insensitive to the potential quality and quantity of native forage habitat restored under the type and scale of treatments such as those proposed in the Pioneer Gulch silvicultural prescription (Holthausen et al, 1994).

Declines in forage quality (digestibility) are known to occur in conjunction with increases in forage quantity responding to growth stimulated by overstory removal (Cook 2002). However this relation appears to be variable between study sites and across regions. Dynamic shade patterns resulting from buffered Riparian Reserves and variable density thinning components should mitigate potential negative responses discussed by Cook (Cook 2002) in forage quality against positive responses in forage quantity. Evidence suggests the diversity of tree, shrub, grass, and forb species throughout the project area would respond favorably to proposed activities thereby adding to overall quality of habitat for big game.

Cumulative Effects – Alternative B

In an overall context, cumulative effects of the Pioneer Gulch project on deer/elk would be positive in both short and long term. Thinning with gap effects would last at least a decade while road closures would extend to long-term. Other projects that would contribute to cumulative effects include: fish habitat improvement, ongoing roadside danger tree removal, as well as salvage logging the Tumblebug fire. These activities should have a beneficial to neutral effect on deer and elk habitat.

Pileated Woodpecker - Existing Condition

Because of home range size or dispersal capabilities for this species and the spatial extent of areas proposed for commercial thinning activity, effects from proposed activities are considered in relation to the Pioneer Gulch planning area.

The amount and distribution of large snag and down wood habitat, especially when associated with natural, late-successional, and old-growth stands are important in influencing the presence of pileated woodpeckers in the project area. Approximately 1,250 acres involving several blocks of forest within the planning area have been designated as a Special Habitat Area (Management Area-9d) under the Willamette Forest Plan (1990). Pileateds also benefit from Late Successional Reserves (Management Area-16b), Special Interest Area (Management Area-5a), and Wilderness (Management Area-1) land designations. These land allocations occur on 27% of the planning area. About 34% of the planning area consists of natural stands in late-successional and old-growth conditions. These natural stands are well distributed across the planning area and provide key habitat components for pileated woodpeckers.

These habitat components are important in influencing the presence of this MIS in the project area. Current, as well as historic, composition and structure associated with the habitat type and plant associations for this area favor nesting and foraging use by pileated woodpeckers (Csuti et

al, 1997), (Marshall et al, 2003). This species has been detected on numerous occasions during field visits throughout the planning process. Observations include foraging activity in habitat ranging from closed canopy forest to open canopy shelterwood settings. Typical foraging sign can be commonly found on trees and logs throughout the planning area. Favored tree species appear to be western redcedar, Douglas-fir, and grand fir. There are no known nest trees within any proposed treatment unit or elsewhere throughout the planning area.

Modeling output suggests current dead wood levels are near to below average for snags and near to well above average for down wood when habitat across the entire UMFW watershed is considered. This subject is discussed in detail in the Dead Wood section of this E.A. as well as the Pioneer Gulch Wildlife Report (Ferland, 2012). The relationship of current snag and down wood levels to DecAID values associating pileated woodpeckers and their use of dead wood habitat is also discussed in the Dead Wood sections.

DecAID data for pileated use of dead wood is available associated with the Westside lowland conifer/hardwood habitat type. Tables E-1 and E-2 in Appendix E display current against historic performance for snags and down logs respectively. Modeling data show current levels below historic levels for snags and down logs. Current information suggests 52% of pileated woodpecker downed log cover habitat in the watershed is in the moderate quality category (i.e. 30-50% tolerance level). However, the amount of moderate quality snag habitat supporting nesting and foraging is less -- 33% and 20% respectively.

Currently the Oregon Biodiversity Information Center (ORBIC) shows the status of this “watch” species to be sensitive and vulnerable yet widespread, abundant, and secure throughout its range - which suggests species viability may be assured as long as adequate protection measures such as Standards and Guidelines governing activities proposed by this type of project continue to be implemented. The changing trend in timber management that has occurred within the past decade, and projected for the future, may positively influence occupancy of suitable habitat for pileated woodpeckers as previously harvested stands redevelop, and more emphasis is placed on recruitment of key structural components missing from harvested stands and retention of key structural components present in unharvested stands.

Pileated Woodpecker - Environmental Consequences

Direct and Indirect Effects – Alternative B

Project effects (direct and indirect) to this species are considered relative to the large home range size (>1000 ac) and the amount of habitat modified or disturbed against the amount available throughout the area. Suitable foraging and nesting habitat would continue to be provided throughout the project area both during and after treatments are completed. Approximately 97% of the planning area would not be affected by proposed activities. Modification or disturbance of habitat for this species would be limited to about 2.5% of the planning area under the Action Alternative as a result of commercial thinning and related activities. Activities would largely be limited to affecting foraging habitat. Effects to habitat would be spatially distributed across the planning area and would occur across an extended implementation timeframe. Proposed activities under the Action Alternative should not limit the ability of this species to disperse through or persist within the project area.

Pileated woodpeckers are more likely to associate nesting or roosting activity in mature to late successional or old-growth habitat found in portions of the planning area than in previously harvested stands proposed for thinning and fuels treatment activities. Proposed actions include

measures that should avoid directly affecting pileated woodpecker habitat within treated areas and ensure the ongoing ability of the species to utilize habitat throughout the planning area for nesting, roosting, foraging, or dispersal. Silviculture and fuel treatment prescriptions include measures for protecting key features of potential nesting or roosting habitat such as existing legacy overstory trees, snags, and large down logs. Yet unintentional loss of some such features is inevitable due to operational or safety reasons.

The presence of equipment involved in noise generating activities are considered to have some potential for disturbance to this species should it occur in close enough proximity. However because of daily activity patterns, wide-ranging daily movements, low population density, plus the spatially and temporally dispersed aspect associated with activities across the planning area, disturbance potential is considered low. Any direct effects in this regard should not compromise the suitability of overall habitat throughout the planning area for use by pileated woodpeckers to any estimable extent.

Implementing the silvicultural prescription as proposed should result in accelerating the transition from managed stands in a structurally simplified seral condition, to habitat having large tree characteristics as released trees respond by increasing size and structural diversity, and as additional levels of snags and down wood continue to accumulate in the near-term. Such developmental effects in habitat across treated areas would be beneficial to pileated woodpeckers. However long-term indirect effects would trend towards neutral or negative as effects from thinning and related activities alter suppression mortality rates and decrease associated snag and down wood recruitment potential in affected areas.

Cumulative Effects – Alternative B

Beyond the direct/indirect effects addressed associated with proposed activities under the Action Alternative, there are projects that would contribute to cumulative effects such as: road closure/restoration projects, fish habitat improvement, ongoing roadside danger tree removal, as well as salvage logging the Tumblebug fire. These activities may have some affect to pileated woodpecker habitat, but would be staggered spatially and temporally, thus the overall impact should be inconsequential.

Management of the planning area under the Willamette Forest Plan as amended by the Northwest Forest Plan and the Middle Fork Willamette Watershed Action Plan should provide a long-term stable or increasing trend in amount and distribution of habitat capable of providing for the ecological requirements of pileated woodpeckers. Cumulative effects from the Pioneer Gulch project in conjunction with past actions are considered neutral or negative as some components of habitat important to this species improve in response to silvicultural treatments while other components decline in response to thinning or fuel treatments within portions of the project area.

Existing Condition – Cavity Excavators

The significance of snags as one component characterizing both old-growth and younger timber stands, and the dependence of primary cavity excavators (PCE) on this component as MIS that provide nesting and denning habitat for numerous additional species of birds and mammals (secondary cavity nesters) is thoroughly addressed in the Willamette National Forest Land and Resource Management Plan (USDA Forest Service 1990).

Current snag and down wood amounts within the project area are presented and addressed in the Dead Wood section of this EA and the Wildlife Report. Small and large snags (> 10” dbh), as well as small and large down wood (> 5” diameter), are currently patchy in distribution with

values generally within the DecAID 30-50% tolerance range for similar habitat in the western Oregon Cascades. The amount and distribution of dead wood habitat within the planning area is comparable to average levels for similar habitat across the western Oregon Cascades, and is known to be used by most cavity excavators designated as MIS on the Willamette National Forest.

Four out of eight species of primary cavity excavators used as ecological indicators in the Willamette Forest Plan are known to occur within the Pioneer Gulch planning area. Visual or audible detection plus visual indicators of presence (use sign) have confirmed the presence of the following four PCE MIS: red-breasted nuthatch, northern flicker, hairy woodpecker, and red-breasted sapsucker. Three species (Lewis woodpecker, black-backed woodpecker, and three-toed woodpecker) are generally not associated with Westside lowlands conifer-hardwood forest habitat that typifies stands throughout the planning area where treatments are proposed (Marshall et al, 2003), (O'Neil et al, 2001).

Environmental Consequences – Cavity Excavators

Direct, Indirect, and Cumulative Effects

Alternative A – No Action

Alternative A is the No Action alternative where the proposed project does not take place. There would be no direct or indirect effects under Alternative A, and therefore no cumulative effects to cavity excavators or their habitat.

Alternative B – Proposed Action

One recent study conducted on the Willamette National Forest in this habitat type grouped cavity-nesters that included these species when considering post treatment effects of commercial thinning on this group of birds (Hagar and Friesen, 2009). Data analysis 10-years post treatment revealed that the density of all cavity-nesting species was greater in thinned treatments than in control. Stands that were lightly thinned with gaps averaged much greater density of cavity-nesting species

Project effects (direct and indirect) to this group of species are considered relative to the amount of habitat modified or disturbed against the amount available throughout the Pioneer Gulch planning area. Suitable foraging and nesting habitat would continue to be provided throughout the project area both during and after treatments are completed. About 97% of the planning area would not be affected by proposed activities. Modification or disturbance of habitat for these species would be limited to less than 3% of the planning area under the Action Alternative, and would largely be limited to disturbance of foraging habitat. Effects to habitat would be spatially distributed across the planning area and would occur across an extended implementation timeframe, including periods outside the breeding season or when species have seasonally migrated. The proposed action should not limit the ability of this species to disperse through or persist within the project area.

Implementing the silvicultural prescription associated with the proposed action would result in maintaining a partial no-treatment buffer in all Riparian Reserves, plus protection and retention of habitat features such as snags, hardwoods and any legacy conifers (many of which possess decadent features making them suitable for use by cavity excavators). One anticipated result of this project would be a post-treatment habitat offering greater amount of edge habitat, with greater complexity in more open habitat, and with abundant forage and nesting opportunities in

both living defective and dead trees that can be considered to provide better overall habitat for a greater diversity of cavity excavator species (Hagar et al, 2004; Hager and Friesen, 2009; O'Neil et al, 2001; Marshall et al, 2003; NatureServe, 2011).

Proposed management activities do involve modification or disturbance of suitable habitat for these species. Removal of standing green trees, loss of snags that pose a risk to worker safety, and disturbance of some large down wood from effects of harvest activities would occur. The snags and down wood section of this report provides a thorough discussion of how dead wood habitat, important to this group of cavity excavator MIS, may be affected by proposed treatments. Additional levels of snags and down wood continue to accumulate in the near-term as a result of prescribed burning and meadow restoration activities. Such developmental effects in habitat across treated areas would be beneficial to local cavity excavator MIS. However long-term indirect effects would trend towards neutral or negative as effects from thinning and related activities alter suppression mortality rates and decrease associated snag and down wood recruitment potential in affected areas.

Past actions related to timber harvest activity are generally responsible for the defining the current condition of habitat throughout the planning area relative to suitability for PCE designated as MIS. These actions have affected the overall amount and seral stage distribution of forested habitat largely by reducing the amount of old-growth habitat and increasing the amount of open/early and mid-late seral habitat. There are no foreseeable actions that would further affect seral stage habitat in this area and influence future suitability for PCE. Project effects would not threaten the viability of any current or potential population for this group of cavity excavators across the analysis area.

Beyond the direct/indirect effects addressed associated with proposed activities under the Action Alternative, there are future projects not associated with the Pioneer Gulch project that would contribute to cumulative effects such as: road closure/restoration projects, fish habitat improvement, ongoing roadside danger tree removal, as well as salvage logging the Tumblebug fire. However these activities would be staggered temporally and spatially, thus should not limit the potential for cavity nesters to persist within the project area.

Cumulative effects from the Pioneer Gulch project in conjunction with past actions are considered neutral or negative as some components of habitat important to PCE MIS improve in response to silvicultural treatments while other components decline in response to harvest related activities within treated portions of the project area. The changing trend in timber management that has occurred within the past decade, and is projected for the future, should positively influence management of habitat for this group of species towards a historic condition as previously harvested stands and Riparian Reserves redevelop, and more emphasis is placed on retention of key structural components in unharvested stands.

Landbirds Including Neotropical Migratory Birds - Existing Condition

Land bird species exhibit a dramatic response to the height, seral stage, canopy structure, and spatial distribution associated with forest habitat where greater numbers of birds are associated with more complex heterogeneous forested landscapes (Altman, B. 1999). The current amount of forested and open ecotone habitat throughout the project area should be attractive for use by a variety of avian species (Gilbert, F.F. and R. Allwine 1991). However effects of past management practices (regeneration timber harvest) have resulted in a general simplification of habitat across over half of this area as a uniform canopy dominated by Douglas-fir closes in.

The importance of habitat associated with hardwood trees and shrubs has been widely documented in published literature as one of the leading factors influencing bird community composition in a conifer-dominated landscape that typifies the majority of the Pioneer Gulch planning area (Csuti et al, 1997), (O'Neil et al, 2001), (Marshall et al, 2003). Such habitat in this planning area is generally located in portions of the Middle Fork Willamette River corridor and elsewhere along habitat edges associated with natural openings. A direct positive correlation has been shown to exist between abundance and distribution of hardwoods, and abundance and diversity of birds.

Landbirds Including Neotropical Migratory Birds - Environmental Consequences

Direct and Indirect Effects – Alternative B

The Pioneer Gulch project is consistent with Forest Service obligations contained within a recent Memorandum of Understanding on the Migratory Bird Treaty Act (MBTA) (USDA Forest Service 2008). For this review, effects to this group of species from proposed activities are considered limited to within the project planning area. Consideration of project effects (direct and indirect) to native bird species from proposed activities is directed to the potential for habitat modification and disturbance to occur associated with treatments proposed under the Action Alternative, and how treatments may affect habitat use.

Published study results are somewhat mixed, but can be used to suggest effects from treatments alone are not expected to influence overall avian diversity. Local variation in species composition and abundance is most likely a function of natural annual variation with treatment effects contributing secondarily (Hurteau et al, 2008).

Results from an intensive young stand study (YSS) conducted in conifer dominated managed stands similar to many areas proposed for treatment under the Pioneer Gulch project can be used to infer this projects effects on landbirds. This study grouped Neotropical migrants that included 15 species from the local community when considering post treatment effects of commercial thinning on this group of birds (Hagar and Friesen, 2009). Data analysis revealed the following for Neotropical migrants10 years post-treatment:

- Density of all neotropical migratory species combined was greater in thinned treatments than in controls.
- The median density of neotropical migrants was more than twice as great in the heavy thinned treatments as in the control.

Implementing the silvicultural prescription associated with the proposed action would result in maintaining a partial no-harvest buffer in all Riparian Reserves, plus protection and retention of habitat features such as down logs, snags, hardwoods and legacy conifers. One anticipated result of this project would be a post-treatment habitat offering greater amount of edge habitat associated with untreated areas and more open habitat, and with abundant forage and nesting opportunities in both living and dead trees that can be considered to provide better overall habitat for a greater diversity of bird species (Hagar, J., S. Howlin, and L. Ganio 2004), (O'Neil et al, 2001), (Marshall et al, 2003), (NatureServe 2011).

Habitat associated with about 97% of the planning area would not be subject to modification or disturbance from proposed activities. Activities associated with less than 3% of the acreage

proposed for thinning, forage, or fuels treatments would potentially cause disturbance. Prescribed fall underburning associated with fuels reduction would occur outside breeding seasons and when many species are absent. Disturbance in affected areas would be spatially distributed across the planning area, and temporally distributed throughout multiple breeding seasons further reducing the likelihood of disturbance to individuals.

Loss or displacement of individuals that could be unknowingly occupying habitat during implementation of proposed activities such as falling, yarding, and prescribed burning could occur. The number of individuals and/or species potentially affected by proposed activities is unknown and considered unquantifiable without reliable survey data. The spatial and temporal extent of proposed activities that could result in disturbance to nesting birds across relatively small portions of the planning area should mitigate the overall potential for disturbance and provide protection for nesting birds as intended under the MBTA.

In response to the proposed action, short and near-term suitability of habitat in and near proposed treatment areas should improve for the majority of bird species that are likely to forage and nest in this area.

Past management actions related to timber harvest activity are generally responsible for defining the current condition of forested habitat throughout the planning area relative to suitability for land birds/Neotropical migrants. These actions have affected the overall amount and seral stage distribution of habitat largely by reducing the amount of old-growth habitat and increasing the amount of open, early, and mid-late seral habitat. There are no foreseeable actions that would affect seral stage habitat in this area and influence future suitability for this group of species.

Standards & Guidelines governing management of this area provide direction that should ensure the long-term maintenance of amount and distribution of suitable habitat for native resident and migratory land bird species. Given that some long-term components of habitat important to this group of species improve in response to silvicultural treatments, such as increased shrubs, while other components decline in response to fuel treatments within treated portions of the project area, cumulative effects are considered neutral relative to overall effects from past actions.

Other Species Requiring Survey Consideration - Existing Condition –

The Pioneer Gulch Project is consistent with the Willamette National Forest Land and Resource Management Plan as amended by the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (USDA Forest Service and USDI Bureau of Land Management 2001), as modified by the 2011 Settlement Agreement. For more information about the Settlement Agreement and how this project complies, refer to Appendix F of this EA.

The Willamette National Forest compiled the species in Table 35 from the 2011 Settlement Agreement Attachment 1. The list includes those vertebrate and invertebrate species with pre-disturbance survey requirements (Category A, B, or C species), who's known or suspected range includes the Willamette National Forest. This list also includes any Category D, E, or F species with known sites located within Pioneer Gulch Project Area. For more details refer to Appendix F of this EA.

Table 35: Survey & Manage Wildlife Species within the Pioneer Gulch Project Area

Species	S&M Cate-gory	Survey Triggers			Survey Results			Site Manage-ment
		Within Range of the Species?	Project Area Contains Suitable habitat?	Project May Negatively Affect Species Habitat?	Surveys Required?	Survey Date (mo/year)	Sites Known or Found?	
Vertebrates								
Great Gray Owl (*Strix nebulosa*)	C	Yes	Yes	No	No	N/A	0	No
Red Tree Vole (*Arborimus longicaudus*)	C	Yes	Yes	No	No	N/A	0	No
Mollusks								
Evening Fieldslug (*Deroceras hesperium*)	B	Yes	Yes	Yes	No[1]	N/A	0	No
Crater Lake Tightcoil (*Pristiloma arcticum crateris*)	A	Yes	Yes	No	No	N/A	0	No

N/A = Not Applicable
[1]No survey or manage requirements due to Pechman Exemptions

Evening Field Slug and Crater Lake Tightcoil – Existing Condition and Environmental Consequences

The evening fieldslug was addressed under Sensitive Species in the Wildlife Section of the EA. Crater Lake tightcoil was addressed in Table 25 in the Wildlife Section of the EA. The potential for these species to occur in the project area is considered low.

Great Gray Owl – Existing Condition

The great gray owl has an extensive range throughout North America and Eurasia. In North America the most westerly and southerly extent of the species' breeding range includes areas covered under the Northwest Forest Plan. Observations of great gray owls have been reported at numerous locations across the Middle Fork Ranger District. There are ten known nest sites on the District located in four 5th field watersheds. None of the known nest sites are in the Pioneer Gulch project area, however great gray owl observations have occurred within the project area over the years.

Great gray owls are primarily perch hunters that focus on small mammal prey associated with relatively open, grassy habitat. Such foraging habitat is not limited to natural meadow habitat, but can include habitat associated with managed stands as long as it supports a prey base. Nesting habitat is characterized by mature or remnant old-growth mixed-conifer forest within 200 meters of foraging habitat at least ten acres in size.

Suitable great gray owl foraging habitat exists to a limited extent in the Pioneer Gulch planning area at several locations adjacent to where project activities are proposed. Additionally over the past several decades, there have been nearly a dozen observations of great gray owls within the planning area, however there are no know nest sites. Thus project activities could result in some disturbance to great gray owls however this disturbance would be short-term.

Red Tree Vole – Existing Condition

The Oregon Red Tree Vole *(Arborimus longicaudus)* (aka. *Phenacomys longicaudus* in the Record of Decision for the Northwest Forest Plan (USDA Forest Service and USDI Bureau of Land Management 1994) is endemic to coniferous forests of western Oregon and extreme northwest California. Its known and suspected range extends from the Columbia River south through western Oregon and the Siskiyou Mountains to the Salmon and Klamath Rivers in northern California.

Optimal habitat for red tree voles (RTV) has been considered in some literature to be old-growth Douglas-fir forests. However the species does occur in younger stands that some researchers consider to function as population sinks rather than sources. Hardwood tree species are generally not recognized as an important habitat component of red tree voles. The species is known to occur from sea level to 5,500' elevation in a patchy distribution across its range. Records indicate red tree voles are locally abundant on the Middle Fork Ranger District. NRIS (Natural Resource Information System) data contains over 460 records of RTV since project-related surveys began in 1999. These records represent sites having a wide range of habitat conditions. RTV surveys were conducted in 2001 in a small portion of the Pioneer Gulch Planning Area along Road 21 for the Diamond Drive project. One active RTV nest tree was documented and that nest tree is not located near any of the currently proposed activities.

Suitable habitat for red tree voles is abundant throughout the project area however none of the units proposed for Action Alternative treatments contain suitable habitat. Conifer stands less than 80 years old where commercial thinning activity is proposed are currently exempt from survey requirements for this species based on a recognized low likelihood of occupancy. Areas where forage enhancement is proposed are not considered suitable habitat for red tree vole and fuel-break treatment units were each evaluated for suitability and none qualified.

Environmental Consequences – Other Species Requiring Survey Consideration

Great Gray Owl – Direct and Indirect Effects for Alternative B

Pioneer Gulch project activities would have limited direct, indirect, or cumulative effects on this species. There would be a small-scale indirect beneficial effect for great gray owls as a result of enhancement of prey habitat in the forage units, which improves hunting habitat for great gray owls.

Great Gray Owl – Cumulative Effects for Alternative B

Management of the planning area under the Middle Fork Willamette Watershed Action Plan and the Willamette Forest Plan as amended by the Northwest Forest Plan should provide a long-term stable or increasing trend in amount and distribution of habitat capable of providing for the ecological requirements of great gray owls. Cumulative effects from the Pioneer Gulch project in conjunction with past actions are considered neutral or slightly positive as some components of habitat important to the owl's prey species would improve in forage treatment units.

Red Tree Vole – Direct and Indirect Effects for Alternative B

No activities associated with the action alternative would occur within suitable red tree vole (RTV) habitat, thus there are no direct or indirect affects to RTV.

Red Tree Vole – Cumulative Effects for Alternative B

There would be no direct or indirect effects, therefore there would be no cumulative effects. Additionally, there are no ongoing or foreseeable future actions that would affect the extent or amount of suitable RTV habitat in the Pioneer Gulch planning area. The area has been subject to previous harvest activity that has removed about one half of the most suitable RTV habitat from the project area. That habitat loss is relatively evenly distributed across the project area, leaving the remaining habitat patchily distributed across the landscape. Past RTV survey results on the Middle Fork District confirm the concept of population clusters in a wide range of habitat settings.

Fire and Fuels

The history of large wildfires on the Middle Fork District is well-documented. The need for fuel reduction treatments is based on the fact that surface fine fuels are increased during timber harvesting operations. The desired surface fine fuel load for activity fuels on the Willamette National Forest is 7-11 tons per acre (FW-252). Thinning of stands and subsequent fuel reduction treatments would have the secondary benefit of lowering the risk of large wildfires in the project area. The desired future condition for treated stands in the planning area is Condition Class 1, which is defined by the following statement: within the range of natural/historical variability of vegetation characteristics, fuel composition, fire frequency, fire severity, and associated disturbances. Another desired future condition of this project is to attain a post-treatment condition in which treated stands in the planning area would be resistant to crown fires in all but the most extreme summertime conditions. This would be achieved primarily by harvest to reduce spacing between crowns.

Summary

This analysis was done to predict post-harvest fine fuel loads in the Pioneer Gulch planning area and to analyze the potential effects of treating those fine fuels. The analysis shows that fire was historically a natural part of the Pioneer Gulch planning area and the Willamette National Forest ecosystems as a whole. Because wildfires on the forest are suppressed and not allowed to burn freely, thinning and related fuels treatments may be viewed as a surrogate for the results of natural fire.

Under the No Action Alternative, stands would not be thinned and fuels treatments would not be done. Therefore, stands would continue to develop within a fire suppression/fire exclusion environment, allowing for worsening Condition Class and an increase in stand densities and fuel loadings. Surface and crown fire potential would remain a threat to forested stands and to private property within the vicinity of the planning area.

Under the Proposed Action Alternative, stands would be thinned and comprehensive fuels treatments would be done. Fuels treatments would reduce fine fuels to forest guidelines in approximately 90% of treatment acreage and 100% of the harvest acreage. Condition Class on all harvest acres would be stabilized or improved to Condition Class 1. Stand conditions would be stabilized and/or improved by reducing stand densities and fuel loadings, mitigating many of the negative effects of the exclusion of natural fires. Reducing stand density and treating fine fuels would reduce the long-term risk of larger, more intense wildfires. Because surface and crown fire activity would be reduced, stands within the planning area would become a safer environment for firefighters responding to fires. Negative environmental consequences on air quality would be avoided by closely adhering to the Oregon Smoke Management Plan on all prescribed burning operations.

Existing Condition – Fireshed Conditions

Wildfire History

Available fire history records show that at least 237,912 acres have burned since 1787 on what is now the Middle Fork Ranger District, all of which is within the Middle Fork Sub-Basin group of watersheds. This analysis area was chosen because forest types and fire regimes are similar across the area, and because the Middle Fork District shares a common boundary with most of the Middle Fork Willamette Sub-Basin group of watersheds. For the purpose of this analysis, this area will be referred to as the Middle Fork Willamette Fireshed. A list of fires since 1790 can be found in the Pioneer Gulch Fuels Report (Mercado, 2012) in the Project Analysis File.

Because pre-1943 fire history records are incomplete and exist only for some stand replacing fires, the actual number of acres burned is probably much higher. Out of 237,912 acres known to have burned during the past 220 years, approximately 199,648 acres are known to have experienced stand-replacing fire in natural stands. Natural stands are defined as those that have not been managed or developed for timber, agriculture, etc. by non-Native American settlers. "Stand-replacing" means that at least 75% of overstory trees were killed in a given stand. Because non-stand replacement fires (low and mixed severity fires/underburns) that occurred prior to 1970 are (with a few exceptions) not a part of the historical record, it is very likely that the actual acreage of pre-1970 low and mixed severity wildfire is much higher. Table 36 (below) provides information about many of those large fires.

Table 36: Middle Fork Willamette Fireshed Large Fires (1787-Present)*

Fire Name	Year	Acres	Cause	Stand Types+
Middle Fork Complex♦	1790	33,141	Lightning	Natural
Young's Rock Complex♦	1800	18,351	Lightning	Natural
Lowell Creek♦	1820	1,321	Lightning	Natural
Needle Creek♦	1840	719	Unknown	Natural
Fourth Creek♦	1840	191	Unknown	Natural
Basin Creek♦	1840	1,716	Unknown	Natural
Salt Creek♦	1840	5,613	Unknown	Natural
Waldo-Fuji Complex♦	1840	12,813	Lightning	Natural
Box Canyon♦	1840	4,348	Lightning	Natural
Devil's Canyon♦	1840	4,293	Lightning	Natural
Emigrant♦	1840	4,346	Lightning	Natural
Bear Mtn. Complex♦	1850	5,755	Lightning	Natural
Christy Creek♦	1850	1,748	Lightning	Natural
Fuji Mtn.♦	1850	4,464	Lightning	Natural
Salmon Creek♦	1870	76	Unknown	Natural
Cougar Ridge♦	1870	14,535	Lightning	Natural
Heckletooth Mtn.♦	1880	2,515	Unknown	Natural
Oakridge♦	1890	119	Unknown	Natural

Fire Name	Year	Acres	Cause	Stand Types+
Huckleberry♦	1890	2,849	Unknown	Natural
Waldo Mountain♦	1900	15,127	Lightning	Natural
Brock Creek♦	1900	1,289	Lightning	Natural
Mule Mtn.♦	1900	1,094	Lightning	Natural
Lucas lake♦	1900	198	Lightning	Natural
Dead Mtn.♦	1910	7,581	Human	Natural
Mt. David Douglas♦	1910	701	Lightning	Natural
Buckhead Mtn.♦	1920	190	Unknown	Natural
Bunchgrass♦	1930	493	Lightning	Natural
Aubrey Mtn.♦	1930	65	Unknown	Unknown
Gosling Lakes♦	1930	1,195	Lightning	Natural
Taylor Butte♦	1930	1,352	Lightning	Natural
Koch Mtn.♦	1950	199	Lightning	Natural
Pryor	1952	266	Human	Mixed
Fields-Wicopee	1957	300	Human	Mixed
Pryor #2	1960	96	Human	Mixed
Dead Mtn. #2	1967	2,049	Human	Mixed
Westfir	1979	110	Human	Mixed
Pryor #3	1981	71	Human	Mixed
Shady Beach	1988	9,101	Human	Mixed
Warner Creek	1991	8,787	Human	Mixed
Pryor #4 (Baby Rock)	1992	649	Human	Mixed
High Spirit	1992	141	Lightning	Mixed
Westfir #2	1994	75	Human	Mixed
Moolack	1996	1,350	Lightning	Natural
South Zone Complex	1996	3,150	Lightning	Mixed
Captain Prairie	1996	102	Lightning	Mixed
Charlton	1996	9,245	Lightning	Natural
Gorge	1998	259	Human	Natural
Monteith	1999	369	Human	Mixed
Puma	1999	192	Human	Mixed
Hemlock	2002	136	Human	Mixed
Office Bridge	2002	90	Human	Mixed
Clark	2003	4,934	Human	Mixed
Kitson	2008	804	Human	Mixed
Tumblebug	2009	14,560	Lightning	Mixed

Key/Definitions:

*Large fires will be defined here as fires >65 acres in size; the above summary is not a complete list of all large fires on the district during the defined period.

♦Information for these fires was obtained from a fire history stand age study; fire dates are based on stand age estimated to the nearest decade, and names were retroactively given to each fire based on the nearest natural landmark. Where more than one fire was recorded in the same general area with the same date of

occurrence, acres were combined for the purpose of simplifying the historical record. Fire acres were estimated based on stand-replacement fires only, since only those fires could be accurately documented as part of this study; as a result, low-severity historical fires (underburns) that occurred prior to 1970 are not part of this record; fire cause is assumed to be lightning and stands are assumed to be natural unless the fire occurred in and area and period of history where human activity/development occurred.

+Stands were designated as "natural" if the fire burned only in unmanaged stands. Fire area stands were designated as "mixed" if there was a combination of natural and managed stands.

Sources: U.S. Forest Service fire records, U.S. Forest Service fire history study, and Willamette National Forest GIS.

Official fire records for the Middle Fork District exist for the period 1943-present. Fire records for this period indicate that 192 wildfires have been ignited and/or burned into the Pioneer Gulch project area, or approximately 1.7 fires per year. Approximately 90% of these wildfires were contained by suppression forces at less than one acre in size. The largest fire in the vicinity of the planning area during this period was the 2009 Tumblebug Fire, which burned 14,560 acres of timber before fire spread was halted.

During the modern era of fire suppression, timber harvest has replaced lightning-ignited wildfire as the dominant disturbance mechanism within the project area (the same is true of most—if not all—watersheds on the district). During the period 1900 to present, approximately 1/4 of the total acres within the planning area have been managed for timber production. During this period, prescribed broadcast burning was the most common treatment utilized to dispose of harvest slash.

Fire Regime/Condition Class

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human intervention, but including Native American burning. The five natural fire regimes (and sub-classes) are classified based on the average number of years between fires (fire frequency), combined with the severity (amount of stand replacement) of the fire on the dominant overstory vegetation. Table 37 (below) provides a description of natural fire regimes.

Table 37: Fire Regime Descriptions

Fire Regime Group	Frequency (Fire Return Interval)	Severity
I	0-35 years	Low to mixed severity (underburn)
II	0-35 years	High severity (stand-replacing)*
III	35-200 years	Mixed severity (combination of underburn and stand replacement fire)
IV	35-200 years	High severity (stand- replacing)
V	200 + years	High severity (stand-replacing)

*Stand replacement wildfire is defined as mortality in >75% of the overstory vegetation.

Mapping done through the Integrated Natural Fuels Management Strategy has classified lands within the Pioneer Gulch planning area as **fire regimes I, III, and V**. Fire regime designations are simply a method to estimate how often we would expect to see natural fire on the landscape in the absence of human intervention. For example, in a natural landscape categorized as fire regime II, we would expect to see a high-severity fire at least once every 0-35 years on any given piece of ground. In the era of modern fire suppression, we will continue to see natural (lightning) ignitions according to the same natural regime schedules. What is different now is that natural wildfires are quickly suppressed by firefighters and are not able to spread and grow naturally. When a fire is immediately suppressed, a fire return interval is essentially skipped, causing

natural, healthy forest conditions to degrade over time. Because fire regimes range from 0-200 years within the planning area, deteriorating forest health may not (at present) be readily apparent in all areas.

Condition Class is a classification of the amount of departure from the natural fire regime. Three condition classes have been identified for all fire regimes. Departure from a natural fire regime results in changes to one or more of the following ecological components: vegetation characteristics, fuel composition, fire frequency, fire severity, burn pattern, and other associated disturbances, including plant/tree mortality from insects or disease. Condition Class may be measured at the stand level or landscape (stratum) level. The three condition classes have been defined as follows:

- Condition Class 1: within the range of natural/historical variability of vegetation characteristics, fuel composition, fire frequency, fire severity, and associated disturbances.
- Condition Class 2: moderate departure from the natural/historical variability of vegetation characteristics, fuel composition, fire frequency, fire severity, and associated disturbances.
- Condition Class 3: high departure from the natural/historical variability of vegetation characteristics, fuel composition, fire frequency, fire severity, and associated disturbances.

As a result of current mapping techniques and field observations, the Pioneer Gulch planning area may be characterized as **Condition Class 2**. This indicates that the majority of stands within the Pioneer Gulch planning area are moderately departed from the natural range of variability for fire frequency and severity. The most likely explanation for this is that fire exclusion within the planning area has caused at least one fire return interval to be missed.

Fuel Models

Three major Fire Behavior Prediction System fuel models are represented within the Pioneer Gulch planning area. Field observations have indicated that fuels in proposed treatment areas are primarily a mosaic/mix of fuel models 5, 8 and 10 (see Table 38).

Table 38: Fuel Models

Fuel Model	Description
1	Short Grass
2	Open Timber (grass understory)
3	Tall Grass
4	Chaparral
5	Timber (w/understory brush)
6	Tall Brush
7	Southern Rough
8	Timber (w/ light litter)
9	Hardwood Litter
10	Timber (w/heavy dead/down)
11	Light Logging Slash

Fuel Model	Description
12	Medium Logging Slash
13	Heavy Logging Slash

(Source: GTR-INT-122)

Fuel models 5, 8 and 10 are distributed in roughly equal proportions throughout planned treatment areas. Fuel Model 5 is characterized by conifer stands or openings where the primary carrier of fire is understory brush. Under dry and windy conditions, understory brush fires spread quickly with moderate intensity, and may lead to the development of crown fires in the overstory trees. Fuel Model 8 is characterized by closed conifer stands where dead fuel loads in the understory are relatively light. Fuel Model 8 fires spread primarily through litter and light fuels on the forest floor. Under normal conditions, fires in fuel model 8, burn with low intensity and do not spread quickly. Fuel model 10 is characterized by closed conifer stands with a large component of dead and down fuels. Fires in this fuel type spread primarily through dead/down fuels on the forest floor, and generally burn with greater intensity than fires in fuel model 8. Fuel Model 10 fires have a higher probability of developing into crown fires. Crown fires often spread quickly and often cause severe, stand replacement fires when hot, dry and windy conditions persist.

Fuel Loading

Fixed area plots were established throughout the project area to determine existing surface and crown fuel loads. Table 39 represents existing Dead/Down Surface Fuel Loads in the project area.

Table 39: Dead/Down Surface Fuel Load (range in tons/acre)+

Area	0-3” Fuels	3-9” Fuels	>9” Fuels	Total Fuel Load
Commercial Harvest				
Young Stands (avg. 47 yr.) +	8	5	33	46
Fuel Break/Non-Harvest				
Mature Stands (> 80 yr.) +	6	4	11	21
Young Stands (Fuelbreak PCT) (≤ 35 yr.)+	15	9	5	29
Forage/Non-Harvest				
Mature Stands (> 80 yr.)+	8	5	15	28
Young Stands (≤ 21 yr.)+	14	9	6	29

Source: U.S. Forest Service Field Surveys
+Fuel load data based on randomly distributed Brown’s method transects.

The influence of small woody fuels (3 inches and less in diameter) on spread rate and intensity of surface fires and associated torching and crowning is substantial. Large woody fuels have little influence on spread and intensity of the initiating surface fire in current fire behavior models; however, they can contribute to development of large fires and high fire severity (Brown, 2003).

Coarse woody and large woody debris are both defined as dead standing and downed pieces larger than 3 inches in diameter (Harmon et al, 1986).

Fine fuels are required for fires to spread and gain the intensity needed to ignite heavier fuels. Harvest activities primarily generate fine fuels and create relatively small amounts of coarse woody fuels. In addition, treating coarse fuels on the landscape without treating fine fuels is not

feasible. Coarse woody requirements for wildlife should be addressed in the wildlife biologist's analysis. Predictions for fine fuels generated as a result of harvest in the project area will be discussed in detail in the Environmental Consequences, Direct and Indirect Effects Section.

The availability of fine dead fuels is one of the primary contributing factors in crown fire development. Under very dry conditions, fine fuels, large woody fuels, duff, herbaceous vegetation and conifer branches/crowns may all contribute to large fire development. Other factors include fuel moisture, wind, ladder fuel availability, canopy base height and spacing between crowns.

Of the fires listed in Table 36, most (if not all) large wildfires in Middle Fork District's historic record have become sustained crown fires at some point in their development. This means that an adequate combination of wind/weather, fuel moisture, surface/ladder fuel loadings, and crown density were available to support the initiation and development of a sustained wildfire in the forest canopy. Most fires of this sort continue to burn at the surface as the fire spreads. On rare occasions, crown fires may become independent, meaning that they burn through the canopy only, leaving surface fuels unburned. Fires of this sort may be especially hazardous for firefighters, because "re-burn" may later occur through the understory after the crown fire front has passed.

Environmental Consequences – Fireshed Conditions

Direct and Indirect Effects

Alternative A – No Action

Under Alternative A, there would be no thinning or fuels reduction, and forested stands would continue on a path of natural succession. Modern fire suppression policies would continue to dictate wildfire exclusion from the project area, and this would contribute to overstocked stand conditions and increasing fuel loads. Over time, increasing surface fuel loads, ladder fuels and denser canopies would be associated with greater fire intensity and higher burn severity. Crown fire potential would increase in all stands, making it more difficult and dangerous for firefighters to suppress future wildfires.

Alternative B – Proposed Action

Alternative B comprehensive fuels treatments would be done in all harvest areas, or approximately 940 acres. These harvest treatments would include yarding tops/limbs on skyline and ground-based units; burning of landing piles on all units, except for the ones prescribed for broadcast/underburning. Underburning would take place in four units where trees are ≥55 years old. Tables 40 and 41 (below) represent current and predicted Pioneer Gulch fuel loading estimates. Forest Plan Standards and Guidelines for fine fuels would be met on approximately ≥95% of all harvest acres. Additionally, the Condition Class would be stabilized or improved from Condition Class 2 to Condition Class 1 on all harvest acres.

The proposed Alternative B treatment plan would allow for underburning in four harvest units where trees are ≥55 years old. The surface wildfire behavior in the underburned units would be greatly diminished as a result of live and dead understory fuels being consumed through the prescribed fire treatment (see Tables 41 and 42). Although prescribed underburning would reduce flammable live and dead fuels in the understory, shrubs, brush and trees would grow back over time. It is estimated that tree scorch height would reach 10-40 ft. on the boles of residual trees and mortality would be about 5-15% of the residual trees (Mercado, 2012).

Construction of firelines around units prescribed for underburning (except where roads exist) or the use of wetlines would help prevent the escape of prescribed burning outside the planned burning area.

The current stand conditions adjacent to wilderness landscapes are currently such that a wildfire event has the available fuel conditions to escalate into a larger fire which may be difficult to control. The fuel break understory treatments would include: whip-felling conifers ≤ 10"/pruning leave trees/handpiling/pile burning. In the fuel break units we would retain under-represented species like chinquapin, leaving 5 per acre. This treatment would not be as effective as the originally proposed mature thinning in the fuel break (see chapter 2 discussion on alternatives considered but not given detailed study). However, treating the understory fuels would reduce fire behavior potential during wildfire events and restore fire to fire adapted landscapes as well as providing a safety anchor point that could be used for future fires in the wilderness. The pre-commercial thin units in the fuel break treatment areas would be pre-commercially thinned/handpiled/burned within 100 feet of the road system. Pre-commercial thinning by itself where the cut fuel is not disposed of is not recognized as a fuels treatment, however in this case, the pre-commercially thinned fuels would be handpiled and burned and as a result would not contribute to an increase in fuel loading in the unit. See Table 42 for current and predicted dead/down fuel loading estimates in the fuel break units.

Forage Units may have any of the listed treatments: Whip-Felling/Brush Piling/Burn/Mechanical Mastication. The forage units are prescribed to have approximately 25% of the forage unit areas receive any of the above listed treatments. The whip-felled material would be piled. Some of the piles would be burned and some would be retained for wildlife purposes. The retained piles may contribute to an increase in fuel loadings in portions of the forage units. However, according to the amended Forest Plan Update No. 2, FW -250 direction, "…fuel treatment prescriptions to meet other resource requirements may specify lower or higher fuel loadings than identified in Table IV-32". See Wildlife Biologist Report for detailed forage treatment prescriptions.

Table 40: Current & Predicted Dead/Down Fuel Loading Estimates in Commercial Harvest Units (tons/acre)*

Treatment Type	Current Fine Dead/Down Fuel Load (0-3")	Current Dead/Down Fuel Load (3-9")	Current Dead/Down Fuel Load (>9")	Predicted Post-Treatment Fine Dead/Down Fuel Load (0-3")	Predicted Post-Treatment Dead/Down Load (3-9")	Predicted Post-Treatment Dead/Down Fuel Load (>9")
Commercial Harvest						
Underburn (Alternative B)+	8	5	33	0-3	1-2	13
Yard Tops/Limbs Pioneer Gulch (Alternative B)**	8	5	33	11	9-12	48
Handpile/Burn (Alternative B)***	8	5	33	7-11	8-12	48

*Pre-treatment fuel load information is based on Brown's transect data gathered in the planning area. Post-burn fuel loads for underburning were estimated using First Order Fire Effects Model (FOFEM), which is a commonly used fire effects modeling software; moderate springtime conditions were used to model consumption.

+Alternative B treatments would include yarding tops/limbs on skyline and ground-based units, roadside grapple pile clean-up on skyline and ground-based units and underburning ≥55 year-old stands.

** Alternative B treatments would include yarding tops/limbs on skyline and ground-based units, and burning landing piles.

*** DTR's in all harvest units under Alternatives B, slash would be handpiled and burned, except in the Riparian Reserves. Post-treatment fuel loads represent handpiling standards to be applied in the handpiling contract.

Table 41: Current & Predicted Dead/Down Fuel Loading Estimates in Fuel Break and Forage units (tons/acre)

Treatment Type	Current Fine Dead/Down Fuel Load (0-3")	Current Dead/Down Fuel Load (3-9")	Current Dead/Down Fuel Load (>9")	Predicted Post-Treatment Fine Dead/Down Fuel Load (0-3")	Predicted Post-Treatment Dead/Down Fuel Load (3-9")	Predicted Post-Treatment Dead/Down Fuel Load (>9")
Fuel Break/Non-Harvest						
Pioneer Gulch (mature stands > 80 yr.)	6	4	11	7	10	12
Pioneer Gulch (young stands ≤ 35 yr.) PCT	15	9	5	16	11	5
Forage/Non-Harvest						
Pioneer Gulch (mature stands)+	8	5	15	9-11+	6	15
Pioneer Gulch (young stands)+	14	9	6	15-17+	10	6

+Mechanical Mastication of trees ≤10" over 25% of the project area would increase fine fuel loads by approximately 3 tons/acre in the treated areas. Mastication does not reduce the dead/down fuel load, but changes its structure, allowing fuels to decompose more rapidly.

Table 42: Pioneer Gulch Current and Post-Treatment Predicted Wildfire Behavior*

Fuel Models**	Flame Length (ft.)	Rate of Spread (ch/hr)+	1 Hour Fire Size (acres)	Crowning Index[1]	Crownfire Type (w/25mph wind and 40% slope)
8/5/10 (Current, Alt. A No Treatment)	2.9-4.2	5.0-7.4	1.4-2.8	7.3	Passive[2] and/or Active[3] Crown Fire
8 (Alt. B Post-Treatment)	1.7	4.5	0.6	32.8	Surface Fire
11 (Alt. B Post-Treatment)	17.1	46.3	55.7	22.5	Passive Crown Fire

*Represents fire behavior under 95th percentile weather/fuel (late summer type) conditions. Surface fire behavior is modeled with BEHAVE fire behavior prediction software.

**Fuel model 11 represents forests with light amounts of untreated slash on the ground. Fuel models 8/5 and 10 represent current fuel models. Fuel Model 8 represents units under Alternative B that receive underburning or handpiling treatments. Under Alternative B, portions of the project area would remain as fuel model 11 for 5-10 years, and return to fuel model 8/5/10 thereafter.

+One chain = 66 feet

[1]Crowning Index= the 20 foot wind speed (mph) at which a sustained crown fire is possible.

[2]Passive Crown Fire, also called torching or candling, is one in which individual or small groups of trees torch out, but solid flame is not consistently maintained in the canopy (Scott and Reinhardt. 2001).

[3]Active Crown Fire, also called a running or continuous crown fire, is one in which the entire surface/canopy fuel complex becomes involved (Scott and Reinhardt, 2001).

Crown Bulk Density (density of fuel in a stand's canopy) and Canopy Base Height (average height from the ground to bottom of a stand's canopy) are elements common to most crown fire modeling prediction systems, and are common indicators of crown fire potential. Stand characteristics entered into CrownMass (fire and fuels modeling software) automatically calculate Crown Bulk Density and Canopy Base Height for use in crown fire predictions. Table 43 represents predicted canopy bulk densities and canopy base heights in current and post-treatment Pioneer Gulch commercially harvest stands and mature stands where fuel break treatments occur..

Table 43: Pioneer Gulch Crown Bulk Density and Canopy Base Height*

Pioneer Gulch Stand Type	CBD Current (lbs/ft³)	CBD Post Treatment	CBH Current (ft.)	CBH Post Treatment
Young (<56 yr.)Commercial Thin	.0087	.0039	52	63
Mature (>80 yr.)	.0094	.0094	31	48

The above estimates obtained from CrownMass fire and fuels modeling software.

*Overstory CBH only.

Note: Heavier Crown Bulk Densities have more fuel available for combustion in wildfires than do lighter Crown Bulk Densities. Lower Canopy Base Heights allow fires to move into the crowns more easily than do higher Canopy Base Heights. Thinning removes fuel from the forest canopy, thereby lowering the Canopy Bulk Density; thinning younger, shorter trees in a stand, and leaving the older, taller trees raises the Canopy Base Height.

Cumulative Effects

The largest and existing cumulative effect within the Pioneer Gulch planning area and the Middle Fork Willamette Fireshed as a whole has resulted from fire suppression/fire exclusion during the past 80-100 years. The cumulative effects of fire exclusion during the modern fire suppression era are well-documented and have been observed in fire prone ecosystems throughout the American West (RMRS-GTR-42 vol. 5, p.185-203). Within the Fireshed, approximately 80% of wildfires are naturally ignited by lightning, and about 90% of all wildfires are suppressed at less than one acre in size. Those that escape initial attack fire suppression are eventually suppressed at the smallest possible size. Allowing fires to burn naturally on the landscape would be optimal, however, the vast majority of the public demands swift and aggressive suppression of wildfires. Without a surrogate for natural fire, such as thinning and underburning, most forests do not have the opportunity to develop on a path of natural succession.

Timber harvest-related prescribed burning has been the second most important cumulative effect during this era. However, because natural fires occurred on the landscape within the Fireshed at a rate of approximately 5,000 acres per year during the pre-suppression era (assuming a 150 year return interval on approximately 750,000 acres), the cumulative effects of human implemented

prescribed burning are probably negligible within the overall historical context (at its peak, prescribed burning did not exceed the annual acres that is believed to have burned under the natural regime).

Alternative A – No Action

The cumulative effects of the No Action Alternative would be increasing stand density and the accumulation of fuels, which would inevitably lead to wildfires that are much more difficult to control than fires in thinned, treated stands. Condition Class throughout the Fireshed would continue to worsen until future thinnings/treatments are accomplished or a stand-replacing wildfire occurs. A severe, large wildfire may not occur within the project area for some time, but natural combinations of weather and fuel conditions dictate that it would happen eventually. The Tumblebug Fire (2009) burned 14,560 acres of timber in a portion of the planning area during this period. The only foreseeable, measurable, and negative cumulative effect within the Middle Fork Fireshed is the continued policy of fire suppression, which will contribute to deteriorating Condition Class where fire return intervals are missed.

Alternative B – Proposed Action

Modern fire suppression/fire exclusion practices have created the most important cumulative effects within the Pioneer Gulch project area and Middle Fork Willamette Fireshed as a whole. The cumulative effects of prescribed burning within the Fireshed are probably negligible within the overall historic fire regime. Timber management and appropriate fuels treatments, when done properly, can act as a surrogate for natural fire by removing younger trees and reducing surface fuels.

The only foreseeable, measurable, and negative cumulative effect within the Middle Fork Fireshed is the continued policy of fire suppression, which will contribute to deteriorating Condition Class where fire return intervals are missed. Allowing fires to burn naturally on the landscape would be optimal, however, the vast majority of the public demands swift and aggressive suppression of wildfires. Without a surrogate for natural fire, such as thinning and underburning, most forests do not have the opportunity to develop on a path of natural succession.

Conclusions and Rationale

Under Alternative A, no fuels would be generated from harvest, fuel break, and forage activities and forested stands would continue to develop in a fire suppression/fire exclusion environment. Under Alternative B, timber harvest and comprehensive fuels treatments would be done to reduce canopy and understory fuel loads, thereby diminishing the potential for large wildfires in the planning area. Forest Standards and Guidelines for activity created fuels would be achieved on approximately 95% of harvest acres and fuel break units. Fuel loadings in forage units (Wildlife objective activity) would also be reduced.

Existing Condition – Air Quality

The State of Oregon has been delegated authority to enforce air quality standards set by the 1955 Federal Clean Air Act and its amendments. To do this, the state developed the Oregon Smoke Management Plan. All National Forests in Oregon are required to strictly adhere to the guidelines in the Oregon Smoke Management Plan.

The Oregon Smoke Management Plan was designed primarily to protect air quality in Smoke Sensitive Receptor Areas (SSRAs) including Eugene, Oakridge, and Bend, and Class I Areas

(such as Diamond Peak Wilderness), and Special Protection Zones (SPZs) such as Oakridge. In SSRAs, smoke emission limitations are in place year-round. Class I Areas include certain wildernesses, and limitations have been established to protect these areas during the summer months (July 1-September 15). SPZs were established to limit smoke emissions during winter months (November 15-February 15) in areas where air quality often deteriorates as a result of the combined effects of weather and wood stove/backyard burning. Burning in restricted areas/seasons requires careful monitoring of weather conditions and daily coordination with the State of Oregon Smoke Management Office in Salem.

Environmental Consequences – Air Quality

Direct and Indirect Effects

Alternative A – No Action

There would be no direct/indirect effect on air quality as a result of the No Action Alternative. However, the buildup of fuels represents the threat of an uncontrolled release of large amounts of smoke-related emissions (in the event of a wildfire). Eventually, a large fire would occur during the summer or early fall months when fuels are driest, resulting in high consumption of fuels and large amounts of smoke. Large quantities of smoke from such a wildfire could flow into the Eugene, Oakridge, or Bend SSRAs, and the Diamond Peak or Three Sisters Class I Airsheds. This would amount to a substantial, negative effect on air quality and visibility in the affected area. The most likely time for a large wildfire to occur is between August 1-September 30, which coincides with outdoor recreation activities and high use of public lands. Table 44 gives an indication of the volume of common pollutants that would be released in the event of a 4300 acre wildfire in the planning area.

Alternative B – Proposed Action

Prescribed pile burning would occur during fall and early winter; broadcast burning would occur fall, winter, or spring, when the chances of an escaped fire are lowest. By adhering to guidelines in the Oregon Smoke Management Plan, smoke impacts on air quality in sensitive areas (SSRAs, Class I Areas, or SPZs) due to these treatments would be negligible. Table 44 illustrates the estimated totals of PM 2.5 and PM 10 emissions (particulate matter 2.5 and 10 microns), according to treatment type.

Alternatives A and B

Table 44: Project Area Burning Emissions Estimates (tons)*

Emission Type[1]	Alternative A Wildfire Emissions in Tons[2]	Alternative B Prescribed Underburning, Handpile Burning, Landing/Roadside Grapple Pile Burning Emissions in Tons[3]
PM 2.5	6,244	859
PM 10	7,366	1,025
Totals	13,610	1,884

*Smoke emissions calculations done with CONSUME (burning emissions prediction software) and FOFEM (First Order Fire Effects Model).

[1]PM 2.5 = Particulate matter 2.5 microns/cubic meter. PM 10 = Particulate matter 10 microns/cubic meter

[2]Estimate based on 4300 acre wildfire burning in late summer conditions; summer wildfires produce much higher emissions because live fuels, dead fuels and duff are drier and therefore are more available for consumption.

[3]Based on smoke emissions for all proposed roadside grapple, landing, and hand pile burning and underburning under Alternative B, or approximately 1028 acres of broadcast and pile burning of slash. Prescribed burning is implemented in spring and/or fall when live fuels, large dead/down fuels and duff are too moist to burn; therefore, fewer emissions are created than in summer wildfires.

Cumulative Effects

Alternative A – No Action

There would be no direct/indirect effect on air quality as a result of the No Action Alternative. However, the buildup of fuels represents the threat of an uncontrolled release of large amounts of emissions (in the event of a wildfire). Eventually, a large fire would occur during the summer or early fall months when fuels are driest, resulting in high consumption of fuels and large amounts of smoke. Large quantities of smoke from such a wildfire could flow into the Oakridge, Eugene, and/or Bend SSRA's, and the Diamond Peak or Three Sisters Class I Areas. This would amount to a substantial, negative effect on air quality and visibility in the affected area. The most likely time for a large wildfire to occur is between August 1-September 30, which coincides with outdoor recreation activities and high use of public lands. Table 44 gives an indication of the volume of common pollutants that would be released in the event of a 4300 acre wildfire in the planning area.

Alternative B – Proposed Action

No long-term, cumulative effects on air quality are anticipated due to burning associated with this project. Burning would be completed within 1-5 years after harvest, and would create far fewer emissions than a wildfire occurring in an area of equivalent size. In order to protect air quality, the Oregon Smoke Management instructions would be strictly adhered to. The Middle Fork District's fire management strategy for prescribed burning is to avoid large, uncontrolled releases of smoke that are produced during large wildfires. By burning slash in one timber sale area at a time, residual fuels are treated gradually and in a controlled manner. For this reason, emissions from prescribed burning are far fewer than emissions caused by wildfires during the pre-suppression, natural fire regime. Approximately 5000 acres burned annually on the 750,000 acres Middle Fork District under the natural fire regime (150 year return interval). Since 1991, the district conducts prescribed burns, including pile burning, on about 1000 acres annually. During the era of fire suppression when managers began maintaining thorough fire records (1970-present), wildfires burned only about 1050 acres annually. This indicates that the combined total, annual acreage of wildfires and prescribed fires on the district is now far less than burned under the natural regime (2,050 acres annually vs. 5,000 acres annually).

Roads

Existing Condition – Roads

The Pioneer Gulch project area contains approximately 147.06 miles of system road, for a total road density of 2.53 miles per square mile. About 17.7 miles (12%) of these roads are currently closed to vehicle traffic. Of the system roads 10.75 miles are paved, 111.38 miles are surfaced with gravel, and 24.93 miles have a native surface, typically dirt. See Table 45.

Nearly all the roads in the area were initially built to facilitate timber harvest. Roads are infrastructure and as such are a resource, but primarily a social resource. They often do have

effects, both positive and negative, on natural resources. Roads can have a benefit when managing timber resources, can be both beneficial and detrimental to various recreational pursuits, and can often have a number of different negative effects to aquatic and wildlife resources. Roads also serve as a vector to the spread of unwanted and non-native organisms, particularly invasive plants.

Table 45: Miles of open and closed roads in the Project Area

Current Road Miles in Project Area	
Miles of Forest Service road in the Pioneer Gulch project area	147.06
Miles of Forest Service road open to public for motorized use	129.36
Percentage of Forest Service road system that is open for motorized vehicles	88%
Miles of Forest Service road currently closed to the public or not drivable	17.70
Percentage of Forest Service road system that is closed to motorized vehicles	12%

Environmental Consequences – Roads

The environmental effects of these road closures mentioned above have been displayed and discussed previously in this chapter, related to the resources that are affected. These discussions occur in the Water Quality, Vegetation, Wildlife, and Recreation sections of this Chapter.

Table 46: Direct and Indirect Effects of Proposed Road Closures

	Alt. A No Action		Alt. B Proposed Action	
	Miles	Percent of Forest Service road system in project area	Miles	Percent of Forest Service road system in project area
Roads currently open to motorized vehicles	129.36	88%	129.36	88%
Roads proposed for closure with Pioneer Gulch project	0	0	13.86	9%
Roads remaining open to motorized vehicles	129.36	88%	115.50	79%

Direct and Indirect Effects – Alternative A

Alternative A, No Action, would not close any roads, so the risk of road drainage failure would remain unchanged. Road maintenance would occur at current intervals and levels. See Table 46.

Direct and Indirect Effects – Alternative B

Alternative B, the Proposed Action, would construct about 2.16 miles of new, mostly short, temporary spur roads and about 4.12 miles of temporary spurs on previously used routes. The latter would be located on areas already used as main skid trails during the last harvest entry. Temporary spur roads would all be closed and hydrologically stabilized after use. This alternative would also close 13.86 miles of system roads, or an additional nine percent, as shown on Figure 9 and Table 6. These roads would be closed to motorized travel through placement of various types of barriers. They would still be available for non-motorized use. In addition, about 4.56 miles of currently closed system roads would be re-opened for log hauling and then closed after use, for a

total of 18.42 miles of road closure treatments. Of the 18.42 miles, about 14.69 miles of the road closures proposed would be closed at a low level (closure with a physical barrier, water bars installed as needed, water bars would not be drivable). About 3.73 miles of road would be closed at a moderate level (closure with a physical barrier, installation of non-drivable water bars as needed, removal of culverts from stream channels with shallow to moderate depth fills, reduction of fill depths for culverts in deep fill locations, and side-cast material pullback, where needed). A minor amount of road may be decommissioned if it is determined that they are no longer needed. All of the system roads proposed for closure have the potential to be needed for future use, so none of them would be decommissioned. System roads are only decommissioned (obliterated and taken off the road system) when it is determined that they will never be needed again.

Most of these roads would be closed with minimal disturbance to the existing road beds (a low level of closure), as it is thought these roads may need to be reopened in the future to provide for various management activities, including timber harvest and fire suppression. Most of these roads are proposed to be closed due to a risk to aquatic and terrestrial resources. Some are also proposed for closure due to low administrative access needs. Another reason for these proposed road closures is the lack of funding to properly maintain the extensive road system within this planning area. The method of and reasons for closure of each road can be found in Table 6 in Chapter 2 of this EA.

The road closures in this alternative would increase the total amount of closed roads in this area to 31.56 miles or 21 percent of the entire road system. Alternative B would also maintain about 55.45 miles of roads in conjunction with timber hauling. As a result, these roads would be safer to drive, and provide a reduced risk for culvert and ditch failure that could affect water quality. See Table 46.

Cumulative Effects

Alternative A

There would be no cumulative effects because there would be no direct or indirect effects.

Alternative B

The Upper Middle Fork Watershed Restoration and Road Closure Project authorized the closure of an additional 32.18 miles of system roads within the Pioneer Gulch project area. The 13.86 miles of road closures in Alternative B, when added to past, current, and foreseeable future road closures in the project area, would increase the total amount of closed roads in this area to 63.74 miles or 43 percent of the road system within the project area. Alternative B would also maintain about 55.45 miles of roads in conjunction with timber hauling. As a result, these roads would be safer to drive, and provide a reduced risk for culvert and ditch failure that could affect water quality. The remainder of the open roads would be maintained as part of the district-wide road maintenance program, as funding becomes available. The cumulative effects of past, present, and foreseeable future road closures are displayed in Table 47, below.

Table 47: Cumulative Effects of Road Closures

	Alternative B Proposed Action	
	Miles	Percent of Forest Service road system in project area
Roads in project area	147.06	100%
Past road closures	17.70	12%
Current road closures: Upper Middle Fork Watershed Restoration and Road Closure Project	32.18	22%
Pioneer Gulch proposed road closures	13.86	9%
Total Roads Closed	63.74	43%
Total Roads Remaining Open to public motorized use	83.32	57%

Economics

Economic efficiency is the determination of the cost of planning and implementing forest management and fuel treatments and the benefits or revenues those treatments generate. Forest Service Manuals (2430-2432) and Handbook (2409.18 Chapters 10-30) require financial and economic efficiency information be available to the decision maker prior to substantial investment of capital and resources in timber sales.

A financial efficiency analysis was completed for the project and can be found in the Pioneer Gulch Analysis File. This analysis includes revenues generated from timber sale receipts, and costs of the planning, sale preparation, administration, roads, fuel treatments, and other mitigating measures. The analysis did not include an estimate of non-market amenities values due to the unpredictable nature of these values. Non-market values are required "only when excess demand exists for non-market goods (Forest Service Handbook 2409.18 32.24) or the project has detrimental effects on non-market output. For a comprehensive discussion of the social and economic considerations at the forest level, refer to the Willamette Forest Plan FEIS, Chapter III, pages 213-235 and Chapter IV, pages 119-130.

Direction for the financial efficiency analysis can be found in the Forest Service Manual 2430-2432 (Amendments 2400-95-1 through 3) and Forest Service Handbook 2409.18, Chapters 10-30 (Amendments 2409.18-95-1 through 6). The financial efficiency analysis provides information relevant to the future financial position of the program if the project is implemented. The analysis basically compares estimated Forest Service direct expenditures with estimated financial revenues. Financial efficiency analysis measures two things – revenue/cost ratio and financial present net value.

For consistency of the Pioneer Gulch proposed action with direction and regulations for economic analysis, see Appendix F.

Existing Condition - Economics

The high cost of planning and implementing a timber sale project may affect the overall economic efficiency of the project. The economic efficiency is primarily dependent on the cost associated with planning the project, type and cost of log yarding systems used, amount and cost of road management work, the timber benefit produced from the thinning, amount and cost of fuel reduction treatments, cost of mitigating measures to reduce effects. The designs and

decisions made on these aspects of thinning projects influences the net revenues returned by the project.

Timber revenues are returned to the U.S. Treasury and a proportion of the revenues re-distributed back to local county governments. The thinning project also generates benefits to the economy by providing timber products, direct and indirect employment from the planning and implementation of the project to the processing, production, and manufacturing of the raw wood material.

Environmental Consequences - Economics

Direct and Indirect Effects

Alternative A – No Action

The cost of the no action alternative is the cost associated with time invested by the Interdisciplinary Team to complete field surveys, analysis, and reports for this project. There would be no economic benefit from this alternative because there would be no timber harvested and sold.

Alternative B – Proposed Action

Alternative B has a positive present net value of $103,227 and revenue/cost ratio of 1.05. Jobs created in the logging sector in Oregon are estimated at 3.5 jobs per million board feet (MMBF) harvested (Gebert et. al., 2002). Jobs created in the timber products manufacturing sector in Oregon (using the estimate for sawmill jobs) are estimated at 4.0 jobs per thousand (Gebert et. al., 2002). Using these estimates, Alternative 2 would provide about 44 jobs in the logging sector and about 51 jobs in forest products manufacturing. Additional jobs would be generated in the fuel treatment sector.

Table 48: Financial Efficiency and Jobs Generated

	Alternative A – No Action	Alternative B Proposed Action
Present Net Value	(-95,250)	$103,227
Revenue/Cost ratio	0	1.05
Logging Jobs	0	44
Forest Products Mfg	0	51

The cost and benefit values that were used to calculate the Present Net Value and Revenue/Cost ration in Table 48 are displayed in Table 49, below.

Table 49: Activity Costs and Benefits

Activity	Present Net Cost	Present Net Benefit
Planning	$95,250	
Prep, Admin	$31,750	
Roads		
Temporary road construct - new	$38,405	

Activity	Present Net Cost	Present Net Benefit
Temporary road construct – previously used routes	$54,940	
Road Maint. - Low	$612,085	
Road Maint. - Moderate	$127,773	
Road Maint. – High, includes Estep Cr. culverts	$248,919	
Road Closures - Low	$27,908	
Road Closures - Moderate	$22,676	
Stumpage Value		
Ground based		$1,368,490
Skyline		$791,976
Fuel Treatments		
Skyline yard tops and limbs	$222,987	
Grapple & Landing Piles and Cover	$44,100	
Burn Piles	$131,192	
Underburn	$167,547	
Mastication in forage treatment units	$20,983	
Whip felling, pruning in fuelbreak	$22,742	
Precommercial thinning in fuelbreak	$5,335	
Hand Pile and Cover	$63,067	
Reforestation of gaps	$19,501	
Mitigation Measures		
Soil Tillage	$48,012	
Roadside Seed, Mulch, Fertilize	$7,599	
Pre-harvest Noxious Weed Treatment	$44,450	
Total	$2,057,240	$2,160,466

Cumulative Effects

The cumulative effects of an alternative on the socioeconomic environment are quite difficult to estimate (Forest Plan FEIS, page IV-127). In terms of cumulative effects, District or Forest timber volumes for sale may have little influence on any one mill, for example an owner can purchase from Bureau of Land Management and private woodlot owners to get additional supply. They can also purchase logs from the Umpqua or Siuslaw National Forests. Or, at the owner's choice, they can increase or reduce the size of the mill operation, sell the operation to another company, or close the mill. All of these have occurred in the last decade and few, if any, of the changes to companies or communities can be tied directly to the sale of the Willamette National Forest timber.

Cumulative effects were assessed based on past, present, and foreseeable future actions listed in Appendix B. The cumulative effects analysis area for Economics is Lane, Linn, and Douglas counties.

Alternative A – No Action

Alternative A would not produce any timber volume for the District's or Forest probable sale quantity.

Alternative B – Proposed Action

Alternative B, the Proposed Action would produce about 12.7 MMBF of timber. This timber volume represents about 13 percent of the Middle Fork District's timber probable sale quantity for fiscal years 2010 to 2012 and 4.5 percent of the Forest's timber probable sale quantity for the next four years. The timber volume produced from this alternative would have no cumulative effects to the economy of Lane, Linn, and Douglas counties given the timber land base in these three counties.

Recreation

Existing Condition – Driving for Pleasure

Forest Road 21 is a common thoroughfare for people traveling from Oakridge to Cottage Grove. It makes up one section of Diamond Drive, and is used by people seeking a more scenic and remote alternative through the Cascades, from Oakridge south to Diamond Lake, on the Umpqua National Forest.

Off of this main thoroughfare, Forest Roads 2149 and 2160 connect through to Forest Road 23, which eventually leads back to Road 21, making a long and pleasurable loop opportunity. Additionally, Forest Roads 2153 and 2154 provide access to the Paddy's Valley and Timpanogas Lake areas, respectively. The Project area roads are also used by hunters and wilderness visitors to access their destinations. An unknown portion of the population uses the high country roads with their non-street legal vehicles for sight-seeing and exploration. Typical activities of road users include driving for pleasure, riding OHVs (off-highway vehicles such as quads, motorcycles or jeeps), hunting, fishing, mushroom or huckleberry picking, dispersed camping, accessing trails, and firewood gathering.

Environmental Consequences – Driving for Pleasure

Effects of Road Closures

Direct and Indirect Effects –Alternative A

Road maintenance would occur at current intervals and levels, so recreational activities would continue into the foreseeable future, with the possibility of some, or all roads becoming impassable due to lack of maintenance.

Direct and Indirect Effects –Alternative B

Approximately 18.42 miles of system roads are proposed for closure as part of Alternative B with this project. Of the 18.42 miles, about 4.56 miles are already not drivable so there would be no effect on public driving for pleasure on those roads. Effects of closing the other 13.86 miles on public driving access are described below.

Decreased access to some roads in the project area could potentially affect such activities as camping, pleasure driving on the forest roads, hunting, firewood gathering, berry picking, mushroom gathering and OHV use.

Some road closures would have a positive effect on activities such as hunting, particularly for those who desire to hunt closed roads on foot or bicycle without potential disturbance by vehicle travel. The action alternative would create greater solitude for those that do not participate in

road-based recreation. For those that walk or use mountain bikes, some of the closed roads would be useable until vegetation grows up making passage difficult.

Cumulative Effects- Alternative A

There are no cumulative effects for Alternative A, No Action, because there would be no direct or indirect effects.

Cumulative Effects- Alternative B

This project would decrease the mileage of roads available for vehicle-based recreation. About 43% of the road system would be closed after past, present, and foreseeable future closures are taken into account (10% more than with No Action). Alternative B would also maintain about 55.45 miles of roads in conjunction with timber hauling. As a result, these roads would be safer to drive, and provide a reduced risk for recreational activities within the project area. Additionally, there would still be about 115 miles of road available for driving within the Pioneer Gulch project area over 3,000 miles of roads available for driving across the Middle Fork Ranger District. All the roads that have been closed provide for an entirely different but still valuable and attractive recreational use (in particular road-based non-vehicular hunting) that otherwise would virtually be non-existent had the roads not been closed.

Effects of Log Hauling

Direct and Indirect Effects –Alternative A

Alternative A, No Action, would not incur any direct or indirect effects from log hauling along project area roads, as the Pioneer Gulch project would not be implemented.

Direct and Indirect Effects –Alternative B

Under Alternative B proposed logging operations, forest visitors may encounter log truck traffic while driving in the Pioneer Gulch project area. The following measures would be implemented to provide for safety of forest visitors using forest roads.

All mixed use, level 2 roads that are open used for log/commercial hauling will be signed to indicate commercial hauling is occurring. As per the Motorized Mixed Use Analysis completed in support of the Travel Management decision, non-street legal vehicle use is prohibited on these roads during log hauling. Within the project area during commercial hauling activities, the following roads and junctions are required to be signed by haulers with traffic safety signs that state, “Log Haul”, “Trucks”, or similar language. By implementing this signage, the potential for log truck/recreational traffic collisions would be reduced and the safety of forest visitors would be improved.

- Road 21, Spur 21-400, at the north boundary of Unit #2761 (facing the sign towards traffic traveling down 400 toward Forest Road 21)
- Road 2149, at the Junction of Spur 2149-422 (facing the sign towards traffic traveling down 2149 toward the junction of 21 and 2153)
- Road 2153, Spur 2153-375, at the northwesterly boundary of Unit #3770 (facing the sign towards traffic traveling down 375 toward Forest Road 2153)
- Road 2153, at the boundary of Unit# 4115 (beyond the hairpin turn, facing the sign towards traffic traveling down 2153 toward Forest Road 21)

- Road 2154, at the Junction of Spur 2154-380 (facing the sign towards traffic traveling down the 380 spur to 2154)

Road 2154, at the Junction of Spur 2154-383 (facing the sign towards traffic traveling down Forest Road 2154 toward the junction of 2154/2153).

Cumulative Effects- Alternative A

There are no cumulative effects for Alternative A, No Action, because there would be no direct or indirect effects.

Cumulative Effects- Alternative B

There are no cumulative effects for Alternative B, Proposed Action, because the temporary nature of log hauling during operations does not typically create effects on recreation resources that accumulate in time and space.

Existing Condition – Developed Recreation

Indigo Springs Forest Camp is a small campground with three automobile accessible campsites and one vault toilet, located adjacent to a high-volume natural spring. Many travelers along Road 21 stop here to fill up water bottles and to enjoy the beauty of the water cascading out of the hillside. Because this is a free camping opportunity, no estimate of use is available. However, observation indicates this campground is frequently full during the summer season.

Indigo Lake is a rustic campground with five campsites located approximately two miles from Timpanogas Lake on a single track trail open to hikers, equestrians, mountain bikes and motorcycles. Northwest Forest Pass records for this location indicate an average of 40 vehicles accessing this trailhead per year. However, this is thought to represent an underestimate, due to a high rate of non-compliance in this location. It is estimated that approximately 150 visitors use this campground each year.

Timpanogas Campground contains ten automobile-accessible campsites and is visited by approximately 300 people per year.

Timpanogas Cabin is available for rent from June through October. The most recent records indicate that the cabin was rented for 76 nights in 2009. During the winter months, the cabin is left open and stocked with wood by volunteers for snowmobile users.

Environmental Consequences – Developed Recreation

Direct and Indirect Effects –Alternative A

Alternative A, No Action, would not impose any effects on developed recreation resources within the project area.

Direct and Indirect Effects –Alternative B

The Alternative B, Proposed Action would not impose any direct effects on any of the developed campgrounds in the project area; however, indirect effects to forest visitors could occur as they travel to and from these campgrounds. There is the potential for those traveling to and from developed campgrounds to experience increased heavy equipment traffic along project area roads, or experience temporary delays where active operations are occurring.

Cumulative Effects- Alternative A

There are no cumulative effects for Alternative A, No Action, because there would be no direct or indirect effects.

Cumulative Effects- Alternative B

There are no expected cumulative effects to developed recreation as a result of proposed Alternative B activities because the temporary nature of log hauling during operations does not typically create effects on recreation resources that accumulate in time and space.

Existing Condition – Dispersed Recreation

No public use numbers exist for general dispersed recreation in the project area. It is evident by the observations of field-going personnel, as well as evidence of frequent use along main road networks and system trails, that the general area receives a fair amount of visitation, with the majority of use in dispersed camping areas during the fall hunting season. Additionally, visitors use rock quarries throughout the forest for target shooting. Hunting is popular within the project area during the fall months, and others use the area for gathering forest products such as berries and mushrooms.

A popular snowmobile trail, groomed and maintained by the volunteer group The Walker Rim Riders, follows along the southern section of road 2154. This route provides connectivity for several loop trails out of Crescent Lake Junction Snopark on the Deschutes National Forest.

Based on multiple field visits and geographic information system map analysis, approximately ten dispersed campsites are scattered along the road system within the planning area (not including campsites located in wilderness or the Oregon Cascades Recreation Area). Due to the transient nature of some roadside dispersed camping locations (such as informal rock fire rings constructed immediately alongside through and spur roads), additional unrecorded sites may exist within the planning area. Overall, the area experiences relatively low dispersed camping use for a majority of the useable season; more frequent dispersed use is generally seen during hunting season. Generally, dispersed campsites are typically used by overnight visitors as a staging area for other recreation activities, such as hunting, fishing or hiking, or less frequently (especially those sites located in upland areas away from water sources) as final destinations. Most of these dispersed sites have not been utilized in years, based on field observation

The following dispersed campsites were noted in the project area:

- Forest Road 21, junction of Spur Road 401
- Forest Road 21, junction of Spur Roads 405 and 406 (“Camp Marsh”)
- Forest Road 21, Spur 391
- Forest Road 2149, Spur 398 (multiple sites)
- Forest Road 2149, near the Corrigan Lake Trailhead
- Forest Road 2153, Spur 340
- Forest Road 2153, Spur 354
- Forest Road 2154, Spur 371
- Forest Road 2160, Spur 394
- Forest Road 2160, Spur 412

Environmental Consequences – Dispersed Recreation

Direct and Indirect Effects –Alternative A

Alternative A, No Action, would not impose any effects on dispersed recreation resources within the project area.

Direct and Indirect Effects –Alternative B

Proposed system road closures with dispersed sites may impact forest visitors who value motorized access and dispersed camping. For the dispersed campsites noted in the Existing Condition section, this action is expected to have no effect on this type of recreational use, as most of these dispersed sites have not been utilized in years, based on field observation.

The one heavily-used dispersed camp is "Camp Marsh", at Forest Road 21 at the junction of spur roads 405 and 406. This camp was likely created from a landing area when the unit further up the 406 spur was initially logged, and is frequently used as a base camp during hunting season, due to easy access off of Forest Road 21. Spur 406 is proposed to be re-opened and closed after project work is completed. Project activities, such as log hauling on the 406 spur have the potential to impact campers with dust and noise if hauling occurs while visitors are actively camping. If the area is required as a landing for this project, the camp would be rehabilitated by removing logging slash and debris, as well as replanting or reseeding with native vegetation.

Cumulative Effects- Alternative A

There are no cumulative effects for Alternative A, No Action, because there would be no direct or indirect effects.

Cumulative Effects- Alternative B

The potential impact to campers at Camp Marsh, in combination with temporary restoration work activities connected with the Respect the River project at other dispersed campsites along the Middle Fork Willamette River corridor, would have a cumulative effect of short-term restriction on the use of some dispersed sites in the project area while the work is being done. There are no other expected cumulative effects to dispersed recreation as a result of proposed Alternative B activities, because the temporary nature of logging operations does not typically create effects on recreation resources that accumulate in time and space.

Existing Condition – Trails

Trails are divided into four classes by the Forest Plan for the purposes of directing trail corridor management (reference the Forest Plan, starting on page IV-52). These standards primarily address timber and road management in the trail corridors, and also specify VQOs for each trail class. The following trails are located within the project area.

Middle Fork National Recreation Trail

Approximately 12.5 miles of the Middle Fork National Recreation Trail (MFNRT) pass through the project area. Designated in 2007, the trail is open to all non-motorized uses, including hikers, equestrians and mountain bikers, and is often used to access the river for fishing and picnicking activities. The trail is 27 miles long, ranging along its length from 2,000-5,300 feet in elevation. This allows for use of the lower elevation sections year-round, though the section located within the project area is generally utilized during summer months.

This trail transitions from the higher Cascade crest elevation at Timpanogas Campground down to the lower elevations along the Middle Fork Willamette River, offering the visitor a diversity of

ecosystems. Multiple trailheads offer opportunities for shorter trips and several of the more easily-accessible riverside areas receive high use. General recreational opportunities include viewing wildlife, flowers, waterfalls, and portions of the Oregon Central Military Wagon Road.

Other Trails

Five trailheads provide access from roads 2149 and 2160 into the Diamond Peak Wilderness within the planning area, including the Diamond Peak (#3699), Diamond Rockpile (#3632), Pioneer Gulch (#3630), Corrigan Lake (#3654), and Bear Mountain Trails (#3602). The Pacific Crest Trail (#2000) also traverses the project area. Segments of these trails located outside the Wilderness boundary are classified as Class I trails (described above in relation to the MFNRT). Parking for each of these trailheads is located adjacent to the main roadway.

An estimated 400 people per year access this section of the wilderness using these trails. Wilderness visitors include hikers, backpackers, stock users, hunters, and anglers. Dispersed camping associated with hunting use in the wilderness occurs in the fall along roads 2149 and 2160.

Environmental Consequences – Trails

Direct and Indirect Effects –Alternative A

Alternative A, No Action, would not impose any effects on dispersed recreation resources within the project area.

Direct and Indirect Effects –Alternative B

The Alternative B Proposed Action is not expected to impose direct effects on the Diamond Peak (#3699), Diamond Rockpile (#3632), Pioneer Gulch (#3630), and Corrigan Lake (#3654) trailheads.

Fuelbreak precommercial thinning unit #2636 operations have the potential to directly affect the Bear Mountain trailhead, as well as approximately 500 linear feet of the trail (#3602) from the trailhead.

The Alternative B Proposed Action has the potential to create indirect aesthetic effects for the Bear Mountain Trail (#3602).

Additionally, Alternative B Proposed Action operations have the potential to directly affect the MFNRT (#3609) in proposed wildlife forage unit #3570.

There are potential Alternative B indirect aesthetic effects for the MFNRT within unit #3570. Brush piles may be evident beyond the 300 foot limit, and may create visual impacts for trail users, but these effects would be temporary in nature as brush piles would diminish within five to ten years.

Cumulative Effects- Alternative A

There are no cumulative effects for Alternative A, No Action, because there would be no direct or indirect effects.

Cumulative Effects- Alternative B

There are no expected cumulative effects to trails as a result of proposed Alternative B activities, because the temporary nature of logging operations does not typically create physical or visual effects that accumulate in time and space.

Existing Condition – Wild and Scenic Eligible Rivers

Wild and Scenic (Eligible) Rivers: Upper Middle Fork

The section of the Middle Fork Willamette River flowing through the project area was identified in the Forest plan as eligible for designation as a Scenic Class Wild and Scenic River because it meets two criteria for designation: it is free-flowing, and it has at least one Outstanding Remarkable Value (ORV). This Scenic eligible section runs from Echo Creek to Timpanogas Lake for a total of 16 miles. This section of the Middle Fork Willamette is still largely primitive and its shorelines are largely undeveloped, though it can be accessed in multiple places by roads.

The Willamette National Forest Plan protects ORVs in the Scenic eligible section to insure potential designation of the river segment is not affected by management actions. The Forest Plan specifies the river corridor to be managed to achieve the Visual Quality Objective of Retention.

Outstanding Remarkable Values associated with this stretch of river focus on the scenic, historical/cultural, and ecological/biological values (Table E-3, in Forest Plan FEIS Appendices and listed below). To qualify as an ORV, a river-related value must be a unique, rare, or exemplary feature that is significant at a regional or national level. ORVs are to be protected when management activities are planned within the river corridor. More information regarding the special characteristics of this river segment can be found in the Interim Resource Assessment for the Middle Fork of the Willamette River (1990).

- Scenic: water clarity, canyons, cascading waterfalls, exceptionally clear and clean springs, classic examples of glacial features, and the Big Swamp Old Growth Grove. Big Swamp is a marsh meadow that sits at the head of Paddy's Valley between 3,800-3,900 feet in elevation. Surrounding the meadow is an old growth forest of Douglas-fir, western red cedar, Englemann spruce, and western hemlock. The Middle Fork NRT skirts the north side of the grove.

- Recreation: camping, fishing, hiking, and potential for many interpretive occasions.

- Geologic/Hydrologic: Timpanogas Lake, waterfalls, Paddy's Valley, a unique, distinguishable break in the geological formation showing the young and old cascades, a glacier carved valley, and the Big Swamp Old Growth Grove.

- Vegetation and Ecology: Big Swamp Old Growth Grove, diversity of species due to wide range of elevation (from 2,400-5,000 feet), habitat for bull and cutthroat trout.

- Wildlife: important biological pathway as a connecting link from Hills Creek Reservoir to the Cascades, specially designated habitat areas contains spotted owls, habitat for bald eagles and ring-tailed cats, elk calving area, and winter range for big game.

- Historic: Historical significance of Oregon Central Military Wagon Road (OCMWR) and Rigdon Meadows.

Environmental Consequences – Wild and Scenic Eligible Rivers

Direct and Indirect Effects –Alternative A

Alternative A, No Action, would not impose any effects on the eligibility for Scenic class status of the Middle Fork Wild and Scenic River corridor within the project area.

Direct and Indirect Effects –Alternative B

The Alternative B Proposed Action has the potential to affect visitors accessing the Middle Fork Willamette (Wild and Scenic Eligible) River corridor from the Middle Fork National Recreational Trail through direct project activity (workers, noise, dust) in Unit #3570. Indirectly, visitors may experience noise during operations from the eight harvest units and one forage treatment unit planned within ¼ mile of the river channel. These impacts require no special mitigations as they are temporary in nature.

For recreation ORVs, the Alternative B Proposed Action has the potential to affect visitors accessing the river corridor from the Middle Fork National Recreational Trail through direct project activity (workers, noise, dust) in Unit #3570. Indirectly, visitors may experience noise during operations from the eight harvest units and one forage treatment unit planned within ¼ mile of the river channel. These impacts require no special mitigations as they are temporary in nature. Additionally, no direct or indirect effects are expected from the Alternative B Proposed Action for scenic, geologic/hydrologic, vegetation/ecology, wildlife, and historic ORV's (Outstanding Remarkable Values). Overall, the eligibility for Scenic class status for this section of the Middle Fork Willamette River in the Project area is not expected to be affected by the Alternative B Proposed Action.

Cumulative Effects- Alternative A

There are no cumulative effects for Alternative A, No Action, because there would be no direct or indirect effects.

Cumulative Effects- Alternative B

There are no expected cumulative effects on any of the ORV's within the Middle Fork Wild and Scenic (eligible) corridor as a result of proposed Alternative B activities, because the temporary nature of logging operations does not typically create physical or visual effects that accumulate in time and space. Therefore there would be no cumulative effect on the eligibility of the Middle Fork Willamette River for Scenic class status.

Existing Condition – Scenic Resources

Scenic Resources

Valued Landscape Character

The Pioneer Gulch Project area is typical of the Western Cascades Coniferous Forest-Alpine Meadow geomorphic province, encompassing mountainous terrain at moderate to high elevations, combined with deeply-incised hydrologic drainages. The broad hydrologic pattern in this zone is the Middle Fork of the Willamette River and its associated tributaries. Vegetation patterns range from Douglas-fir and fir-spruce cover, with areas of alpine vegetation at the highest elevations approaching Diamond Peak. Diamond Peak, at 8,744' provides the major focal backdrop at certain locations within the project area. Bounded by broad ridges, Paddy's Valley is a noticeable scenic feature in the project area, especially to those traveling the Middle Fork National

Recreation Trail (within the eligible Wild and Scenic Middle Fork of the Willamette River corridor) or driving along Forest Road 2153. The Middle Fork of the Willamette River represents a geographically-accessible recreation and scenic resource to residents of Oakridge, Westfir, Eugene, and surrounding areas. Typical activities include fishing, boating, swimming, horseback riding, day-hiking, trail cycling, and hunting.

Scenic Resource Analysis

The Visual Quality Objectives (VQOs) in the project area were designed to maintain the integrity of scenic resources along the Upper Middle Fork Willamette River drainage, as viewed from Forest Roads 21, 2153, 2154, and the Middle Fork National Recreation Trail along the Middle Fork of the Willamette River. The Management Area (Willamette Forest Plan management allocation) along these corridors is 11d, which prescribes Partial Retention as seen from the foreground. As defined by the Forest Plan, Management Areas are areas with similar management objectives and a common management prescription. Along Class I trails, including the Middle Fork National Recreation Trail and the non-wilderness portions of trails leading into the Diamond Peak Wilderness, management activities must meet the VQO of Retention, as seen from the Foreground.

During the summer of 2009, the Tumblebug Fire burned portions of the viewshed that can be seen from some viewing points within the Project area. Although the fire resulted in a major reduction in green trees in some areas, this area is not considered disturbed for the purpose of this analysis because the visual impacts of fire, either natural or human-caused, are considered to be consistent with characteristics of a dynamic and evolving natural landscape through time and space.

Overall, Alternative B forest management activities proposed in these units (commercial thinning, fuel break understory reduction, fuel break pre-commercial thinning, and forage treatments) do not qualify as visual disturbances to scenic resources, as they do not approach the large-scale removal of vegetation, as seen in regeneration harvesting. According to the Standards and Guidelines, Management Area 11a considers a harvest area disturbed until the regenerated stand is 4.5’ in height (IV-202), Management Area 11c, 15-20’ in height (IV-206), and 11d, 10-15’ in height (IV-209). No forest management activities qualifying as disturbance to visual resources (regeneration harvests) have occurred within the planning area since 1999. Because of the quick-growing nature of the vegetation in the planning area, all past harvest acres are fully recovered according to the Forest Plan Standards and Guidelines; however, visual evidence of past forest management activities is still readily apparent from viewpoints within the project area.

The extent of analysis for effects to scenic resources extends to the Project area boundary. The 1990 Willamette National Forest Land and Resource Management Plan (Forest Plan) and Scenery Management Systems handbook sets the regulatory framework as it applies to Scenery Management. The goal of Scenery Management is to maintain and create desired visual characteristics of the forest landscape through time and space for the benefit of the public. Within the project area, proposed thinning units are located in Management Areas 11a, 11c, and 11d. The three Management Areas are more specifically described in the following table.

Table 50: Scenic Management Allocations with Pioneer Gulch Project Area

Management Area/Sight Distance	Visual Quality Objective (VQO)	Scenic Integrity	Landscape Condition	Deviation from landscape character
11a/Middleground (1/2 mile to 4 miles)	Modification	Low	Moderately Altered	Begins to dominate the landscape character being viewed, but borrows existing landscape attributes of form, line, color, texture, etc.
11c/Middleground (1/2 mile to 4 miles)	Partial Retention	Moderate	Slightly Altered	Remains visually subordinate to the landscape character being viewed.
11d/Foreground (0' to ½ mile)	Partial Retention	Moderate	Slightly Altered	Remains visually subordinate to the landscape character being viewed.

Environmental Consequences – Scenic Resources

Direct and Indirect Effects –Alternative A

Alternative A, No Action, would not impose any effects on scenic resources within the project area, as dynamic landscape processes, such as vegetation growth and natural disturbances (lightning, wildfire, etc.) would dominate both previously managed and unmanaged stands.

Direct and Indirect Effects –Alternative B

The Alternative B Proposed Action has the potential for direct effects in the following areas: Harvest operations in all units may result in temporary effects to scenic quality, including visible slash, log decks, temporary roads and landings, skid trails, decreased vegetation (increasing depth of field) and evidence of tree stumps. In wildlife forage treatment units, the visual effects of mastication and handpiled slash may be seen from roadsides and trails. These effects are unavoidable, but temporary in nature, as green-up typically occurs within 3-5 years, softening the effects of forest management.

The indirect effects of the Alternative B Proposed Action are as follows:

Management Area 11a and 11c Units (Middleground)

All treatment units in Management Areas (MA) 11a and 11c are Middleground zones, as seen from Forest Roads 21, 2153, and 2154. When visual management areas were established in this portion of the Willamette National Forest, these three roads were considered the critical viewsheds from which a majority of the public would perceive this area of the forest landscape. The VQO for MA 11a is Modification Middleground, which means that management activities may dominate the characteristic landscape, but must follow naturally-established forms, lines, colors, and textures, and should appear as a natural occurrence when viewed in Foreground or Middleground. The VQO for MA 11c is Partial Retention, where management activities must remain visually subordinate to the characteristic landscape. Within the Middleground zone, all proposed management activities may appear as coarser textures in the landscape when seen from 21, 2153, and 2154, but would not approach any noticeable level of visual contrast due to the

proposed silvicultural treatments. Therefore, all units within the 11a and 11c Middleground Zone, as viewed from Roads 21, 2153, and 2154 would meet their respective VQOs of Modification Middleground and Partial Retention.

Management Area 11d Units (Foreground)

The units in Management Areas (MA) 11d are situated in Foreground zones, as seen from the travel corridors of Forest Road 21, 2153, and 2154. The VQO for MA 11d is Partial Retention, Foreground, which means that management activities can occur, and must remain subordinate to the characteristic landscape within an area between the observer and ¼ to ½ mile distant.

Along Forest Road 21, there are no proposed treatments immediately adjacent to the roadside, although six units come to within approximately one-tenth of a mile (176 yards) of the road. Forest visitors traveling this section of the 21 road are typically moving quickly, due to good road conditions and relatively straight alignments, therefore, the likelihood of noticing visual contrast from these units is small.

Along Forest Road 2153 and 2154 seven treatment units are proposed immediately adjacent to the roadside. The visual effects of management in these units would not approach a magnitude that would dramatically contrast from their surroundings.

Overall, all units immediately adjacent to the 11d Foreground Zone, would meet their respective VQO of Partial Retention, as management proposals in all units would not noticeably detract or contrast from the overall visual landscape.

Middle Fork Wild and Scenic (Eligible) River

All management activities must meet the VQO of Retention to within ¼ mile of either side of the river, or not be evident to the casual observer. All proposed Alternative B management activities within ¼ mile of the river corridor would meet the Retention VQO, as they would not create dramatic visual contrasts to the characteristic natural landscape features.

Cumulative Effects- Alternative A

There are no cumulative effects for Alternative A, No Action, because there would be no direct or indirect effects.

Cumulative Effects- Alternative B

There are no expected cumulative effects to the Middle Fork Wild and Scenic (eligible) corridor as a result of proposed Alternative B activities. Although visitors within the Middle Fork Eligible Wild and Scenic Corridor would notice the effects of past management activities, , these activities are considered visually recovered according to the Forest Plan Visual Standards and Guidelines.

Potential Wilderness and Other Undeveloped Areas

The geographic scale used to assess direct, indirect, and cumulative effects for potential wilderness areas includes the Pioneer Gulch project area and/or any area using the criteria described below that is connected to the Pioneer Gulch project area.

FSH 1909.12 directs the identification of Potential Wilderness Areas (PWA) during project level analysis and provides guidance on what constitutes a PWA. The inventory of PWAs is completed to identify lands that meet the criteria for being evaluated for Wilderness suitability and possible recommendation to Congress for Wilderness study or designation. Evaluation would occur

during Forest Plan development or revisions. The following criteria were used to identify PWAs (FSH 1909.12 Chapter 71).

1. The area contains>5,000 acres FSH 1909.12 chapter 71.1(1)
2. The area contains no forest roads or permanently authorized roads (non-forest roads on private lands were also considered in the analysis) FSH 1909.12 chapter 71.1(3)
3. The area is adjacent to Wilderness or IRA (Inventoried Roadless Area). FSH 1909.12 chapter 71.1(2)(c)
4. The area contains no evident results of past timber harvest (where stumps, skid trails or roads are substantially unrecognizable). FSH 1909.12 Chapter 71.11(9)
5. The area contains at least 80% ownership, except if adjacent to Wilderness or IRA. FSH 1909.12 Chapter 71.11(6)

Geographic Information System (GIS) analysis identified no areas that meet the previously listed criteria, and the project Interdisciplinary Team found no areas that meet the criteria based on site-specific knowledge. Some basic standards used in the GIS analysis included the road buffer distance and the removal of areas based on timber harvest activities. Road buffering involved a 200 foot buffer for all forest roads and a 500 foot buffer of all highways, which are the standard boundary distances for current Wilderness areas on the Willamette National Forest (See PWA GIS analysis in the project record). Stands that have been regenerated were removed, as were stands that have been commercially harvested. Areas that were less than approximately ¼ mile wide were also eliminated.

Existing Condition – Potential Wilderness Areas

The Potential Wilderness analysis did not identify any Potential Wilderness Areas in the Pioneer Gulch project area.

Environmental Consequences – Potential Wilderness Areas

Direct, Indirect, and Cumulative Effects

Alternatives A and B

Both alternatives would have no effect on the potential wilderness area because no management activities would occur in the area. Management of the area would continue under current direction and past decisions.

Existing Condition – Other Undeveloped Areas

The Forest Service does not maintain a database of other unroaded areas (typically areas in excess of 5000 acres, but can be less if such areas are adjacent to existing wilderness, or are “self-contained” ecosystems that can be preserved due to terrain and natural conditions – see FSH 1909.12 71.1). Oregon Wild (see letter of comment dated October 28, 2008 in the public comment section of the Analysis File) did identify five areas within this planning area they consider unroaded and within which they suggest timber harvest and road construction be avoided if such activities would disqualify the areas from future wilderness designation. The five areas are: Bear Mountain (2,688 acres), Tumblebug Creek (3,092 acres) , Reflection Lake (817 acres), Big Swamp (1,503 acres), and McClean Mountain (1,953 acres). The identified unroaded

areas do not contain any proposed commercial thinning units or temporary road construction. One unroaded area (Bear Mountain) overlaps a portion (about two acres) of one fuelbreak understory treatment unit (Unit 2611b, 4 acres).

Environmental Consequences – Other Undeveloped Areas

Direct, Indirect, and Cumulative Effects

Alternative A – No Action

The No Action alternative would have no effect on the other undeveloped areas because no management activities would occur in those areas. Management of the areas would continue under current direction and past decisions.

Alternative B – Proposed Action

Alternative B proposes one fuelbreak unit within the Bear Mountain undeveloped area as identified by Oregon Wild. Unit 2611b (4 acres) proposes understory whip-felling and pruning of residual trees to reduce potential fire behavior. Only small diameter trees would be cut (average cut tree diameter of 7 inches). The unit is part of a fuelbreak strategy to be used as a possible location to start a backfire in the event of future fires in the wilderness. The cutting of small diameter trees needed to maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, is allowed in Roadless Areas (36 CFR Part 294.13). Therefore, Alternative B would have no direct, indirect, or cumulative effects on the eligibility of the Bear Mountain undeveloped area for Wilderness status. Two road closures are proposed within the Reflection Lake undeveloped area. Roads 2160394 (0.39 miles) and 2160408 (0.12 miles) are proposed for closure and hydrological stabilization treatments. Two road closures are proposed within the Tumblebug Creek undeveloped area. Roads 2100403 (0.52 miles) and 2100408 (0.49 miles) are also proposed for closure and hydrological stabilization. Road closure and stabilization treatments on these four roads would enhance the unroaded characteristics of the undeveloped areas in which they occur.

Heritage Resources

In this section, the terms “heritage resources” and “cultural sites” are used interchangeably and have the same meaning.

Existing Condition – Heritage Resources

Prehistoric Background

Archaeological research to date suggests the people have lived in the Oregon Cascades for over 10,000 years, and that their relationship with the landscape changed as the environment changed. According to Burtchard and Keeler (1991), the western slopes of the Oregon Cascades provided adequate habitat for ungulates between 14,000 and 11,000 years ago, and it is possible that the earliest presence of humans in the Cascades may also date to this time period. Although no sites have been professionally investigated, a Clovis point (a point style likely dating to the early-Holocene or terminal Pleistocene) was surface collected in 1959 on the Mohawk River, a tributary of the McKenzie River, ~5 miles northeast of Springfield, Oregon. As described in more detail below, several investigated sites in the region have yielded components dating to the early or mid-Holocene. As previously suggested, environmental conditions allowed for forest

expansion during the early to mid-Holocene (9,000 to 4,500 years ago) and sustained human use of the region dates from this time onward (Hyman et al. 2008).

Human use of the region in the middle and late-Holocene is relatively well documented. Baxter (1986a), for example, researched four sites in close proximity to the current project area: Rigdon's Horse Pasture Cave, Vine Rockshelter, the Colt Site, and the Saddle Site, in an attempt to "understand the human adaptation in the Upper Middle Fork valley…" (Baxter 1986a:1). Baxter used ethnographic and ethnobotanical data cross-referenced with prehistoric site locations in the Upper Middle Fork to develop and understanding of ancient settlement and subsistence patterns (Baxter 1986a). He concluded that in the Upper Middle Fork ethnographic, environmental, and archaeological data suggest that:

> [t]he area's resources called for moderate mobility and therefore smaller groups during most of the year. Conditions may have allowed congregation of larger groups, not dependent on stored foods, only during a fairly short period in the late fall when large game gathered in sufficient numbers to support many humans. In contrast, the huge camas fields, larger grass fields and the greater number of oaks of the Willamette valley proper could have supported much larger, relatively sedentary social units (Baxter 1986a:162).

We can conclude that the current project area might contain archaeological sites that would have sustained small groups over short periods of time, but to which people would have returned year after year, procuring and storing the abundant yet seasonal subsistence resources available in the lowland and upland areas as an expression of cultural adaptation (Hyman et al. 2008).

Ethnographic Background

The project area lies within the historic territory of the Molalla (Zenk and Rigsby 1998:400). Very little information exists on the Molalla at the time of historic contact yet much can be inferred from the practices of neighboring tribal groups and archaeological evidence. It is felt that the Molalla were on friendly terms with their neighbors, which included Kalapuya bands in the Willamette Valley to the west and Umpqua to the south. Additional neighboring groups include the Chinookan-speaking Clackamas living to the north, Sahaptin-speaking Tenino and Northern Paiute living east of the Cascades and the Klamath and Upper Takelma residing to the south.

Swanton (1952) reported that a party led by Joseph M. Garrison in July of 1853 encountered a settlement of Molalla. This encounter was on the route of the Emigrant Road up the Middle Fork of the Willamette River:

Historic Background

During the summer of 1845 Indian Agent and missionary Dr. Elijah White and six men set out to find a route over the Western Cascades that emigrants and pioneers could use to access the Willamette Valley other than by way of the Columbia Gorge. Other parties tried to find similar routes in the coming years, but little information exists as to whether those ventures were successful. In 1852, residents of Lane County donated food, money and livestock to support exploration of the Cascades in an effort to open a route by which emigrants could travel directly into the Willamette Valley. It was believed such a route would facilitate the influx of new residents and all would prosper as a result. The resulting exploration and reconnaissance eventually led to the construction of the Free Emigrant Road (FER) in 1853, which traveled

through the Pioneer Gulch project area along the Middle Fork Willamette River to the Deschutes. Approximately 1,000 people and their livestock (approximately 6000 head) traveled the road in the first year (Williamson 1857:80). Government surveyors, charged with locating the Oregon leg of a new transcontinental railroad, found the FER in 1855 but deemed the route poor for a railroad due to the steep topography in the Diamond Peak area (Williamson 1857:81-82).

When it comes to examples of historic transportation within the Pioneer Gulch planning area, the stand-out features remain the previously described FER and the Oregon Central Military Wagon Road (OCMWR). The OCMWR Company of Eugene secured the rights for exploration and construction in 1865. The company hired surveyors, axe men, bridge builders, packers and cooks in late 1864. The OCMWR Company was escorted up the Middle Fork Willamette River corridor by Lt. John M. McCall and a company of army regulars in June 1865. The road was constructed during 1865 and 1866. The OCMWR Company secured patent rights to 19,153 acres in 1867 and additional tracts in the 1870's. Acreage obtained by 1875 for investors was 361,327 acres out of potential grants of 806,400 acres (U.S. Senate 1867:2). The OCMWR became a major route through the wilderness for eastward migration and movement of livestock from the Willamette Valley to south-central and southeastern Oregon in the 1870's (Beckham 1987). Eventually much of the wagon road was paved and incorporated into the current Forest road system (i.e. FS Road 21).

Heritage Sites in the Pioneer Gulch Project Area

An investigation of research materials relating to the Pioneer Gulch project area revealed numerous cultural resource inventory reports, archaeological and historical studies, and historic maps. The search revealed nine cultural resources surveys had been previously conducted within Pioneer Gulch units, as summarized in the Pioneer Gulch Heritage Resources Report (Godin and Hamilton, 2012). District records indicate surveys occurred in the area from the early eighties through 1999.

Standard protocol dictates a careful GIS analysis and literature review of a project's area of potential effect (APE), in this case each of the units of the Pioneer Gulch planning area. This search is not limited to the areas inside the boundaries of each thinning, forage enhancement, or fuel break unit but includes all areas within a one mile buffer surrounding all Pioneer Gulch units.

Ten heritage sites and nine isolates have been previously recorded within one mile of the project APE. Seven of these sites are prehistoric in origin, and are comprised of four rock cairn sites, two lithic scatters, and one rockshelter/rock cairn site. There are only three historic sites previously recorded within the search area, and these consist of the remains of a historic fire lookout and two historic roads. The latter two sites are the Oregon Central Military Wagon Road (OCMWR) (FS Site 18-05-029) and the Free Emigrant Road (FER) (FS Site 18-05-238), which combined traverse the width of the Pioneer Gulch planning area. Previously recorded Pioneer Gulch isolates are comprised almost exclusively of prehistoric lithic debitage or formed tools, though one historic coin has been documented.

Of the resources previously recorded within the search area, four sites and two isolates are located within a commercial thinning, forage enhancement, or fuel break units. All remaining sites and isolates are located well outside of Pioneer Gulch units, and some are actually situated outside of the planning area (but within one mile of a given unit).

Environmental Consequences – Heritage Resources

Direct and Indirect Effects

Alternative A – No Action

Implementation of the no action alternative would not directly nor indirectly affect cultural resources since there would be no change to the integrity of heritage resource sites.

Alternative B – Proposed Action

Implementation of Alternative B would result in "new" ground disturbance from construction of 2.16 miles of new temporary spur roads, forage enhancement treatments on 59 (of 164) acres, fuels treatments (fuel break) on 133 acres, and commercial thinning on 940 acres. Five heritage sites requiring mitigation measures have been identified within Pioneer Gulch planning units and are potentially eligible for inclusion to the NRHP. Two isolates also require protective measures, and have been identified within Pioneer Gulch planning units. All eligible or potentially eligible heritage resources will be avoided during ground-disturbing activities.

All potentially eligible sites have been protected by restricting project activities at site locations and/or by flagging their boundaries for avoidance. Since appropriate and approved surveys have been completed and cultural site protection measures have been put in place for this project (see Mitigation Measures in Chapter 2), 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.

Cumulative Effects – Alternatives A and B

It is not anticipated there would be cumulative effects to the potentially eligible cultural resource sites in the Pioneer Gulch project area from any of the proposed actions as long as the heritage mitigation measures are implemented prior to timber harvest and associated activities.

Other Disclosures

Consumers, Civil Rights, Minority Groups, and Women

Implementation of any alternative may not by itself have any effects upon consumers but, in combination with other timber harvest projects, may have an effect on the local economy, especially upon the communities of Lowell, Oakridge, Westfir, Springfield, and Eugene. The Willamette National Forest Plan FEIS (USDA, 1990a) addresses social and economic effects on pages IV-119 to 128.

Implementation of this project proposal has not been planned to either favor or discriminate against any social or ethnic group. Contracting procedures used to implement whatever decision may come from this analysis would ensure that contracts used to implement proposed actions would be advertised and awarded in a manner that gives proper consideration to minority and women-owned business groups and meet Equal Employment Opportunity requirements. Due to these considerations, there would be no direct, indirect or cumulative effects to consumers or minority groups should any of the action alternatives be implemented.

Irretrievable and Irreversible Commitments of Resources

Some irreversible and irretrievable commitments of resources would result from the proposed actions contained in all action alternatives. Some erosion or soil movement could result from

culvert replacement if a large rainstorm occurred during construction, but the likelihood of storm-based erosion would be minimized through implementation of the design criteria and mitigating measures presented above in Chapter II. Some soil movement and stream sedimentation could result if a large storm event occurred before temporary roads are closed and stabilized. Soil loss in this worst case scenario would be irreversible, but if rainfall caused only soil displacement (e.g.) soil is mobilized but moves only to fill in depressions on the slope) there would be no irreversible effects.

Production of crushed rock from quarries used in maintenance of the existing road system would be both irreversible and irretrievable from a practical standpoint. Energy used to grow, manage, and harvest trees, and in other management activities is generally irretrievable. The tree growth that would be forgone by the maintenance of portions of the special habitats as an open forest or meadow would be irretrievable but the open canopy nature of the restored forest could be reversed in the future simply by ceasing the application of prescribed underburning. The same could be said for wildlife habitat and individual animal and plant species that would use closed canopy mature forest over open, grassy forests. Irreversible and irretrievable commitments as stated above are also discussed in a general sense in the Willamette Forest Plan FEIS (USDA 1990b) on page IV-178.

Special Forest Products

There is increasing recognition of the economic value of special forest products (SFPs) and their potential role in supporting the diversification of forest product dependent communities. The SFP program on the Forest provides a potentially wide range of products (see USDA, 1993). The Willamette National Forest provides access to firewood, Christmas trees, mushrooms and other consumables through a personal-use permit system. Middle Fork Ranger District records indicate that about 1,800 cords of firewood; 2,000 Christmas tree permits; 400 personal-use mushroom permits and another 360 commercial mushroom permits are sold annually. The action alternative has the potential to generate a total of approximately 1,500 cords of firewood from material (mostly tree tops and defective section of boles) left on log landings. Other commercially valuable SFP include various types of foliage or other plant material for use in the floral trade (particularly beargrass, salal, pine cones, moss, and true fir boughs), posts and poles, yew bark, huckleberries, etc.

The collections of SFPs are directed by Forest Plan Amendment No. 23 and the SFPs Management Plan (USDA, 1993). The latter document suggests that collection of certain SFPs be focused upon areas that are scheduled for harvest, so the proposed actions would provide for a greater amount of potential SFP harvest. This direction ensures resource protection that is consistent with current Forest Plan goals and resource protection and ensures a sustainable long-term supply of desired products. FW-323 to 338 provides direction, such as acceptable harvest levels of various plants/products, acceptable methods of harvest, measures needed to protect other resource values, and where harvesting will be allowed.

At this time, though some SFPs provide a potential for economic development, there is generally a low amount of interest in their collection (aside from those mentioned above), and the supply of various renewable forest products existing in this planning area and throughout the Middle Fork watershed far exceeds the demand for these products except for firewood.

Short-term and Long-term Effects

Over the short-term the No Action alternative would have no specific environmental effects. Over the long-term, it would not enhance the structural diversity of uniform second-growth plantations. Over the long-term, this alternative would result in maintenance of relatively non-diverse young stands of conifers and a gradual loss of non-forest habitats as meadows continue to be encroached upon. This loss of open vegetation types would like result in a long-term depression of big game populations and other species that require open habitats.

The short-term effects of the proposed actions are to affect resources in the planning area within thresholds established in the Willamette National Forest Plan as amended by the Northwest Forest Plan, as described in detail above. These would include a potential short-term increase in turbidity within the Middle Fork Willamette River should a large storm event occur before road use ceases and road closures are implemented. No long-term adverse resource impacts are anticipated. The Action Alternatives also have the short-term effect of depressing snag recruitment and development of suitable northern spotted owl habitat in thinning areas, and the long-term effect of providing for larger sources of snags and down wood and higher quality (more diverse) spotted owl habitat.

Farmland, Rangeland and Forest Land Effects

No farmland or rangeland is found in the project area, though portions of the project area were grazed around the turn of the 20th century. No grazing has occurred within this area for more than 40 years. Effects on forest land are displayed in this document for all alternatives, and are generally consistent with the management direction contained in the Willamette National Forest Land Management Plan (USDA, 1990) as amended by the Northwest Forest Plan (USAD/USDI, 1994).

Unavoidable and Adverse Effects

Unavoidable adverse effects from any of the action alternatives (in proportion to the amount of area being restored) would include soil movement, the potential for sediment entering the stream system should there be a large storm before recovery of vegetation, the production of smoke during fuels reduction and maintenance burning, some sediment production as the result of road maintenance and use, soil erosion as the result of slash burning and underburning, the loss of snag habitat in areas proposed for excess tree removal (due to safety concerns for forest workers).

Also unavoidable are the effects to fish and fish habitats as detailed above under the water quality and fish habitat issues. There is risk of sediment production in this restoration proposal that cannot be avoided given the change that has occurred to this landscape over the last 100 years, particularly the construction and continued use of roads.

Climate Change

Potential changes in the physical and chemical nature of the earth's climate are likely to have impacts on the Nation's agriculture, forests, and related ecosystems. The complete extent and magnitude of these changes are uncertain at this time. There is a lack of sufficient information to predict and detect changes in health, diversity, and productivity of these specific, local ecological systems within this project area due to global climate change, and as such, insufficient information to enable estimation of site-specific effects. The Intergovernmental Panel on Climate Change (IPCC) has summarized the contributions of global human activity sectors on climate change in their Fourth Assessment Report (IPCC, 2007). The three highest human-caused

contributions to greenhouse gas emissions (from 1970 to 2004) are fossil fuels combustion (57 percent), deforestation (17 percent) and agriculture/waste/energy (14 percent). Their analysis of deforestation clearly focuses on land use conversions (as in conversion of forests to agricultural lands or urban development) as the primary forest management issue. The Pioneer Gulch Project does not fall into these categories of main contributors to greenhouse gas emissions; it does not convert forest land into non-forest land, aside for some limited areas to restore historic conditions in areas that did not historically provide for a forest-based carbon sink. Given the IPCC findings and the small scale and limited impacts of this project on vegetative cover and in terms of its combustion of fossil fuels by log movement and other machinery used for land management, the incremental contribution of greenhouse gases and climate change is so small it is not measurable.

The United States, through the Office of Science and Technology Policy has developed a national plan for global climate and atmospheric change research. The USDA activities are identified in that plan, and are outlined in "Our Changing Planet: The FY l991 U.S. Global Change Research Program." The Department of Agriculture is developing a Strategic Plan for Global Change which includes assessment and development of policy options, and research on the effects of management of forest and agricultural ecosystems on carbon dioxide and greenhouse gas cycling.

The USDA is committed to a long-term research effort. Until research removes scientific uncertainties, the National Environmental Policy Act (NEPA) disclosure documents at the regional or project levels are not the appropriate means for addressing global change issues. The USDA endorses the concept that atmospheric and climate effects from major Federal actions be considered in national planning. Such analysis is incorporated as part of the two National analyses coordinated by USDA, the Resources Planning Act (RPA) Assessment and Program of l990 and the Resources Conservation Act Appraisal of l995. Evaluation of global change effects in NEPA documents at the regional or project levels would be speculative and rarely provide meaningful information for the decision maker or the public. Evaluation of global change effects for long-term regional programs may be appropriate in the future when research removes major scientific uncertainties. The USDA will continue an active leadership role in agriculture and forestry regarding the reduction of emissions of greenhouse gases.

Regional Climate change modeling (see for example, Spies, et. al., 2010) generally predict, for the west slope of the Cascade Mountains, that average temperatures increases would result in longer and more intense summer dry periods, increasing summer soil moisture deficits and intensifying wildfire activity and frequency. Variable trends in precipitation are projected, which could result in more intense precipitation events resulting in changes to peak flow regimes, and a rising of snowpack elevations.

The actions that are proposed in the Pioneer Gulch planning area would, to some extent, preserve plant communities since less dense and diversified second-growth stands would be more resilient in the face of insect and disease infestation and wildfire that could increase in frequency due to a changing climate. The proposed actions would have no effects upon the current hydrologic regime in the planning area as a whole, and would maintain all vegetation currently providing shade to perennial streams channels, so they would not affect stream temperature that could increase as a result of climate change. It is not known what could be done to maintain peak flow regimes in the face of changing precipitation patterns, nor how the amount of shade produced by riparian stands could be increased in the face of a warming, drier climate.

According to Mote, et al (1999; page 74) successful forest management approaches in the face of potential increases in temperature and decreases in precipitation and snowpack accumulation include maintaining the full range of biodiversity, managing forest densities for reduced

susceptibility to drought stress, plant species with a known broad physiological climate response curve, and use prescribed fire to reduce susceptibility to high-intensity, large disturbances. All these management approaches are included in the Proposed Action that has been developed for the Pioneer Gulch project.

Recent studies have indicated there is considerable potential to increase carbon storage in Douglas-fir/western hemlock forests (Harmon, et al., 2009, Hudiburg, et. al., 2009, and Mitchell, et al., 2009), the point being to increase vegetative carbon sequestration to lower, or at least avoid continued increases in the amount of carbon dioxide in the atmosphere. These studies suggest that routine forest management activities, such as fuels reduction, thinning, and relatively short rotation harvests result in a reduction of the potential amount of carbon that a forest can store in the long-term. The later of these studies specifically states that even taking into account potential future losses of a dense forest to stand replacement fire and the use of forest products for durable goods (another form of sequestration) or renewable fuels, such management still results in a reduced rate of carbon storage. These results are intuitive in that removal of any vegetative material from a forest, whether by harvest or application of prescribed fire, results, at least in the short-term, in a reduction of total biomass. However, this is a simplistic viewpoint that does not fully take into account the dynamic nature of forests, both biologically and socially in terms of human goals and objectives.

The purpose and need for this project is to maintain and enhance forest health, growth, and vigor, not to provide for storage of a theoretical maximum amount of carbon. As Hudiburg, et. al. (2009) establish, the way to sequester the most carbon in Westside Pacific Northwest Forests is to maintain the most trees on a site for the longest period of time. Such a strategy does not provide much room for other species, and does not provide for development of dominant tree crown structures that can provide various types of plant and animal habitat over the long-term.

There currently is neither general Forest Service policy mandate nor specific Forest Plan direction to manage forests primarily, or even secondarily, as maximum carbon reserves. Such an objective would be counter to the identified purpose and need for action for the Pioneer Gulch project, which is generally to promote health, growth, and vigor of forest stands in the project area. There is specific National (FSM 2020) and Forest Plan (FW-201) direction to manage for maintenance of biodiversity. Maximization of carbon storage in this area would inevitably result in favoring dense, uniform stands of conifer trees to the exclusion of more diverse vegetation communities. Biodiversity enhancement is mandated on National Forest lands both by statute and Forest Service policy. Management of second growth stands for maximum carbon storage would not provide for multiple use, would not provide for diverse and resilient forests, and stands maintained in as dense a condition as physically possible could likely result in ephemeral storage if these stands were affected by wildfire, a relatively common event in the western and southern Cascades Mountains of Oregon.

Additionally, the manipulation of vegetation is not likely an effective method of reducing concentrations of carbon dioxide in the atmosphere as long as large amounts of fossil fuels continue to be burned. As Herzog, et al. (2000) points out, one would have to plant an unforested area the size of the Indian subcontinent each year to balance current carbon dioxide emissions that are almost entirely generated from the combustion of fossil fuels. Even if there was enough non-forested land to use for effective carbon sequestration through aforestation, these forests also are not really storing carbon for any reliably long period of time; they are still part of the active carbon cycle and are subject to various disturbances that can abruptly end the storage function. This is especially true of coniferous forests in the western Unites States, such as those in the

Pioneer Gulch planning area, which are quite flammable and subject to periodic wildfire during summer droughts (USDA, 1995, Characterization section, page 6). One severe wildfire on this landscape would release much carbon dioxide immediately, and much more would be generated chronically as the killed tree stems decompose.

Monitoring

The project would be subject to randomly selected implementation monitoring trips sponsored by either provincial, regional, forest, or district level management teams to determine if the objectives, standard and guidelines, and management practices specified in the Forest Plans are being implemented.

Vegetation

Monitor road systems, landings, fuel breaks, forage areas, gaps and other disturbed areas for invasive weeds for five years following thinning and fuels treatments.

Monitor gaps for survival of conifer and hardwood seedlings planted.

Logging operation would be monitored by the sale administer, soil scientist, and Silviculturist. If standards and guidelines, best management practices, mitigation measures, or the silvicultural prescription are not being met, additional measures would be prescribed to insure compliance. If a leave tree must be harvested for safety reasons, the sale administer may mark another tree to leave to replace it. The sale administer would inform the appropriate staff member if logging feasibility issues may make it impossible to meet the desired conditions outlined in the environmental document.

Monitoring of the units will occur at several stages throughout the contract preparation and administration of the timber sales. Timber sale officers (TSO) monitor the implementation of those contract provisions. All timber sale contract provisions are also closely monitored by TSOs. Some of the more important timber sale contract provisions include season restrictions on operations for TE&S species, best management practices to ensure soil erosion control, and logging feasibility around protected areas. The project is subject to randomly selected implementation monitoring trip sponsored by either provincial, regional, forest, or district level management teams to determine if the objectives, standards, guidelines, and management practices specified in the Forest Plans are being implemented.

Wildlife

Monitor green tree mortality associated with prescribed underburning to document accuracy of mortality estimate and anticipated post treatment snag levels to ensure applicable prescriptions are met.

Monitor down wood consumption associated with prescribed underburning to ensure consumption projections are accurate.

Monitor effectiveness of forage treatments in the four proposed Forage Treatment units.

Fire and Fuels

Monitoring of fuels treatment activities would include fuels surveys of treated areas for the purpose of evaluating the success of implemented fuels reduction plans. Monitoring activities will continue until fine fuel loads in all harvest areas have been returned to background levels (7-9

tons/acre), or about 10 years. Spring underburning would be monitored for mortality at intervals of 2, 5 and 10 years after burning.

Heritage Resources

Monitor the mitigation measures through implementation.

Chapter 4. Consultation and Coordination

The Forest Service consulted the following individuals, Federal, State, tribal, and local agencies during the development of this environmental assessment:

Interdisciplinary Team Members:

IDT Role	Name
IDT Leader, Silviculturist	Eric Ornberg
Botanist	Molly Juillerat
Soil Scientist	John Dixon
Hydrologist	Lisa Kurian
Fisheries	Brandy Langum
Wildlife Biologist	Cheron Ferland
Fire/Fuels	Jose Mercado
Engineering	Zeke Langum
Recreation	Karl Dietzler
Heritage Resources	Terry Godin and Steve Hamilton
Logging Systems Specialist	Bill Menke
Presale Technician	Jerry English

Federal, State, and Local Agencies:

The following Federal and State government agencies were contacting at various points during project development. This contact consisted primarily of report submissions, but some attended field trips or meetings.

- U.S. Fish and Wildlife Service (USFWS)
- National Oceanic and Atmospheric Administration (NOAA)
- National Marine Fisheries Service (NMFS)
- Oregon Department of Fish and Wildlife
- Oregon State Historic Preservation Office.

Formal consultation with the U.S. Fish and Wildlife Service (USFWS) was required based on analysis of impacts from initial proposed actions for the northern spotted owl (spotted owl). Consultation for effects from proposed Pioneer Gulch project activities was incorporated into the Willamette Province FY 2011-2012 Batched Biological Assessment (BA) for Habitat Modification Projects (dated July 2010). In February 2011, the USFWS issued their Biological Opinion (BO) for fiscal years 2011-2012 habitat modification activities within the Willamette Province (February 2011: FWS Reference Number 13420-2010-F-0157). The Pioneer Gulch project is listed in the BO and will comply with all standards pertaining to project activities described therein.

Based on the initial Pioneer Gulch Project proposed action alternatives, the determination for affects to spotted owls was Likely to Adversely Affect (LAA). However, due to project modifications that occurred after the consultation, the final determination of affects is May Affect,

Not Likely to Adversely Affect (NLAA) spotted owls. Formal consultation will remain in place, and the change in determination will be addressed in the annual monitoring reports.

National Oceanic and Atmospheric Administration (NOAA) Fisheries has worked with the U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), and the Forest Service (FS) to revise the methods for making determinations of effect for land management activities impacting ESA-listed salmonid species in the Northwest Forest Plan geographical area. This new approach was used to assess the effects of the proposed action. In this regard, the elements of the proposed action were analyzed for potential effects on the Upper Willamette spring Chinook salmon and bull trout due to changes in the habitat pathways of water quality, habitat access, habitat elements, channel conditions and dynamics, flow/hydrology, and watershed conditions. In applying the revised analysis approach, the agencies consider eight factors, derived largely from the joint NOAA Fisheries and Fish and Wildlife Service ESA Section 7 Consultation Handbook, when evaluating the effects of an action on habitat indicators and subsequently the effects on ESA-listed fish. These factors are proximity, probability, magnitude (severity and intensity), nature, distribution, frequency, duration, and timing, where applicable. The effect determinations for listed fish in this project are Likely to Adversely Affect (LAA) for spring Chinook salmon, Not Likely to Adversely Affect (NLAA) bull trout, Likely to Adversely Affect spring Chinook salmon Critical Habitat and bull trout Critical Habitat, and No Effect (NE) for Essential Fish Habitat (spring Chinook salmon).

State Historic Preservation Office consultation is underway under the terms of the 2004 Programmatic Agreement. When complete, a signed Project Review form, indicating compliance with the federal laws and regulations will be provided for the project file.

Tribes:

A letter with the description of the proposed action and project area information was sent out on August 21, 2008 to representatives of the following tribes: Confederated Tribes of Warm Springs Reservation of Oregon, Confederated Tribes of Siletz Indians of Oregon, Confederated Tribes of Grand Ronde Community of Oregon, and the Klamath Tribe. The letter explained the purpose and need for the project, provided a map of the project area, and solicited comments on the proposed action.

A project update letter was mailed out to the four tribes on October 18, 2011. This letter described several changes to the proposed action that were incorporated since the first letter.

The Pioneer Gulch Project has been included in the Annual Program of Work Review with the Confederated Tribes of the Grand Ronde, Siletz, and Warm Springs since 2008. No comments from any tribes have been received specific to the Pioneer Gulch Project

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Appendix A – Sale Area Improvements

Project Funding Priority List

Priority Grouping	Activity	NEPA Coverage	Estimated Cost
1	Inventory, treatment, and monitoring of invasive weeds in harvest, fuel break, and forage treatment units, haul roads, and quarries (post-operations).	Pioneer Gulch EA	$50,000
1	Roadside seeding/mulching with native species in various places within sale area boundaries to maintain conditions after operations are completed.	Pioneer Gulch EA	$7,000
1	Subsoiling enhancement and seeding with native seed to treat additional non-primary skid trails and existing non-system roads not used for this harvest ($1350/acreX25.2 ac).	Pioneer Gulch EA	$34,020
2	Treatments in forage enhancement units 3570 (hand-cutting of conifers, hand pile and burn). 45 acres of treatment X $400/ac.	Pioneer Gulch EA	$18,000
2	Closure and hydrological storage of system roads listed in the Proposed Action. Highest priority roads are2100390 and 2100392. Priority for other roads will follow the Aquatic Risk Rating with top priority being High, followed by Moderate, then Low.	Pioneer Gulch EA	$55,174
2	Hazardous fuel reduction (precommercial thinning, whip-felling, pruning, piling and burning) in fuelbreak treatment units (133 acres).	Pioneer Gulch EA	$123,300
2	Stream restoration – in stream placement of large wood and root wads, including pulling over trees to enhance bull trout and salmon habitat in the Middle Fork Willamette River.	A separate Decision Memo would be needed.	$55,000
3	Restoration of Quail Meadow, located north of and adjacent to Units 2923a and 2952a.	Calapooya II Meadow Restoration project Decision Memo (in progress)	$50,000
4	Planting of 3-acre gaps in commercial thinning units with rust-resistant western white pine, western redcedar, and native shrubs such as elderberry, cascara, hawthorn, and serviceberry (47 ac x $525/ac).	Pioneer Gulch EA	$24.675
4	Precommercial thinning and pruning in plantations other than the Alternative 2 Proposed Action treatments – to increase health and vigor.	2012-2016 Young Stand Density Management and Conifer Pruning Decision Memo (in progress).	$34,200
5	Effectiveness monitoring of forage units and gaps for wildlife use.	Pioneer Gulch EA	$1,500
5	Effectiveness monitoring of underburning related mortality in Units 2923a, 2923b, 2952a, and 2952b.	Pioneer Gulch EA	$4,240

Appendix B – Past, Present, and Reasonably Foreseeable Future Actions

The Forest Service Handbook (FSH 1909.15 Chapter 10 15.1) addressing NEPA procedures requires consideration of cumulative impacts in an environmental analysis. Cumulative effects are defined as the impacts on the environment resulting from incremental effects of the action when added to other past, present, or reasonably foreseeable future actions. Reasonably foreseeable future actions are those for which effects can be accurately estimated, typically actions that have been formally proposed, and have a specific locations and acreage associated with them. These actions may take place after the effects considered in this analysis occur. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

In some cases there are no accumulating effects on a particular resource from past or future actions because the effect on a given resource are so ephemeral (for example smoke produced by prescribed burning) that it is gone before the next action produces a similar effect. In other cases there have not been any past nor reasonably foreseeable future actions that had or may have a similar effect to the actions under consideration. Council of Environmental Quality guidelines for cumulative effects analyses (Cannaughton, 2005) do not require a cataloging or exhaustive listing of individual past actions. Past actions occurring within this planning area that contribute to cumulative effects consist primarily of timber harvest, particularly the regeneration harvest that generated the second-growth stands that are common in this area.

Table B-1: Past and Present Actions in the Project Area

Past and present actions in the project area include:	
Regeneration harvest - from the 1950's to 1990's	8,347 ac.
System Road construction – 1940 to 1980	147 miles
Trail construction	44 miles
Pre-commercial thinning – 1960 to present	Several hundred acres
Road maintenance	Ongoing for system roads
Road Closure	131 miles
Tumblebug Fire BAER	See Below

While the effects of the 14,560 acre Tumblebug Fire of 2009 are not, strictly speaking, an "action" in that they resulted from a wildfire, there were considerable environmental effects from soil, vegetation, wildlife populations and habitat, and social perspectives. As such, the fire has created a certain background condition which has been taken into account for the preceding effects analysis just as they would be if such results were from past human actions.

Another past action within the Upper Middle Fork Willamette watershed was implementation of the Tumblebug Fire Burned Area Emergency Response (BAER) Plan, which began as the fire was suppressed in 2009 and was finalized in 2010. Activities associated with this plan included (1) applying wood mulch by helicopter on approximately 110 acres to protect soil productivity by replacing ground cover burned in the fire. (2) applying mulch by truck-mounted applicator along 4.5 miles of road to speed vegetative recovery on cut and fill slopes, (3) maintaining road drainage features to protect the road infrastructure and provide for safe public access,

(4) stabilizing the road fill for a segment of Road 2144, (5) replacing the Mac Creek culvert on Road 2143-320, (6) repairing drainage on approximately 1.5 miles of trail, and (7) implementing a variety of patrols, public contacts, area closures, area signing, and monitoring to assess inform the public and assess post-fire conditions.

1) Past Actions

-Past timber harvest by decade within the project area:

Table B-2: Past harvest

Decade	Commercial Thinning		Regeneration Harvest	
	Acres	% of Project Area	Acres	% of Project Area
1950's	0		569	2%
1960's	0		1,983	5%
1970's	0		2,034	5%
1980's	269	<1%	3,004*	8%
1990's	408	1%	757	2%
2000's	0		0	0%
Totals	677	2%	8,347	22%

-Past road construction in the project area.

Total road miles – 147.06

Paved road miles – 10.75

Aggregate surface road miles – 111.38

Native surface road miles – 24.93

- Road maintenance work (blading, ditch cleaning, brushing, hazard tree removal).

-Past road closures:

-Upper Middle Fork Watershed Road Stormproofing and Restoration Project closed and stored 18.4 miles and stored without closing about 4.8 miles of road in the Upper Middle Fork Willamette River fifth-field watershed.

-Echo Staley Road Storage and Illegal Household Trash Site Management Project closed and stored about 23.3 miles of road in the Echo Creek and Staley Creek portions of the Upper Middle Fork Willamette River fifth-field watershed.

-Numerous aquatic restoration projects have been completed in the Upper Middle Fork Willamette 5th Field during the last ten years. These include; remediation of fish passage problems in Swift and Echo, (2003-2008); in-stream large wood placement in Swift, Bear, Echo, Staley, and Upper Middle Fork Willamette River (starting in 2001); and the Indigo Springs Passage and Spawning Channel Project (2009).

-Respect the River Project (phase 1) minimized resource impacts at 17 dispersed campsites along the Middle Fork Willamette River in the fall of 2011 and improved riparian health. This was accomplished by reducing the number of user created trails, limiting site size, limiting motor vehicle access to the riparian zone, scarifying or subsoiling compacted soils, planting native vegetation, and displaying educational Respect the River signage.

-In 2009, the Tumblebug Fire burned 14,560 acres of the Upper Middle Fork Willamette Watershed, including a portion of the project area. While the impacts of Tumblebug, strictly speaking, are not "actions" since they resulted from a wildfire, there were considerable environmental effects to soil, vegetation, wildlife populations and habitat, and social perspectives. As such, the fire has created a certain background condition which has been taken into account for the effects analysis just as it would be if such results were from past human actions.

-Implementation of the Tumblebug Fire Burned Area Emergency Response (BAER) Plan began as the fire was suppressed in 2009 and was finalized in 2010. Activities associated with this plan included (1) applying wood mulch by helicopter on approximately 110 acres to protect soil productivity by replacing ground cover burned in the fire. (2) applying mulch by truck-mounted applicator along 4.5 miles of road to speed vegetative recovery on cut and fill slopes, (3) maintaining road drainage features to protect the road infrastructure and provide for safe public access, (4) stabilizing the road fill for a segment of Road 2144, (5) replacing the Mac Creek culvert on Road 2143-320, (6) repairing drainage on approximately 1.5 miles of trail, and (7) implementing a variety of patrols, public contacts, area closures, area signing, and monitoring to inform the public and assess post-fire conditions.

- Past invasive weed treatments

-Recreation activities including dispersed camping, hunting, hiking, mountain biking, ATV use, snowmobiling, general motorized use.

-Fire suppression and emergency rehabilitation activities on the Tumblebug Fire.

2) Present Actions

Road Storage and Decommissioning -

> -Upper Middle Fork Watershed Restoration and Road Closure Project: Closure and storage or decommissioning treatments on approximately 89.6 miles of road within the Upper Middle Fork Willamette 5th field watershed. Implementation began in the summer of 2011.
>
> -Middle Fork Closed Road Stabilization project: Road storage treatments on already closed roads beginning in 2011. Approximately 25 miles of Maintenance Level 1 roads in the Upper Middle Fork Willamette 5th field watershed that have either already been closed by previous NEPA decisions or have closed naturally (by encroaching vegetation or drainage related problems) is being treated for hydrological stabilization. This work is covered with a Categorical Exclusion and Decision Memo.

-Weed reduction treatments

-Ongoing road maintenance efforts (brushing, ditch cleaning, blading, etc)

-Recreation activities including dispersed camping, hunting, hiking, mountain biking, ATV use, snowmobiling.

- Replanting burned areas in the Tumblebug Fire,500 acres in the fall of 2011.

3) Reasonably Foreseeable Future Actions

-At this time, there is one future timber harvest project, the Tumblebug Fire Roadside Treatment Project, scheduled for implementation in 2012. The project consists of felling hazard trees within areas approximately 150 feet below the roads and 300 feet above the roads. In lower mortality areas, felled trees will be left in place. In higher morality areas, felled trees will be removed through timber sale contract in 51 treatment units covering 497 acres. An estimated 15.0 million board feet of commercial material will be made available for removal from these units through timber sale contract. About 43 miles of road within the fire area will receive low-level maintenance in order to support traffic associated with proposed activities. Within the hazard tree treatment areas, replanting is required and will be accomplished within five years.

-Respect the River (phase 2) Project will minimize resource impacts at an additional 15 dispersed campsites along the Middle Fork Willamette River and improve riparian health. This will be accomplished by reducing the number of user created trails, limiting site size, limiting motor vehicle access to the riparian zone, scarifying or subsoiling compacted soils, planting native vegetation, and displaying educational Respect the River signage.

- Routine maintenance for roads, (ongoing).

- Invasive weed treatments (ongoing).

-Routine hazard tree assessment and management (ongoing).

-Silvicultural maintenance and improvements to managed plantations, including precommercial thinning and pruning.

-Prescribed fire in approximately 200 acres of special habitat (Quail Meadow) to provide habitat for rare plant species, as part of the Calapooya Divide II Meadow Restoration project.

- Noisy/Found Culvert Replacement. This project will replace the Noisy Creek and Found Creek culverts on FS Rd. 2100 with stream simulation design structures that will provide fish passage and meet the flow needs of a 100 –year flood event. The existing culverts prevent the passage of fish. The project NEPA and design have been completed but the project is not yet funded.

-Middle Fork Restovert Project (2012-2013). Placement of approximately 1,100 pieces of large wood in three tributary streams to the Middle Fork Willamette River. Replacement of culverts on Windfall, Maple, and Coal Creek with structures that allow aquatic organisms to pass during all life stages.

- Replanting burned areas in the Tumblebug Fire, 500 acres in 2012.

-Any future action proposed in this watershed will would be in compliance with Forest Plan standards and guidelines designed to keep cumulative effects from preventing the achievement of desired future conditions.

Appendix C – Aquatic Conservation Strategy Objectives

As part of the Record of Decision (ROD) for Northwest Forest Plan (Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl - USFS, BLM 1994), the Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. A goal of this strategy is to maintain a "natural" disturbance regime. In addition, management activities must comply with nine objectives that are included in the strategy. A variety of tactics to accomplish these goals and objectives are incorporated into four primary components. These components are: Riparian Reserves, Key Watersheds, Watershed Analysis, and 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. The emphases on integration of forest and stream management objectives and the implication of natural disturbance regimes are closely aligned with the goals and objectives of the Aquatic Conservation Strategy. What follows is a discussion of how the activities proposed in the action alternative (alternative B) conform to the nine objectives of the ACS.

Aquatic Conservation Strategy Objectives

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 or special habitat. The objectives for the treatments are to develop stand structures that would maintain existing habitat, while creating conditions resembling those that would occur in the presence of the historic natural fire regime. The commercial thinning of this project would occur in managed stands that now lack natural complexity and diversity due to past harvest and replanting. This would 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.

The complexity and diversity of aquatic systems within the Pioneer Gulch Project area would be protected by recognizing no-cut buffer areas within the Riparian Reserves. The proposed action alternative would thin 286 acres of Riparian Reserve within the project area. Variable density thinning (VDT) would incorporate needed diversity and complexity back into these riparian areas while using no-cut primary shade zone protection to retain shade and micro climate near streams. These features would ensure the protection of the aquatic system as a whole.

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.

Networks of Riparian Reserves cover all streams within the project area providing spatial connectivity. Thinning within the Riparian Reserves outside the no-cut buffers with VDT does not change that characteristic of the Riparian Reserve network, nor would it alter the existent temporal connectivity that occurs naturally in the watershed. Treatments are proposed within Riparian Reserves where they have the potential to enhance functions such as the development of future large wood, stand structural diversity, vegetative species richness and diversity, and other late successional characteristics. This design criteria within the preferred alternative, assures that project actions within Riparian Reserves during treatments do not affect either spatial or temporal connectivity.

Road treatments include upgrade of stream crossings to accommodate 100-year flood events, so that these events can flow through the landscape unimpeded and without the risk of catastrophic fill failures. Where needed, these crossings would be retrofitted to permit passage of fish, amphibian, and other aquatic and riparian species, to and from wetland habitat located both upstream and downstream of the crossing. On selected roads, stabilization would occur to either maintain or restore hydrologic flow paths and assure proper downstream connectivity on unused road infrastructure.

Maintaining the road system would give the opportunity to upgrade stream crossings and to impose an additional 18.4 miles of road for closure. There would be no construction of permanent roads.

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 within no-cut buffers, 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. A total of 55.5 miles of road would be maintained and undersized or old culverts would be replaced improving drainage issues, and applying aggregate where necessary would likely reduce the risk of chronic, low amplitude sources of fine sediment from reaching the stream network. A total of 6.4 miles of temporary spur roads would be needed for haul and closed when the project work is complete.

Maintenance of portions of the existing road network that are in poor repair, replacement of undersized or old culverts, drainage improvement, and application of aggregate where necessary would reduce chronic, low amplitude sources of fine sediment from the existing transportation system as well as the potential of crossing fill failures that could cause stream bed scour during debris torrents. This would reduce the possibility of fine sediment becoming embedded in gravels and cobbles in stream channel bottoms or the deposition of large amounts of material that could aggrade channels and cause widening and subsequent riparian damage.

Objectives #4 and #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. 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 criteria 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. These criteria include no-cut buffers that protect existing shade and filter any potential effects of harvest.

Many of the roadwork projects would likely reduce 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. By keeping the road system opened and in a maintained condition, future road related maintenance issues that arise would be dealt with as needed. If the road system is allowed to digress to an unmaintained condition, than elements of the sediment regime would likely change for the worse as well. Road failures would not be able to be corrected and the frequency of failures would likely increase.

Objectives #6 and #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. 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 would 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 would 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.

Maintaining the no-cut buffers within the Riparian Reserves would sustain aquatic habitats and maintain a near complete and larger level of future wood routing to the streams and floodplains, with more utility to the stream environments.

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 would maintain existing habitat, while creating conditions resembling those that would occur in the presence of the historic natural fire regime.

This would 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 would create conditions that favor development species composition and structural diversity of plants across the landscape of the Pioneer Gulch 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 would be treated are expected to develop a more diverse pattern of small openings and patches, and a richer vegetative species composition and diversity.

Actions of the Pioneer Gulch Project would in no way negatively change the species compositions or structural diversity of plant communities in Riparian Reserves. The thinning prescriptions within the Riparian Reserves would help to create more diverse understory vegetation, and larger healthier trees, that would benefit the streams by increasing deep pools, forage areas, capture sediment and spawning areas.

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

Implementation of the Pioneer Gulch Timber Sale Project is intended to restore landscape processes, vegetative structures, and landscape patterns to more natural conditions, and would restore the ability of the landscape to create a rich variety of habitats for native species. Where project activities have potential to affect existing native plant and animal species within the project area, designation of buffered areas or use of specific project criteria would maintain intact populations. Gaps of 1 to 3 acres would be created to support well-distributed populations of riparian- dependent species. Thinning within the Riparian Reserves would contribute to larger trees in the future to contribute to the stream channels as LWD.

Appendix D – Soil Restoration (Subsoiling)

Soil Restoration (Sub-soiling) by Unit and Logging System:

Unit (Activity Area)	Logging System *	Acres (by logging system)	Landings (2% of acres for ground-based, 1.5% for skyline)	Skid Trails (5% of ground-based acres)	Total Restoration Acres by Unit and Logging System
2761	S	19	0.39	0.0	0.39
2761	G	6	0.16	0.41	0.57
2803	S	32	0.72	0.0	0.72
2888	S	40	0.65	0.0	0.65
2915	S	21	0.34	0.0	0.34
2920a	S	13	0.17	0.0	0.17
2920a	G	5	0.08	0.20	0.28
2920b	S	13	0.17	0.0	0.17
2920b	G	3	0.12	0.31	0.43
2923a	G	114	2.25	5.62	7.87
2923b	G	33	0.64	1.60	2.23
2952a	G	103	2.08	5.20	7.28
2952a	S	8	0.12	0.0	0.12
2952b	G	7	0.13	0.33	0.47
3048a	G	19	0.38	0.95	1.33
3048a	S	7	0.08	0.0	0.08
3048b	G	15	0.32	0.81	1.13
3048b	S	3	0.04	0.0	0.04
3057	G	16	0.32	0.80	1.12
3057	S	7	0.11	0.0	0.11
3062	S	39	0.59	0.0	0.59
3068	S	25	0.38	0.0	0.38
3068	G	8	0.17	0.43	0.60
3135a	G	9	0.19	0.47	0.66
3135b	S	19	0.30	0.0	0.30
3144	G	46	1.03	2.58	3.61
3147	G	35	0.70	1.76	2.46
3147	S	26	0.38	0.0	0.38
3148a	G	31	0.60	1.51	2.11
3148a	S	5	0.08	0.0	0.08
3148b	G	13	0.25	0.63	0.88
3148b	S	1	0.02	0.0	0.02
3485	G	19	0.43	1.08	1.51
3485	S	1	0.01	0.0	0.01
3546	S	71	1.14	0.0	1.14

Unit (Activity Area)	Logging System *	Acres (by logging system)	Landings (2% of acres for ground-based, 1.5% for skyline)	Skid Trails (5% of ground-based acres)	Total Restoration Acres by Unit and Logging System
3546	G	8	0.16	0.40	0.56
3599	S	23	0.39	0.0	0.39
3599	G	2	0.04	0.10	0.14
3633	S	12	0.22	0.0	0.22
3770	S	12	0.33	0.0	0.33
3770	G	8	0.29	0.72	1.01
3870	S	11	0.19	0.0	0.19
3870	G	4	0.13	0.32	0.44
4115	G	2	0.04	0.09	0.13
5756	G	12	0.24	0.59	0.82
6927	G	14	0.38	0.94	1.32
TOTALS			17.6	27.8	45.8

* S = Skyline and G = Ground- based logging system
Shaded rows indicate units that the purchaser will be required to sub-soil primary skid trails

Appendix E – DecAID Analysis of Dead Wood in the Upper Middle Fork Willamette River Watershed

The Pioneer Gulch Project area totals about 37,195 acres. Habitat in this area is primarily representative of the Westside Lowland Conifer Hardwood (WLCH).

Data presented below display estimated current percent of the Upper Middle Fork Willamette River watershed for the two dominant wildlife habitat types (WLCH) in different snag and downed wood densities based on Gradient Nearest Neighbor (GNN) analysis of forest inventory plot data (LEMMA 2009) for the watershed. A historic reference condition is also developed using snag and downed wood abundance derived from plot data in unmanaged stands throughout the habitat type and an assumed fire regime interval for the watershed that estimates the average amount of the habitat in different successional stages. This information is calculated for both total snags (≥ 10” dbh) and downed logs (≥ 5” diameter) and for large (≥ 20” diameter) logs and large (≥ 20” dbh) snags. Snag data are given as snags/acre and downed wood data are given as percent cover. DecAID assesses down wood levels in specific habitats against natural ranges by considering volume as percent cover. DecAID selects percent cover because it best describes down wood abundance as it relates to wildlife use (Mellen-McLean et al. 2011).

Predictions generated by methods such as GNN for vegetation conditions are appropriate for regional-scale analyses but are recognized as insufficiently accurate for most site-level application (LEMMA 2009). Including a broad range of size and structural stage data when considering current dead wood levels for affected habitat results in utilizing data that is less specific to the project area.

SNAGS

For Lowland Conifer/Hardwood Forests in the UMF Watershed, the estimated median number of large snags (≥ 20” dbh) Pre-TF is 2/acre compared to an estimated historic median reference condition of 5/acre for the Westside Lowland Conifer/Hardwood Forests of the Oregon Cascades. The estimated median number of large snags Post-TF in this WHT (wildlife habitat type) is 2.1/acre (Figure E-1).

For Lowland Conifer/Hardwood Forests in the UMF Watershed, the estimated median number of total snags (≥ 10” dbh) Pre-TF is 5.5/acre compared to an estimated historic median reference condition of 12/acre for the Westside Lowland Conifer/Hardwood Forests of the Oregon Cascades. The estimated median number of large snags Post-TF in this WHT is 6.5/acre (Figure E-2.

For Montane Mixed Conifer Forests in the UMF Watershed, the estimated median number of large snags (≥ 20” dbh) Pre-TF is 4/acre compared to an estimated historic median reference condition of 5/acre. The estimated median number of large snags Post-TF in this WHT is 4.5/acre (Figure E-3).

For Montane Mixed Conifer Forests in the UMF Watershed, the estimated median number of total snags (≥ 10” dbh) Pre-TF is 12.5/acre compared to an estimated historic median reference condition of 13/acre. The estimated median number of snags Post-TF in this WHT is 14.5/acre (Figure E-4).

An additional estimate for snag levels in unmanaged WLCH or MMC habitat within the UMF watershed that is more specific to the Tumblebug Fire area can be derived based on the influence

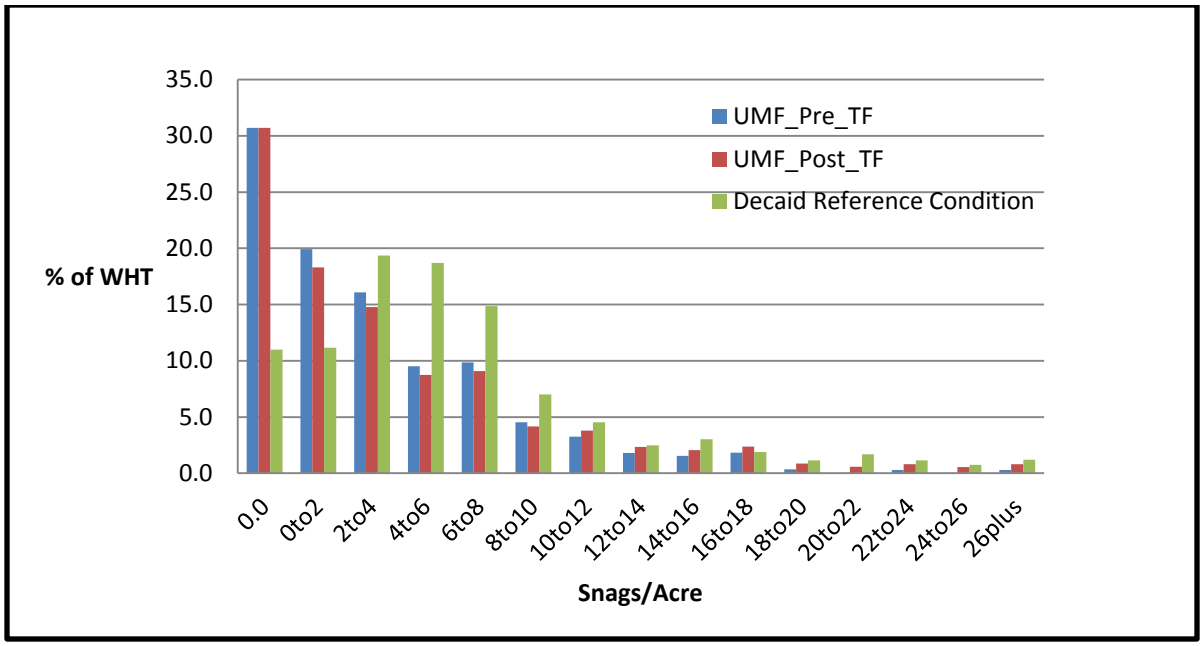

Figure E-1: Comparison of Large (≥ 20"" DBH) Snag Densities in Westside Oregon Cascade Lowland Conifer/Hardwood Forests in the Upper Middle Fork Willamette Watershed Pre and Post-Tumblebug Fire to Reference Conditions.

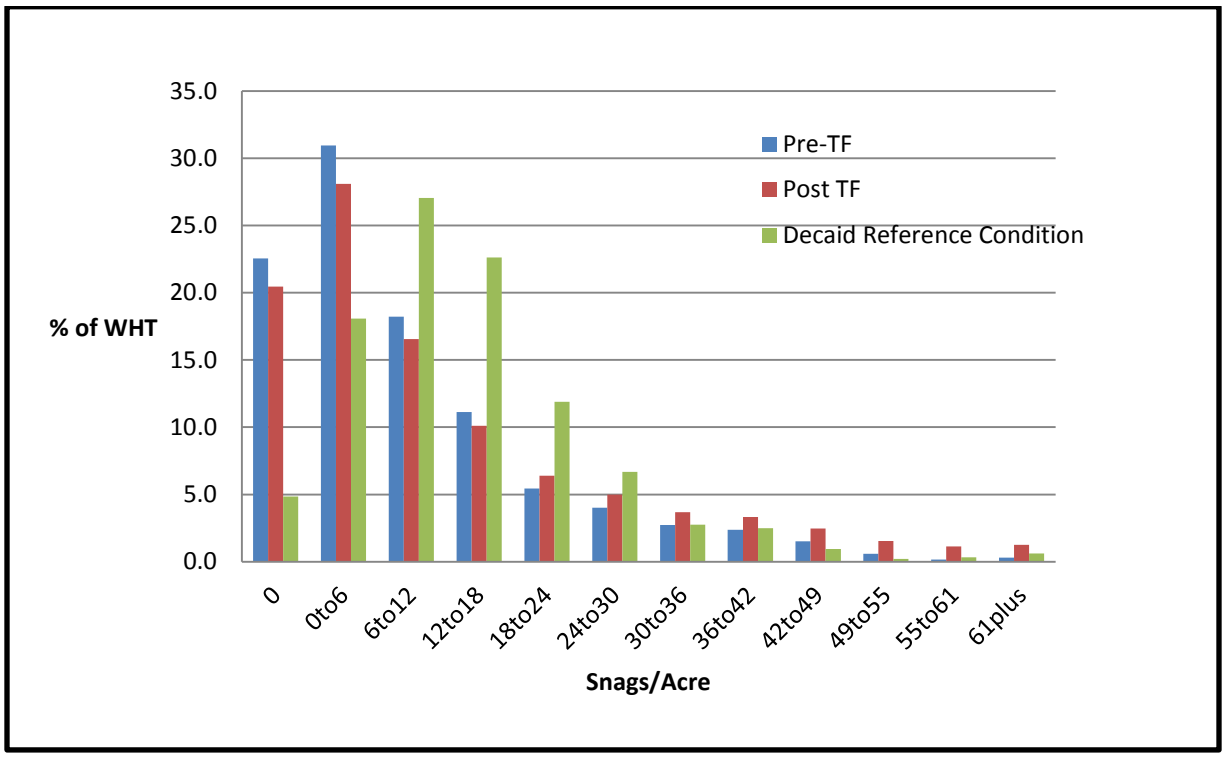

Figure E-2: Comparison of Total (≥ 10" DBH) Snag Densities in Westside Oregon Cascade Lowland Conifer/Hardwood Forests in the Upper Middle Fork Willamette Watershed Pre and Post-TF to Reference Conditions

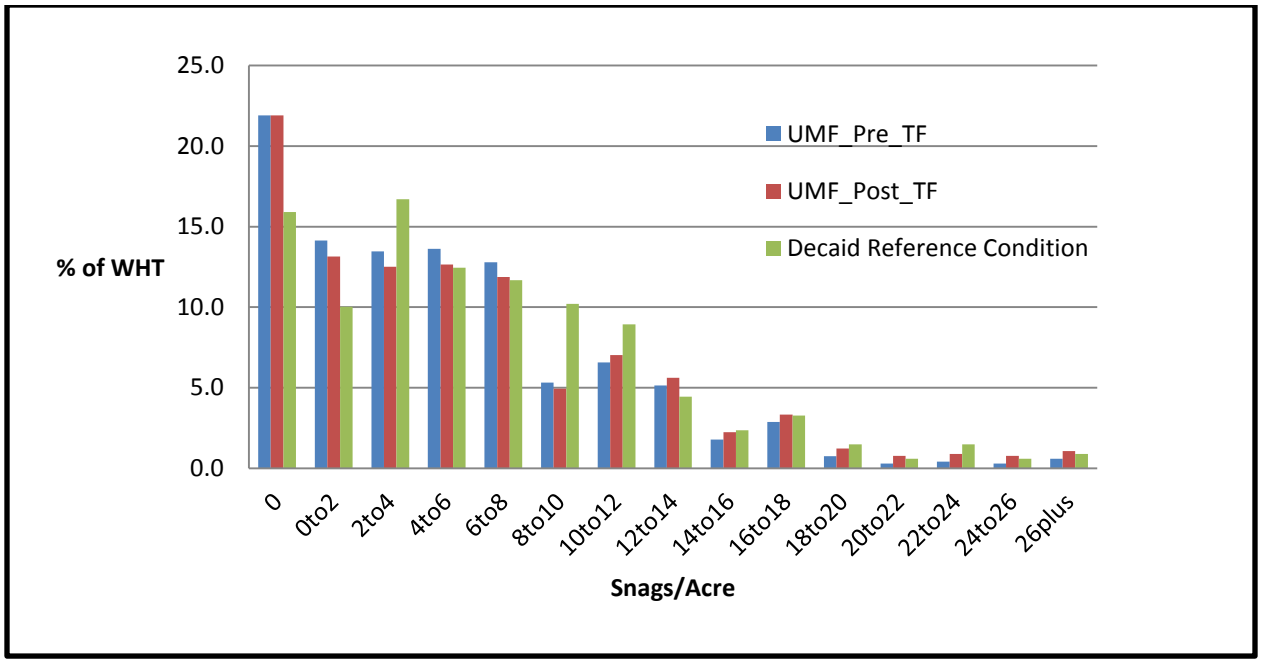

Figure E-3. Comparison of Large (≥ 20" DBH) Snag Densities in Montane Mixed Conifer Forests in the Upper Middle Fork Willamette Watershed Pre and Post-Tumblebug Fire to Reference Conditions

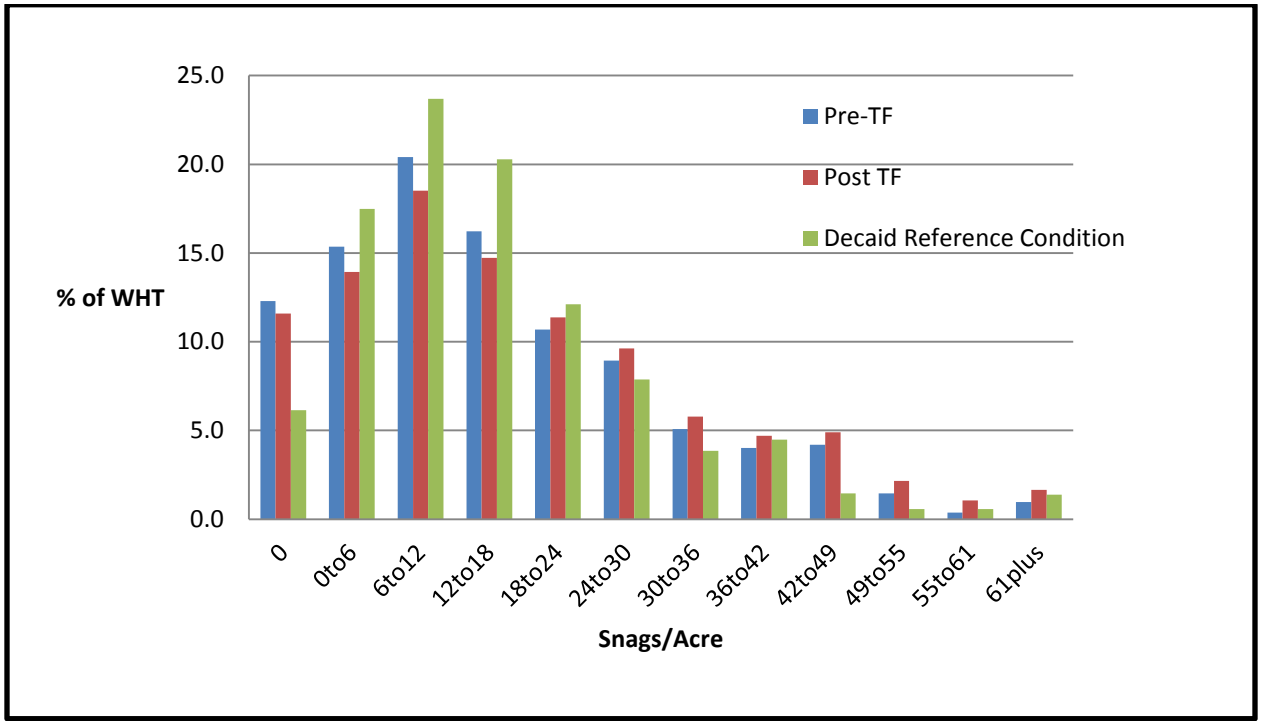

Figure E-4. Comparison of Total (≥ 10" DBH) Snag Densities in Montane Mixed Conifer Forests in the Upper Middle Fork Willamette Watershed Pre and Post-TF to Reference Conditions

of fire severity on post-fire snag levels. The Tumblebug Fire area overlaps about 10% of the Pioneer Gulch Project Area and lies directly adjacent to its western boundary. The snag level estimate is dependent on a set of assumptions that warrants consideration against GNN analysis values presented above. These assumptions are used for assigning post-wildfire CWD levels to GNN-modeled current forested habitat, and are based on data from west Cascades wildfires dating back to 1987. Much of the data behind assumptions is specific to fires on the Middle Fork District, has been incorporated into DecAID, and is considered to reinforce the validity for applying to the Tumblebug fire post-burn condition (Kertis pers com).

A key aspect for applying assumptions is that post-fire conditions met or exceeded 50% moderate to severe mortality in higher elevation habitat (MMC) and 36% similar mortality in lower elevation habitat (WLCH). These conditions were exceeded in the Tumblebug fire. Under such a scenario the following conditions have been assumed:

- Total snags ≥ 10" dbh are boosted to ≥ 80% tolerance level (tl) for the first 15 years before dropping to post-fire large snag levels. This equates to about 23 snags/acre for MMC WHT (wildlife habitat type) and 21 snags/acre for WLCH WHT (DecAID Figures MMC_L.inv-14 and WLCH_OCA_L.inv-14).

- Snags ≥ 20" dbh are boosted to ≥ 80% tl for the first 30 years, then drop to 50% tl for the next 20 years. This equates to about 13 snags/acre for MMC WHT and 10 snags/acre for WLCH WHT at 80% tl, dropping to about 8 and 6 snags/acre respectively at 50% tl (DecAID Figures MMC_L.inv-15 and WLCH_OCA_L.inv-15).

These values are considerably higher than those referenced and displayed in the previous figures, although they are specific to the Tumblebug Fire area as opposed to the entire UMF watershed. If these assumed values were factored into the overall watershed snag levels, the difference between Pre-TF and Post-TF snag levels would be greater than those indicated based on a very coarse and conservative approach.

DOWN WOOD

For Lowland Conifer/Hardwood Forests in the UMF Watershed, the estimated Pre-TF median % cover of large logs (≥ 20" diameter) is 2% compared to an estimated historic median reference condition of 1.5% for the Westside Lowland Conifer/Hardwood Forests of the Oregon Cascades (Figure E-5).

For Lowland Conifer/Hardwood Forests in the UMF Watershed, the estimated Pre-TF median % cover of downed logs (≥ 5" diameter) is 4% compared to an estimated historic median reference condition of 5% for the Westside Lowland Conifer/Hardwood Forests of the Oregon Cascades (Figure E-6).

For Montane Mixed Conifer Forests in the UMF Watershed, the estimated Pre-TF median % cover of large logs (≥ 20" diameter) is 3.5% compared to an estimated historic median reference condition of 0.5% (Figure E-7).

For Montane Mixed Conifer Forests in the UMF Watershed, the estimated Pre-TF median % cover of downed logs (≥ 5" diameter) is 6.5% compared to an estimated historic median reference condition of 3.5% (Figure E-8).

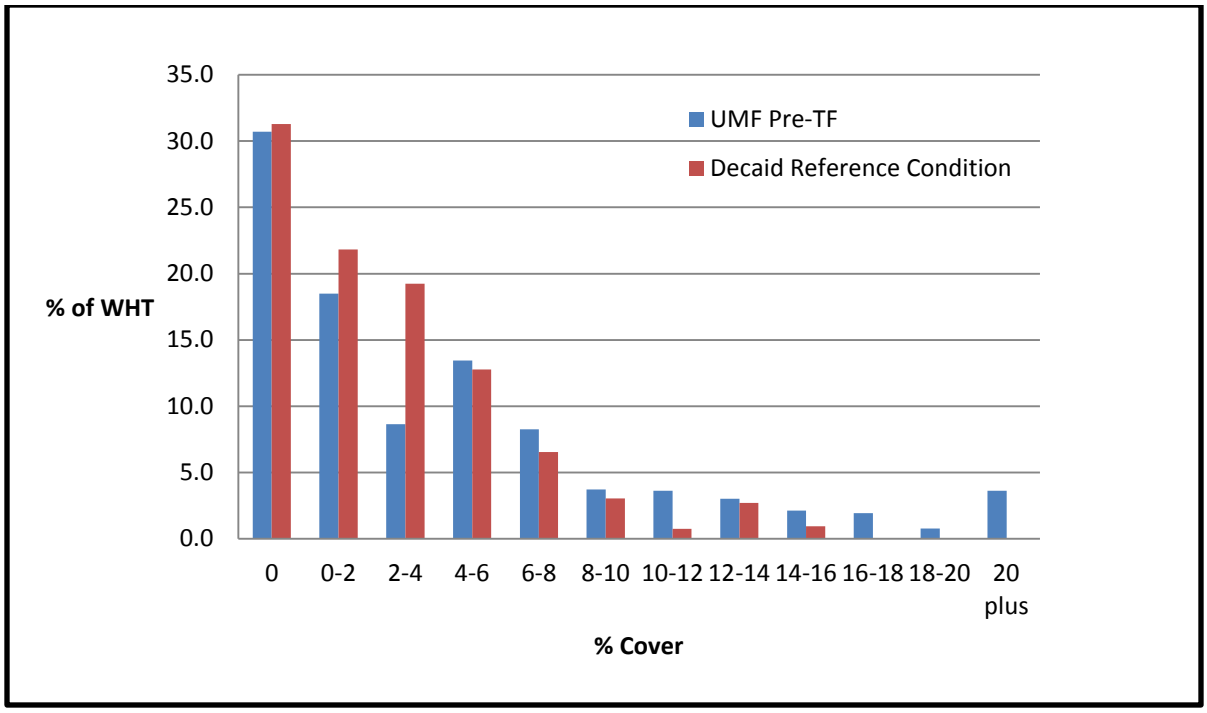

Figure E-5. Comparison of Pre-Tumblebug Fire % Cover of Large (≥ 20" Dia.) Downed Logs in Westside Oregon Cascade Lowland Conifer/Hardwood Forests in the Upper Middle Fork Willamette Watershed to Reference Conditions.

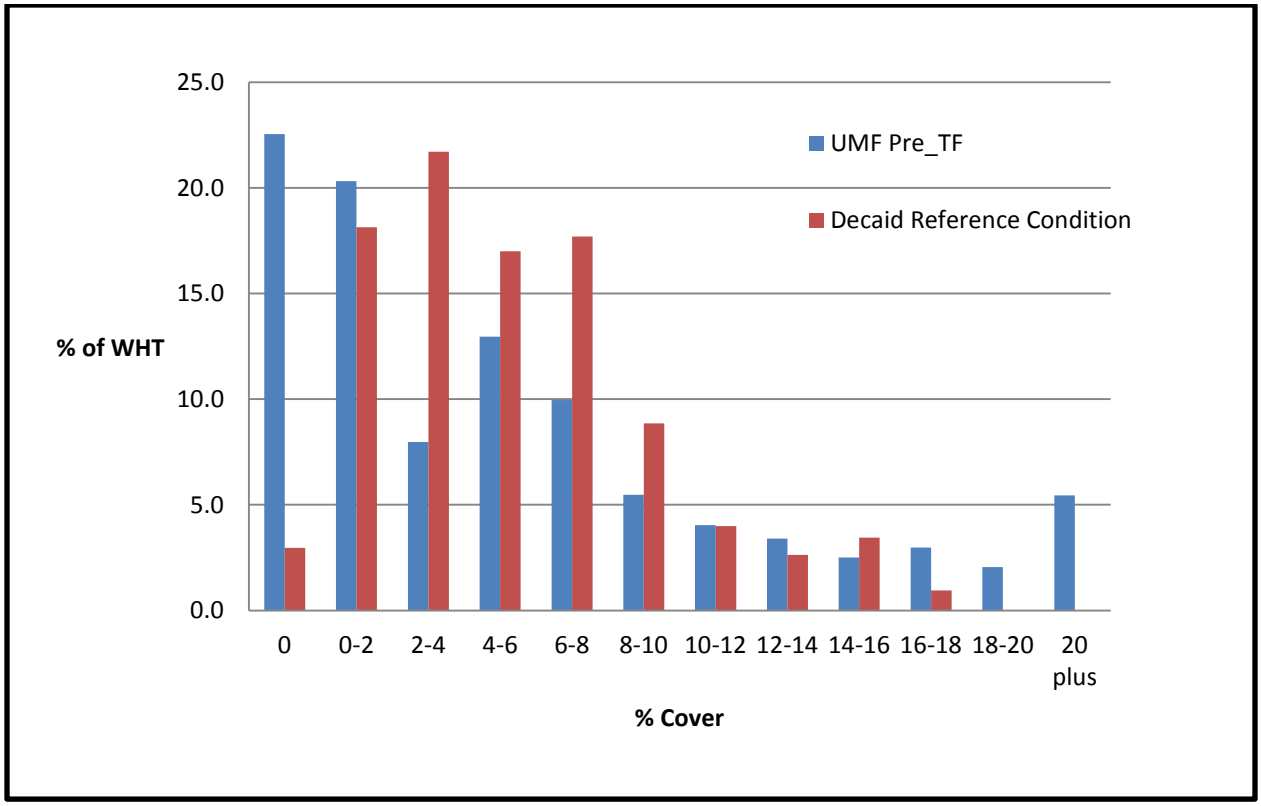

Figure E-6 Comparison of Pre-TF % Cover of Total (≥ 5" Dia.) Downed Logs in Westside Oregon Cascade Lowland Conifer/Hardwood Forests in the Upper Middle Fork Willamette Watershed to Reference Conditions

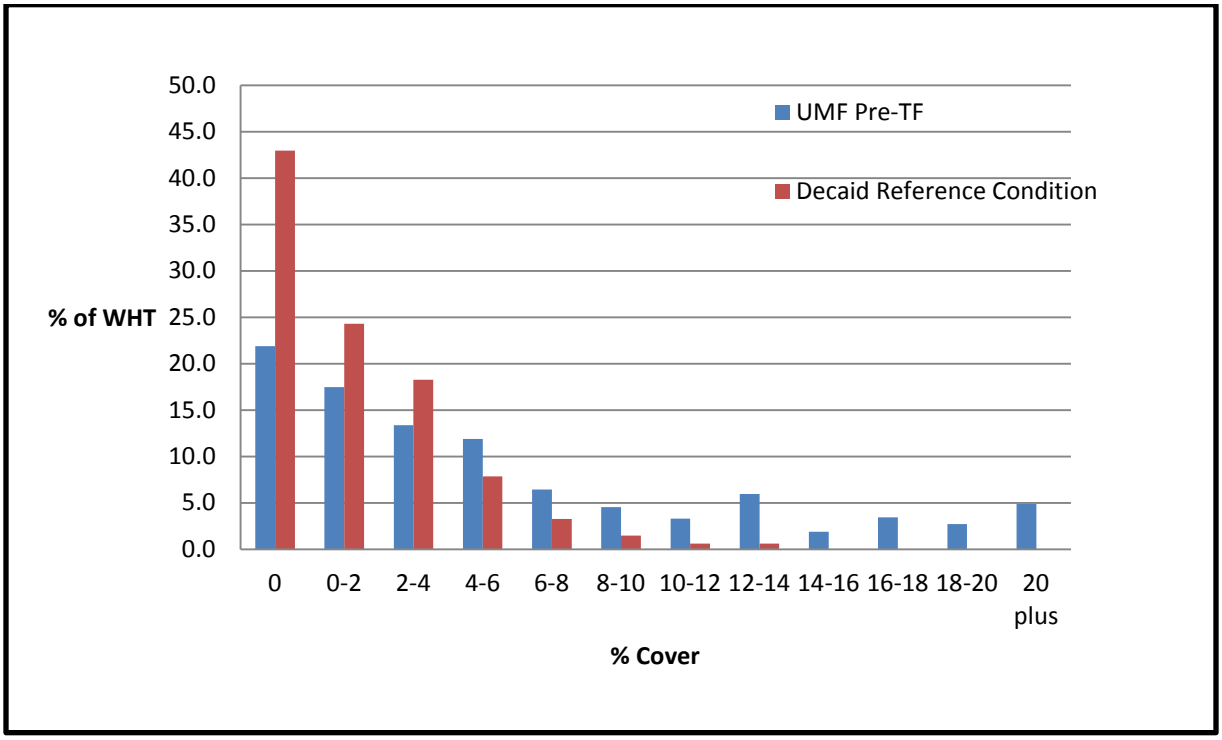

Figure E-7 Comparison of Pre-Tumblebug Fire % Cover of Large (≥ 20" Dia.) Downed Logs in Montane Mixed Conifer Forests in the Upper Middle Fork Willamette Watershed to Reference Conditions

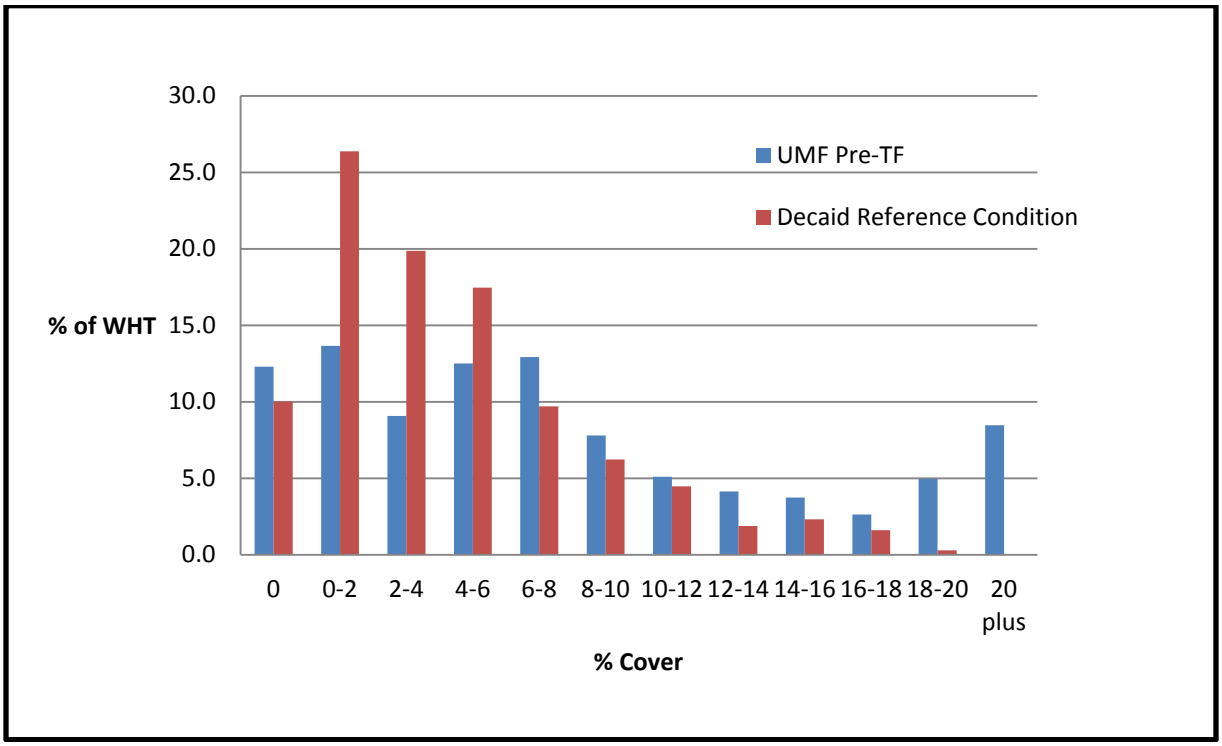

Figure E-8. Comparison of Pre-TF % Cover of Total (≥ 5" Dia.) Downed Logs in Montane Mixed Conifer Forests in the Upper Middle Fork Willamette Watershed to Reference Conditions

An estimate for down wood levels in unmanaged WLCH or MMC habitat within the UMF watershed that is more specific to a Post-TF condition for the Tumblebug Fire area which overlaps the Pioneer Gulch Project area can be derived based on the influence of fire severity on post-fire down wood levels. Such an estimate is dependent on a set of assumptions that warrants consideration against GNN analysis values presented above. These assumptions are used for assigning post-wildfire CWD levels to GNN-modeled current forested habitat, and are based on data from west Cascades wildfires dating back to 1987. Much of the data behind assumptions is specific to fires on the Middle Fork District, has been incorporated into DecAID, and is considered to reinforce the validity for applying to the Tumblebug fire post-burn condition (Kertis pers com).

A key aspect for applying assumptions is that post-fire conditions met or exceeded 50% moderate to severe mortality in higher elevation habitat (MMC) and 36% similar mortality in lower elevation habitat (WLCH). These conditions were exceeded in the Tumblebug fire. Under such a scenario the following conditions have been assumed:

- Total down wood levels (≥ 5” diameter) are boosted to ≥ 80% tolerance level (tl) for the first 20 years before dropping to post-fire large log levels. This equates to about 8% cover for MMC WHT (wildlife habitat type) and 9% cover for WLCH WHT (DecAID Figures MMC_L.inv-16 and WLCH_OCA_L.inv-16).

- Large log levels (≥ 20” diameter) are considered boosted to ≥ 80% tl for modeling purposes. This equates to about 4% cover for MMC WHT and 5% cover for WLCH WHT (DecAID Figures MMC_L.inv-17 and WLCH_OCA_L.inv-17).

These values are somewhat to considerably higher than those referenced and displayed in the previous figures, although they are specific to the Tumblebug Fire area as opposed to the entire UMF watershed. If these assumed values were factored into the overall watershed down wood levels, Pre-TF and Post-TF values would be distinguished. And down wood levels at the watershed scale would further exceed the estimated reference conditions described above.

WILDLIFE RELATIONSHIP TO DEAD WOOD

DecAID provides data from a compilation of studies showing relationships of snag and downed wood abundance to wildlife occupancy of the site for a variety of wildlife species. These are expressed as tolerance levels. For example, the 50% tolerance level for large snags for nesting pileated woodpeckers is 7/acre for Westside Lowland Conifer/Hardwood Forests of the Oregon Cascades. This number indicates that half of pileated woodpeckers studied in this wildlife habitat would be expected to nest at sites with 7 or fewer large (≥ 20” dbh) snags/acre. Many factors influence the population density and habitat selection of species that are associated with dead wood abundance. In general though, the greater the abundance of snags and downed wood and the larger the snags and downed logs, the better the habitat conditions for the “dead wood dependent” species, and standards and guidelines for retaining snags and downed wood were developed around these relationships.

Snags densities above the 50% tolerance level were used to estimate the amount of “above average” habitat for the species, while the amount of habitat meeting the 30−50% tolerance interval were used to represent the amount of “moderate quality” dead wood habitat.

Species-specific information in DecAID was reviewed for species found in the project watershed with snag and downed wood relationship studies comparable to the forest inventory plot data. From these studies, PETS species, MIS species, and key prey species of northern spotted owl

were selected. Then tolerance levels for these species were compared to estimated current and historic snag and downed wood abundance. DecAID provided tolerance levels for the following species:

1) Westside Lowland Conifer/Hardwood Forests of the Oregon Cascades:

    a) Pileated woodpeckers-MIS (large snag density at nesting and foraging sites, large log cover at foraging sites) and

    b) Northern flying squirrel-important prey for NSO (total snag densities and total log cover in occupied habitat)

2) Montane Mixed Conifer Forests-(available wildlife use data is limited for species that normally occur in this habitat in the UMF watershed):

    a) Marten-MIS (large and total snag density and total log cover8 at occupied sites).

Note:DecAID shows information for % total log cover ≈> 8" diameter compared to ≥ 20" diameter in the inventoried plot data. DecAID shows information for % total log cover ≥ 4" diameter compared to ≥ 5" diameter in the inventoried plot data. Only the 50% tolerance level is given in DecAID for % total log cover for marten

The large snag analysis suggests that currently the UMF watershed is below historical levels for large snags in Westside Lowland Conifer/Hardwood habitat both Pre and Post-TF and providing less nesting and foraging habitat for pileated woodpeckers than was provided in the estimated historic condition (Table E-1). An estimated 19% and 23% of this habitat type meets or exceeds large (≥ 20" dbh) snag densities at the 50% tolerance level for pileated woodpecker nesting sites Pre and Post-TF respectively, compared to 32% of the estimated historic habitat. An estimated 6% and 10% of the habitat meets or exceeds large snag densities at the 50% tolerance level for pileated woodpecker foraging sites Pre-TF and Post-TF respectively, compared to 13% of the estimated historic habitat. DecAID inventory data for pileated woodpecker habitat use are from the Oregon Coast Range and Olympic Peninsula where snags are known to be larger and more common than in the Oregon Western Cascades. Tolerance level data in this table should be viewed as reflecting a general trend rather than absolute values.

The total snag analysis also shows that currently the UMF watershed is below historical levels for total snags in Westside Lowland Conifer/Hardwood habitat both Pre and Post-TF and providing less snag habitat for northern flying squirrels than was provided in the estimated historic condition (Table E-1). An estimated 34% and 40% of this habitat type meets or exceeds total (≥ 10" dbh) snag densities at the 50% tolerance level for occupied northern flying squirrel sites Pre and Post-TF respectively, compared to 58% of the estimated historic habitat.

When large snag and total snag data are considered for WLCH_OCA habitat in the Tumblebug Fire area portion of the overall watershed, current values are shown to be equal to or greater than projected reference conditions shown in Table E-1. Taking the cumulative Tumblebug fire snag levels into account is an important component of dead wood evaluation for the Pioneer Gulch Project Area.

Missing from this analysis based on model output is the recognition that, in addition to snags, defective live trees provide an important function in this habitat type. Studies have shown defective live trees are important for supporting pileated woodpecker (Aubry and Raley 2002) and spotted owl (Hershey et al. 1998) use in habitat where such features occur. A conservative

estimate can be made that at least 30% of the WLCH and MMC habitat in the UMF watershed consists of late-successional or old-growth habitat having defective live tree characteristics. This is a relevant qualitative consideration that additional current large “snag” habitat exists that is not represented by data displayed in Table 4.

Table E-1. Estimated % of Forest Habitat Type (WHT) Meeting Snag Density Tolerance Levels for Key Wildlife Species; Pre and Post-TF vs. DecAID Historic Reference Condition (UMF Watershed)

Habitat and Wildlife Species Use	Dead Wood Feature	Wildlife Tolerance Level	% of Habitat Meeting Toler. Level		
			Pre TF	Post TF	DecAID Historic Reference
Westside Lowland Conifer/Hardwoods, Oregon Cascades (WLCH_OCA)					
Pileated Woodpecker					
Nesting Sites	Snags≥ 20”dbh	>30% T. L.	30%	33%	52%
	Snags≥ 20”dbh	>50% T. L.	19%	23%	32%
Foraging Sites	Snags≥ 20”dbh	>30% T. L.	16%	20%	28%
	Snags≥ 20”dbh	>50% T. L.	6%	10%	13%
Northern Flying Squirrel					
Occupied stand	Snags≥ 10”dbh	>30% T. L.	56%	60%	82%
	Snags≥ 10”dbh	>50% T. L.	34%	40%	58%
Montane Mixed Conifer (MMC)					
Marten					
Occupied site	Snags≥ 20”dbh	>30% T. L.	52%	54%	60%
	Snags≥ 20”dbh	>50% T. L.	50%	52%	57%
Occupied site	Snags≥ 10”dbh	>30% T. L.	55%	59%	57%
	Snags≥ 10”dbh	>50% T. L.	49%	54%	49%

Table E-2. Estimated % of Forest Habitat (WHT) Meeting Down Wood Cover Tolerance Levels for Key Wildlife Species; Pre-Tumblebug Fire vs. DecAID Historic Reference Condition (UMF Watershed)

Habitat and Wildlife Species Use	Dead Wood Feature	Wildlife Tolerance Level	% of Habitat Meeting T. L.	
			Pre-TF	DecAID Historic Reference
Westside Lowland Conifer/Hardwoods, Oregon Cascades (WLCH_OCA)				
Pileated Woodpecker				
Foraging Sites	Logs≥ 20”diameter*	>30% T. L.	>52%*	>48%*
	Logs≥ 20”diameter*	>50% T. L.	>45%*	>33%*
Northern Flying Squirrel				
Occupied stand	Logs≥ 5”diameter**	>30% T. L.	55%	72%
	Logs≥ 5”diameter**	>50% T. L.	34%	37%
Montane Mixed Conifer (MMC)				
Marten				

Habitat and Wildlife Species Use	Dead Wood Feature	Wildlife Tolerance Level	% of Habitat Meeting T. L.	
			Pre-TF	DecAID Historic Reference
Occupied site	Logs≥ 5”diameter**	>50% T. L.	39%	16%

*DecAID shows information for % total log cover ≈> 8” diameter compared to ≥ 20” diameter in the inventoried plot data. Thus the % of habitat in the above the tolerance limit is substantially underestimated, but is shown to compare the relative difference between the current and historic condition.

**DecAID shows information for % total log cover ≥ 4” diameter compared to ≥ 5” diameter in the inventoried plot data. Thus the % of habitat in the above the tolerance limit is somewhat underestimated. Only the 50% tolerance level is given in DECAID for % total log cover for marten.

Appendix F – Consistency with Direction and Regulation

The action alternatives all comply with the following legal and policy requirements as follows:

Federal Laws and Policies

The National Historic Preservation Act – 1966 as amended (most recently) in 2006

The National Historic Preservation Act of 1966---All areas proposed for ground-disturbing activities have been surveyed for the presence of cultural resources. All surveyed and inventoried cultural resource sites in the Pioneer Gulch planning area would be protected by avoidance, or mitigated through data collection. See the Project Review Form Heritage Resources document in the Analysis File for more information.

Consultation with the Oregon State Historic Preservation Officer (SHPO)

The project has been reviewed and approved by the Forest Heritage Specialist consistent with the 2004 Programmatic Agreement between the SHPO, ACHP and Oregon National Forests. The Forest Heritage Specialist certifies that the undertaking would have no effect on historic properties as per 36 CFR 800.16(i) and has forwarded the project report to SHPO for review (see the Heritage Resources Report in the Analysis File). When consultation with SHPO is complete, a signed Project Review form, indicating compliance with the federal laws and regulations cited previously under Section II of this document, would be provided for the project file.

The National Environmental Policy Act (NEPA), 1969

NEPA establishes the format and content requirements of environmental analysis and documentation such as the Pioneer Gulch Project environmental assessment. The entire process of preparing this environmental assessment was undertaken to comply with NEPA requirements, as codified by 40 CFR 1501 and the Forest Service Handbook 1909.15, Chapter 40.

The Endangered Species Act, December 1973, as amended

There are three species of animals listed as threatened under this Act that occur or utilize habitat within or adjacent to the project area. These are Chinook salmon, bull trout, and the northern spotted owl. There are no plants listed as threatened or endangered that have been found to occur in the area (see the project's Botany Biological Evaluation in the Analysis File). Field surveys for all listed endangered, threatened, or sensitive species have been conducted to determine possible effects of any proposed activities in the Pioneer Gulch project area. Discussions of the effects on these species can be found in the Environmental Consequences section of this document under Water Quality, Fisheries, and Wildlife. More in depth discussions of habitat conditions, survey techniques and project effects are contained in the Fisheries Biological Assessment, the Hydrology and Fisheries Reports, and the Terrestrial Faunal Biological Evaluation/Assessment contained in the Analysis File for this project.

The National Forest Management Act (NFMA), 1976

This EA contains numerous references as to how this project complies with Forest Plan and Northwest Forest Plan standards and guidelines, usually parenthetically, and the Silvicultural Prescription in the Analysis File contains a discussion of compliance with NFMA's requirement

to identify lands unsuited for management. See also the discussion below regarding compliance with FSH 1909.

The Clean Water Act, as amended in 1977 and 1982

The alternatives all meet and conform to the Clean Water Act, Amended 1982. This Act establishes a non-degradation policy for all federally proposed projects. None of the action alternatives would degrade water quality below its current condition and standards set by the State of Oregon. This is accomplished through project design and planning, application and monitoring of Best Management Practices (BMPs; see the mitigating measures discussed above), and adherence to the Northwest Forest Plan's Aquatic Conservation Strategy Objectives (See the Hydrology and Fisheries and Reports and the water quality discussion in this EA.. This project is in compliance with the Northwest Forest Plan Temperature Total Maximum Daily Load Implementation Strategy (USDA, 2005), which addresses water temperature concerns in compliance with the Clean Water Act. The Silvicultural Prescription in the project Analysis File determined that all action alternatives comply with this plan in that they would retain riparian buffers to avoid increases in water temperature.

Clean Air Act as Amended in 1977

The action alternatives are designed to meet the National Ambient Air Quality Standards, as per direction from the Oregon Smoke Management Act, through avoidance of practices which degrade air quality below health and visibility standards, as disclosed previously in this Chapter and is fully discussed in the Fuels Report (Mercado, 2012) contained in the Analysis File.

Forest Service Manual (FSM) and Handbook (FSH)

FSM 1926.41 indicates that all projects implementing Forest Plan direction that involve vegetative manipulation of tree cover must comply with the Forest Plan, and the National Forest Management Act (NFMA, 1976) requirements. This project also implements direction in FSM 2020 0, Ecological Restoration and Resilience, to integrate resource projects to accomplish ecological; restoration.

The Pioneer Gulch project complies with additional direction in the Forest Service Manual to identify and prescribe measures that prevent adverse modifications or destruction of critical habitat and other habitats essential for the conservation of proposed, endangered, threatened, and sensitive species (FSM2670.31 (6)).

Consistency with the Forest Plan

These proposals are in compliance with the Forest-wide and Management Area standards and guidelines presented in Chapter IV of the Forest Plan, as cited throughout this EA and the documents within the Analysis File (see also the detailed discussion below under Other NEPA Decision documents), aside from exceptions as discussed in the Mitigations section of Chapter 2 of this document and as discussed below.

The alternative selected for management of the Willamette National Forest includes a strategy that provides Management Requirements (MRs) exceeding the minimum MRs established for Management Indicator Species (MIS) as presented in the Willamette Forest Plan FEIS Appendices - Volume 1 ((USDA Forest Service 1990b), pp B-79 through 82). Maintenance of the MRs ensures the viability of MIS and the species they represent. The MRs have been further enhanced for most MIS species (i.e. those species that use or select for old growth and mature

conifer habitat, and dead and defective tree habitat) under the Forest Plan S&Gs as amended by the Northwest Forest Plan.

Proposed actions associated with this project comply with current Forest-wide (FW) and Management Area (MA) Standards and Guidelines (S&Gs) pertaining to general wildlife and MIS management - including those MIS species also listed as proposed, endangered, threatened, or sensitive. This proposal also complies with other S&Gs established for affected allocations in the Willamette National Forest Land and Resource Management Plan (1990) as amended by the Northwest Forest Plan Records of Decision (ROD) (1994 & 2001).

For situations where they would apply, this project complies with Standards and Guidelines pertaining to snag and down wood management on matrix land. See the Dead Wood section of this report for further discussion on this.

NFMA Consistency

FSM 1921.12a directs that timber harvest can occur only where:

1. Soil slope or other watershed conditions would not be irreversibly damaged – the Soils and Hydrology discussions in Chapter 3 indicate this condition would be met.

2. There is assurance that lands can be adequately stocked within five years after final regeneration harvest – This direction does not apply to this proposal as no regeneration harvest is proposed. No total removal of forest cover is proposed. The purpose and need for action recognizes that there are too many trees on the sites in questions to meet Forest Plan biodiversity objectives and guidelines. The NFMA does not require reforestation of areas harvested to provide non-timber benefits, such as providing for increased wildlife forage.

3. Streams, stream banks, shorelines, wetlands and other bodies of water are protected from detrimental change that could adversely affect water conditions or fish habitat – The proposal provides buffers along water bodies as detailed in the Water Quality section of Chapter 3, with the small exceptions of some streams that would be restored to their historic meadow conditions.

4. The harvesting system to be used is not selected primarily because it would give the greatest dollar return or the greatest output of timber.-The proposed systems for removing excess trees includes skyline which is not the lowest cost method of moving logs. Additionally, no regeneration harvest is proposed, and such harvest would be proposed if the objective of the proposed action was to generate the largest monetary return.

Survey and Manage

<u>Wildlife Species – Survey and Manage</u>

Projects that are within the range of the northern spotted owl are subject to the survey and management standards and guidelines in the 2001 ROD, as modified by the 2011 Settlement Agreement. On December 17, 2009, the U.S. District Court for the Western District of Washington issued an order in Conservation Northwest, et al. v. Sherman, et al., No. 08-1067-JCC (W.D. Wash.), granting Plaintiff's motion for partial summary judgment and finding NEPA violations in the *Final Supplemental to the 2004 Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines*

(USDA Forest Service and USDI Bureau of Land Management 2007). In response, parties entered into settlement negotiations in April 2010, and the Court filed approval of the resulting Settlement Agreement on July 6, 2011.

The Pioneer Gulch Project is consistent with the Willamette National Forest Land and Resource Management Plan as amended by the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (USDA Forest Service and USDI Bureau of Land Management 2001), as modified by the 2011 Settlement Agreement.

The 2011 Settlement Agreement states:

"*For projects with signed Records of Decision, Decision Notices, or Decision Memoranda from December 17,2009, through September 30, 2012, the Agencies will use either of the following Survey and Manage species lists:*

> a. The list of Survey and Manage species in the 2001 ROD (Table 1-1, Standards and Guidelines, pages 41-51).
>
> b. The list of Survey and Manage species and associated species mitigation, Attachment 1 to the Settlement Agreement."

The Pioneer Gulch Project applies the Survey and Manage species list in the 2001 ROD and thus meets the provisions of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (2001 ROD), as modified by the 2011 Settlement Agreement.

The Willamette National Forest compiled the species in Table 35 from the 2011 Settlement Agreement Attachment 1. The list includes those vertebrate and invertebrate species with pre-disturbance survey requirements (Category A, B, or C species), who's known or suspected range includes the Willamette National Forest according to:

- Survey Protocol for the Great Gray Owl within the Range of the Northwest Forest Plan – Version 3.0 (2004).
- Survey Protocol for the Red Tree Vole (*Arborimus longicaudus)* of the Northwest Forest Plan – Version 2.1 (2002).
- Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan – Version 3.0 (2003).

This list also includes any Category D, E, or F species with known sites located within Pioneer Gulch Project Area:

Note that there are no known sites for *Megomphix hemphilli* (Oregon megomphix) within the project area that would require management under the 2001 ROD requirements.

There is little potential for habitat within the project area to support occupancy or use by other species for which a standard, guideline, or management recommendation was addressed in the 2001 ROD. These species include white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, and flammulated owl. Each of these species generally occurs on the eastern and southern periphery of the range of the northern spotted owl. This project's proposed action would

not affect suitable habitat for these species, or influence their distribution or population numbers to any extent relative to this portion of the range for the northern spotted owl.

The Pioneer Gulch Project applies a 2006 Exemption from a stipulation entered by the court in litigation regarding Survey and Manage species and the 2004 Record of Decision related to Survey and Manage Mitigation Measure in Northwest Ecosystem Alliance v. Rey, No. 04-844-MJP (W.D. Wash., Oct. 10, 2006). Previously, in 2006, the District Court (Judge Pechman) invalidated the agencies' 2004 RODs eliminating Survey and Manage due to NEPA violations. Following the District Court's 2006 ruling, parties to the litigation entered into a stipulation exempting certain categories of activities from the Survey and Manage standards and guidelines, including both pre-disturbance surveys and known site management. Also known as the Pechman Exemptions, the Court's Order from October 11, 2006 directs:

"Defendants shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on projects to which the 2004 ROD applied unless such activities are in compliance with the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004), except that this order will not apply to:

- *Thinning projects in stands younger than 80 years old:*
- *Replacing culverts on roads that are in use and part of the road system, and removing culverts if the road is temporary or to be decommissioned;*
- *Riparian and stream improvement projects where the riparian work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement large wood, channel and floodplain reconstruction, or removal of channel diversions; and*
- *The portions of project involving hazardous fuel treatments where prescribed fire is applied. Any portion of a hazardous fuel treatment project involving commercial logging will remain subject to the survey and management requirements except for thinning of stands younger than 80 years old under subparagraph a. of this paragraph."*

Per the 2011 Settlement Agreement, the 2006 Pechman Exemptions remain in force:

> *"The provisions stipulated to by the parties and ordered by the court in Northwest Ecosystem Alliance v. Rey, No. 04-844-MJP (W.D. Wash. Oct. 10, 2006), shall remain in force. None of the following terms or conditions in this Settlement Agreement modifies in any way the October 2006 provisions stipulated to by the parties and ordered by the court in Northwest Ecosystem Alliance v. Rey, No. 04-844-MJP (W.D. Wash. Oct. 10, 2006)."*

The Pioneer Gulch Project meets Exemptions A and D.

<u>Botanical Species – Survey and Manage</u>

The Willamette National Forest applied the 2001 ROD Survey and Manage Species List to the Pioneer Gulch project, completing pre-disturbance surveys, (Table A) required by Survey Protocols and Management Recommendations to comply with the *2001 Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines.*

Project surveys discovered no sites with Survey and Manage botanical species.

Executive Orders

#11988 Floodplain Management and #11990 Protection of Wetlands

These orders direct Federal Agencies to avoid, to the extent possible, both short-term and long-term adverse impacts associated with the modification of floodplains and wetlands. None of the alternatives presented above have specific actions that adversely affect floodplains. Proposed activities comply with these orders and USDA Departmental Regulation 9500-3. See the discussions above regarding fisheries, soils, and watershed effects for more information.

#12898 Environmental Justice

The Pioneer Gulch Project is located about 28 road miles south of the Cities of Oakridge, and Westfir, and about 43 miles southeast of the City of Lowell, in Lane County, Oregon. These communities have minority populations of 15 percent, 10 percent, and 13 percent, respectively. Lane County, in its entirety, has a minority population of 15 percent, (U.S. Census Bureau, 2010).

Approximately 16.7% of the population in Lane County is at or below poverty level, (U. S. Census Bureau, 2010). According to information from the Oregon Economic and Community Development Department (OECDD), Lane County, (excluding areas within the city limits of Eugene, Springfield, Coburg and Dunes City), is rated 1.30, (threshold 1.20), on the distressed area index.(OECDD, 2002). These Cities, as well as much of Lane County, have experienced a significant decline in timber-based jobs over the past decade, contributing to factors used to determine distressed community status.

Implementation of the Proposed Action would provide the opportunity for employment, positively affecting low-income families who are either unemployed or underemployed. Implementation of either action alternative is not expected to impose a disproportionately high or adverse effect to those populations.

Subsistence and cultural use levels are difficult to quantify and differential patterns of subsistence consumption are unknown at this time. However, the Forest provides access to firewood, Christmas trees, mushrooms, and other consumables through a personal-use permit system. Middle Fork Ranger District records indicate the following for 2009: 1,714 cords of firewood were sold; 2,130 Christmas tree permits were sold; and 388 personal-use mushroom permits and another 360 commercial mushroom permits were sold. The Proposed Action road closures (13.86 miles of new closures) could have an impact on motorized vehicle accessibility to certain portions of the project area for subsistence gathering and tribal cultural uses, however there would still be about 115 miles of open road in the Pioneer Gulch project area for motorized access to these types of activities.

The proposed treatments have the potential to contribute to the supply of special forest products (SFP) available within the area, such as basic greenery plant species and some mushrooms. Interest in commercial harvest of SFPs is low in this area at this time, and supply far exceeds demand in the Middle Fork watershed. (See “Special Forest Products,” discussed under Other Disclosures, above).

Road closures may impact subsistence in the immediate project area, but these impacts would be mitigated by the availability of other access routes throughout the area.

#12962 Aquatic Systems and Recreational Fisheries

This Order was made to conserve, restore, and enhance aquatic systems to provide for increased recreational fishing opportunities. It requires Federal agencies to evaluate and document the effects of federally funded actions on these resources and opportunities. There is potential for sediment input into streams from the proposed actions, as discussion above in detail in the water quality section. These effects would be short-term and would not threaten fish species or population levels. Mitigating measures have been applied in all actions alternatives to minimize the potential of detrimental effects to fish habitat or water quality in general. These measures include provision of untreated riparian buffers along all stream classes, helicopter removal of trees, provision of various erosion control structures during the project life, road closure, culvert replacement, and restriction of culvert replacement and road maintenance work to dry periods. These mitigating measures are consistent with current management guidelines including the Willamette National Forest Plan Standards and Guidelines (USDA, 1990a, pages IV-59 to 65), the Aquatic Conservation Strategy Objectives contained in the Northwest Forest Plan (USDA/USDI, 1994, page B-11) at the watershed level, and the Federal Clean Water Act. Implementation of required and standard Best Management Practices (USDA, 1988) would ensure protection of aquatic resources and fishing opportunities under all alternatives.

#13007 Indian Sacred Sites

No specific sacred sites have been identified that would be affected by the proposed actions. No impacts, as outlined in the Indian Religious Freedom Act, are anticipated in terms of American Indian social, economic, or subsistence rights.

#13084 Consultation and Coordination with Indian Tribal Governments

The Willamette National Forest has Memorandums of Understanding (MOU) with the Confederated Tribes of the Grand Ronde, the Confederated Tribes of Warm Springs, and the Confederated Tribes of Siletz. These MOUs provide a mechanism for regularly scheduled consultations on proposed activities. Beyond this, the Forest notifies and consults with tribal governments in a manner consistent with the government-to-government relationship on any matters that ripen outside of the meeting schedule. The Willamette National Forest does not currently have an MOU with the Klamath Tribe, but the tribe has been consulted regarding this proposal. Several tribal organizations with the State of Oregon which have historic interests in this area have been contacted in reference to this planning effort. All four tribes were notified of the project during development of issues and alternatives.

#13112 Invasive Species

This Order requires Federal Agencies whose actions may affect the status of invasive species to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species, and provide for restoration of native species and habitat conditions in ecosystems that have been invaded, as well as other various requirements. The proposed actions all carry mitigating measures to assure invasive species do not move into the area as discussed above under the Vegetation effects section, and the purpose and need for action addresses restoration of native species and habitat in part through invasive plant species abatement.

#13186 Migratory Birds

The proposed action is consistent with the 1918 Migratory Bird Treaty Act (MBTA) and the Migratory Bird Executive Order 13186. Additional management direction for the conservation of migratory landbirds is consolidated in the Forest Service Landbird Strategic Plan and further

developed through the Partners in Flight Program. Vegetation management cannot completely avoid unintentional take of birds, regardless of criteria imposed on activities. Design criteria such as the overall implementation timeline, spatial distribution of treatment units, retention of snags and down logs, retention of live trees, and no treatment riparian areas proposed in this project would minimize take of migratory birds.

The Wildlife effects discussion above (Landbirds/Neotropical Migrants), addresses the effect to migratory birds, as well as in the Terrestrial Wildlife Report and Biological Evaluation contained in the project's Analysis File (Ferland, 2012). When taken in the context of the watershed, the effects of any proposed actions are negligible.

State Laws

Oregon State Best Management Practices (BMPs)

State BMPs are employed to maintain water quality (see the Mitigating Measures listed in Chapter 2 of this EA and USDA, 1988).

The Oregon Smoke Management Plan

The Oregon State Implementation Plan and the Oregon State Smoke Management Plan would be followed to maintain air quality, as mentioned earlier in this Chapter. See Fuels Report contained in the Analysis File.

The Oregon State Water Quality Regulations (DEQ, 2004)

These regulations dictate how water resources are to be managed and protected; see the Hydrology and Fisheries Reports in the project Analysis File.

Other NEPA Decision Documents

The Willamette National Forest Land and Resource Management Plan (USDA, 1990a; as amended by USDA/USDI, 1994) played a major role in determining the Purpose and Need and in the development of all the alternatives. As mentioned above, the action alternatives comply with all aspects, standards, and guidelines of the Forest Plan. Rationale for compliance with these requirements can be found in the Hydrology and Fisheries and Wildlife Effects sections above, and the Silvicultural Prescription and the Wildlife Report contained in the project Analysis File, and in the above discussion on compliance with Federal Laws and Policies in this section. This analysis is tiered to the Final Environmental Impact statement for the Forest Plan (USDA, 1990b).

The Upper Middle Fork of the Willamette River Watershed Analysis (USDA Forest Service, 1996), the Upper Middle Fork Watershed Analysis Update (USDA Forest Service, 2002) and the Upper Middle Fork and Hills Creek Reservoir Watershed Analysis Update (USDA Forest Service, 2008) identified the needed activities and mitigation measures to comply with the Aquatic Conservation Strategy Objectives, and determines the width for Riparian Reserves.

The Willamette National Forest Road Analysis Report (USDA, 2003) and the Middle Fork District Supplemental Road Analysis (USDA 2004) recommended which system roads should remain open to facilitate management and public use and which should be closed to reduce maintenance costs and resources risk. The Forest Road Analysis provides decision makers with information needed to identify and manage a minimum road system that is safe and responsive to public needs and desires, is affordable and efficient, has minimal adverse effect upon ecological

processes and ecological health and productivity of the land, and is in balance with available funding for needed management actions. It provided recommendations for key roads that should remain open and well maintained as well as recommendations of roads that should be considered for closure.

The District road analysis evaluated each road segment on the District relating to terrestrial, aquatic, administrative, and public use factors. Based upon that rating system, road closure recommendations for the Districts road system were made. The roads in the project area proposed to be closed under all action alternatives developed for this project have all been recommended for closure in the two Road Analysis documents mentioned above.

Appendix G – Scoping Comments

Commenter and Date	Comment	Response
Oregon Wild November 23, 2011	1-Support the significant changes in the proposed action.	1-Thank you for the comment.
	2-In the fuelbreak, retain under-represented species like chinkapin and Pacific yew.	2-Chinkapin is quite common in the fuelbreak units, so if a few are cut, there would not be an effect on the species. Pacific yew does not occur in the fuelbreak units due to the high elevations.
	3-Fuel break may be perpetuating the problem instead of meeting the core need of reintroducing fire.	3- The fuelbreak would allow more management options for fire in the wilderness in the future.
	4-How useful is a fire break in an area with infrequent fire regime?	4- The Pioneer Gulch area is an area of high lightning frequency . The firebreak could be used as a place to start a backfire safely whether in response to wildfire, or as part of a planned burn.
	5-Consider leaving more than 6 trees per acre in gaps.	5- An alternative that would leave four to six clumps of live trees per acre in each gap (in commercial thinning units) with three to five trees in each clump and patches of tall shrubs and /or small trees left within gaps was considered but eliminated from detailed study (see Chapter 2). The Proposed Action would leave 6 dominant and codominant trees per acre, and also trees <7" diameter that are unmerchantable. The purpose and need for the gaps is to improve big game forage habitat in the project area. The more trees that are left in the gaps, the sooner the canopy would close and the sooner the forage benefit diminished.
	6-Avoid road construction in unroaded areas>1,000 acres and make sure treatments emphasize reintroduction of natural processes.	6- See response to Oregon Wild's 2008 letter, below.
	7- Strongly support road closures and stabilization.	7- The Proposed Action closes and hydrologically stores (stabilizes) about 18 miles of system roads.
	8-Logging is prohibited in Riparian Reserves unless "needed" to obtain ACS objectives.	8-ACS objectives and how they are being met by the proposed action are discussed in the EA Appendix C.
	9-Accelerating late successional conditions (as stated in the scoping letter) is not a goal of the (NW Forest Plan) Riparian Reserve land allocation. Thinning can reduce the overall recruitment of snags and dead wood in upland, riparian, and aquatic	9-The EA states in the Purpose and Need section that the goal of attaining late-successional conditions in the Riparian Reserves is a recommendation in the Upper Middle Fork Willamette River watershed analysis. Dead wood (snags and down

Commenter and Date	Comment	Response
	ecosystems.	wood) are discussed in the EA Chapter 3, Wildlife section and in Appendix E (Decaid Analysis).
	10-Retain at least 100 foot no-cut buffers along streams and significant untreated “skips” in the outer portions of Riparian Reserves.	10-An alternative that would have provided for 100 foot no-cut buffers on all streams and retaining significant untreated “skips” within the outer portion of Riparian Reserves was considered but eliminated from detailed study (see Chapter 2). Under the Proposed Action, Class 1 streams and Skunk Creek (a class 2 stream) would have 100 ft buffers. Furthermore, it was determined that stream buffers of 60 ft on Class 2 and 3 streams are supported by the TMDL model (EA Chapter 3, Hydrology section). Also, 90% of wood recruitment occurs within 60 ft. of streams. Large, untreated skips within Riparian Reserves do exist in the portions of commercial thinning units that were dropped from proposed harvest treatments
	11-Apply variable density thinning techniques, including gaps, skips, use heavy thinning sparingly, fully disclose effects of logging on dead wood, avoid spreading weeds, buffer streams from heavy equipment, disclose effects of biomass utilization, address carbon and climate by deferring harvest of older forest and thinning younger stands to increase resilience.	11- Alternative B does apply variable density thinning techniques, most units would be thinning to moderate or light spacing, effects on dead wood – see #9 above; Class 1 streams would be buffered by 50 ft from heavy equipment and perennial streams buffered by 100 ft. from heavy equipment; biomass utilization is not proposed in this project because of the distance to existing biomass markets although firewood utilization would occur; Alternative B defers harvest of older forests and thins younger stands.
Rocky Mountain Elk Foundation November 8, 2011	1-Consider thinning below 40% crown closure to provide for early seral habitat.	1-Many of the commercial thinning units would have a post-harvest crown closure less than 45%, especially when considering the contribution of gaps.
	2-Make gaps as large as possible, tending towards 2 to 3 acres.	2- Alternative B includes gaps ranging from 1 to 3 acres.
	3-Locate gaps away from open roads.	3-Gaps would be located 100 ft away from Level 2 and 3 roads.
	4-Plant gaps with native shrubs that produce fruit and nuts for wildlife and reduce the number of conifers left in gaps.	4-Larger gaps would be planted with elderberry, hawthorn, and cascara in addition to white pine and western redcedar. Six dominant/codominant trees per acre would be left in gaps to provide for structural diversity.
	5- Seed all soil disturbed with a native seed mix of high forage value.	5- The Willamette N.F. forage seed mix would be used

Commenter and Date	Comment	Response
	6-Restore natural openings and meadows by removing conifers.	6- Quail Meadow was moved into the Calapooya II Meadow Restoration project, however it is possible that funds generated by the Pioneer Gulch timber sales, if available, could be used to fund the restoration of Quail Meadow, which would include removing encroaching conifers.
Cascadia Wildlands Project July 7, 2009	1-Don't log in mature forests. 2-Discuss compliance with Survey and Manage 2001 ROD. 3-Focus creation of early seral habitat on younger stands. 4-Support road closures but urge decommissioning of as many of those roads as possible.	1-The mature thinning units have been dropped. 2-Project complies with 2001 ROD. See EA Appendix F. 3-Forage creation through gaps would occur in second-growth younger plantations. Forage treatment units are in young regeneration. 4- An alternative that would have decommissioned some of the roads proposed for closure was considered but eliminated from detailed study (see Chapter 2). It was determined that all of the roads proposed for closure have the potential to be needed in the future and would be stored for future use. Roads are only decommissioned if they will never be needed again.
Oregon Department of Fish and Wildlife December 12, 2008	1-Support restoration of Quail Meadow. 2-Recommend not doing Big Swamp restoration, currently providing suitable habitat. 3-Support commercial thinning, creation of 1-3 acre gaps, and prescribed burning. 4- Recommend not harvesting the overstory in shelterwood units. 5- Support road closures to lessen disturbance and harassment of wildlife.	1-Quail Meadow restoration has been moved to the Calapooya II Meadow Restoration Project. 2- Big Swamp restoration was dropped. 3-Commercial thinning units would have 1-3 acre gaps. Four comm. thin units would be underburned after harvest. 4- Overstory removal in shelterwoods has been dropped. 5- Proposed Action includes 18 miles of road closures.
Oregon Wild October 28, 2008	1-Don't log in naturally regenerated mature and late-successional stands. 2-Support variable density thinning with gaps of ¼ to ½ acre and skips in young managed stands.	1-Mature thinning units dropped. 2- Proposed Action includes 940 acres of thinning in young managed stands, including gaps of 1 to 3 acres. Larger gaps would maintain their function as big game forage areas longer. Tree canopies surrounding smaller gaps would begin to close in sooner, reducing the time the gaps would function as big game forage. Skips would be comprised

Commenter and Date	Comment	Response
		of riparian buffers, special habitats, and unsuited areas.
	3-Support careful thinning in Riparian Reserves.	3-Proposed Action includes 286 acres of thinning in Riparian Reserves. No-cut buffers would be used to protect stream banks and provide for shade to streams.
	4-Avoid building new or temporary roads.	4-There would be no new system road construction. Alt. B includes about 2 miles of new temporary road and 4 miles of temporary road construction on previously used routes. All temporary roads would be closed and decommissioned after use.
	5- State whether there are any proposed activities in any of the five roadless areas >1000 acres identified in scoping letter. Fully analyze any effects to these areas.	5- Two small understory fuelbreak units are planned in unroaded areas. See EA Chapter 3, Potential Wilderness and Other Undeveloped Areas.
	6-Need to know the spacing in the fuelbreaks. Analyze effects in fuelbreaks.	6- Spacing within fuelbreak units is described in EA Chapter 2. Effects from fuelbreaks are described in EA Chapter 3.
	7-Alternatives considered for this project should include wildlife habitat enhancement (in addition to big game), late-successional habitat and stream restoration, old growth protection (minimum fragmentation and mechanical treatments), and focusing on non-commercial fuel treatments. Impacts to unroaded areas should be added as a significant issue, and an alternative that avoids negative impacts, while focusing on restoration surrounding these areas, should be developed.	7-The Proposed Action includes habitat enhancement for both big game and other species. For example, planting of hardwood trees and shrubs in the gaps within commercial thinning units would benefit both big game and other wildlife species. The proposed commercial thinning is not within Late-Successional Reserve. Late-successional habitat restoration was not considered a key issue because the proposed treatments are not located in a Late-successional Reserve. Stream restoration projects may occur at a later date but would be covered by separate NEPA. An alternative was considered but not given detailed analysis that would have not proposed any treatments in old growth stands, but it would not have met the purpose and need to reduce understory fuels in the fuelbreak along FS Rd. 2160. The Proposed Action does not propose any timber harvest within old growth stands. The Proposed Action proposes only non-commercial fuel treatments in the fuelbreak units. An alternative was considered that avoids negative impacts to unroaded areas and focuses on restoration surrounding these areas. This alternative was not given detailed study because the Proposed Action only has one small non-commercial fuel treatment unit in an Oregon Wild identified unroaded area in the Proposed Action and

Commenter and Date	Comment	Response
		only trees less than 10 inches diameter would be cut (see discussion in Chapter 3, Potential Wilderness section).
American Forest Resource Council October 27, 2008	1-Like to see all timber sales be economically viable. Use temporary roads to access for economical yarding systems. Limit use of helicopter yarding. 2-Encourage Forest Service to allow winter harvesting and haul. 3-Allow mechanical harvesting and pre-bunching of processed logs on slopes <35%. 4-Specify slash treatment goals rather than methods required. 5-Encourage creation of small patch cuts up to 2 acres. 6-Support thinning in Riparian Reserves with 25-50 foot buffers.	1- The economic analysis for Pioneer Gulch shows a present net value of slightly over 100,000 dollars. All harvest units are planned for ground-based and skyline. 2-Approximately 43 miles of the 55 miles of haul route would be suitable for winter haul. Timber Sale Officer, Hydrologist, and Fishery Biologist will decide if hauling operations need to be shut down due to deteriorating road conditions. See EA Chapter 2 Mitigation Measures. 3-Mechanical harvesting and pre-bunching would be allowed on slopes <30% as designated in EA Chapter 2 Mitigation Measures. 4-Slash treatment is discussed in the EA Chapter 3, Fire and Fuels. 5- Patch cuts, or gaps, up to 3 acres are proposed. Larger gaps would maintain their function as big game forage areas longer. 6-Thinning in Riparian Reserves would occur in about 286 acres. Buffers of 30-100 feet are prescribed to provide for habitat needs of listed bull trout and spring Chinook salmon.
Rocky Mountain Elk Foundation October 22, 2008	1-Support variable density thinning and gaps of 2-3 acres. 2-Recommend using standard Willamette N.F. forage seed mix, which contains legumes with high value forage, as opposed to standard erosion seed mix. 3-Recommend that natural meadows be restored by removing encroaching conifers.	1-Patch cuts, or gaps, up to 3 acres are proposed. Larger gaps would maintain their function as big game forage areas longer. 2-See response #5 to 2011RMEF letter, above. 3-See response to #6 to 2011 RMEF letter, above.