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FARLEY VEGETATION MANAGEMENT PROJECT

Draft Environmental Impact Statement

Umatilla National Forest

North Fork John Day Ranger District

Grant County, Oregon

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Draft Environmental Impact Statement

Umatilla National Forest
North Fork John Day Ranger District
Desolation Watershed
Grant County, Oregon

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SUMMARY

INTRODUCTION

The Forest Service has prepared this Draft Environmental Impact Statement (DEIS) for deciding the forest and other natural resource management activities that could be implemented in the proposed Farley Vegetation Management Project as required by the National Environmental Policy Act (NEPA). The purpose and need for the proposed project are to conduct timber harvest, commercial and non-commercial thinning, fuels treatment, prescribed burning, and reforestation on Umatilla National Forest lands in the Desolation Creek watershed in the Blue Mountains of northeastern Oregon to:

- capture present economic value of raw forest materials for the benefit of local and regional economies
- reduce forest fuel loads and to promote long-term forest stand structure and tree stocking densities that are more consistent with historic conditions
- promote forest resilience to large-scale wildfire, disease and insect infestations and the long-term sustainability of forest and associated resources (such as fish, wildlife, scenic values, and recreation), as well as economic and social values.

The Multiple-Use Sustained Yield Act of 1960 states that it "is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." The National Forest Management Act of 1976 requires that National Forest lands be managed to "provide for multiple use and sustained yield of the products and services obtained therefrom… and [must] include coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness." Congress has consistently acknowledged that the Forest Service must balance these competing demands in managing National Forests.

In this context of multiple and sustained use, an interdisciplinary team (IDT) of professional Forest Service resource specialists evaluated the forest and associated resources in the Farley project analysis area and the potential benefits that could be derived from them, and the most prudent means to sustain those resources and benefits for the long term. The forest resource management activities proposed in this DEIS seek to best balance short-term risks with long-term economic, environmental, and social benefits, and the long-term sustainability of those benefits.

Initially, an action was envisioned that sought to capture economic value of raw forest materials from a large portion of the National Forest lands in the Desolation Creek watershed, and to begin the long-term process of restoring historical forest conditions and to improve resilience to large-scale wildfire and other disturbances. However, forest management activities at this scale could have involved approximately 18,000 acres (of the approximately 56,300 acres of National Forest land in the watershed), required construction of almost 60 miles of new system and temporary road and reconstruction and maintenance of an equivalent amount of existing road, would have required several Forest Plan amendments, and could have resulted in substantial and potentially unacceptable environmental consequences.

As a result of preliminary analysis by the IDT and Responsible Official, and comments received during the public scoping process, the action as initially proposed was rejected. Also rejected

was an alternative that limited cutting or harvesting of trees larger than 12 inches in diameter, which would not have met project purpose and need or been economically viable. Instead, a range of action alternatives was developed and evaluated in this DEIS that focus on those specific areas (covering approximately 7,037 to 7,735 acres, depending on alternative) that are the most suitable for, and would benefit the most, from the forest resource management purpose and need stated above.

The activities proposed in the action alternatives presented in this DEIS do not involve inventoried roadless areas. Three large undeveloped areas in the analysis area provide a connective corridor between the North Fork John Day Wilderness and two inventoried roadless areas. Proposed project activities could affect the apparent undeveloped character of these areas. However, these areas are not consistent with the inventory criteria for potential wilderness and would not qualify for, or be included in the inventory of potential wilderness (FSH 1909.12, Chapter 70) because past mining, grazing, timber harvest, dispersed camping, fire suppression, off highway vehicle (OHV) and trail use, lack of special (geological, biological, ecological, cultural, or scientific) features, and proximity to roads detracts from their apparent naturalness and natural integrity.

Forest management activities for this project are proposed to occur primarily in C7 Special Fish Management and A4 Viewshed 2 management areas designated by the Forest Plan. The only project activities proposed for Riparian Habitat Conservation Areas (RHCAs) and other buffer distances specified for streams and channels are the obliteration / stabilization of existing closed roads and removal of associated stream crossings. All proposed activities are consistent with the Forest Plan and all other applicable environmental laws and regulatory programs and policies.

All alternatives involve:

- snag retention and replacement tree standards greater than specified by the current Forest Plan (for wildlife habitat),
- reconstruction of 36 miles of existing road,
- obliteration of 31 miles and stabilization for non-use of 8 miles of existing closed roads,
- closure of all newly constructed Forest System road and obliteration of temporary roads following project activities.

The proposed forest management activities would be expected to occur over 3 to 10 years beginning as soon as late 2009.

A preferred action alternative has not been identified in this DEIS. A preferred alternative will be selected by the Responsible Official following receipt and thorough analysis of comments and according to the decision framework described in the DEIS (Chapter 1).

LOCATION AND DESCRIPTION OF PROJECT ANALYSIS AREA

The project analysis area is located in the Desolation Creek watershed in the North Fork John Day Ranger District in Grant County, Oregon (Figure 1.1). Its watershed covers a total of 69,674 acres; 56,226 acres is National Forest System land and 13,448 acres is private land. Elevations range from approximately 3,000 ft at the Desolation Creek confluence with the North Fork John Day River near the community of Dale, Oregon, to almost 7,600 ft in the headwaters

in the Greenhorn Mountains to the southeast. The Desolation Creek watershed generally is mountainous with a dominant forest overstory of grand fir/subalpine fir/lodgepole pine in the higher elevations and ponderosa pine and Douglas-fir in the lower elevations.

The project analysis area exhibits some of the most complex geology on the Umatilla National Forest (U.S. Dept. of Agriculture, Forest Service, 1999). It is dominated by volcanic flow materials and includes some very old metamorphosed materials. Also present are extensive volcanic ash deposits and unconsolidated landslide, alluvial and glacial materials with considerable water-storage capacity.

The project analysis area primarily has a continental climate characterized by seasonal extremes of temperature and precipitation. Average annual precipitation increases with elevation from less than 20 inches to more than 40 inches. Most of the precipitation falls as snow in the winter months and rain in the spring. Convective storms in the summer occasionally produce lightning and localized, heavy rainfall.

There are approximately 252 miles of streams in the Desolation Creek watershed. Compared to the rest of the Umatilla National Forest, on an areal basis the project analysis area has more than twice the percentage of anadromous fish streams, half again the percentage of perennial streams, and approximately half the percentage of intermittent streams. Forest management activities for this project are proposed to occur in primarily C7 Special Fish Management and A4 Viewshed 2 management areas designated by the Forest Plan. The analysis area contains habitat for protected anadromous (salmon and steelhead) and resident fish species (bull and redband trout).

Proposed project activities would occur on National Forest System lands within the following sections (Willamette Meridian surveyed).

Township	Range	Sections
7 South	31 East	1
7 South	32 East	5, 6, 9, 10, 11, 13, 14, 23, 24
7 South	33 East	18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36,
8 South	32 East	10, 11, 12, 13, 14, 24
8 South	33 East	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
8 South	34 East	29, 30, 31, 32, 33
9 South	33 East	1, 2, 3, 4, 9, 10, 11, 12, 13
9 South	34 East	3, 4, 5, 6, 7, 8, 9, 10, 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33

PURPOSE AND NEED FOR ACTION

Historically, fire occurred relatively frequently in the interior Columbia Basin and was a major disturbance process in determining the natural conditions and functioning of forest ecosystems. The systematic exclusion of fire from forest ecosystems began in the early 1900s. Fire suppression and past harvest practices, tree stress and mortality from insects and disease, and wildfire have shifted the forests to earlier structural stages resulting in substantially fewer old forest stands than in the past. Also, recent analyses of historical data from General Land Office surveys conducted in the 1880s (Powell, 2008) indicate that ponderosa pine woodlands were more prevalent then, and the current extensive lodgepole pine and sub-alpine fir forests were less prevalent.

In the 1970's, large areas of mature lodgepole pine stands in the Farley project analysis area experienced extensive mortality as a result of epidemic populations of mountain pine beetle. Since then, additional stands of dense lodgepole pine have reached full maturity and are susceptible to widespread insect-caused mortality. In the 1980s and 1990s a succession of dry years caused trees that are adapted to relatively more moist conditions (such as Douglas-fir, sup-alpine fir and grand fir) to become stressed and more susceptible to defoliating insects, bark beetles, and fungal diseases. Although this may be a potential natural progression for these forest types, currently they are at high risk for insect and disease mortality, increased fuel loadings and large-scale wildfires, with associated short- and long-term adverse effects on other forest resources including fish, wildlife, recreation and scenic values, as well as social and economic values.

The purpose and need for the proposed project are to conduct timber harvest, commercial and non-commercial thinning, fuels treatment, prescribed burning, and reforestation on Umatilla National Forest lands in the Desolation Creek watershed in the Blue Mountains of northeastern Oregon to:

- capture present economic value of raw forest materials for the benefit of local and regional economies
- reduce forest fuel loads and to promote long-term forest stand structure and tree stocking densities that are more consistent with historic conditions
- promote forest resilience to large-scale wildfire, disease and insect infestations and the long-term sustainability of forest and associated resources (such as fish, wildlife, scenic values, and recreation), as well as economic and social values.

AGENCY, PUBLIC AND TRIBAL INVOLVEMENT

The North Fork John Day Ranger District invited participation from local, federal and state agencies, local tribes, environmental interest groups and individuals interested in, or potentially affected by the proposed action. These actions are briefly summarized below.

Tribal Involvement

On October 17, 2007, a Scoping Letter / Notice of Intent (to prepare and environmental impact statement) were sent to:

- Honorable Antone Minthorn, Chairman of the Board of Trustees of the Confederated Tribes of the Umatilla Indian Reservation
- Honorable Samuel N. Penny, Chairman of Tribal Council Nimiipuu Tribe
- Honorable Ron Suppah, Chairman of the Tribal Council of the Confederated Tribes of the Warm Springs Reservation
- and to the appropriate natural resource advisory committee and technical staff of these tribes.

On November 13, 2007, the District Ranger of the North Fork John Day District met with the Natural Resources Committee of the Confederated Tribes of the Umatilla Indian Reservation, which expressed a desire for the Farley project to result in a net decrease in road miles.

Public Involvement

- On November 1, 2007, a Scoping Letter / Notice of Intent was sent to 126 individuals, State, Federal and local agencies and organizations, informing them of the intent to prepare an environmental impact statement and inviting comments for developing proposed project action alternatives.
- On November 20, 2007, a Notice of Intent (to prepare environmental impact statement) appeared in the Federal Register / Vol. 72, No. 223 / Notices (at page 65289), with a deadline for scoping comments to be received by December 12, 2007.

Written or e-mail responses were received from the Environmental Protection Agency – Region 10, one individual, a representative of a large forest products corporation, and four environmental interest organizations.

ISSUES IDENTIFIED DURING SCOPING

Key issues were identified by the IDT and Responsible Official from comments received from government agencies, tribal governments, interest groups, and the public. These issues generally can be categorized as follows:

- No construction of additional new or temporary roads; no road construction in areas that might be considered to be undeveloped
- Net reduction in total road miles in the analysis area
- No commercial harvest; no cutting of trees greater than 12 inches diameter
- No adverse effects to soils, water quality, hydrology, wildlife, and threatened, endangered, and sensitive animals and plants
- No or minimal Forest Plan amendments.

KEY ISSUES

FISHERIES and WATER QUALITY

Silvicultural and vegetation management activities are proposed to occur primarily in areas designated by the Forest Plan as C7 – Special Fish Management areas. Bull trout and steelhead have been listed as a Threatened species under the Endangered Species Act. Lower mainstem Desolation, North Fork Desolation, Junkens and Sponge Creeks are listed as water quality-impaired for temperature (303d list). Although silvicultural treatment and vegetation management activities are not proposed to occur directly in Riparian Habitat Conservation Areas (RHCAs), some proposed activities such as prescribed burning could affect streamside vegetation that provides shade and thus affect stream temperatures. Also, soil disturbance from

road construction, maintenance, and obliteration could result in sediment reaching streams and degrading fish habitat.

UNDEVELOPED AREAS

The environmental interest group Oregon Wild provided a map with areas it considers to be undeveloped that are greater than 1,000 acres and are adjacent to inventoried roadless areas and/or designated wilderness areas. Some of the proposed project activity units and associated transportation system for the Farley project occur within these undeveloped areas.

ROADS

Proposed opening of closed roads for administrative access to proposed thinning, timber harvest, and fuels treatment units could result in unauthorized public vehicle use. Also, proposed mechanized fireline construction around proposed thinning, timber harvest, and fuels treatment units could create access opportunities for Off-Highway Vehicles (OHVs), resulting in new unauthorized trails.

WILDLIFE

Big Game Habitat

For big game, the **C7 – Special Fish Management Area** in the Farley project analysis area (in which most of the project activities are proposed to occur) largely functions as summer range habitat. These C7 areas currently meet standards specified by the Forest Plan for total cover and Habitat Effectiveness Index (HEI), but currently are below standards for satisfactory cover. In some localized areas where project activities are proposed, thinning, timber harvest, prescribed burning and reforestation activities could reduce vegetation that hides animals from human disturbance resulting in conversion of satisfactory big game cover to marginal cover, or marginal cover to forage. Road construction and use also can increase exposure of animals to human disturbance.

Snag and Down Wood Habitat

Snags and down wood provide important habitat for many wildlife species including resident and migratory birds. In some localized areas, proposed thinning, timber harvest, prescribed burning and reforestation activities could reduce the amount of this habitat type.

Late / Old Structure Forest Habitat

Past harvest, other silvicultural treatment activities, and insect/disease epidemics have reduced the amount of late old structure habitat as well as reduced the connective corridors between remaining late old structure stands. Existing late and old structure habitat (single and multi strata) is currently below the Historic Range of Variability (HRV) in the Moist and Cold Upland Forest potential vegetation groups. Single strata old growth is below HRV in the Dry Upland Forest potential vegetation group. Proposed thinning, timber harvest and fuels treatments would have the potential to further reduce this habitat type.

Species of Interest

Proposed thinning, timber harvest and fuels treatments could reduce habitat for species of interest. Thinning and harvest activities (including fuels treatment) have the potential to affect foraging and nesting habitat for goshawk, olive-sided flycatcher, and other species of interest. Spring is a critical and vulnerable time for fledging of birds, small mammal reproduction in burrows, and sensitive plant flowering and seeding. These species could be disturbed or killed by prescribed burning activities, particularly neotropical migratory birds, which are protected under the Neotropical Migratory Bird Treaty Act.

Threatened, Endangered, Proposed, and Sensitive Species

The proposed action would change the composition and structure of wildlife and plant habitat within the Farley analysis area, which could affect Threatened, Endangered, Proposed, or Sensitive species.

SOCIOECONOMICS

Proposed sale of merchantable material could create jobs and income for local communities. Unit selection and project design and mitigation could create costs that render the commercial sale of trees unfeasible.

ALTERNATIVE DEVELOPMENT

An adequate range of action alternatives is one that fully meets the Purpose and Need and addresses key issues. An action alternative must: (1) address one or more key issues; and (2) meet the Purpose and Need. An action alternative that does not meet both criteria may be eliminated from detailed study.

The alternatives for this project were designed to express a range of possible actions based on:

- the purpose and need for the project,
- the management direction, standards and guidelines specified by the Forest Plan for lands in the Farley project analysis area, and
- comments received from government agencies, tribal governments, interest groups and the public.

Other influences on the development of alternatives included consultation requirements under the Endangered Species Act, and other federal and state laws and regulations.

ALTERNATIVES CONSIDERED BUT REJECTED

Proposed Action

The proposed action (as described in the Scoping / Notice of Intent letters) involved commercial and non-commercial timber harvest, mechanical thinning, prescribed burning and other vegetation management activities on approximately 18,000 acres in the Farley analysis area. No vegetation management activities were proposed:

- in Riparian Habitat Conservation Areas (RHCAs)
- within one-quarter mile on either side of Desolation and South Fork Desolation Creeks (which are candidates for Wild & Scenic River designation)
- in C1 and C2 old forest management areas
- in goshawk nesting areas.

The proposed action would have involved commercial timber harvest and thinning on approximately 13,139 acres, non-commercial thinning on approximately 4,870 acres, and required approximately 59 miles of new Forest System and temporary roads (some in undeveloped areas). Several Forest Plan amendments would have been necessary related to:

- wildlife cover and habitat effectiveness
- connectivity among stands exhibiting old forest structure
- the maximum amount of area in a subwatershed allowed to be in the less than 20 year old age class following project activities, and
- designated visual resource corridors and management areas.

Scoping comments received from the public indicated substantial potential opposition to a project of that magnitude. In addition, the Interdisciplinary (ID) Team concluded that forest management activities and associated transportation system of that scale and geographic extent had the potential to create undesirable effects on forest resources. Therefore, the action as initially proposed was eliminated from further consideration.

Instead, five other alternatives for conducting vegetation management actions that still met the project purpose and need (although on not as large an area as anticipated) within acceptable balances of short and long term resource management benefits and risks were developed and assessed.

Alternative 3: 12 Inch Diameter Maximum Cutting Limit

The Forest Plan amendments known as the Eastside Screens already prohibit harvest of trees >21" dbh. Tree diameter-based harvest limits (of any size) impose artificial pressures to leave or remove specific classes of trees that result in unnatural "gaps" in stand age and size structure in the future, one of the very situations the project purpose and need intends to address.

A major objective of the forest management activities proposed for this project is to create stands with a mix of size classes of trees with an emphasis on retaining large diameter trees within a multi-age stand. Thinning of trees larger than 12 inches dbh is necessary to move stands toward

the desired stand structure and stocking density conditions. A 12-inch diameter limit would not meet the Purpose and Need to modify stand structures and/or reduce stand densities to improve the vigor of remaining trees. In addition, an alternative with a 12-inch dbh upper cut limit is not viable for economic reasons. Therefore, after sufficient analysis, this alternative was rejected and not considered further.

PROPOSED ACTION ALTERNATIVES

Proposed action alternatives are summarized below.

Comparison of proposed action alternatives for the Farley project.

	Proposed Action*	**Alternative**				
		1	**2**	**3***	**4**	**5**
Silvicultural Activity	**ACRES**					
Patch cut & Non-commercial thinning harvest	726	0	0	0	0	0
Regeneration harvest	111	0	0	0	0	0
Thinning – Commercial Harvest	388	390	353	33	390	353
Thinning – Commercial Harvest and non-commercial	415	48	0	48	48	0
Seed tree	7,646	1,515	1,432	674	1,253	1,149
Seed tree with non-commercial thinning	2,728	524	347	432	393	334
Overstory removal	269	30	30	30	30	30
Overstory removal and non-commercial thinning	668	310	310	310	310	310
Harvest shelterwood and non-commercial thinning	188	31	31	31	31	31
Commercial Thinning and Timber Harvest	***13,139***	***2,848***	***2,502***	***1,557***	***2,454***	***2,206***
Ground-based		2,483	2,210	1,250	2,132	1,945
Skyline		365	292	306	322	261
Non-commercial Thinning	***4,870***	***4,887***	***4,887***	***4,887***	***4,583***	***4,887***
Non-commercial thinning	4,870	4,577	4,577	4,577	4,273	4,577
Non-commercial thinning (by hand)	0	310	310	310	310	310
TOTAL ACRES	***18,009***	***7,735***	***7,389***	***6,444***	***7,037***	***7,092***
Reforestation / Planting	***11,148***	***2,006***	***1,716***	***1,079***	***1,583***	***1,420***
Burning		***3,276***	***2,906***		***1,941***	***2,758***
Broadcast		2,466	2,180		1,131	2,032
Pile		810	726		810	726
	MILES					
Fire Line Constructed		***49***	***44***		***40***	***36***
ROADS (currently 235 miles in analysis area)	**MILES**					
Roads (OPEN) likely to be used for Project		104	106		106	105
Roads (CLOSED) likely to be used for Project		57	63		63	62
Existing Forest System Roads to be Reconstructed		36	36		36	36

	Proposed Action*	Alternative				
		1	2	3*	4	5
New Forest System Roads to be Constructed	59.1 (total)	13.9	0		7.8	7.2
Temporary Roads to be Constructed (obliterated after project)		6.6	10		5.1	5
Existing Closed Roads to be Obliterated **		31	31		31	31
Existing Closed Roads to be Stabilized ***		8	8		8	8

*NOT CONSIDERED
**Road bed removed, recontoured and revegetated following project
***Culverts removed, passive drainage features installed, revegetated, access blocked

NO ACTION ALTERNATIVE

Current biological processes, ecosystem functions, and level of human activity and intervention generally would continue at present levels and rates.

ALTERNATIVE 1

Objective

The intent of this alternative is to conduct commercial and non-commercial thinning and timber harvest, fuels reduction, prescribed burning, reforestation and other vegetation management actions on as many stands as possible that were initially identified in the proposed action, while doing so within current Forest Plan management direction, guidelines, standards and constraints without amendments (Figure 2.4). No Forest Plan amendments are proposed for any of the alternatives.

Affected Environment

- Alternative 1 involves forest management activities on approximately 7,735 acres (with some activities in undeveloped areas), and construction of 13.9 and 6.6 miles of new Forest System and temporary road, respectively.

ALTERNATIVE 2

Objective

The intent of this alternative is to conduct commercial and non-commercial thinning and timber harvest, fuels reduction, prescribed burning, reforestation and other vegetation management actions on as many stands as possible that were initially identified in the proposed action, while constructing only temporary roads < 1 mile long to minimize road densities and protect water quality (Figure 2.5).

Affected Environment

- Alternative 2 involves approximately 7,389 acres and construction of 10 miles of temporary road.

ALTERNATIVE 4

Objective

The intent of this alternative is to conduct commercial and non-commercial thinning and timber harvest, fuels reduction, prescribed burning, reforestation and other vegetation management actions on as many stands as possible that were initially identified in the proposed action, while doing so without project activities occurring in, or new or temporary roads constructed in areas asserted by Oregon Wild to be undeveloped in character outside of inventoried roadless areas (Figure 2.6).

Affected Environment

- Alternative 4 involves approximately 7,037 acres (with none in undeveloped areas), and construction of 7.8 and 5.1 miles of new Forest System and temporary road, respectively.

ALTERNATIVE 5

Objective

The intent of this alternative is to conduct commercial and non-commercial thinning and timber harvest, fuels reduction, prescribed burning, reforestation and other vegetation management actions on as many stands as possible that were initially identified in the proposed action, while emphasizing wildlife and wildlife habitat primarily for big game (elk and deer), neotropical birds, and other sensitive or species of concern (Figure 2.7).

Affected Environment

- Alternative 5 emphasizes wildlife (particularly big game); it involves approximately 7,092 acres, and construction of 7.2 and 5 miles of new Forest System and temporary road, respectively.

CONSISTENCY WITH THE FOREST PLAN AND OTHER APPLICABLE NATURAL RESOURCE MANAGEMENT AND ENVIRONMENTAL LAWS, REGULATIONS, POLICIES AND PROGRAMS

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the analysis area.

POTENTIAL ENVIRONMENTAL CONSEQUENCES

FOREST VEGETATION

Forest Stand Structure

No Action

The Interior Columbia Basin Environmental Management Project (ICBEMP) found that in the Blue Mountains, old single-story structures had declined "by nearly 63 percent". No Action would have the cumulative effect of perpetuating these trends.

Effects Common to All Action Alternatives

All action alternatives focus on silvicultural treatments that would promote the long-term increase of old forest structure (Table 3.1.3), which currently is well below its historic range of variability throughout the project analysis area. Thinning would be one of the means of accomplishing this and would directly affect the path each stand takes toward old forest structure. Thinning would shift the site's growing potential to fewer trees, allowing those trees to grow larger more quickly (Powell 1998). Research conducted in the Blue Mountains and central Oregon has shown that "substantial increases" in individual tree growth can occur following a thinning from below (Powell 1998). Since most of these stands are young, development of large trees would be a long process (100+ years), but the action alternatives would start the treated stands down this path.

The effects expected under all of the action alternatives generally would be the same. The difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative.

Forest Stand Stocking Density

No Action

Thinning would not occur with No Action, which would leave stands at higher risk from disturbances. Insects and diseases would be expected to be more prevalent where trees are stressed and weakened by competition for light, moisture, nutrients and growing space. Stands with denser understories would be at higher risk of wildfire.

Effects Common to All Action Alternatives

All action alternatives would reduce stocking in the treatment units, primarily by commercial and non-commercial thinning (Table 3.1.7). Removal of some trees in the treatment units would allow remaining trees more access to sunlight, nutrients, water and growing space, which would improve the overall health of affected stands. Maintaining or improving tree health could reduce damage and mortality from insects and disease, and create a more long-lived and resilient stand. Selection of the silvicultural treatments was guided by the Forest Plan.

The effects expected under all of the action alternatives generally would be the same. The difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative.

Biological Evaluation for Plants Listed as "Sensitive"

Two sensitive plant species on the Regional Forester's Sensitive Species List (dated January 2008) occur in the Farley project analysis area. Determinations of potential project effects are summarized below.

Species	Scientific Name	Species Code	Status	Occur-rence	Effects
Mountain moonwort	*Botrychium montanum*	BOMO	S	D	NI
Bolander's spikerush	*Eleocharis bolanderi*	ELBO	S	D	NI

Codes:

Status

E	Federally Endangered
T	Federally Threatened
S	Sensitive species from Regional Forester's list
C	Candidate species under Endangered Species Act

Occurrence

HD	**Habitat Documented** or suspected within the project analysis area or near enough to be impacted by project activities
HN	**Habitat Not** within the project analysis area or affected by its activities
D	Species **Documented** in general vicinity of project activities
S	Species **Suspected** in general vicinity of project activities
N	Species **Not documented** and not suspected in general vicinity of project activities

Effects Determinations (Sensitive Species)

NI	No Impact
MIIH	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
WIFV	Will Impact Individuals or Habitat with a Consequence that the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species
BI	Beneficial Impact

Invasive Plants / Noxious Weeds

No Action

Existing native vegetation would continue to stabilize soil and consume resources (i.e. nutrients, water, and space), which would help reduce invasion by noxious weed species. Existing infestations, spread and control efforts would continue.

Effects Common to All Action Alternatives

The thinning, timber harvest, burning/reforestation as well as the road construction/reconstruct-tion, maintenance, and stabilization/obliteration activities proposed in each action alternative could cause noxious weeds to spread and/or become established in the analysis area. As the amount of acres treated increases, the potential for weeds to spread or become established

increases. Depending on alternative, thinning and timber harvest activities are proposed to occur on approximately 7,037 to 7,735 acres, and burning is proposed to occur on approximately 1,941 to 3,276 acres. There are 10 inventoried noxious weed infestations totaling approximately 66 acres within project activity units proposed for Alternatives 1, 2 and 5, and nine inventoried noxious weed infestations totaling approximately 64 acres within project activity units proposed for Alternative 4. Alternatives 1, 2, and 5 are mostly identical in the low chance of weed spread when compared to each other because they all have the same 10 weeds sites that total 66 acres in or near treatment units in these alternatives. Alternative 4 has a slightly lower chance of weed spread than the rest of the actions alternatives because it has one less noxious site that is two acres in size in or adjacent to a treatment unit. Due to the location, small size and low densities of these infestations, and the mitigation measures to be employed, there is a low risk that invasive plants / noxious weeds would spread from these sites due to the proposed activities under all alternatives.

FIRE AND FUELS

Stand Structure and Historic Range of Variability (HRV)

No Action

No action would result in continuation of current conditions, and ecological trends and processes, including the potential for wildfire in the future.

Effects Common to All Action Alternatives

There is little appreciable difference among the alternatives in terms of effect on stand structure HRV. Some of the Stem Exclusion Open Canopy (SEOC) and Young Forest Multi-Story (YFMS) structure areas would be converted to Stand Initiation (SI) or Understory Reinitiation (UR) structure through overstory removals. Thinning of dense young stands would be expected to accelerate growth of individual trees and aid stand development in the long term, but fire hazard would be increased for up to 5 years by the slash generated by non-commercial thinning. Young stands may be particularly vulnerable due to low canopy base heights and small diameter thin-barked trees that are more easily killed by fire. Older forests tend to be more resistant to low and moderate intensity fires due to higher average crown base heights and thicker barked larger diameter trees that are not as easily killed by fire.

Fire Regime and Condition Class

No Action

No action would result in continuation of current conditions, ecological trends and processes, including the potential for wildfire in the future.

Effects Common to All Action Alternatives

There would not be much immediate change in progression to restore historical conditions to the landscape under any of the alternatives. There would still be an overabundance of young stand initiation and a scarcity of old growth in the treated units as well as throughout the analysis area.

Thinning and fuel reduction treatments might accelerate growth and promote such conditions if the landscape is not subjected to extensive stand replacement fire.

Wildfire Risk

No Action

No action would result in continuation of current conditions, and ecological trends and processes, including the potential for wildfire in the future.

Effects Common to All Action Alternatives

Wildfire risk is not expected to change appreciably under any of the proposed alternatives. Fire hazard would increase in areas where fuels generated by project activities are in excess of prescribed treatment maximums. From a fuel management perspective, there is not much overall difference between the alternatives except for the number of acres treated. Fire danger would temporarily be increased due to the fuels (slash) created by the proposed activities in all action alternatives. The increase in potential fire activity would be of short duration (1-5 years), until associated prescribed burning is completed. In the longer term (20-30 years after treatment) fire danger would be decreased.

Air Quality and Prescribed Burning

No Action

No action would result in continuation of current conditions, and ecological trends and processes, including the potential for wildfire in the future. Air quality effects of wildfire are difficult to predict (and are outside the scope of this analysis) but could be expected to greatly exceed the emissions from prescribed burning proposed under the project action alternatives.

Effects Common to All Action Alternatives

Prescribed burning associated with proposed project activities would comply with the Clean Air Act and be conducted in accordance with the operational guidelines agreed to by the USDA - Forest Service and the Oregon Department of Environmental Quality. Prescribed burning would comply with the Oregon Smoke Management Implementation Plan and would be conducted within the guidelines of the Smoke Management Program.

Burning would take place under conditions favorable to effective mixing and dispersal of smoke. The effects associated with prescribed burning would be of short duration and have little effect on Class I Airsheds and Smoke Sensitive Receptor Areas due to the remoteness of the project area. Some local communities may be affected for short periods of time due to smoke settling in valleys overnight.

SOILS

No Action

Conditions in the analysis area would remain much the same as now. Slow accumulation of woody material, including smaller branches and duff, would continue unless interrupted by wildfire. Organic material buildup on the surface would increase productive capacity somewhat but increase the risk of widespread, high-severity wildfire that could remove large amounts of this material at once over large areas. The low severity, mosaic pattern of prescribed fire would not occur with subsequent release of nutrients for plant uptake and invigoration. Road conditions would remain much the same except road maintenance would not occur on utilized closed road sections, and temporary and system road construction would not occur.

Effects Common to All Action Alternatives

As differences among the alternatives are relatively minor, the effects of each of the action alternatives generally would be similar. The relative difference among alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. In general, compared to Alternative 1, relatively less soil disturbance would result from Alternatives 2, 4, and 5. Road obliteration and stabilization proposed in each of the action alternatives (approximately 31 and 9 miles, respectively) would improve or eliminate current erosion problems and future erosion hazard potential over the long (> 25-50 year) time period.

WATER QUALITY and HYDROLOGY

Regulatory Status and Compliance

The water bodies in the Desolation Creek watershed on Oregon's 2004-2006 303(d) list for temperature are:

Water Body	Reach (designated by River Mile)	Season	Temp. Criteria	Beneficial Uses
Desolation Creek	0 to 3.5	January 1 – June 15	13.0 degrees Celsius	Salmon and steelhead spawning
Desolation Creek	0 to 3.8	Year Around	16.0 degrees Celsius	Core cold water habitat
Junkens Creek	0 to 7	Year Around	12.0 degrees Celsius	Bull trout spawning and rearing
N. F. Desolation Creek	0 to 6.6	Year Around	12.0 degrees Celsius	Bull trout spawning and rearing
Sponge Creek	0 to 2.7	Year Around	12.0 degrees Celsius	Bull trout spawning and rearing

Water Quality Management Plans (WQMPs) for achieving beneficial use support and water quality standards (called Total Maximum Daily Loads or TMDLs in the Clean Water Act) for temperature in the John Day River Basin are in development and scheduled for completion in 2009.

In accordance with the 1990 Forest Plan (p. 4-77) and as required by the Clean Water Act and laws of the State of Oregon (OAR Chapter 340-341), the proposed activities for the Farley project include design criteria and implementation of Best Management Practices (BMPs) to protect water quality (USDA, 1988). The Umatilla National Forest is implementing active restoration to improve water quality in Desolation watershed and is actively collaborating in the TMDL process with Oregon Department of Environmental Quality (ODEQ) in the John Day River Basin.

Sediment from Roads

No Action

Existing erosion and sediment transport in the analysis area would continue generally at present levels. Surface runoff would largely be determined by the location and intensity of precipitation events and their duration. The existing 235 miles of roads would continue to erode and cause sedimentation in the vicinity of the 182 crossings. Hill slope erosion would continue to enter the drainage ditches of the road system, reducing their effectiveness. No change in road use would occur nor would any stabilization or obliteration of existing roads. Road-related erosion would remain about the same over time, contributing approximately 30 percent above-baseline erosion and sediment production in the watershed (Figure 3.4.1, Table 3.4.6).

Effects Common to All Action Alternatives

Road construction activities would result in localized, short-term increases in sediment production. New road construction would incorporate design, construction, and engineering practices that are intended to reduce sediment production. Road obliteration activities are a short term disturbance with some potential for erosion, however, it would result in a long term net decrease in erosion and sediment transport on a watershed scale when completed.

Existing Forest System roads would receive maintenance consisting of blading the road surface, cleaning out ditches and culverts of accumulated sediment, and removing encroaching vegetation. Road maintenance activities may result in short term, low intensity, localized sedimentation, particularly if precipitation occurs during or shortly thereafter. These practices can be expected to reduce road-derived erosion and sediment transport for 3 to 5 years, when maintenance is likely to be needed again.

Over the long term (5 to 30 years), the combination of road activities (addition of up to 14 miles of new system roads, stabilization of 8 miles and obliteration of 31 miles of existing roads, reduction in road density, and reduction in the number of stream crossings would result in a decline in road-related erosion and sediment production by about 16 percent compared to existing background conditions, at the watershed scale.

Water Yield and Peak Flows

No Action

The existing hydrologic regime of the analysis area would stay the same. Water yield and peak flows would largely be determined by variability of precipitation and biophysical conditions in the Desolation Creek watershed.

Effects Common to All Action Alternatives

The Equivalent Clearcut Area (ECA) calculation for the watershed in its current condition (No Action) is 4.5 percent (Table 3.4.7). The total area of timber canopy removal from the proposed activities in the analysis area would be small (about 5% increase in openings) compared to total forested area. The Equivalent Clearcut Area would range from 10.3 to 11.3 percent. No measurable change in water yield or peak flows would be expected because all action alternatives are below the 15-20 percent "threshold" value as identified by Stednick (1995).

FISHERIES

Fish Populations

No Action

Because current vegetation would remain largely unaltered under this alternative there would be no direct effects to fish species. A large wildfire could potentially eliminate all fish from a burned-over stream as documented in the Bull, Tower, and Summit fires (in 1996), Meadow Fire (in 2001), and Bull Springs Fire (in 2003) which all occurred in similar stand conditions.

Effects Common to All Action Alternatives

Because most activities would occur outside of Riparian Habitat Conservation Areas (RHCAs), there would be little effect to aquatic habitat and fish populations. Temporary increases in fine sediments from stabilization and obliteration of approximately 39 miles of existing closed road could occur. However, in the long term, road stabilization and obliteration would be expected to lead to a reduction in stream temperature and an overall reduction in the amount of sediment entering streams.

An increase in large wood from hazard tree cutting may provide a short term increase in hiding cover, shade and substrate for food sources. It may also indirectly lead to an increase in pool formation, which would also increase hiding cover and may increase areas of thermal refuge. Effects on large wood in streams (and hence, fish populations) are expected to be similar among all action alternatives.

It is likely that the proposed activities combined with the effects of past and ongoing management activities would slightly increase the short-term risk for salmonids in the analysis area. However, in the long-term, reduction in chronic sedimentation associated with roads, and the potential reduction in stream temperatures associated with road obliteration in RHCAs would be expected to benefit all populations of fish in the analysis area.

The biological evaluation for all action alternatives is summarized below.

Species	Determination
Columbia River bull trout	NLAA
Steelhead	LAA
Steelhead critical habitat	LAA
Essential fish habitat	LAA
Redband trout	MI
Chinook salmon	MI
Westslope cutthroat trout	NI

DEFINITIONS:
NLAA – not likely to adversely affect
LAA - likely to adversely affect (short term)
MI – may impact
NI – no impact

Water Temperature

No Action

Because present vegetation would remain unaltered under this alternative there would be no direct effects to any riparian vegetation. Should a large wildfire occur in the analysis area, there could be indirect effects to stream temperatures. Loss of shade-providing trees adjacent to streams would directly increase stream temperatures. No new roads or stream crossings would be constructed so no additional riparian vegetation would be removed at these crossings.

Effects Common to All Action Alternatives

No vegetation within the RHCAs of any of the subwatersheds would be disturbed during commercial and non-commercial thinning and timber harvest under any of the proposed action alternatives so no reduction in stream shading or increase in temperature is expected to be associated with these activities.

Roadside hazard trees would be cut and left where they fall in RHCAs. Some reduction in stream shade may occur if hazard trees within one tree height of the streams are felled. Hazard trees would be cut along a total of 126 miles of road. Only 3.6 miles of this total are within 100 feet of a perennial stream; the small number of hazard trees that are felled over this distance likely would not create a measurable change in stream temperatures.

Approximately 39 miles of existing closed roads would be stabilized or obliterated under all alternatives. Approximately 9 miles are within RHCAs including 44 existing stream crossings. Restoration of these roads and stream crossings would contribute to additional vegetation recovery within RHCAs and a reduction in stream temperatures.

Approximately 3 miles of closed roads would be reopened in riparian areas for access to proposed project activities and may lead to a short-term loss of existing vegetation where trees and other shade-providing vegetation have re-grown on these roadbeds. There are five stream crossings associated with these closed roads.

Sediment/Substrate Embeddedness

No Action

Current vegetation would remain unaltered so there would be no effects on current erosion and sedimentation processes and rates.

Effects Common to All Action Alternatives

No vegetation within the RHCAs of any of the subwatersheds would be disturbed during commercial and non-commercial thinning and timber harvest in these alternatives. In addition, this project is located in a special fish management area so there is an additional emphasis on preventing soil exposure and sediment movement within 500 feet of fish-bearing streams. With these additional restrictions, it is not likely that any sediment would reach streams as a result of project activities.

Approximately 39 miles of roads would be stabilized or obliterated. Approximately 9 miles would be stabilized or obliterated within RHCAs including 44 existing stream crossings. These activities could cause a short-term increase in soil mobilization and sediment entering Desolation Creek, North Fork Desolation Creek, and potentially Kelsay Creek streams. However, removal of these roads from the landscape would lead to a long-term decrease in chronic sediment input into affected streams and an improvement in overall substrate embeddedness.

Approximately 3 miles of closed roads would be reopened in riparian areas for access to project activities and may lead to additional soil exposure where vegetation had re-grown on these roadbeds. Five stream crossings associated with these closed roads could result in a short term increase in sediment input into the affected streams.

Stream Bank Stability

No Action

Current processes affecting stream bank stability would remain the same.

Effects Common to All Action Alternatives

No vegetation management activities would occur in the RHCAs of any of the subwatersheds so there would be no disturbance to stream banks as a result of these activities. Roadside hazard trees would be cut and left where they fall in RHCAs.

Approximately 39 miles of roads would be stabilized or obliterated as part of this project. Approximately 9 miles would be stabilized or obliterated within RHCAs including 44 existing stream crossings. Restoration of these 44 crossings would result in approximately 0.3 mile of stream banks returned to their original condition.

Large Wood in Streams

No Action

Current processes affecting large wood in streams would remain the same.

Effects Common to All Action Alternatives

No vegetation in RHCAs would be disturbed during proposed project activities. Roadside hazard trees would be cut along 126 miles of road of which 5.8 miles are within 100 feet of a stream; the amount of road affected is the same for all alternatives. Hazard trees would be cut and left where they fall in RHCAs. Some increase in large wood may occur if hazard trees within a tree height of streams are felled into the stream. Approximately 2.6 miles are along Class 4 intermittent streams so an increase in large wood at these locations would not affect fish habitat. Given the small number of trees that are felled along the remaining 3.2 miles of roads within 100 feet of streams, there would not likely be a measurable change in the amount of large wood in streams.

Proposed underburning could back into riparian areas where they occur in or near treatment units and create some potential future large wood. Burning in riparian areas would be done under controlled conditions so vegetation loss of existing large wood is not likely under any of the proposed alternatives. Approximately 100 to 300 feet of fire line would be constructed in Class 4 RHCAs by hand under all alternatives; this is not expected to affect large wood in streams.

Approximately 39 miles of roads would be stabilized or obliterated under all alternatives. Approximately 9 miles would be stabilized or obliterated within RHCAs including 44 existing stream crossings. Restoration of these roads would lead to additional vegetation recovery within these RHCAs and to an increase in the amount of potential large wood in streams.

Approximately 3 miles of closed roads would be reopened in riparian areas for access to project activities and may lead to a loss of existing vegetation where trees have re-grown on these roadbeds. This may lead to an increase in large wood at isolated locations.

Currently many of the streams are meeting large wood standards in the analysis area. Overall, activities proposed in this project are likely to lead to an increase in large wood, mostly in Class 4 streams.

Pool Frequency and Quality

No Action

Current processes affecting pool frequency and quality in streams would remain the same.

Effects Common to All Action Alternatives

No vegetation within the RHCAs of any of the subwatersheds would be disturbed during proposed project activities in this alternative so no change in the amount of large wood or number of pools is expected to be associated with these activities. In addition, this project is located in a special fish management area so there is an additional emphasis on preventing soil exposure and sediment movement within 500 feet of fish bearing streams. With these additional restrictions it is not likely any sediment would reach streams as a result of vegetation removal activities and so will not affect pool quality.

Hazard trees would be cut along 126 miles of road of which 5.8 miles are within 100 feet of a stream. Hazard trees would be cut and left where they fall in RHCAs. Some increase in large wood may occur if hazard trees within a tree height of streams are felled into the stream; this could indirectly lead to pool formation. Approximately 2.6 of these miles are along Class 4

intermittent streams so an increase in large wood at these locations would not affect fish habitat. Given the small number of trees that are felled along the remaining 3.2 miles of roads within 100 feet of streams, it is not likely that there would be a measurable change in the number of pools.

Proposed underburning could back into riparian areas and create some potential future large wood, and indirectly increase the number of pools in the future. Burning in riparian areas would be done under controlled conditions so vegetation loss of existing large wood and indirectly the number of pools is not likely. Associated with broadcast burning, fire line would be constructed under each alternative. Depending on alternative, between 100 and 300 feet of fire line would be constructed in Class 4 RHCAs by hand. This would not affect the stream channel or large wood and would have no effect on the number or quality of pools in any alternative.

Approximately 39 miles of existing closed roads would be stabilized or obliterated as part of this project under all alternatives. Approximately 9 miles would be stabilized or obliterated within RHCAs including 44 existing stream crossings. Restoration of these crossings would involve returning the stream channel to its natural state. This could lead to an increase in the number of pools at these crossings.

Road Density and Location

No Action

Neither road density nor drainage density would change under this alternative.

Effects Unique to Alternative 1 on Road Density

Approximately 20.5 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.5 miles of new system road would be constructed in RHCAs across five Class 4 streams. This would increase overall road density but would not increase riparian road density. The five new stream crossings would add approximately 1000 feet to the drainage length, which is not measurable in terms of effects at the watershed scale.

Approximately 39 miles of roads would be stabilized or obliterated as part of this project. Approximately 9 miles would be stabilized or obliterated within RHCAs including 44 existing stream crossings, resulting in reduced riparian road density. Restoration of these 44 stream crossings would reduce the drainage length and (taking into account the addition of the five new crossings) change the drainage density increase from the existing 2.60 to 2.00 percent.

Effects Unique to Alternative 2 on Road Density

Ten miles of temporary roads would be constructed with no new stream crossings under this alternative. Road density would temporarily increase. Effects from road obliteration would be the same as discussed for Alternative 1. Restoration of these 44 stream crossings would reduce the drainage length and because no new crossings would be constructed under this alternative, the drainage density increase would be 1.96 percent.

Effects Unique to Alternative 4 on Road Density

Approximately 12.9 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.25 miles of new system road would be constructed in RHCAs across two Class 4 streams. This would increase overall road density but would not show a measurable increase in riparian road density. The two new stream crossings would add

approximately 400 feet to the drainage length, which is not measurable in terms of effects at the watershed scale.

Effects from road obliteration would be the same as discussed for Alternative 1. Restoration of the 44 stream crossings would reduce the drainage length and (taking into account the addition of the two new crossings) would result in a drainage density increase of 1.99 percent.

Direct and Indirect Effects Unique to Alternative 5 on Road Density

Approximately 12.2 miles of new system or temporary roads would be constructed under this alternative. As a part of the construction of roads, approximately 0.3 miles of new system road would be constructed in RHCAs across three Class 4 streams. This would increase overall road density but would not increase riparian road density. The three new stream crossings would add approximately 600 feet to the drainage length, which is not measurable in terms of effects at the watershed scale.

Effects from road obliteration would be the same as discussed for Alternative 1. This would reduce the overall road density and the riparian road density. Restoration of the 44 stream crossings would reduce the drainage length (and taking into account the addition of the three new crossings) would result in a drainage density increase of 2.00 percent.

WILDLIFE

Late and Old Forest Structure Habitat

No Action

In the short term (0 to 3 years), late and old forest structure (LOS) habitat would maintain its current quality and extent in the analysis area. Single-stratum old forest would remain below HRV in the dry upland forest PVG. Multi-strata old forest habitat also would remain below HRV in the moist and cold upland forest PVGs. The amount of LOS habitat would be expected to change over time. With the existing management direction including fire suppression, late and old structure stands (multi-strata and single-stratum), young forest and stem exclusion closed/open canopy stands, and stands recovering from wildfire would develop old growth habitat features such as large trees, high standing and down wood densities, and multiple canopy layers, and would provide habitat for wildlife adapted to old growth and late and old forest structure (in the mid and long term).

However, growth in old and young forest stands would increase stand density and fuel loading, making the forest increasingly susceptible to stress, insect and disease outbreaks, and high-severity wildfire. A major disturbance on the landscape (such as fire) would change these stands to early seral, stand initiation-structural stages, resulting in reduced quantity and connectivity of late and old structure habitats. Old forest single-stratum and old forest multi-strata would be well below the historical range of variability in all potential vegetation groups after such an event, and would remain low for many years as the young stands grow.

Effects Common to All Action Alternatives

The effects expected under all of the action alternatives on LOS habitat generally would be the same. The differences among individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each

alternative. No thinning or harvest activities are proposed in late and old forest structure stands. Non-commercial thinning, fuels reduction and broadcast burning, and road-related activities (construction, stabilization / obliteration, etc) would not affect the quality or quantity of LOS habitat in the analysis area.

By retaining the largest trees in proposed treatment units (thinning from below), commercial harvest activities would create late and old structure habitat in the long term. Proposed thinning and harvest in young forest stands would indirectly affect the availability and distribution of late and old structure habitat by delaying or reducing development of future late and old structure habitat in the future, primarily in the moist and cold upland forest potential vegetation groups.

Connectivity

No Action

In the short term (0 to 3 years), the existing connectivity corridor network between late and old structure stands and designated/managed old growth stands would remain the same. Indirectly, connectivity habitat would change over time. With the existing management direction including fire suppression, stands in the project area would continue to grow into dense multi-layered stands. Openings created by past harvest and wildfire would grow into mid-seral stands composed of small and medium sized trees. These stands would provide connectivity corridors in the future. Increased stand densities, standing and down fuel loads, and multi-layer conditions would increase the susceptibility to wildfire and insect and disease outbreaks. A major disturbance on the landscape would change the composition and structure of connectivity habitat. As a result, late and old structure and old growth stands would be disconnected from other late and old structure stands in the analysis area. This would limit "free movement" between late and old structure and old growth stands within and outside the analysis area for wildlife species associated with these habitats.

Effects Common to All Action Alternatives

No commercial harvest or regeneration harvest activities are proposed for this project within the designated connectivity corridor network in the Desolation Creek watershed. Initial project design eliminated all potential treatment units that would have affected connectivity corridors between old growth and late and old structure stands. Therefore, the existing level of habitat connectivity would not change under any of the proposed action alternatives.

Non-commercial thinning would have no effect on the quality of connectivity habitat because overstory composition and structure would not be affected. Patches of understory vegetation (small diameter conifers) would be maintained in non-commercially thinned units to provide hiding cover for wildlife and maintain the quality of connectivity corridors. Non-commercial thinning would increase growth rates of the remaining trees.

Slash created in non-commercial thinning units would be lopped and scattered within the unit. These stands would not be burned, so all retained small diameter trees, patches of retained regeneration, and overstory trees would not be affected. Snags and down wood also would not be affected in non-commercial thinning units. Broadcast burning and pile burning would not affect connectivity corridors; these activities would occur entirely outside of connectivity corridors within commercial and regeneration harvest units. All commercial thinning and regeneration units would be (fire-)lined to prevent escape of prescribed fire. These stands would

be burned during periods of weather and fuel conditions conducive to a low intensity underburn. The risk of connectivity habitat being affected by burning is minimal.

Roads used for project activities would not change the composition or structure of connective habitat in the project area. Maintenance and reconstruction of some roads may require the removal of some vegetation; this activity would not affect overstory composition or structure. New system roads that pass through connective corridors would not create barriers to the movement of wildlife. These roads would be relatively narrow (13 to 15 feet wide) and would be closed (or obliterated in the case of temporary roads) to motorized use following project activities.

Snags

No Action

In the short term (0 to 3 years), the distribution of snags across the watershed is expected to remain the same. In the mid and long term (3 to 20+ years), existing snags would decay and fall to the ground, increasing down wood in the analysis area. Snag densities have the potential to increase in the analysis area through naturally occurring (background) mortality and mortality caused by insect and disease outbreaks and wildfire. Snags resulting from such event(s) would fall and be relatively scarce until the regenerating stand becomes old enough to produce large trees and snags, a time period ranging from 60 to 100 years.

Effects Common to All Action Alternatives

The effects expected under all of the action alternatives generally would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. Proposed commercial thinning activities would target green trees for removal; any removal of snags would be incidental to green-tree harvest activities. Snag densities within proposed commercial thinning units would meet the snag density retention rates described above for the Farley project (Table 3.6.1). These snag densities would contribute to high quality habitat for species requiring snags for some portion of their lives.

Snag densities would be expected to be reduced in regeneration harvest units. As a result, primary cavity excavator habitat would be reduced. However, snag densities would meet the adjusted snag density retention rates for the Farley project and would be sufficient to support wildlife dependent on this habitat feature.

Within non-commercial thinning units, there would be no cutting or removal of snags unless they pose a safety hazard to thinning operations. Generally, snag densities in these stands are relatively low due to past harvest and salvage activities.

Use of the road system and construction of roads has the potential to affect snags. Snags that present a danger to operations would be felled to provide for safety in the work area and along system and temporary roads. Felled snags would be left on the ground to provide down wood habitat. Effects would vary in proportion to the miles of system and temporary road by alternative (Table 3.6.2). In the long term, temporary roads would revegetate and contribute to snag densities, while the area committed to new system roads would be removed from production (of vegetation) for the life of the road.

Snag Replacement Trees

No Action

In the short term (0 to 3 years), snag replacement trees (live/green) would continue to occupy the project area at or near current densities and size classes, exceeding Forest Plan objectives. In the mid (0 to 3 years) and long term (> 20 years), green tree replacements would decrease in response to disease and insect outbreaks. In the absence of fire, disease and insect outbreaks would affect dense multi-strata stands. Although green tree replacements may decrease in the future due to mortality, it is unlikely that green tree replacement levels would fall below Forest Plan objectives. In the long term, mortality of overstory trees would increase standing and down fuel loads, increasing the risk of high severity wildfire. Wildfire of this type would change the composition and structure of forested stands in the analysis area. Depending on the intensity and severity of the fire, this would reduce or even eliminate green replacement trees currently occupying the affected areas. After a severe fire event, it could take in excess of 80-100 years to regain sufficient quantities of replacement trees, in all size classes, to meet the Forest Plan objectives.

Effects Common to All Action Alternatives

Proposed project activities would directly and indirectly affect green (snag replacement) trees in the analysis area. Commercial thinning and regeneration harvest would reduce the density of green trees in treatment units; however, all treated stands would be fully stocked after treatment. Green (snag replacement) tree objectives (Table 3.6.6) would be met following project activities; these adjusted standards would exceed Forest Plan standards for green tree replacements. Green tree replacements would also be met in mechanical and hand non-commercial thinning units following harvest, where larger diameter trees that meet retention objectives are available.

The effects of burning would be the same under all of the action alternatives; the effect would vary according to the number of acres burned under each action alternative. Low intensity broadcast burning and pile burning would potentially affect a small number of overstory trees. Under all of the action alternatives, burning would not reduce green tree replacements to below the adjusted guidelines for the Farley project (Table 3.6.6); these elevated retention levels would mitigate for expected mortality in green leave trees.

Down Wood

No Action

Over the short term (0 to 3 years), dead down wood would continue to occupy the watershed at or near the current density in the dry upland, moist upland, and cold upland forest potential vegetation groups. Over the next three to 10 years, falling snags would be the primary factor contributing to the recruitment of down wood habitat, potentially increasing down wood densities across the watershed. In the long term, stands would continue to develop multi-layered conditions, resulting in competition for resources and stress. Potential increases in the incidence of insects and disease would cause mortality in these stands, increasing potential standing and down wood. Increases in down wood density would increase fuel loading and the risk of

wildfire. Large scale, high severity wildfire would reduce down wood densities by consuming down wood. A fire of this type could reduce down wood densities below Forest Plan standards immediately following the fire. Down wood would eventually increase as snags created by a fire of this type begin to fall. After a series of continued disturbances on the site, down wood densities likely would fall below the Forest Plan standard because of the diminished source of green trees and snags.

Effects Common to All Action Alternatives

Generally, the effects on down wood would be the same for each of the action alternatives. The effect (extent) would vary by the number of acres under each alternative that are subjected to activities that would affect down wood. Proposed commercial thinning and regeneration harvest activities would directly and indirectly affect down wood in proposed treatment units. In proposed treatment units with large diameter fuels in excess of Forest Plan standards, down wood would be removed to reduce the risk of wildfire. Down wood would also be crushed, broken apart, or otherwise displaced by machinery operating in proposed treatment units. These activities would also indirectly affect the future abundance of down wood by reducing snag densities.

Regeneration harvest would meet green tree replacement guidelines after harvest. Although densities of down wood would be reduced, they would meet Forest Plan standards following treatment. Down wood retained in these stands would be distributed throughout the treatment units as singles and small high-density patches (not piles). A variety of decay classes, structures, sizes, hollow logs, and other special features highly valued by wildlife would be retained. Because snag densities would meet or exceed Forest Plan standards, recruitment of down wood is not expected to be adversely affected in the mid and long term.

Non-commercial thinning would not directly affect down wood in treatment units. Generally, machinery (slashbuster, mulcher, etc.) would be used to treat these stands. Use of machinery in treatment units would crush, break, or displace some portion of the down wood in these units. However, it is not expected that down wood densities would be measurably affected.

Fuels treatment within non-commercial thinning units would affect down wood within treatment units in a similar manner as that described for commercial thinning. Down wood densities would meet or exceed Forest Plan standards in these proposed treatment units. The largest down wood in treatment units would be retained where it is available.

Pile burning generally would not affect down wood. Broadcast burning (acres vary by alternative) has the potential to affect down wood densities in treated stands. However, there is a potential that down wood, particularly smaller diameter material, would be consumed or charred during burning. Charring would reduce the quality of down wood for primary cavity excavators due to reductions in insects that use down wood (ants, beetle larvae, etc). Locally heavy accumulations of activity-created fuels may result in consumption of down wood in patches ranging in size from one to several acres. Underburns would also be expected to create snags within the burn area. Snags created by burning would compensate for down wood that may be consumed during this activity. Although patches within burned units would have little or no down wood, it is expected that Forest Plan standards for down wood would be met within individual treatment units following burning.

Tractor fire lines used to contain broadcast burns would likely displace down wood, and may result in it being broken apart. This occurrence would not measurably reduce down wood densities.

The proposed treatment activities would reduce mortality in treated stands, ultimately reducing snag recruitment and down wood levels. High snag and down wood densities would be maintained in untreated areas adjacent to treatment units.

Management Indicator Species

Rocky Mountain Elk

No Action

In the short term (0 to 3 years), elk habitat would essentially remain unchanged in the analysis area. The amount of satisfactory and total cover, and the HEI values in the C7 management areas would remain the same in the short term.

In the mid and long term, stands would continue to grow, recover from past insect and disease disturbance and harvest, and develop a multi-story structure, thus increasing the amount of total cover in the C7 management areas. Satisfactory cover levels in the C7 management area would approach Forest Plan standards in the long term as stands regenerate and marginal cover stands mature. HEI in the C7 management area would likely increase with an increase in satisfactory cover due to an improved distribution and abundance of this cover type

An increase in cover and multi-layer condition would increase the risk of high severity wildland fires in the analysis area. A large scale fire event similar to the Tower or Summit Fires (1996) is possible given that the Farley analysis area has similar vegetative conditions. A fire of this scale would result in widespread reduction of total cover and satisfactory cover in the analysis area and a marked increase in foraging habitat. HEI in the C7 management areas would decrease due to an increased abundance of forage habitat and the lack of cover habitat.

The elk population in the analysis area is expected to remain stable in the mid and long term. Open road densities are also not expected to change in the short or long term.

Effects Common to All Action Alternatives

The effects expected under all of the action alternatives generally would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. In the C7 management area, total cover and HEI standards would be met under all of the action alternatives. Although satisfactory cover levels in the C7 management area would continue to be below standards, there would be no change in satisfactory cover levels from the existing condition under all of the action alternatives. There would be no activities in satisfactory cover in the C7 management area. Meeting the HEI and total cover standard for elk in the C7 management area would continue to contribute to the elk population management objectives of the State of Oregon.

Cover habitat would be minimally affected by prescribed burning. Burning generally would have a beneficial effect on elk habitat. Low intensity broadcast burning would consume accumulated small diameter litter and logging slash, and stimulate growth of forage. Forage

would improve for several years following burning. It is not expected that treatment activities would substantially affect calving or result in reductions in calf survival in the analysis area.

Use of the existing road system, particularly closed roads, would increase road-related disturbance through increased traffic volumes. Clearing of vegetation from existing closed roads would make these routes more accessible to non-permitted ATV use following implementation, potentially increasing disturbance on elk. Temporary and new system road construction would also affect elk and elk habitat. These roads occur where there are currently no existing travel routes; consequently, elk would likely move away from these areas during construction and use of roads. After harvest, these roads would not constitute a barrier to the movement of elk. Temporary roads would be obliterated after use. New system roads would be closed using gates or barricades after implementation is complete.

Pileated Woodpecker

No Action

In the short term (0 to 3 years), suitable pileated woodpecker habitat would maintain its current quality and extent in the analysis area. In the mid and long term (3 to 20 and >20 years), the structure and composition of pileated woodpecker habitat would change. In this time frame, multi-strata conditions in suitable pileated woodpecker habitat would continue to develop. Stand densities would increase, and locally high concentrations of insects and disease would provide foraging and nesting habitat by creating snags. Young stands in an unsuitable condition for pileated woodpecker foraging or nesting would also develop multi-strata characteristics in the mid and long term, increasing the amount of suitable habitat in the analysis area and improving its distribution. Higher stand densities and increased standing and down fuel loads would increase the risk of wildfire in these stands. Wildfire would change the composition and structure of suitable pileated woodpecker habitat for as long as 80-100 years as stands reseeded themselves and grew into a structural stage and size class where snags are large enough to provide potential nesting and foraging sites for pileated woodpecker.

Effects Common to All Action Alternatives

Commercial thinning and regeneration harvest would reduce overstory canopy densities in suitable foraging habitat under all of the action alternatives. The effects expected under all of the action alternatives essentially would be the same. The difference between individual alternatives (in terms of magnitude of effects) would be proportional to the number of acres subjected to the various treatment activities under each alternative. Suitable pileated woodpecker foraging habitat (treated and untreated stands) would continue to be well distributed through the moist and cold upland forest habitat types following project activities. Reductions in suitable nesting habitat would range from 8.1 to 9.6 percent, depending on which alternative is implemented. In the mid and long term, canopy density would increase in treated stands.

Non-commercial thinning would not affect overstory structure or composition and down wood densities would meet or exceed Forest Plan standards. Snag and down wood densities would be reduced on portions of non-commercial thinning acres that are also treated for fuels. Although foraging habitat quality may be reduced on a portion of the non-commercial thinning acres, treated pileated woodpecker habitat would be classified as suitable foraging and nesting habitat after project activities.

Broadcast burning in suitable pileated woodpecker habitat has the potential to affect snags and down wood retained during harvest. Green tree replacements and retained snags would be clumped within treatment units. Retention of snag and green replacement trees at densities greater than the current Forest Plan guideline (as proposed for this project) would ensure that standards are met following burning. Piling and burning of activity-created slash also could reduce the abundance of the primary prey (ants). It is not expected that burning would negatively affect prey availability for this species.

Hazard tree felling along haul routes and temporary and new system road construction could minimally affect habitat for the pileated woodpecker.

Pine Marten

No Action

In the short term (0 to 3 years), there would be no change in the quality or distribution of pine marten habitat in the analysis area. In the mid (3 to 20 years) and long term (> 20 years), the quality and distribution of pine marten habitat would change as old forest and young forest stands continue to develop multiple canopy layers and increased canopy density. Tree mortality resulting from insects and disease in stressed stands would increase snag and down wood densities, improving the condition of foraging habitat for the pine marten. Reproductive habitat also would increase. The distribution of suitable reproductive habitat also would improve in the mid and long term, providing for connectivity between foraging and reproductive habitats. However, higher fuel loading would increase the risk of high severity wildfire that would cause heavy overstory mortality and consume down wood used for denning and foraging. It would take upwards of 80-100 years for mixed conifer stands to develop a composition and structure that would provide suitable pine marten foraging and reproductive habitat after such an event.

Effects Common to All Action Alternatives

In general, the direct and indirect effects expected under all of the action alternatives would be the same. The difference between individual alternatives (in terms of magnitude of effects) would be proportional to the number of acres subjected to the various treatment activities under each alternative.

No project activity units are proposed in pine marten denning habitat. Forest Plan standards for snags and down wood would be met or exceeded in all treatment units following silvicultural treatment and burning activities. With the adjusted snag and green tree replacement standards proposed for the Farley project (which exceed current Forest Plan standards – Tables 3.6.1 and 3.6.4), snag and down wood densities remaining in commercial thinning units would provide suitable habitat for marten. Non-commercial thinning would not affect the suitability of marten foraging habitat. In time, overstory structure would develop in regeneration harvest units; the presence of down and standing dead wood would make these areas suitable foraging habitat in the long term. It is expected that the effects of broadcast burning would be relatively minor, and that snags created during burning would compensate for snags and down wood lost. Temporary and new system road construction would not adversely affect this species or its habitat.

Primary Cavity Excavators

Primary cavity excavators (PCEs) with the potential to occur on the Umatilla National Forest are listed below along with their preferred habitat type; all 16 of them have the potential to occur in the analysis area.

Common Name	Habitat Community	Nest Tree Size[1]
Lewis' woodpecker	Ponderosa pine, riparian cottonwood, oak woodland and burned stands.	13 - 43 inch (") diameter at breast height (dbh)
Red-naped sapsucker	Riparian cottonwood, aspen, conifer forest. Mid – high elevations.	11" dbh Average
Williamson's sapsucker	Mid – high elevation, mature or old conifer forests (ponderosa pine, fir, lodgepole pine, etc. with large dead trees present.	27" dbh. Average
Downy woodpecker	Riparian cottonwood, willow, aspen, mixed-deciduous, and mixed-conifer.	8" dbh Minimum.
Hairy woodpecker	Mixed-conifer, ponderosa pine, and adjacent deciduous, stands.	17" dbh Average
White-headed woodpecker	Open ponderosa pine or mixed conifer, dominated by ponderosa pine.	26" dbh Average
Three-toed woodpecker	Coniferous, mixed conifer-deciduous forests. Prefer burned tracts and montane spruce or aspen.	12" dbh Minimum
Black-backed woodpecker	Coniferous forests especially burn over stands.	12" dbh Minimum
Northern flicker	All forest types with older open forest and edges adjacent to open country.	22" dbh Average
Pileated woodpecker	Mature coniferous, deciduous, and mixed forests.	20" dbh Minimum
Black-capped chickadee	Mixed woodland, deciduous and coniferous forests.	4" dbh Minimum
Mountain chickadee	Open canopy, ponderosa pine, lodgepole pine, and other conifer forests.	4" dbh Min.
Chestnut-backed chickadee	Prefers low elevation, mesic coniferous forest of pine.	4" dbh Minimum
Red-breasted nuthatch	Coniferous forests with mid to late seral stages..	12" dbh Minimum
White-breasted nuthatch	Mature ponderosa pine and mixed-conifer forests. Oak woodlands	12" dbh Minimum
Pygmy nuthatch	Mature to old ponderosa pine or mixed conifer with ponderosa pine dominant.	12" dbh Minimum

[1] Marshall and others, 2003; Thomas 1979

No Action

In the short term (0 to 3 years), there would be no change in existing PCE habitat in the Farley analysis area. Over time, the structure and composition of forested stands would change. Regenerating and young stands would develop overstory vegetation and trees large enough to be used by some cavity excavators in the mid (3-20 years) and long term (> 20 years). In the absence of fire, dry forest stands would continue to be invaded by fire-intolerant tree species. Historic dry forest stand structure and tree species composition would occur on progressively fewer acres within the Desolation Creek watershed over time. Already dense habitats (typically moist and cold upland forest) would become denser. Insects and disease would affect stressed stands, providing foraging and nesting habitat for a number of PCE species, including the pileated, hairy, and northern three-toed woodpeckers. Fuel loading also would increase in the mid and long term, increasing the risk of large and intense wildfire similar to the Summit, Tower, and Sharps Ridge Fires. PCE species like the black-backed, northern three-toed, hairy, and Lewis' woodpecker initially would be attracted to these fire areas, but after approximately 10 to 15 years few PCE species would use these areas due to reduced insects (for forage) in burned stands. It could require 100 years or more to reestablish an overstory structure and composition and produce snags that would be used by the pileated woodpecker, Williamson's sapsucker, and white-headed woodpecker following a stand-replacing wildfire.

Effects Common to All Action Alternatives

In general, the direct and indirect the effects expected under all of the action alternatives would be the same. The difference between individual alternatives (in terms of magnitude of effects) would be proportional to the number of acres subjected to the various treatment activities under each alternative. Habitat for the red-naped sapsucker, downy woodpecker, pygmy nuthatch, black-capped chickadee, white-headed woodpecker, and Lewis' woodpecker is not present within treatment units. Given the mosaic of habitats available to PCEs in the Farley analysis, including habitat within treated stands, there would be no measurable effect on PCE populations under any of the proposed action alternatives.

Endangered, Proposed, Threatened, Candidate, and Sensitive Wildlife Species and Habitat - BIOLOGICAL EVALUATION

Potential effects of proposed activities on endangered, proposed, threatened, candidate, and sensitive wildlife species and habitat are summarized below.

Species	Status	Determination			
		Alt.1	Alt. 2	Alt. 4	Alt. 5
Bald eagle *Haliaeetus leucocephalus*	Sensitive	NI	NI	NI	NI
Upland sandpiper *Bartramia longicauda*	Sensitive	NI	NI	NI	NI
Gray wolf *Canis lupus*	Endangered	NE	NE	NE	NE
California wolverine *Gulo gulo*	Sensitive	MIIH	MIIH	MIIH	MIIH

Species	Status	Determination			
		Alt.1	Alt. 2	Alt. 4	Alt. 5
Canada lynx *Lynx canadensis*	Threatened	NE	NE	NE	NE
Columbia spotted frog *Rana luteiventris*	Sensitive	NI	NI	NI	NI
Inland tailed frog *Ascaphus montanus*	Sensitive	NI	NI	NI	NI
Lewis' woodpecker *Melanerpes lewis*	Sensitive	NI	NI	NI	NI
White-headed woodpecker *Picoides albolarvatus*	Sensitive	NI	NI	NI	NI

Definitions

NE No effect on a proposed or listed species or critical habitat
NLAA May affect, but not likely to adversely affect a listed species or critical habitat
LAA May affect and likely to adversely affect a listed species or critical habitat
NI No Impact to R6 sensitive species individuals, populations, or their habitat
MIIH 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.
WI Will impact indivuduals or habitat with a consequence that the action will contribute to a trend toawards federal listing or cause a loss of viability to the population or species.

Species of Interest

Northern Goshawk

No Action

Potential goshawk nesting and foraging habitat would remain unchanged in the short term. In the mid and long term, stands would continue to grow and develop multiple dense canopy layers. Young stands would develop large trees and openings created by past harvest would fill in over time. The availability of nesting habitat would increase in the long term due to a greater abundance of large trees and dense multi-layered habitat. However, foraging habitat would be reduced as the area grows denser and more homogeneous, resulting in fewer microhabitats for prey species. The multi-layer condition would increase the susceptibility of stands to high-intensity wildfires and insect or disease outbreaks that could affect goshawk habitat.

Effects Common to All Action Alternatives

In general, the effects expected under all of the action alternatives would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. No silvicultural treatment activities in suitable goshawk nesting habitat are proposed under any of the action alternatives. Silvicultural treatment activities (commercial and non-commercial thinning and regeneration harvest) would occur in potential goshawk foraging habitat under all of the action alternatives (Table 3.6.20).

Commercial thinning in suitable foraging habitat would reduce stand densities and canopy closure. Although canopy density would be reduced, foraging goshawk would continue to use these stands following treatment. Reducing stand densities (by commercial thinning and regeneration harvest) and understory vegetation (by non-commercial thinning) would allow goshawk to maneuver and hunt better in these habitats. Reductions in snags and down wood would reduce potential prey habitat, but is not expected to affect goshawk prey as it would be compensated for by increased accessibility of foraging habitat through thinning. Forest Plan standards for snags and down wood would be met or exceeded. In the mid and long term, canopy closure and understory vegetation layers would increase, and commercially thinned foraging habitat would provide suitable nesting habitat.

Regeneration harvest would create openings within dense forest stands. Goshawk largely would avoid regeneration harvest units but may forage along edges and leave patches. In the long term, regeneration harvested stands would provide suitable foraging habitat for the goshawk.

Non-commercial thinning would reduce understory regeneration of conifers. Non-commercial thinning would not affect the suitability of northern goshawk habitat. Where dense regeneration currently exists, thinning may improve access to goshawk by opening up stands.

Slash burning would not affect potential goshawk nesting or foraging habitat suitability. Potential prey may be reduced as a result of consumption of small diameter down woody material, slash piles, and brush. Burning is not expected to measurably affect prey species for the goshawk because untreated habitats would be available and well distributed throughout the analysis area, affected areas would meet Forest Plan standards for large wood that contribute prey habitat, and pile and broadcast burning would be of low intensity and would burn in a mosaic fashion.

Road maintenance and construction is not expected to affect the goshawk. If a goshawk nest is discovered during layout project or implementation, project activities would be adjusted and seasonal road use restrictions would be applied to meet the guidelines provided in the “Eastside Screens”. An existing nest is located approximately 200 yards from Forest Road 1010-040. Use of the portion of this road that lies in the post-fledging area established for this nest for project activities would not be allowed prior to July 1 to reduce disturbance.

Olive-Sided Flycatcher

No Action

In the short term, the quality of habitat for the olive-sided flycatcher would not change. In the mid and long term, riparian communities would continue to develop along existing successional pathways - canopy closure would increase, stands would develop large trees with multiple canopy layers, and riparian vegetation would continue to recover from past disturbance. High severity wildfire would create edge habitat and create large diameter snags potentially used by the flycatcher as perches.

Effects Common to All Action Alternatives

In general, the effects expected under all of the action alternatives would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each

alternative. Under all of the action alternatives, harvest or thinning activities are not proposed to occur in RHCAs.

Commercial thinning would decrease canopy closure, reduce stand density, and encourage the growth of understory vegetation, all of which are habitat attributes selected for by this species. It is unlikely that commercial thinning would adversely affect this species or suitable habitat. Burning (broadcast and pile burning) would not affect habitat suitability for this species; large overstory trees and snags used for perching and nesting would be minimally affected.

Regeneration harvest would have variable effects on the olive-sided flycatcher. Snag densities for the Farley project would exceed Forest Plan standards in all treatment units and edge habitats would be created by this harvest type. Habitat for this species would be created by these activities due to its preference for stands with low canopy closure and scattered large trees and snags and edge habitats. However, research indicates that nesting success in these human-created habitats is much lower than occurs in unharvested or recently burned stands (Altman in Marshall and others 2003; Robertson and Hutto 2007). These areas may represent an ecological trap where nest success is too low to maintain existing populations, but other breeding habitat would be well distributed following harvest in adjacent mixed conifer stands throughout the analysis area.

Broadcast and pile burning is not expected to adversely affect olive-sided flycatcher habitat in riparian or upland habitats. Underburns (including pile burning) would be of low intensity. High fuel moisture levels would make it unlikely that riparian habitat preferred by this species would be affected. It is expected that a few retained green trees and snags would be killed or consumed by proposed burning but this would create perches for this species.

Great Gray Owl

No Action

In the short term, there would be no change in existing suitable nesting habitat for this species. In the mid and long term, the risk of wildfire would increase in dense stands used by this species for nesting. Large-scale stand replacement wildfire would convert suitable nesting habitat to an unsuitable condition. Great gray owl may utilize openings created around the periphery of a fire, but would be unlikely to utilize interior habitats until these stands regenerate.

Effects Common to All Action Alternatives

In general, the effects expected under all of the action alternatives would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. In owl nesting habitat, commercial thinning is proposed to occur on 60 acres under each alternative, with regeneration harvesting occurring on 281 acres (Alternative 4) to 356 acres (Alternative 1). Snag and down wood densities would be reduced in commercially thinned stands, reducing potential nesting structure for this species. Cover for potential prey would be reduced through treatment of down wood and disturbance of understory vegetation by machinery. However, available prey still is expected to occur in stands following harvest and thinning. Commercially thinned habitats would continue to be classified as suitable nesting habitat after treatment. Reductions in stand density and canopy closure may improve accessibility of these stands to foraging.

Regeneration harvest would convert suitable nesting habitat to an unsuitable condition due to reductions in stand density. These areas would be considered suitable foraging habitat after treatment until regenerating conifers reduced the ability of aerial predators to observe the ground, a period of 10 to 15 years. Noncommercial thinning in stands adjacent to suitable foraging habitat (meadows and open grasslands) and suitable nesting habitat would improve foraging habitat for this species by making prey more visible.

Bats

No Action

Potential roosting habitat would remain unchanged in the project area in the short term. Over time, stands in the project area would continue to grow and develop dense multi-layered canopies, with large diameter snags providing roosting habitat. However, dense multi-layer conditions would increase the susceptibility to high-intensity wildfires and insect or disease outbreaks. Insect and disease outbreaks would create potential roosting habitat. Wildfire also would create snags for roosting, but due to the limited time snags are suitable for roosting (while the bark is exfoliating), a high severity wildfire would create a shortage of roosting habitat for an extended period.

Effects Common to All Action Alternatives

Proposed commercial thinning and regeneration harvest would target both green timber and dead standing trees (snags). Snags also would be felled in treatment units for safety reasons. Hazard tree felling along roads (existing and closed system roads, new system roads, and temporary roads) also would affect snags. Snag reductions are not expected to adversely affect habitat for forest-dwelling bats because Forest Plan standards would be met or exceeded according to the adjusted snag retention guidelines for the Farley project (Table 3.6.1). Untreated areas (particularly riparian habitats) with high snag densities would continue to be well distributed throughout the analysis area, providing excellent roosting habitat for these species.

Neotropical Migratory Birds

No Action

The current condition of habitats for neo-tropical migratory birds in the analysis area would not change in the short term. No change is expected for riparian, shrub, meadow and aspen habitats. Populations of bird species that rely on multiple strata and high canopy closure likely would remain static. Dry forest could continue to fill in with fir due to continued fire suppression, which could further restrict development of old forest habitat. Insect and disease damage would continue. Snags likely would increase in number, benefiting many snag-associated species. The area would remain prone to fire, and there would be few opportunities to restore larch and ponderosa pine where fir has encroached. If small or low intensity fire were to occur, species associated with edge and burned habitats would thrive, and more single story ponderosa pine habitat might result. If a larger stand-replacing event took place, the now-scarce old forest habitats could be lost.

Effects Common to All Action Alternatives

The effects expected under all of the action alternatives generally would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. Proposed thinning and timber harvest in the Farley analysis area seeks to reduce overstocking and fuel loads and promote forest stand health and resiliency. In the short term (0 to 3 years), these stands generally would not provide adequate habitat for many bird species of concern.

A small amount of commercial thinning is proposed in dry forest that would promote development of a large tree, single-layered canopy with an open understory dominated by herbaceous cover, scattered shrub cover, and pine regeneration. This would occur on 6 to 7 percent of the total project acres. No treatments would occur in dry forest stands classified as old forest, and all trees > 21 inches dbh would be left. Bird species that favor open stands of old ponderosa pine have declined as these stands have grown in with more shade-tolerant species. Understory burning and thinning would be beneficial to this group.

Closed canopy forest and multiple layered stands in mesic mixed conifer (moist upland forest) and subalpine (cold upland forest) habitat would be reduced. Thinning and regeneration harvest would reduce the amount of tree canopy and understory layers within treated stands. These additional patchy openings in the landscape would aggravate the existing lack of cover in the short term. Many of these areas are prone to insect and disease. Outbreaks of mountain pine beetle and balsam wooly adelgid are currently causing extensive mortality of lodgepole pine and subalpine fir throughout the west. Thinning and timber harvest treatments to remove diseased trees and replace them with more resilient species would eventually lead to more and better bird habitat.

Noncommercial thinning would have little or no effect on birds of concern, and would eventually lead to larger diameter trees and provide more future habitat for birds associated with late successional stages. Tree planting would provide future habitat with more resilient tree species that better reflect the historical mix of species.

Post-harvest fuels treatments (mastication, underburning, etc) would remove some shrubs, grasses, and seedlings from the understory, temporarily reducing cover and decreasing foraging habitat for some birds. Harvest activities and burning could temporarily disrupt ground nesting birds if activities occur during springtime.

The reduction of crown and ladder fuels would reduce habitat for some birds, but it also would reduce the chances that a large scale fire would eliminate large areas of forest habitat. Because no timber harvest would occur in old forest, and all trees > 21 inches dbh would be left in thinning and timber harvest units, existing patches and elements of old forest would remain. Snags would be left at levels that exceed the Forest Plan.

RECREATION AND VISUAL RESOURCES

Recreation Opportunity Spectrum

No Action

No action would not effect current Recreation Opportunity Spectrum class conditions in throughout the Farley analysis area.

Direct, Indirect and Cumulative Effects Common to All Alternatives

Proposed project activities would only occur in management areas A4 (Viewshed 2) and C7 (Special Fish Management). None of the proposed activities under any of the proposed action alternatives would change the Recreation Opportunity Spectrum class as specified by the Forest Plan.

Camping

No Action

Campers would remain undisturbed by dust, noise, smoke, or traffic. Dispersed campsite use patterns would remain the same.

Effects Common to All Action Alternatives

No activities are proposed near the Tollbridge Campground. However, six thinning and five timber harvest units are proposed within one mile of the Welch Creek Campground.

The silvicultural prescription for the harvest units would remove most of the mature trees, and for the thinning units would remove or thin out the small understory. Terrain would partially or completely block views of all units except thinning unit ***2002***. Since thinning would leave a fully stocked stand, views from the campground should not be affected. The only effect on the camping experience at Welch Creek would be noise and dust during thinning and harvest operations, which would be of short duration (one season).

However, Welch Creek Campground is located beside FS Road 10, which would be a primary haul route for the duration of the Farley project (3 to 5 seasons). Noise and dust could reduce the recreation experience for some campers. Appropriate and timely dust abatement measures could reduce some of these effects. Most use of Welch Creek Campground occurs during the fall hunting seasons, with summer use primarily by OHV riders.

Dispersed camping would be minimally affected by the proposed activities under all of the action alternatives. Fourteen dispersed campsites would be affected during project activities by noise and dust. These sites would experience a more open stand of trees for a decade or two. This is particularly true for harvest units ***crw, cma, bgc,*** and ***ac*** which would have little remaining overstory after harvest. Some campers could avoid the five sites near these harvest units for an extended period until sufficient shade and vegetation make them more appealing. However, hunters likely would continue to use them because most available sites are occupied in the fall. Some campers could be displaced, but the effects would be limited to a small number of sites at a given time and would end with completion of activities in the adjacent unit (generally 1-2 weeks). Harvest would improve camper safety by removing weakened or dead trees that could fall and cause injury.

Forest Roads 10, 1010, and 45 are the most popular areas for dispersed camping. Forest Roads 10, 1010 and 5505 would be major haul routes for timber harvest. Dispersed campsites along these roads would experience increased traffic, dust, and noise. As with Welch Creek Campground, most use of these sites occurs during the fall hunting seasons. Since hunters tend to be away from camp during the day, impacts to campers would be minimal.

Dispersed campsites could also be affected by smoke from prescribed burning. Generally this would occur at the beginning (late spring/early summer) and end (late autumn) of the camping season when conditions allow for adequate control of fire. Late fall campers (primarily hunters) likely would be the most affected. Dense smoke could cause campers to relocate to another area, but the duration of this effect would be short (1-2 weeks).

Trails and Dispersed Recreation

No Action

No trails would be affected under this alternative. Dispersed recreation would also remain unchanged.

Effects Common to All Action Alternatives

There would be no effects on the following trails from this project: Blue Mountain, Jump-off Joe Lake, Sharps Ridge, South Fork Desolation, Squaw Rock, Cold Spring, Glade Creek, and Basin. The two administrative sites would remain unaffected. Also, there should be no effects on fishing, huckleberry picking, firewood gathering, rock collecting, or gold panning. Hunters could be temporarily displaced by harvest activities or burning. Mushroom picking could improve where prescribed burning takes place.

Snowplowing of portions of Forest Road 10 to support project activities could affect or eliminate snowmobiling opportunities along 10 miles of groomed trail for the duration of the project. Five trails designed for OHV use would be affected by roads proposed for use as haul routes for this project (Table 3.7.4). The portions of trail overlapping haul routes would be closed during active hauling for safety reasons (Table 3.7.5). Trail beds would be restored (ruts removed, placement of drainage structures, disguise of adjacent skid trails) when project activities are complete.

Harvest units would straddle or be directly adjacent to four trails (Table 3.7.6). Most of the stands in these units are heavily infested by insects/disease, and would be treated so that few trees would remain. Views along these segments of trail would be more open and evidence of harvest would be prominent. Trail users would be temporarily displaced when trails are closed during harvest (approximately for 1-2 weeks until harvest is completed). Units ***cav, ab,*** and ***bhc*** straddle trails and could result in skid trails crossing or running adjacent to the trail bed. These skid trails would be disguised with debris or seeded upon completion of project activities so they do not confuse trail users or result in multiple trails. Any damage that occurs to the trail bed would be repaired prior to completion of project activities as described in the project design criteria. Most of the harvest units would be burned to prepare for tree planting. Trails would be closed during active burning, and smoke could cause discomfort for trail users for 1 to 2 weeks. Proposed activities would improve trail user safety in many places by removing dead and infected trees, which could otherwise fall in the trails.

Non-commercial thinning also would straddle or occur adjacent to the Beeman Junkens, Howard Creek, Bull Prairie, Battle Creek, Lost Lake, Welch Creek, and Cougar trails. Non-commercial thinning would open up the understory and improve sight distance on these trails. Also, the resulting increased tree growth would provide future shade to trail users and improve overall stand health that would reduce potential trail hazards. Trails would be closed during active

burning of debris produced by thinning activities, and smoke could cause discomfort for trail users for 1 to 2 weeks. Mechanical thinning could create areas of soil disturbance across or adjacent to trails that would be rehabilitated by scattering debris or seeding.

Effects Unique to Alternative 1

One of the proposed road construction segments (accessing harvest units ***bia, bka,*** and ***bla***) would create a new connection between the Howard Creek and Bull Prairie trails. Although these two trails already connect via Forest Road 1010, this new road would be closed to full-sized vehicles, thus separating them from OHVs and improving safety.

Visual Resources

No Action

There would be no change to visual resources within the analysis area.

Effects Common to All Alternatives

No thinning and harvest activities are proposed in the A4 management area that include the entire foreground, However, harvest activities would occur in the middleground and background as viewed from the road and river corridor, and would meet Forest Plan standards for visual resources. Most proposed harvest would occur north of Forest Road 10. The terrain along that side of the road is steep and densely vegetated, and it is unlikely that thinning and harvest activities would be visible from the road. Where thinning and harvest could be visible on the south side of the road, there already is evidence of past harvest; additional activities would not be expected to further reduce visual quality. In addition, thinning and harvest units would be irregular in shape to blend with other natural features in the middleground and background. The history of fires in the analysis area has created a patchy mosaic of different tree sizes and densities, and would further mask the proposed activities.

New road construction within the A4 management area has the potential to reduce visual quality. However, because of the steep terrain, location of proposed activities, and existing vegetation, the scenic integrity along this corridor would remain intact.

Approximately 4.7 miles of existing closed road would be obliterated in undeveloped areas under each alternative. Associated soil disturbance would detract from the natural color and texture of the surrounding areas. These effects would last 3-5 years until vegetation once again covers the soil, however, these effects would be limited by short sight distances caused by steep terrain and heavy vegetation. In the longer term, road obliteration would restore original natural lines and texture.

Candidate Wild and Scenic Rivers

No Action

The candidate rivers would not be affected.

Effects Common to All Alternatives

All harvest units were located a minimum of 0.25 miles away from the candidate rivers. Some non-commercial thinning units come within 0.25 miles of the candidate rivers, however, a fully

stocked stand would be left, so there would not be an effect on the Outstandingly Remarkable Values of ecological diversity, wildlife, or recreation. Road obliteration is the only activity that would occur in Desolation Meadow. Removal of the roadbed should help restore the water table and benefit botanical values. Fisheries and wildlife populations would remain unchanged at the river corridor scale. Water quality also would remain unaffected. As a result, there would be no change in the eligibility of these three streams for Wild and Scenic River status.

Inventoried Roadless and Undeveloped Areas

No Action

Inventoried Roadless Areas: The character of the Jump-off Joe and Greenhorn Inventoried Roadless Areas (IRAs) would not be affected. Ongoing activities such as grazing, fire protection, monitoring, and recreation would continue.

Areas with undeveloped characteristics**:** There would be no direct effect on the natural integrity or the appearance of naturalness in areas that exhibit undeveloped characteristics. Changes would only occur through natural processes. Current biological and physical processes and ecosystem functions likely would continue at present magnitudes and rates. The long-term natural integrity of the undeveloped areas could be altered as an indirect effect of continued fire suppression or large-scale wildfire. There would be no direct or indirect effects on the current opportunities for solitude and remoteness in either the short or long term.

Effects Common to All Alternatives

Inventoried Roadless Areas: No activities are proposed to occur in these areas under any alternative. Therefore, the character of the Jump-off Joe and Greenhorn Inventoried Roadless areas would remain unchanged. Prescribed burning could creep into the roadless area. However fire is a natural component of roadless areas and would not affect their character. These IRAs would retain the characteristics that make them suitable for wilderness designation.

Areas with Undeveloped Characteristics**:** Obliteration of approximately 4.7 miles of existing closed roads within or adjacent to undeveloped areas would occur under all alternatives (Table 3.7.7). This would create soil disturbance that would remain visible for 3-5 years until vegetation reclaims the disturbed area. While this would initially reduce the apparent naturalness of these areas, restoration of these roads to the original landform would increase natural integrity and restore a sense of remoteness and solitude in the long term.

Effects Common to Alternatives 1, 2 and 5

Areas with Undeveloped Characteristics: Thinning and harvest activities proposed under these alternatives would reduce the appearance of naturalness, solitude and remoteness by creating tree stumps, debris, and soil disturbance (<5% of the area of the treatment unit). However, areas of disturbed soil would be rehabilitated so these effects would be transient. Skid trails would remain evident for 5-8 years. Tree stumps could take decades to decay to the point of not being identifiable to an untrained eye.

Non-commercial thinning would cause short-term loss of undeveloped character. Eleven non-commercial thinning units are proposed in undeveloped areas under these alternatives (Units ***0124, 0232b, 0649, 0714, 2058, 2074a, 2074b, 2074c, 2077, 2109b, and 2109c***). All of these units are located on the edges of the undeveloped areas except for ***0649*** and ***0714***. Both manual

and machine thinning would leave stumps that would detract from the undeveloped character of these areas. However, the thinned trees would be of small diameter and the stumps would be expected to decay relatively quickly (5-15 years). In addition, machine thinning would create localized areas of soil disturbance that would detract from the undeveloped character, but required erosion control and revegetation measures would rehabilitate these areas in 1-3 years.

Fuel treatments, either mechanical or with prescribed fire, would occur within harvest and thinning units. Where mechanical treatments occur, results would be similar to those identified for thinning, although debris would be less evident. Prescribed fire would help restore apparent naturalness by burning debris and stumps so they blend more with surroundings. Vegetation would be reduced in a mosaic pattern across the burned area, and would recover in 1-3 years; the mosaic pattern also would create a more natural appearance.

Effects Common to Alternatives 2 and 5

Alternatives 2 and 5 would construct approximately 2.3 and 4.3 miles, respectively, of new system and/or temporary road (Table 3.7.7) in the large undeveloped area north of Forest Road 10. This area is approximately 3,100 acres in size, although existing motorized trails traverse the north and west sides, effectively reducing it by about 330 acres. Alternatives 2 and 5 would still leave a connective corridor between the North Fork John Day Wilderness and the Jump-off Joe and Greenhorn IRAs.

Effects Unique to Alternative 1

Alternative 1 would construct 13 new road segments within the large undeveloped area north of Forest Road 10. In particular, road segment 12 would effectively eliminate the undeveloped character of this area by intruding into its core, counteracting any gain achieved by the proposed obliteration of existing closed roads. Eleven harvest units (***bia***, ***bka***, ***bla***, ***bra***, ***bnb***, ***bwa***, ***bma***, ***bna***, ***ae***, ***af***, and ***ag***) are proposed within this area. These units total 325 acres and would reduce the apparent naturalness, remoteness, and solitude throughout most of this area for up to 20 years.

Effects Unique to Alternative 4

Only road obliteration activities would occur in undeveloped areas under this alternative.

MINING, ENERGY, AND SPECIAL USES

No Action

There would be no effects to current mining claims or activities, minerals deposits, abandoned mines, and/or special uses from the activities proposed to be conducted under any of the alternatives. Large-scale wildfire could damage historic monument markers for mining claims and other resources associated with special uses.

Effects Common to All Alternatives

Proposed project activities may have a localized and short-term effect on access to existing mining claims in and near the Farley project area. Obliteration of road 420 should not have any effect as no Plan of Operation has been submitted by the operator of a potentially-affected claim for the use of this road. As of January 25, 2008, there are no mining known mining Plans of Operation that would affect or be affected by proposed Farley project activities.

One abandoned mine site is near (just south) of project units ***bcb*** and ***bca***. It is accessed by Forest Road 1010 170. No hazards are identified at this time.

One abandoned mill-site with an unsafe, fallen-down cabin and a shaft (measuring approximately 4 x 4 x 15 feet) full of murky water is located within the project analysis area but outside of proposed project activity units. This shaft is scheduled for temporary closure in the summer of 2008 and would not affect or be a hazard to proposed project activities.

Activities that would be conducted under proposed action alternatives would have no substantial effect on access to mineral materials (such as gravel and rock). Project unit *crw* which is off of the 1010 170 Road and could limit access to a rock pit located in the SW ¼ of Section 13, T08S, R33E. Currently there are no commercial mineral material permit holders.

Proposed project activities may have minor localized and short-term effects on access related to special uses in and near the Farley project area. These activities would not be expected to prevent any foreseeable future opportunities.

RANGE

No Action

Livestock grazing distribution on the uplands would stay the same or continue to decrease as stocking in timber stands grows denser and wood continues to accumulate on the ground. Livestock access would stay the same or decrease due to down wood and continuous small regeneration. Forage also would stay the same or continue to decrease due to the reduction of sunlight on the forest floor reducing forest floor vegetation.

Effects Common to All Action Alternatives

Managing forests with harvest or prescribed fire would have long term benefits to livestock grazing management within the analysis area by increasing transitory range. Transitory range is defined in the Forest Plan as "…land that is suitable for grazing use of a nonenduring nature over a period of time, often found in the openings created by timber harvesting activities". For example, grass may cover the disturbed areas for a period of time before being replaced by trees or shrubs not suitable for forage.

Proposed thinning and timber harvest activities under all alternatives would increase the amount of transitory range in the Indian Creek and Central Desolation Allotments by approximately 7,037 to 7,735 acres, depending on alternative (Table 3.9.2). By increasing the amount of transitory range, it would be expected that livestock distribution would be spread more evenly throughout the pastures and reduce soil and vegetation disturbance in areas of concentrated use (such as water sources and riparian areas). The action alternatives would have the greatest increases in transitory range in the Battle Unit of the Indian Creek Allotment, and the Turner Unit of the Central Desolation Allotment. However, the increase in transitory range likely to result from the Farley project is relatively small compared to the total acres of the Central Desolation and Indian Creek Allotments, and likely would not result in substantial changes to livestock distribution in these allotments.

The burning associated with proposed project activities could reduce the amount of forage for a period of 1 to 2 years. After this time, the amount and quality of forage would be expected to be higher than the existing condition due to the reduction in competition from small trees and/or

shrubs and increase in grass species in forested plant communities. Burning also generally increases access to forage and livestock distribution within pastures.

SOCIOECONOMICS

Economic Effects of All Alternatives

Benefit-cost ratios and net present values (NPVs) associated with commercial timber harvest by alternative (in 2008 dollars) are shown below.

Economic Measure	Alt. 1	Alt. 2	Alt. 4	Alt. 5
Benefit Cost Ratio	0.86	0.99	0.94	0.91
Net Present Value ($)	-638,822	-25,072	-252,711	-286,303

Source: USDA Forest Service, Quicksilver (economic model)

Proposed non-commercial thinning (NCT) is the same for Alternatives 1, 2 and 5 at 4,886 acres, and for Alternative 4 is 4,652 acres. One-fourth of these total acres are assumed to be thinned in each year during the four year planning horizon. Total cost of NCT is estimated to be $175 per acre. The NPV of proposed NCT costs by alternative are as follows.

	Alt. 1	Alt. 2	Alt. 4	Alt. 5
NPV	-830,701	-830,701	-790,917	-830,701

Source: USDA Forest Service, Quicksilver

Comprehensive NPVs of all commercial timber harvest and non-commercial thinning activities are summed by alternative below.

	Alt. 1	Alt. 2	Alt. 4	Alt. 5
NPV	-1,469,523	-855,773	-1,043,628	-1,117,004

Source: USDA Forest Service, Quicksilver

Employment effects directly attributable to commercial timber harvest by alternative are:

Resource	No Action	Alt. 1	Alt. 2	Alt. 4	Alt. 5
Timber	0	107	92	96	79

Source: USDA Forest Service, FEAST

Although the primary activities associated with the project are in the Agriculture and Manufacturing sectors they also stimulate employment and other economic activity as estimated below:

Resource	No Action	Alt. 1	Alt. 2	Alt. 4	Alt. 5
Timber	0	5,798,259	4,995,849	5,223,394	4,268,798

Source: USDA Forest Service, FEAST

Environmental Justice

As stated in Executive Order 12898 and CEQ (1997), it is required that all federal actions consider the potential of disproportionate effects on minority and low-income populations in the local region. None of the counties in the Farley analysis area have minority populations that meet the Environmental Justice criterion. Nevertheless, the proposed activities were evaluated to determine if they adversely affect minority and low-income populations. The proposed

alternatives do not differ substantially from one another. There is no reason to suspect that project activities would disproportionately affect minority and low income populations in an adverse manner. Instead, the proposed actions associated with each of the alternatives may provide additional employment and income to the region that would be expected to benefit minority and low-income populations.

Summary

All action alternatives display negative NPVs. Alternative 2 most closely approaches neutral NPV with a value of - $25,072 and benefit-cost ratio of 0.99, while Alternative 1 has NPV and benefit-cost ratios of -$683,833 and 0.86, respectively. Alternatives 4 and 5 are approximately intermediate between these ranges. However, this does not necessarily imply economic inefficiency. In determining economic efficiency, all costs, benefits and desired outcomes associated with the proposed activities should be taken into account. These include those that may not be directly or immediately monetized such as future forest stand characteristics that are more consistent with historic conditions, and long-term sustainability and resilience to large-scale wildfire. Direct and indirect environmental and social effects and values associated with the forest resource management activities proposed by the Farley project should be considered along with the direct financial measures.

CULTURAL RESOURCES

No Action

There would be no effect on cultural resources of no action. The biological, physical, and human-influenced conditions and processes that are occurring now would be expected to continue and present magnitudes and rates.

Effects Common to All Alternatives

In all action alternatives (1, 2, 4, and 5), all eligible and unevaluated sites would be avoided by all project activities. Those sites determined not to be eligible for listing on NRHP require no additional protection, however, they also would be avoided whenever possible.

Cultural resource consultation would be completed with the Oregon State Historic Preservation Office. Tribal consultation is ongoing and would also be conducted prior to any project activities. All project activities would be conducted in accordance with applicable laws and policies.

INCOMPLETE OR UNAVAILABLE INFORMATION

Climate Change

No Action

Under the No Action Alternative, forest ecological processes with respect to climate change would continue at present magnitudes and rates in the Farley analysis area. Susceptibility to drought stress, insect and disease infestations, changes in stand structure conditions, large-scale fire and loss of economic and other forest resources values that may occur as a result of climate change also would continue.

Direct, Indirect and Cumulative Effects of all Alternatives

Potential emissions from this project (from prescribed burning, decomposition of vegetative matter, and combustion of fossil fuels) would add to the global pool of "greenhouse" gases. The magnitude of these emissions would be extremely small and unmeasurable in a global context, and could be expected to be of substantially less magnitude than large-scale wildfire and/or other climate-influenced disturbances.

Models used by the Forest Service such as the First Order Fire Effects Model (FOFEM) can estimate emissions from prescribed burning of particulate matter (2.5 and 10 micron diameter), methane, carbon dioxide and monoxide, and nitric and sulfur oxides. However, at present there are no scientifically accepted means to quantitatively assess the effects of forest management activities and disturbances such as fire, insects, and disease on global carbon cycle dynamics at the individual or multiple event or project scale. Therefore, evaluation of global climate change effects in NEPA documents at the event or project scale would be highly speculative and unlikely to provide meaningful information for the decision process. Evaluation of global climate change effects at the project or event scale may be appropriate in the future when scientific capabilities and uncertainties are better resolved; in general, the Forest Service supports this concept.

Toxics

Effects of No Action and All Alternatives

Air quality effects and compliance with Clean Air Act and ODEQ regulations and standards were evaluated and incorporated in the decision process, as discussed above in Section 3.2 Fire and Fuels. Emissions of regulated substances (particulate matter, 2.5 and 10 micron diameter) from prescribed burning were estimated using the First Order Fire Effects Model (FOFEM 5.5) and discussed in Section 3.2 Fire and Fuels. The only other emissions constituents that FOFEM 5.5 can estimate are methane, carbon dioxide and monoxide, and nitric and sulfur oxides. Estimates of toxic compounds (of regulatory concern or interest) generated by the burning of wood or other vegetative material or by decomposition processes were not made because:

- specific compounds of concern were not identified during the scoping process;
- they likely are not significant issues of the proposed project with respect to NEPA;
- the information is unavailable, incomplete and not easily or economically obtainable; and
- the information likely would be very speculative in nature and unlikely to be useful in the decision process.

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CHAPTER 1 - PURPOSE AND NEED FOR ACTION and DECISION FRAMEWORK

INTRODUCTION

The Forest Service prepared this Draft Environmental Impact Statement (DEIS) for deciding the forest and other natural resource management activities that could be implemented in the proposed Farley Vegetation Management Project as required by the National Environmental Policy Act (NEPA). The goals of the proposed project are to conduct timber harvest, commercial and non-commercial thinning, fuels treatment, prescribed burning, and reforestation on Umatilla National Forest lands in the Desolation Creek watershed in the Blue Mountains of northeastern Oregon to:

- capture present economic value of raw forest materials for the benefit of local and regional economies
- reduce forest fuel loads and to promote long-term forest stand structure and tree stocking densities that are more consistent with historic conditions
- promote forest resilience to large-scale wildfire, disease and insect infestations and the long-term sustainability of forest and associated resources (such as fish, wildlife, scenic values, and recreation), as well as economic and social values.

In the (Forest Service) Organic Administration Act of June 4, 1897, Congress identified two purposes for the national forests – to secure "favorable conditions of water flows, and to furnish a continuous supply of timber." The Multiple-Use Sustained Yield Act of 1960 states that it "is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." The National Forest Management Act of 1976 further required that plans developed for units of the National Forest System "provide for multiple use and sustained yield of the products and services obtained therefrom… and [must] include coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness." Congress has consistently acknowledged that the Forest Service must balance competing demands in managing National Forest System lands, and never intended that "the national forests were . . . to be 'set aside for non-use."' [United States v. New Mexico, 438 U.S. 696, 716 n.23 (1978) (citing 30 Cong. Rec. 966 (1897) (statement of Rep. McRae)].

In this context of multiple and sustained use, an interdisciplinary team (IDT) of professional Forest Service resource specialists evaluated the forest and associated resources throughout the Desolation Creek watershed (hereafter referred to as the Farley analysis area) and the potential benefits that could be derived from them, and the most prudent means to sustain those benefits for the long term. The forest resource management activities proposed in this DEIS seek to best balance short-term risks with long-term economic, environmental, and social benefits, and the long-term sustainability of those benefits.

Initially, an action was envisioned that sought to capture economic value of raw forest materials from a large portion of the National Forest lands in the Desolation Creek watershed and at the

same time begin the long-term process of restoring forest conditions more consistent with those that existed historically, and to improve long-term resilience to large-scale wildfire and other disturbances by mechanical harvest and non-harvest thinning, prescribed fire, fuels treatment, and reforestation. Forest management activities at this scale could have involved approximately 18,000 acres (of the approximately 56,300 acres of National Forest land in the watershed), required construction of almost 60 miles of new system and temporary road and reconstruction and maintenance of an equivalent amount of existing road, would have required several Forest Plan amendments, and likely would have resulted in substantial and unacceptable environmental consequences.

As a result of preliminary analysis by the IDT and Responsible Official, and comments received during the public scoping process, the action as initially proposed was rejected. Instead, a range of action alternatives was developed and evaluated that focus on those areas (covering approximately 7,037 to 7,735 acres, depending on alternative) that are the most suitable for and would benefit the most from the resource management goals presented above.

Forest management activities for this project are proposed to primarily occur in C7 Special Fish Management and A4 Viewshed 2 management areas designated by the Forest Plan. Desired future conditions and management direction specified by the Forest Plan are summarized in Appendix A of this DEIS. The proposed forest management activities would be expected to occur over 3 to 10 years beginning as soon as late 2009.

DOCUMENT ORGANIZATION

This DEIS assesses a No Action alternative and four action alternatives. It discusses how and why these alternatives were developed. It identifies the affected environment and discloses the direct, indirect, and cumulative environmental consequences and resource management issues that likely would result from implementation of these proposed action alternatives. Also, it addresses the decision process for selecting the preferred action, which involved thorough technical analysis of the short-term environmental risks and long-term benefits to forest resources with respect to the long-term risk of allowing present conditions and trends to continue including the associated risk of large-scale wildfire.

This DEIS has been prepared in compliance with the National Environmental Policy Act (NEPA), National Forest Management Act (NFMA), and other relevant Federal and State laws, policies, programs, and regulations, and the Umatilla National Forest Land and Resource Management Plan (U.S. Dept. of Agriculture, Forest Service, 1990a, as amended - referred to hereafter as the Forest Plan). The format for this DEIS follows the Council on Environmental Quality (CEQ) recommended format (40 CFR 1502.10). Chapters contain the following information:

Chapter 1– Purpose and Need: Includes a brief description of the project analysis area, purpose and need for action, the agency's proposal for achieving the purpose and need, and a listing of what decisions are to be made.

Chapter 2 – **Alternatives**: Includes descriptions of key issues relevant to the proposed action that were identified by the Interdisciplinary Team (IDT) and with input from interested parties and the public. It describes in more detail the proposed action alternatives for achieving the

project purpose and need, the means used to evaluate potential environmental effects, and actions likely to be necessary to mitigate those effects.

Chapter 3 - Affected Environment and Environmental Consequences: Describes the affected environment and the environmental consequences likely to be associated with the no action and proposed action alternatives. This chapter is organized by resource.

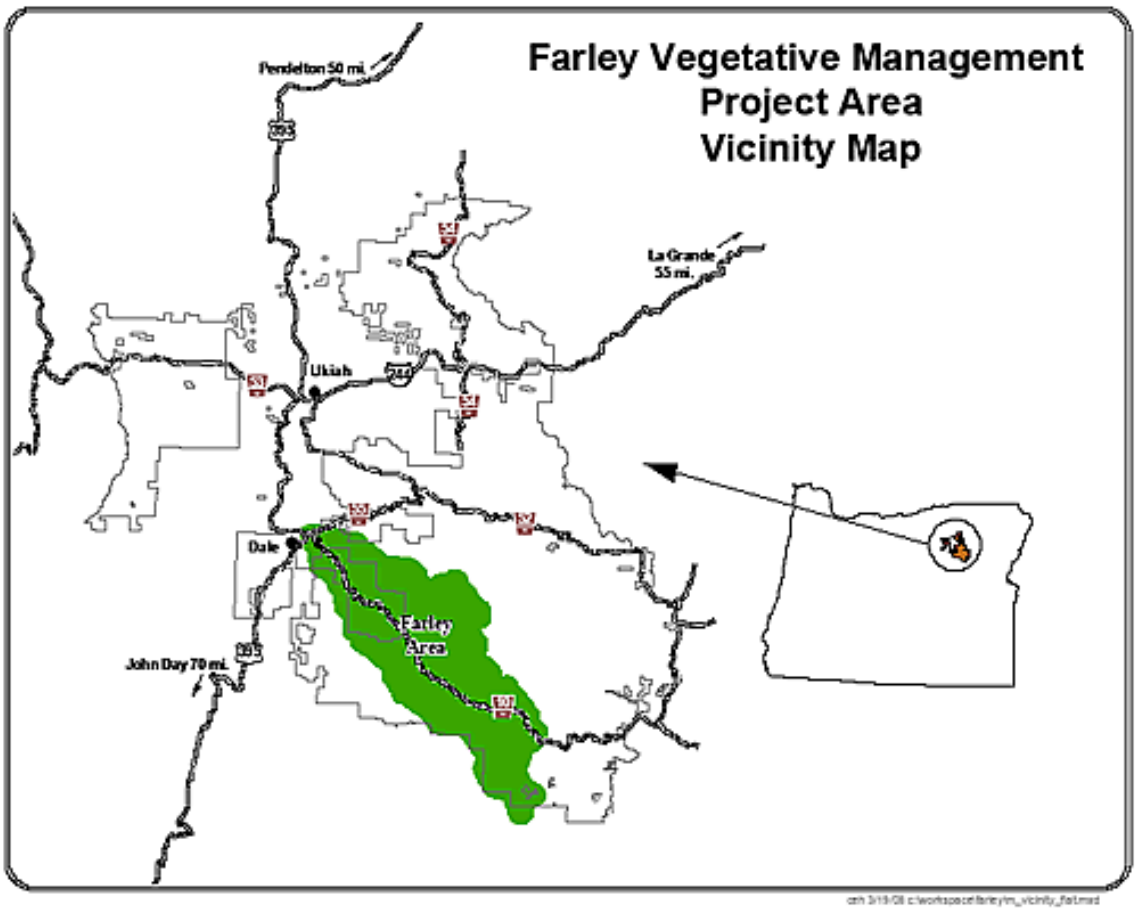
Chapter 4 – List of Preparers, Literature Cited, and Agency, Public and Tribal Involvement: Contains a list of those involved with preparing this document, literature cited in the document, and summarizes public involvement in developing alternatives, and identifies individuals, organizations, and agencies receiving this document.

Appendices: Provide additional or more detailed information and maps used to support the analyses and decision presented in the DEIS.

LOCATION AND DESCRIPTION OF PROJECT ANALYSIS AREA

The Farley Vegetation Management Project area is located in the Desolation Creek watershed in the North Fork John Day Ranger District in Grant County, Oregon (Figure 1.1). Desolation Creek is a tributary to the North Fork John Day River. Its watershed covers a total of 69,674 acres; 56,226 acres is National Forest System land and 13,448 acres is private land. The Farley project analysis area includes the National Forest System lands in the Desolation Creek watershed.

Figure 1.1. Farley vegetative management project area vicinity map.



Elevations range from approximately 3,000 ft at the Desolation Creek confluence with the North Fork John Day River near the community of Dale, Oregon, to almost 7,600 ft in the headwaters in the Greenhorn Mountains to the southeast. The Desolation Creek watershed generally is mountainous with a dominant forest overstory of grand fir/subalpine fir/lodgepole pine in the higher elevations and ponderosa pine and Douglas fir in the lower elevations.

The project analysis area exhibits some of the most complex geology on the Umatilla National Forest (U.S. Dept. of Agriculture, Forest Service, 1999). It is dominated by volcanic flow materials and includes some very old metamorphosed materials. Also present are extensive volcanic ash deposits and unconsolidated landslide, alluvial and glacial materials with considerable water-storage capacity. The geology generally is stable except on steep slopes.

The project analysis area primarily has a continental climate characterized by seasonal extremes of temperature and precipitation. Average annual precipitation increases with elevation from less than 20 inches to more than 40 inches. Most of the precipitation falls as snow in the winter months and rain in the spring. Based on streamflow records of Desolation Creek near the mouth from 1949 to 1958, annual water yield is approximately 1 acre-foot per acre of watershed.

The average of daily high and low temperatures in July is approximately 60° F and approximately 23° F in January; these are the hottest and coldest months, respectively. Convective storms in the summer occasionally produce lightning and localized, heavy rainfall,

There are approximately 252 miles of streams in the Desolation Creek watershed (e.g. the Farley project analysis area), classified as shown in Table 3.1.1. Compared to the rest of the Umatilla National Forest, the Farley project analysis area has more than twice the percentage of anadromous fish streams, half again the percentage of perennial streams, and approximately half the percentage of intermittent streams.

Table 1.1. Miles and percentages of streams by classes in the Desolation Watershed and compared to Umatilla National Forest averages.

	Class 1	**Class 2**	**Class 3**	**Class 4**	**Total**
Miles	70.8	8.0	81.6	91.5	251.9
Percent	28 %	3 %	32 %	37 %	
Umatilla Forest-wide averages	11 %	4 %	24 %	61 %	

Class 1 streams directly support anadromous fish
Class 2 streams support resident fish
Class 3 streams are perennial, but do not support fish
Class 4 streams are intermittent.

The average stream density for the Desolation Creek watershed is 2.3 miles of stream per square mile of watershed; this value is low compared to other watersheds in the Blue Mountains. Channel morphology ranges from steep, confined headwater channels with coarse substrate (upper/lower South Fork Desolation, Battle, Junkens Creeks) to sinuous channels in glacially modified U-shaped alluvial meadows (North and South Fork Desolation), to the lower mainstem of Desolation Creek which is a moderate gradient, cobble dominated stream.

Proposed project activities would occur on National Forest System lands within the following sections (Willamette Meridian surveyed).

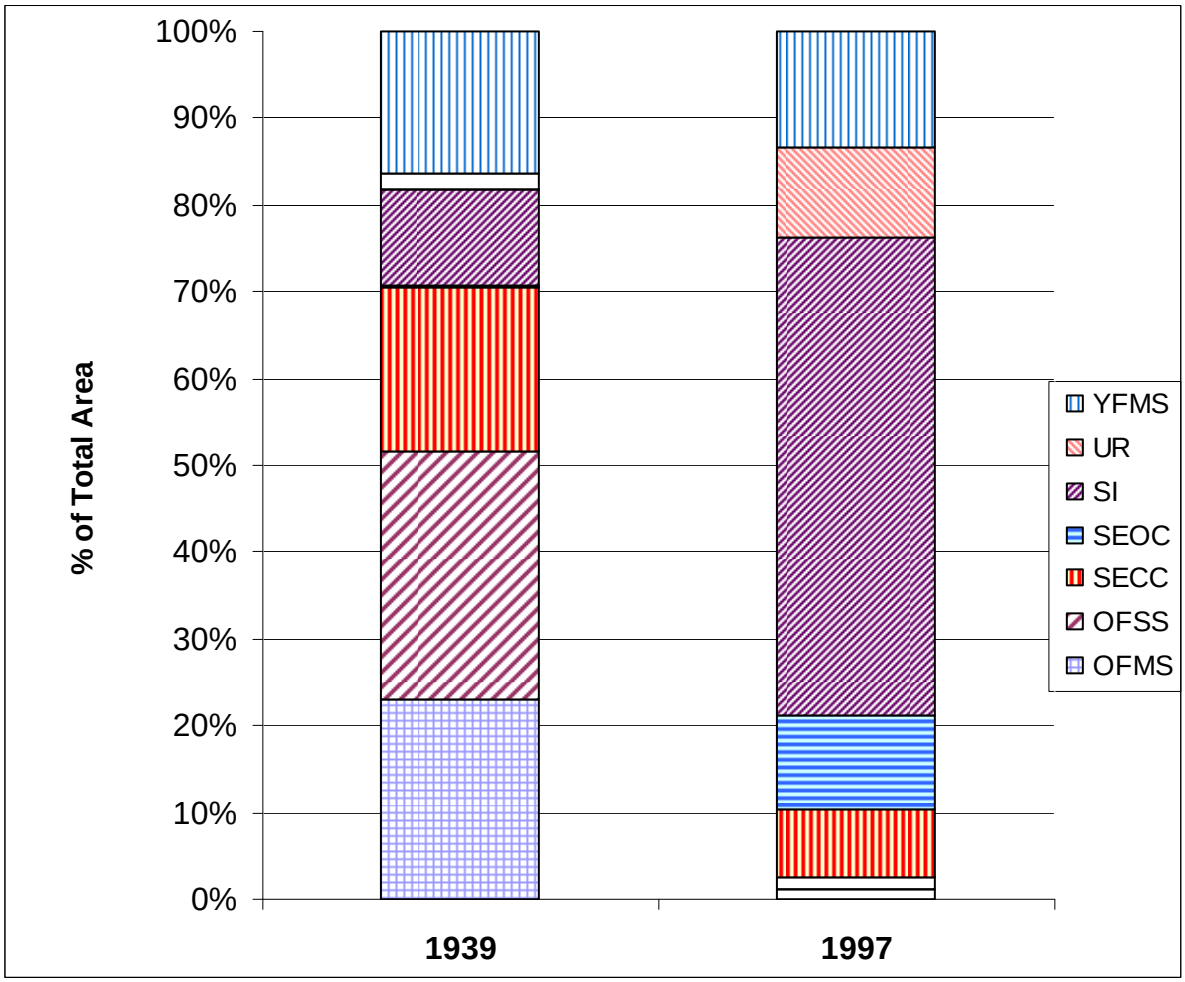
Township	Range	Sections
7 South	31 East	1
7 South	32 East	5, 6, 9, 10, 11, 13, 14, 23, 24
7 South	33 East	18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36,
8 South	32 East	10, 11, 12, 13, 14, 24
8 South	33 East	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
8 South	34 East	29, 30, 31, 32, 33
9 South	33 East	1, 2, 3, 4, 9, 10, 11, 12, 13
9 South	34 East	3, 4, 5, 6, 7, 8, 9, 10, 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33

BACKGROUND

Historically, fire occurred relatively frequently in the interior Columbia Basin and was a major disturbance process in determining the natural conditions and functioning of forest ecosystems. The systematic exclusion of fire from forest ecosystems began in the early 1900s when fire was viewed as a threat to the lives and property of increasing numbers of settlers, as well as to other forest uses such as grazing, timber and water supply. As a result, most fires that have occurred since then have been actively suppressed. Combined with timber harvest practices from the early 1900s to approximately the 1970s that emphasized removing primarily mature ponderosa pine, current forest conditions throughout the Blue Mountains appear to be quite different compared to historical conditions in both form and function.

Field surveys conducted in 1939 and 1997 indicate that stand structure in the Farley project analysis area has changed substantially (Figure 1.2). Fire suppression and past harvest practices, in combination with tree stress and mortality from insects, disease and wildfire have shifted the forests to earlier structural stages resulting in substantially fewer old forest stands than in the past. Also, recent analyses of historical data from General Land Office surveys conducted in the 1880s (Powell 2008) indicate that Ponderosa pine woodlands were more prevalent then, and the current extensive lodgepole pine and sub-alpine fir forests were less prevalent (see maps at the following website: http://www.fs.fed.us/r6/uma/publications/history/glo/index.shtml).

Figure 1.2. Forest structure in the Farley project analysis area in 1939 and 1997.



DEFINITIONS

YFMS - Young Forest Multi-Story
UR - Understory Reinitiation
SI - Stand Initiation
SEOC - Stem Exclusion Open Canopy
SECC - Stem Exclusion Closed Canopy
OFMS - Old Forest Multi-Stratum
OFSS - Old Forest Single Stratum

Numerous studies, including the Interior Columbia Basin Ecosystem Management Project Scientific Assessment (Quigley and others 1996), have described substantial differences in current conditions compared to historical conditions in forests throughout much of the interior Columbia Basin. Forest conditions in the Farley project analysis area presently are outside their historic range of variability for stand structure, stocking density and to some extent, species composition. Historic range of variability (HRV) is a concept based on the premise that native species and ecosystems in an area evolved with and adapted to the historic mechanisms and patterns of disturbance that reflect sustainable conditions for a given area. HRV is expressed as

a range to represent the spatial and temporal continuum of conditions that existed on the landscape.

In the 1970's, large areas of mature lodgepole pine stands in the Farley project analysis area experienced extensive mortality as a result of epidemic populations of mountain pine beetle. Since then, additional stands of dense lodgepole pine have reached full maturity and are susceptible to widespread insect-caused mortality. Also, in the 1980s and 1990s a succession of dry years caused trees that are adapted to relatively more moist conditions (such as Douglas-fir, sup-alpine fir and grand fir) to become stressed and more susceptible to defoliating insects, bark beetles, and fungal diseases. Although this may be a potential natural progression for these forest types, currently they are at high risk for insect and disease mortality, increased dead fuel loadings (both on the ground and standing) and large-scale wildfires with associated short- and long-term adverse effects on other forest resources including fish, wildlife, recreation and scenic values, as well as social and economic values.

For example, in 1996 large areas in mature lodgepole pine and mixed conifer forests near the Farley project analysis area that had experienced this cycle of insect mortality (from mountain pine beetle and western spruce budworm) were involved in three large wildfires (Tower, Bull and Summit). These wildfires were uncharacteristically large (over 130,000 acres combined) and intense as a result of forest conditions that had become more densely stocked with trees and with a greater amount of dead wood material than would have been expected historically. These very large and intense fires caused a substantial long-term loss of old forest structure, wildlife cover and habitat, riparian vegetation, scenic values, recreational opportunities, and detrimental effects to soils, productivity and water quality over large areas of the North Fork John Day Ranger District.

In addition to these direct effects to forest resources, there were substantial social effects including a perceived and real loss to the local and regional economy. While a variety of public opinions were expressed following these fires, the majority of public comments indicated that fires of this intensity and scale are socially and economically undesirable and that forests should be managed to promote long-term sustainability and resilience to large-scale wildfire.

In a random mail survey of Blue Mountain communities (Shindler and Reed 1997) two-thirds of the respondents felt that forests in the region were unhealthy. Over three-fourths (76 percent) favored selective thinning as the means of treating the existing buildup of dead trees in the Blue Mountains, 16 percent favored prescribed fire, and 8 percent wanted no management, instead preferring nature to take its course. Over half of the survey respondents felt that the Forest Service should provide a stronger leadership role (52%) and that federal forest management systems need major changes, not just minor adjustments (56%). Shindler and Reed (1997) further conclude that: "Often loud voices or interest group agendas are the driving forces in agency / public discourse and require most of the attention. It is easy to construe these strong opinions as representing the public at large. This study reveals the views of the general public with empirical data. From this information, it could be concluded that the general population in the study area is in support of the Forest Service increasing its efforts to use prescribed fire and mechanical thinning in the Blue Mountains. It is also likely that citizens would prefer the agency to provide stronger leadership locally, particularly if this direction includes increased interaction with communities".

Resource Management Direction by the Forest Plan

The ***Umatilla National Forest Land and Resource Management Plan Final Environmental Impact Statement (FEIS)*** and Record of Decision (ROD) dated June 11, 1990 (U.S. DEPT. OF AGRICULTURE, Forest Service 1990a) and the accompanying Land and Resource Management Plan (U.S. Dept. of Agriculture, Forest Service, 1990b – hereafter referred to as the Forest Plan) as amended (and all subsequent NEPA analyses for the amendments) provide the management direction and guidance for natural resource management activities in the Umatilla National Forest. The Forest Plan designates land and resource management areas that emphasize a particular Desired Future Condition (DFC), and strategies, standards and guidelines for achieving that DFC.

The Forest Plan establishes management standards and guidelines for the activities proposed to be conducted in the Farley Vegetation Management Project. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for various resource management activities. Farley project activities are proposed to occur only in the A4 - Viewshed 2 and the C7 - Special Fish management areas. Only obliteration and stabilization of existing closed roads are proposed to occur in Riparian Habitat Conservation Areas (RHCAs) or within the buffer zones of the various stream classes as specified by the Forest Plan. Management directions (desired future conditions, guidelines, standards and strategies, etc) for resource management in the A4 and C7 management areas are designated by the Forest Plan at pages 4-108 to 4-113 and 4-173 to 176, respectively.

Table 1.2. Summary of land ownership and management areas designated by the Forest Plan in the Farley project analysis area.

	Acres		Percent of watershed
Total Area of Desolation Creek Watershed	**69,675**		
Portion of Desolation Cr. watershed in private ownership		13,448	19.3
Portion of Desolation Cr. watershed in Malheur National Forest		173`	1.3
Umatilla National Forest Land in Desolation Creek Watershed (the Farley Vegetation Management Project area)	**56,228**		80.7
Management Areas (designated by the Forest Plan) in which Farley project activities are proposed to occur:			
C7 Special Fish Management Area		31,807	56.6
A4 Viewshed 2		3,024	4.3

IMPORTANT NOTE: Throughout this document, values have been rounded for ease of reading and use. Also, the scales and objectives of the analyses performed by various resource discipline specialists differ somewhat. In addition, the Geographic Information Systems (GIS) technologies and the supporting physical, spatial, and temporal data bases used to generate the resulting information and graphical representations continue to evolve. This was especially the case during preparation of this DEIS in a transition by the Umatilla National Forest to ArcGIS v9.2 and its underlying geodatabase format. Use of legacy data bases and formats in an evolving technological environment can result in discrepancies in calculated values and graphical representations. However, the relatively small discrepancies likely to be observed in this DEIS should not be considered to constitute substantial or statistically significant inaccuracies. These data and related graphics are not legal documents and are not intended to be used as such.

Approximately 56.6 percent of the National Forest land in the Desolation Creek watershed (the Farley project area) is designated by the Forest Plan as C7 – Special Fish Management Area, and approximately 5.4 percent is designated A4 – (Natural Appearing to Slightly Altered) Viewshed 2. Most of the silvicultural treatment activities proposed for the Farley project would occur in C7 management areas, while much less activity is proposed for the A4 – Viewshed 2 areas.

The Forest Plan specifies the Management Goal and Desired Future Condition (DFC) for C7 areas as follows:

GOAL

MAINTAIN AND ENHANCE WATER QUALITY AND PRODUCE HIGH LEVELS OF ANADROMOUS FISH HABITAT ON AN AREA-WIDE BASIS.

DESIRED FUTURE CONDITION

In riparian areas, a natural to near natural setting and vegetation development will predominate, with a variety of plant communities, sizes, and age classes. A high tree canopy layer will be present, and the forest will appear denser than surrounding areas. Forest canopy of conifers and hardwoods will provide desired levels of stream surface shading and long-term supply of large woody material for instream fish habitat and snags. Vegetation will contribute to stable streambanks and complex fish habitat along the banks. Dispersed recreation opportunities associated with stream and stream sides will be available for all Forest visitors.

In upland areas of the watersheds, the Forests will appear as a mosaic of even-aged and uneven-aged stands with highly dispersed created openings of 1 to 40 acres in size. Management activities of all types will be observable. Horizontal and vertical diversity in vegetation will be apparent; also, a discontinuity in forest age classes (noncontinuous and fewer age classes) will be noticeable within a watershed.

Emphasis placed on careful timber harvest and road construction and maintenance will be reflected in the high quality water being produced. Dispersed recreation opportunities of all types will be available, though some limitations in access may occur. As a result of management, anadromous fish recovery and long-term fish population goals will be met.

The Forest Plan specifies the Management Goal and Desired Future Condition (DFC) for A4 areas as follows:

GOAL

MANAGE THE AREA SEEN FROM A TRAVEL ROUTE, USE AREA, OR WATER BODY WHERE SOME FOREST VISITORS HAVE A MAJOR CONCERN FOR THE SCENIC QUALITIES (SENSITIVITY LEVEL 2) AS A NATURAL APPEARING TO SLIGHTLY ALTERED LANDSCAPE.

DESIRED FUTURE CONDITION

Viewsheds will be managed primarily to meet the visual quality objectives of partial retention and modification. An attractive, near natural landscape will be maintained or created. A maximum of three distance zones for each viewshed including foreground, middleground, and background radiating from the viewer position (and a visual quality objective for each zone) have been delineated according to the process defined in the

Agriculture Handbook 462, 'National Forest Landscape Management;' Vol. 2, Chap. 1, The Visual Management System (U.S. Dept. of Agriculture, Forest Service 1974).

Management activities will be done with sensitivity to people's concern for scenic quality (Level 2), with vegetative manipulation conducted so that Forest management activities remain visually subordinate in foregrounds of selected travel routes and sites. All viewsheds will have approved vegetative management plans. Management activities will be obvious in the middleground and background viewing area, but designed to compliment their surroundings. Forest stands will occasionally be logged in order to maintain long-term health and vigor, and to encourage a park-like, near natural appearance with big trees in the immediate foreground. Recreation opportunities will be mostly road oriented.

PURPOSE AND NEED FOR ACTION

The purpose and need for this project is to conduct commercial and non-commercial timber harvest and thinning and other silvicultural treatment and vegetation management activities (including prescribed fire and reforestation) consistent with the goals, standards and guidelines of the Forest Plan on Umatilla National Forest lands within the Desolation Creek watershed to:

- capture present economic value of raw forest materials for the benefit of local and regional economies;
- reduce forest fuel loads and to promote long-term forest stand structure and tree stocking densities that are more consistent with historic conditions; and
- promote forest resilience to large-scale wildfire, disease and insect infestations and the long-term sustainability of other forest resources (such as fish, wildlife, scenic values, and recreation) and social and economic values.

Capture Economic Value of Forest Materials

The activities proposed for this project are consistent with the Forest Plan goals regarding economic, social, and other resource values. Specific Forest Plan goal statements relevant to the proposed project activities include:

- *Provide land and resource management that achieves a more healthy and productive forest and assists in supplying lands, resources, uses, and values which meet local, regional, and national social and economic needs. (Forest Plan p. 4-1)*
- *Provide for diversity of plant and animal communities and species consistent with overall multiple-use objectives for the Forest. Maintain or enhance ecosystem functions to provide for the long-term integrity (stability) and productivity of biological communities. (Forest Plan p. 4-2)*
- *Provide for production and sustained yield of wood fiber and insofar as possible meet projected production levels consistent with various resource objectives, standards and guidelines, and cost efficiency. (Forest Plan p. 4-2)*
- *Manage Forest lands to maintain or enhance soil and land productivity. (Forest Plan p. 4-2)*

- *Provide and execute a fire protection and fire use program that is cost efficient and responsive to land and resource management goals and objectives. (Forest Plan p. 4-2)*

Reduce Fuel Loads and Restore Historic Forest Conditions

In the lower reaches and elevations of the Farley project analysis area (the Desolation Creek watershed), the dry forest type (typically represented by ponderosa pine) has missed several fire return intervals. Combined with past timber harvest practices, the result is a higher density of grand fir and Douglas-fir and stand structure conditions that are more susceptible to severe and large-scale wildfire compared to historical conditions. Returning forest stand structure, tree densities, and species composition conditions to those more consistent with the historical range of variability in these dry forest areas would promote long-term forest sustainability and resilience to large-scale wildfire.

Extensive and dense lodgepole pine and mixed conifer forests in the upper reaches and elevations of the Farley analysis area are susceptible to widespread damage and mortality from insects, disease, and wildfires, largely because of present dense stocking levels, increased fuel loadings, and non-heterogeneous stand structure conditions and age class distributions. Long-term vigor, sustainability, and resilience to such disturbances of forest stands covering a total of approximately 18,000 acres in the Desolation Creek watershed could be improved by appropriate silvicultural treatments that include commercial and non-commercial thinning and timber harvest, prescribed burning and reforestation. However, the action alternatives developed in this analysis propose vegetation management activities on less than half of this total area.

Promote Resilience to Large-Scale Wildfire and Long-Term Resource Sustainability

For C7 – Special Fish Management Areas the Forest Plan states that:

> *Fuels should not exceed an average of 9 tons per acre in the 0 to 3-inch size class with an average residue depth of 6 inches (p. 4-176)*

Also the Forest Plan states (for all management areas) that:

> *Levels and methods of fuels treatment will be guided by the protection and resource objectives of the management area. Emphasis will be on intensive utilization of wood residues using a marketing strategy to reduce fuel loadings (p. 4-88).*

Fuel surveys in the Farley project analysis area show that fuel loadings commonly are in the range of 15 to 20 total tons per acre with some areas exceeding 30 total tons per acre and fuel residue depths greatly exceeding 6 inches. Fuel loadings in the 0 to 3 inch diameter class and average fuel residue depths need to be reduced to Forest Plan standards. Fuel loadings in the greater than 3-inch diameter class should be reduced (where they exceed needs for soil protection and wildlife habitat) to lessen the risk of large-scale wildfire and associated short- and long-term adverse effects on other forest resources and social and economic values.

In the upper reaches and elevations of the watershed a large amount of dead and down material exists from past insect infestations in dense stands of lodgepole pine and mixed conifers. Although these conditions are not necessarily outside of the expected fire regime and condition class, it would be desirable to reduce the potential risk of large-scale wildfires and associated short- and long-term adverse effects to other forest resources and social and economic values,

and to capture present economic value of the raw forest material (including in the dead and downed material) through appropriate silvicultural treatments such as commercial and non-commercial thinning and timber harvest, prescribed burning and reforestation. Options that remove dead material, alter present stand structure, reduce stand densities, and reduce the potential for large-scale wildfires are needed to protect current and future wildlife, fisheries, watershed, timber and other forest resource values.

TIERING AND INCORPORATING BY REFERENCE

To eliminate repetition and focus on site-specific analyses, this DEIS is tiered to the following documents as permitted by 40 CFR 1502.20:

- *Umatilla National Forest Land and Resource Management Plan (Forest Plan) FEIS* and Record of Decision (ROD) dated June 11, 1990 (U. S. Dept. of Agriculture, Forest Service, 1990a) and all subsequent NEPA analysis for amendments, and the accompanying *Land and Resource Management Plan (LRMP) as amended (Forest Plan)* (U. S. Dept. of Agriculture, Forest Service, 1990b).

  Hereafter in this DEIS this is referred to as the Forest Plan. The Forest Plan (and its amendments) guides all natural resource management activities and establishes management standards and guidelines for the Umatilla National Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management.

- *Pacific Northwest Region Final Environmental Impact Statement for the Invasive Plant Program, 2005* (U. S. Dept. of Agriculture, Forest Service, 2005a).

  This FEIS culminated in a Record of Decision that amended the Umatilla National Forest Plan by adding management direction relative to invasive plants.

Key Forest Plan amendments pertinent to this analysis include the:

- Regional Forester's Forest Plan Amendment #2 (dated June 12, 1995) that provides "Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales"; and the
- Umatilla National Forest Land and Resource Management Plan Amendment #11.

  These amendments establish additional guidelines and standards for forest management activities in the National Forests of eastern Oregon and Washington that primarily address anadromous and threatened/endangered fish, and wildlife issues. Hereafter in this DEIS these are referred to as the "Eastside Screens".

Also, this DEIS incorporates by reference the following:

- *Biological Opinion (BO) for the Implementation of Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH)* from National Marine Fisheries Service, dated January 23, 1995. PACFISH establishes riparian management goals and management

direction with the intent of restoring riparian and stream habitats which were incorporated into the Forest Plan by amendment.

- *Biological Opinion on the Land and Resource Management Plans for the Boise, Challis, Nez Perce, Payette, Sawtooth, Umatilla and Wallowa-Whitman National Forests* from National Marine Fisheries Service (NFMS), dated March 1, 1995. NFMS has identified a set of goals, objectives, and guidelines that apply to watershed and site-specific consultations until (NFMS), LRMPs (Forest Plans) are amended.
- Biological Opinion on the *Effects to Bull Trout from Continued Implementation of Land and Resource Management Plans and Resource Management Plans as Amended by the Interim Strategy for Managing Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada (INFISH), and the Interim Strategy for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH)* from National Marine Fisheries Service, dated August 14, 1998. This BO addresses the effects of continued implementation of LRMPs (as amended with PACFISH standards and guidelines) where listed distinct populations of bull trout occur in Idaho, Montana, Oregon, and Washington.
- *General Water Quality Best Management Practices.* This is a compilation of accepted methods for protecting of water, soil, vegetation and other resources during resource management activities (U. S. Dept. of Agriculture, Forest Service, 1988).
- *Environmental Assessment for the North Fork John Day Motorized Access and Travel Management Program* and its Decision Notice (U. S. Dept. of Agriculture, Forest Service, 1990c). This EA provides direction on the management of roads and OHV trails (both open and closed).
- *Environmental Assessment for the Management of Noxious Weeds* and its Decision Notice dated May 24, 1995 (U. S. Dept. of Agriculture, Forest Service, 1995). This Environmental Assessment (EA) identifies prevention and appropriate treatment methods for known noxious weed populations on the Umatilla National Forest.
- *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin (and portions of the Klamath and Great Basins).* This report (Quigley and others 1996) links landscape, aquatic, terrestrial, social, and economic characterizations to described biophysical and social systems.
- *Wildlife Tree and Down Wood Guidelines* (memorandum dated March 22, 1996, Subject: Wildlife Tree and Down Wood Guidelines. Umatilla National Forest, North Fork John Day Ranger District, Ukiah, Oregon). This memo provides direction on the number and distribution of snags to retain in harvest and thinning units in the North Fork John Day Ranger District.
- *Desolation Ecosystem Analysis.* This is a watershed-level ecosystem analysis of present and reference conditions in the Desolation Creek Watershed (U.S. Dept. of Agriculture, Forest Service, 1999).

- *Umatilla National Forest Roads Analysis Report.* This report assessed the road system needed to meet forest-wide resource management and other objectives (U.S. Dept. of Agriculture, Forest Service, 2004).

PROJECT RECORD

This DEIS hereby incorporates by reference the project record (hereafter, referred to as the analysis file) [40 CFR 1502.21]. The analysis file contains specialist reports, additional information and supporting technical documentation in the following resource subject areas:

- silviculture
- fire / fuels and air quality as affected by prescribed burning
- soils
- hydrology/water quality
- fisheries
- wildlife
- recreation and visual resources
- cultural resources
- mining/energy and special uses
- range and invasive plants / noxious weeds
- botany (including threatened, endangered and sensitive species)
- roads analysis
- economic analysis.

Relying on resource discipline specialist reports and the analysis files implements the CEQ regulations (1992) that require agencies to reduce NEPA paperwork (40 CFR 1500.4), that environmental documents shall be analytic rather than encyclopedic, and that EISs/EAs shall be concise and no longer than absolutely necessary (40 CFR 1502.2). The objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental effects of the alternatives and how these effects can be mitigated, without repeating detailed analysis and background information available elsewhere. These specialist reports and the associated supporting information in the project analysis files are located in and available for review at the North Fork John Day Ranger District, 401 Main Street (Highway 244), Ukiah, Oregon, 97880; the phone number is 541-427-3231.

OTHER LAWS AND POLICIES

Development of this DEIS was conducted in accordance with the implementing regulations of the:

- National Forest Management Act (NFMA); Title 36, Code of Federal Regulations, Part 219 (36 CFR 219)
- Council of Environmental Quality, Title 40, Code of Federal, Parts 1500-1508 (40 CFR 1500-1508) for the National Environmental Policy Act (NEPA).

Many other federal and state laws, executive orders and policies also guided this analysis. The following is a brief description of other potentially applicable laws, orders and policies:

- American Antiquities Act of 1906 This Act makes it illegal to appropriate, excavate, injure, or destroy any historical, prehistoric ruin or monument, or any object of antiquity situated on lands of the United States without appropriate authorization or permission.
- Migratory Bird Treaty Act of 1918 This Act establishes an international framework for the protection and conservation of migratory birds. The original 1918 statue implemented the 1916 Convention between the United States and Great Britain (for Canada). Later amendments implemented treaties between the United States and Mexico, Japan, and the Soviet Union (now Russia).
- Multiple-Use Sustained-Yield Act of 1960 This Act requires the Forest Service to manage National Forest System lands for multiple uses (including timber, recreation, fish and wildlife, range, and watershed). All renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be re-established and grown again if the productivity of the land is not impaired.
- National Historic Preservation Act of 1966, as amended This Act requires Federal agencies to consult with American Indian Tribes, State and local groups before nonrenewable cultural resources, such as archaeological and historic structures, are damaged or destroyed. Section 106 of this Act requires Federal agencies to review the effect project proposals may have on cultural resources in the project analysis area.
- National Environmental Policy Act (NEPA) of 1969 as amended The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality. To implement these policies, NEPA requires agencies to undertake a thorough assessment of the environmental effects of their proposed actions and to involve the public prior to making decisions.
- Endangered Species Act of 1973, as amended The purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species. The Act also requires that all Federal departments and agencies seek to conserve endangered species and threatened species and utilize their authorities in furtherance of the purposes of this Act.
- National Forest Management Act (NFMA) of 1976 This Act reorganized, expanded and otherwise amended the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on national forest lands. The National Forest Management Act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of national forests and management of the associated natural resources.

- Clean Water Act (CWA) of 1972, as amended in 1977, 1981 and 1987 This Act is the foundation of surface water quality protection in the United States. It employs a variety of regulatory and nonregulatory tools to reduce direct pollutant discharges and manage polluted runoff to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water." Initially in the years following the passage of CWA in 1972, the focus was mainly on regulating discharges from traditional "point source" facilities, such as municipal sewage plants and industrial facilities. Efforts to address polluted runoff have increased since the late 1980s. CWA programs over the last decade have included a shift from a program-by-program, source-by-source, and pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach equal emphasis is placed on protecting healthy waters and restoring impaired ones. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining state water quality and other environmental goals is another hallmark of this approach.
- Clean Air Act, as amended in 1970, 1977, and 1990 This Act forms the basis for national air pollution control efforts. Basic elements of the act include national ambient air quality standards for major air pollutants, hazardous air pollutants standards, state attainment plans, motor vehicle emissions standards, stationary source emissions standards and permits, acid rain control measures, stratospheric ozone protection, and enforcement provisions.
- Invasive Species (Executive Order 13112) This 1999 order requires Federal agencies whose actions may affect the status of invasive species to identify those actions, and (within budgetary limits) to prevent the introduction and spread of invasive species and to provide for restoration of native species and habitat conditions in ecosystems that have been invaded. The EO also directs agencies to not authorize or carry out actions that are likely to cause or promote the further introduction or spread of invasive species unless the benefits of such actions clearly outweigh the potential harm caused by invasive species, and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.
- Migratory Birds (Executive Order 13186) This 2001 order requires the analysis of Federal actions required by NEPA or other established environmental review processes to include migratory birds, with emphasis on species of concern.

The analyses presented in this DEIS for the proposed Farley project considered (but generally were not affected by or relevant to) other laws, executive orders and policies related to floodplains, historic preservation, effects on prime farmland / forest land / rangeland, civil rights and environmental justice. These include:

- **Floodplains and Wetlands (Executive Orders 11988 and 11990).** These 1977 orders are to "…avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development…" and similarly "…avoid to the extent possible the long and short-term adverse impact associated with the destruction or modification of wetlands."

- **Environmental Justice (Executive Order 12898).** This 1994 order directs each Federal agency to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. An accompanying Presidential memorandum emphasized the need to consider these types of effects during NEPA analysis. In 1995, the Department of Agriculture completed an implementation strategy for the executive order. Where Forest Service proposals have the potential to disproportionately and adversely affect minority or low-income populations, these effects must be considered, disclosed, documented, and to the degree possible, mitigated through the NEPA process.

In addition, no adverse effects on civil rights, women, and minorities not already identified in the Final EIS for the Forest Plan would be expected to result from the activities proposed for this project. All activities would be governed by Forest Service contracts, that are awarded to qualified contractors and/or purchasers regardless of race, color, sex, religion, etc., and that contain nondiscrimination requirements. Also, all proposed project activities are in accordance with the Secretary of Agriculture's Memorandum 1827 addressing prime farmland, rangeland, and forestland; prime forest land applies only to non-Federal lands.

DECISION FRAMEWORK

The Responsible Official for this decision is the Forest Supervisor of the Umatilla National Forest. The decision will involve a thorough analysis of the environmental effects associated with each action alternative with respect to the purpose and need for the project, as well as consideration of public comments, and will be based on the following criteria:

Capture Economic Value of Forest Materials	Which alternative captures maximum economic value of raw forest products for the benefit of local economies, within the constraints of project goals, acceptable environmental effects, and current resource management direction?
Reduce Fuel Loads and Restore Historic Forest Conditions	Which alternative best promotes forest stand structure, tree stocking density and species composition conditions that are more consistent with the historical range of variability that promotes long-term forest sustainability and resilience to disturbances (such as insect infestations, disease, and large-scale wildfire)?
Promote Resilience to Large-Scale Wildfire and Long-Term Resource Sustainability	Which alternative best meets social and economic needs and other forest resource values by reducing the potential for large-scale wildfire over the long term? Which alternative best balances the risks of short-term resource effects and mitigation associated with thinning and harvesting, with the long-term risks associated with doing nothing?

The Responsible Official can:

- Select the preferred action alternative

- Select an action alternative that has been considered in detail
- Modify an action alternative
- Select the no-action alternative
- Identify what mitigation measures and monitoring are necessary
- Amend the Umatilla National Forest Plan to incorporate the changes necessary to implement the decision
- Suspend all further action or direct that other actions be pursued.

CHAPTER 2 – ISSUES AND ALTERNATIVES

INTRODUCTION

The National Environmental Policy Act (NEPA, 40 CFR 1501.7) requires that interested and potentially affected parties be involved in determining the scope of the issues to be addressed, and for identifying and assessing the significant environmental and resource management issues related to a proposed action. The North Fork John Day Ranger District of the Umatilla National Forest invited involvement from local, federal and state agencies, local tribes, interest groups and individuals that have previously expressed an interested in, or that are potentially affected by the proposed actions. A record of involvement of tribal governments, other agencies, interest groups and the public at large is in the project file at the North Fork John Day Ranger District in Ukiah, Oregon. A summary of comments received from these entities and the resulting agency action or response is presented in Appendix B of this DEIS.

Issues are concerns about the environmental effects that may result from proposed action(s). Issues are defined by public responses to the proposed action, and by the Interdisciplinary Team (IDT) of resource specialists based on their professional knowledge and judgement. Issues serve to focus the analysis of environmental effects likely to be associated with the proposed actions, and influence development of alternatives and mitigation measures.

Key issues are those with a high level of public interest or potential conflict, and effects of exceptional duration, magnitude, and / or geographic extent, if not mitigated or otherwise addressed. Key issues are referred to by the Council on Environmental Quality (CEQ) as being "significant" in the decision-making process.

In addition to the key issues, other issues were raised that were considered during development of the proposed actions for this project and evaluation of potential environmental effects. The CEQ regulations for implementing NEPA require the identification and elimination from detailed study those issues that are not significant or that have been covered by prior environmental review (Sec. 1506.3). Although these other issues may have had some influence on project development and design, they were not as directly related to the project purpose and need and did not directly influence the formulation and evaluation of specific action alternatives. Nevertheless, these other issues generally were addressed and incorporated in the analyses of the environmental effects of proposed project actions presented in Chapter 3.

Finally, some issues that were raised simply were:

- outside the scope of the proposed action or not relevant to the decision to be made,
- conjectural and / or not supported by fact or science, or
- already decided by law or regulation, Forest Plan, or other higher level decision.

ISSUES IDENTIFIED DURING SCOPING

Key issues were identified by the IDT and Responsible Official from comments received from government agencies, tribal governments, interest groups, and the public. These issues generally can be categorized as follows.

No construction of additional new or temporary roads; no road construction in areas that might be considered to be undeveloped

Comments were received during the scoping process expressing opposition to the construction of any additional new or temporary roads in the Farley analysis area. Extracting logs and thinned material by helicopter could eliminate the need for roads, but was determined to be economically infeasible based on the limited volume and value of forest material that would be removed.

All alternatives sought to minimize the need for construction of additional roads. Alternative 1 proposes to construct both new Forest System and temporary roads. Temporary roads would be obliterated after project activities are completed. Alternative 2 involves construction only of temporary roads. Alternative 4 avoids road construction in undeveloped areas but involves construction of both new Forest System and temporary roads. Alternative 5 avoids road construction in important big game and wildlife habitat areas.

Net reduction in total road miles in the analysis area

In consideration of a specific request from the Confederated Tribes of the Umatilla Indian Reservation (in face-to-face meetings with the North Fork John Day District Ranger), all proposed action alternatives identified and incorporated a net reduction in total existing road miles in the analysis area at the conclusion of project activities (Figure 2.1). All alternatives include obliteration of approximately 31 miles of existing road that currently is closed to general public use (Figure 3.1.4). Obliteration is defined as complete removal and restoring the landform to its near-original condition. An additional 8 miles of closed road would be hydrologically stabilized by removing culverts, installing passive drainage features, planting native forbs and grasses where needed, but leaving the remainder of the roadbed intact (Figure 2.2). In effect, this action preserves these road routes for potential use for resource management activities many decades in the future, thus minimizing overall environmental effects over the long term (when compared to constructing entirely new road routes over previously undeveloped areas).

Figure 2.1. Existing Condition

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Figure 2.2. Roads to Remove

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No commercial harvest; no cutting of trees greater than 12 inches diameter

In response to specific public scoping comments, Alternative 3 limiting timber harvest to trees less than (<) 12 inches diameter at breast height (dbh) was developed and evaluated.

No adverse effects to soils, water quality, hydrology, wildlife, and threatened, endangered, and sensitive animals and plants

All alternatives seek to minimize potential adverse environmental effects, and employ appropriate mitigation measures, Best Management Practices, and Forest Plan (and other applicable) guidelines and standards. Snag retention and replacement tree densities were developed for the activities proposed for this project that exceed those of the current Forest Plan.

No or minimal Forest Plan amendments

No Forest Plan amendments are proposed by any of the alternatives.

KEY ISSUES IDENTIFIED DURING DEVELOPMENT OF ALTERNATIVES

FISHERIES and WATER QUALITY

Silvicultural and vegetation management activities for the Farley project are proposed to occur primarily in areas designated by the Forest Plan as **C7 – Special Fish Management areas**. Five species of salmonids use streams within the analysis area:

- steelhead,
- Chinook salmon,
- bull trout,
- westslope cutthroat trout and
- redband trout.

Bull trout and steelhead have been listed as a Threatened species under the Endangered Species Act. Lower mainstem Desolation, North Fork Desolation, Junkens and Sponge Creeks are listed as water quality-impaired for temperature (303d list). Although silvicultural treatment and vegetation management activities are not proposed to occur directly in Riparian Habitat Conservation Areas (RHCAs), some proposed activities such as prescribed burning could affect streamside vegetation that provides shade and thus affect stream temperatures. Also, soil disturbance from road construction, maintenance, and obliteration could result in sediment reaching streams and degrading fish habitat. Prescribed burning in riparian areas also could remove vegetation that filters out sediment before it reaches streams.

Methods of Measuring Effects

Estimate potential effects of proposed project activities on:

- stream temperature
- sediment (production and transport, road density and number of stream crossings)
- water yield and peak flows
- fish habitat (substrate embeddedness, bank stability, large wood in streams, pool frequency and quality)

HARVEST OF TREES GREATER THAN 12 INCHES IN DIAMETER AT BREAST HEIGHT (DBH)

Proposed activities would harvest trees greater than (>) 12 inches dbh. Although the Forest Plan (Eastside Screens) already prohibits removal of trees > 21 inches dbh, some commenters asserted that trees between 12 and 21 inches provide old growth functions in forest ecosystems and were opposed to the harvest of trees > 12 inches dbh. .

Methods of Measuring Effects

Assess the ability of a maximum 12 inch diameter cut limit to:

- meet the purpose and need of the project
- result in an economically viable project
- result in desirable stand structure and stocking density conditions..

UNDEVELOPED AREAS

The environmental interest group Oregon Wild provided a map with areas it considers to be undeveloped that are greater than 1,000 acres and are adjacent to inventoried roadless areas and/or designated wilderness areas. Some of the proposed project activity units and associated transportation system for the Farley project occur within these undeveloped areas.

Methods of Measuring Effects

Identify location of proposed project activity units and associated transportation system with respect to inventoried roadless and undeveloped areas.

ROADS

Proposed opening of closed roads for administrative access to proposed thinning, timber harvest, and fuels treatment units could result in unauthorized public vehicle use. Also, proposed mechanized fireline construction around proposed thinning, timber harvest, and fuels treatment units could create access opportunities for Off-Highway Vehicles (OHVs), resulting in new unauthorized trails.

Methods of Measuring Effects

- Miles of roads used to access proposed thinning, timber harvest and fuels treatment units.

- Miles of constructed fireline associated with proposed thinning, timber harvest and fuels treatment units.

WILDLIFE

Big Game Habitat

For big game, the **C7 – Special Fish Management Area** in the Farley project analysis area (in which most of the project activities are proposed to occur) largely functions as summer range habitat. These C7 areas currently meet standards specified by the Forest Plan for total cover and Habitat Effectiveness Index (HEI), but currently are below standards for satisfactory cover. In some localized areas where project activities are proposed, thinning, timber harvest, prescribed burning and reforestation activities could reduce vegetation that hides animals from human disturbance resulting in conversion of satisfactory big game cover to marginal cover, or marginal cover to forage. Road construction and use also can increase exposure of animals to human disturbance.

Methods of Measuring Effects

- Acres of satisfactory or marginal cover affected by proposed project activities
- Predicted changes in Habitat Effectiveness Index (which considers amount of thermal and marginal cover, its proximity to forage, road densities, and fragmentation of habitat).
- Predicted response of big game animals to habitat changes.

Snag and Down Wood Habitat

Snags and down wood provide important habitat for many wildlife species including resident and migratory birds. In some localized areas, proposed thinning, timber harvest, prescribed burning and reforestation activities could reduce the amount of this habitat type.

Methods of Measuring Effects

- Predicted snag loss within proposed thinning and timber harvest units based on logging system, and effect of proposed thinning and timber harvest activities on snag densities at the watershed (snag analysis area) scale
- Predicted effectiveness of snag retention measures.
- Comparison of pre-and post-harvest snag densities with DecAid species curves.

Late / Old Structure Forest Habitat

Past harvest, other silvicultural treatment activities, and insect/disease epidemics have reduced the amount of late old structure habitat as well as reduced the connective corridors between remaining late old structure stands. Existing late and old structure habitat (single and multi strata) is currently below HRV in the Moist and Cold Upland Forest potential vegetation groups. Single strata old growth is below HRV in the Dry Upland Forest potential vegetation group.

Proposed thinning, timber harvest and fuels treatments would have the potential to further reduce this habitat type.

Methods of Measuring Effects

- Percent of Late / Old structure affected by proposed activities.
- Effects on habitat and associated late and old structure-dependent species as indicated by the DecAID model.
- Spatial comparison of pre- and post-harvest connectivity between Late Old Structure habitats (discussion of Eastside Screens).

Species of Interest

Proposed thinning, timber harvest and fuels treatments could reduce habitat for species of interest. Thinning and harvest activities (including fuels treatment) have the potential to affect foraging and nesting habitat for goshawk, olive-sided flycatcher, and other species of interest. Spring is a critical and vulnerable time for fledging of birds, small mammal reproduction in burrows, and sensitive plant flowering and seeding. These species could be disturbed or killed by prescribed burning activities, particularly neotropical migratory birds, which are protected under the Neotropical Migratory Bird Treaty Act.

Methods of Measuring Effects

- Acres of potential foraging and nesting habitat for goshawk and olive sided flycatcher that would be affected by activities.
- Effects on priority habitats and habitat features and associated bird species.
- Loss of potential roosts (snags) for forest dwelling bats at the project activity unit and watershed scales.
- Short and long term effects of burning on various habitat types and their associated species.

Threatened, Endangered, Proposed, and Sensitive Species

The proposed action would change the composition and structure of wildlife and plant habitat within the Farley analysis area, which could affect Threatened, Endangered, Proposed, or Sensitive species.

Methods of Measuring Effects

- Effects of proposed thinning, timber harvest, prescribed burning and reforestation activities on federally-listed species habitat and populations, and designated critical habitat.

SOCIOECONOMICS

Proposed sale of merchantable material could create jobs and income for local communities. Unit selection and project design and mitigation could create costs that render the commercial sale of trees unfeasible.

Methods of Measuring Effects

- Predicted volume of merchantable material produced by proposed activities.
- Predicted present net value.

ALTERNATIVE DEVELOPMENT

Range of Alternatives

An adequate range of action alternatives is one that fully meets the Purpose and Need and addresses key issues. An action alternative must: (1) address one or more key issues; and (2) meet the Purpose and Need. An action alternative that does not meet both criteria may be eliminated from detailed study.

The alternatives for this project were designed to express a range of possible actions. The interdisciplinary team developed the range of alternatives and mitigation measures presented in this chapter based on:

- the Purpose and Need for the project,
- the management direction, standards and guidelines specified by the Forest Plan for lands in the Farley project analysis area, and
- comments received from government agencies, tribal governments, interest groups and the public,

Other influences on the development of alternatives included consultation requirements under the Endangered Species Act, and other federal and state laws and regulations.

ALTERNATIVES CONSIDERED BUT REJECTED

Proposed Action

The proposed action (as described in the Scoping / Notice of Intent letters) involved commercial and non-commercial timber harvest, mechanical thinning, prescribed burning and other vegetation management activities on approximately 18,000 acres in the Farley analysis area. No vegetation management activities were proposed:

- in Riparian Habitat Conservation Areas (RHCAs)
- within one-quarter mile on either side of Desolation and South Fork Desolation Creeks (which are candidates for Wild & Scenic River designation)
- in C1 and C2 old forest management areas

- in goshawk nesting areas.

The proposed action would have involved commercial timber harvest and thinning on approximately 13,139 acres, non-commercial thinning on approximately 4,870 acres, and required approximately 59 miles of new Forest System and temporary roads (some in undeveloped areas). Several Forest Plan amendments would have been necessary related to:

- wildlife cover and habitat effectiveness
- connectivity among stands exhibiting old forest structure
- the maximum amount of area in a subwatershed allowed to be in the less than 20 year old age class following project activities, and
- designated visual resource corridors and management areas.

Scoping comments received from the public indicated substantial potential opposition to a project of that magnitude. In addition, the Interdisciplinary (ID) Team concluded that forest management activities and associated transportation system of that scale and geographic extent had the potential to create undesirable effects on forest resources. Therefore, the action as initially proposed was eliminated from further consideration.

Instead, five other alternatives for conducting vegetation management actions that still met the project purpose and need (although on not as large an area as anticipated) within acceptable balances of short and long term resource management benefits and risks were developed and assessed.

Alternative 3 - 12 Inches Diameter Maximum Cutting Limit

The Forest Plan amendments known as the Eastside Screens already prohibit harvest of trees >21" dbh. Tree diameter-based harvest limits (of any size) impose artificial pressures to leave or remove specific classes of trees that result in unnatural "gaps" in stand age and size structure in the future, one of the very situations the project purpose and need intends to address.

A major objective of the forest management activities proposed for this project is to create stands with a mix of size classes of trees with an emphasis on retaining large diameter trees within a multi-age stand. Thinning of trees larger than 12 inches dbh is necessary to move stands toward the desired stand structure and stocking density conditions. A 12-inch diameter limit would not meet the Purpose and Need to modify stand structures and/or reduce stand densities to improve the vigor of remaining trees.

In addition, the stands with trees with an average diameter greater than 12” dbh generally have the higher timber values and volumes per acre. Conversely the stands with less than 12” dbh trees have lower timber values and volume per acre, and thus would cost more to harvest and thin than the value of the timber and other raw forest materials that would be produced. Due to the number of stands with trees >12-inch dbh that could not be harvested and thus not attain the Purpose and Need, combined with the number of stands with trees less than 12-inch dbh that could not be thinned or harvested economically, an alternative with a 12-inch dbh upper cut limit is not beneficial or viable for both forest management and economic reasons. Therefore, after sufficient analysis of this alternative that led the IDT to these conclusions, Alternative 3 was rejected and not considered further.

ALTERNATIVES EVALUATED IN DETAIL AND CONSIDERED

The action alternatives considered in detail are summarized in Table 2.1 and discussed in more detail below.

Table 2.1. Comparison of proposed action alternatives for the Farley project.

	Proposed Action*	**Alternative**				
		1	**2**	**3***	**4**	**5**
Silvicultural Activity	**ACRES**					
Patch cut & Non-commercial thinning harvest	726	0	0	0	0	0
Regeneration harvest	111	0	0	0	0	0
Thinning – Commercial Harvest	388	390	353	33	390	353
Thinning – Commercial Harvest and non-commercial	415	48	0	48	48	0
Seed tree	7,646	1,515	1,432	674	1,253	1,149
Seed tree with non-commercial thinning	2,728	524	347	432	393	334
Overstory removal	269	30	30	30	30	30
Overstory removal and non-commercial thinning	668	310	310	310	310	310
Harvest shelterwood and non-commercial thinning	188	31	31	31	31	31
Commercial Thinning and Timber Harvest	***13,139***	***2,848***	***2,502***	***1,557***	***2,454***	***2,206***
Ground-based		2,483	2,210	1,250	2,132	1,945
Skyline		365	292	306	322	261
Non-commercial Thinning	***4,870***	***4,887***	***4,887***	***4,887***	***4,583***	***4,887***
Non-commercial thinning	4,870	4,577	4,577	4,577	4,273	4,577
Non-commercial thinning (by hand)	0	310	310	310	310	310
TOTAL ACRES	***18,009***	***7,735***	***7,389***	***6,444***	***7,037***	***7,092***
Reforestation / Planting	***11,148***	***2,006***	***1,716***	***1,079***	***1,583***	***1,420***
Burning		***3,276***	***2,906***		***1,941***	***2,758***
Broadcast		2,466	2,180		1,131	2,032
Pile		810	726		810	726
	MILES					
Fire Line Constructed		***49***	***44***		***40***	***36***
ROADS (currently 235 miles in analysis area)	**MILES**					
Roads (OPEN) likely to be used for Project		104	106		106	105
Roads (CLOSED) likely to be used for Project		57	63		63	62
Existing Forest System Roads to be Reconstructed		36	36		36	36
New Forest System Roads to be Constructed	59.1 (total)	13.9	0		7.8	7.2
Temporary Roads to be Constructed (obliterated after project)		6.6	10		5.1	5

	Proposed Action*	Alternative				
		1	2	3*	4	5
Existing Closed Roads to be Obliterated **		31	31		31	31
Existing Closed Roads to be Stabilized ***		8	8		8	8

*NOT CONSIDERED
**Road bed removed, recontoured and revegetated following project
***Culverts removed, passive drainage features installed, revegetated, access blocked

NO ACTION ALTERNATIVE

The No Action alternative means that all of the activities identified in the proposed action alternatives for the Farley Vegetation Management Project would not occur. Previously approved and ongoing activities and projects on National Forest lands within the Desolation Creek watershed such as fire protection, environmental monitoring, road and other facility maintenance, grazing, dispersed camping and other recreational activities and forest uses would continue as presently authorized. Current biological processes, ecosystem functions, and level of human activity and intervention generally would continue at present levels and rates.

ALTERNATIVE 1

Objective

The intent of this alternative is to conduct commercial and non-commercial thinning and timber harvest, fuels reduction, prescribed burning, reforestation and other vegetation management actions on as many stands as possible that were initially identified in the proposed action, while doing so within current Forest Plan management direction, guidelines, standards and constraints without amendments (Figure 2.4). No Forest Plan amendments are proposed for any of the alternatives.

Figure 2.4. Alternative 1

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Description

Commercial Thinning and Timber Harvest

Commercial thinning using a variety of silvicultural prescriptions would occur on approximately 2,848 acres (2,483 acres ground-based and 365 acres skyline). These actions would reduce tree density to recommended stocking levels for each plant association. Diseased, suppressed, or deformed trees would be preferentially removed to promote overall forest stand health. For all action alternatives for this project, snags and down wood would be retained at levels exceeding those specified by the Forest Plan as discussed later in the Wildlife section (3.6) of Chapter 3. Thinned material that is merchantable would be utilized. This alternative would produce an estimated volume of 14,890 hundred cubic feet (Ccf) of raw forest material.

Non-Commercial Thinning

Non-commercial thinning would occur on approximately 4,887 acres to reduce tree density to recommended stocking levels for each plant association, promote tree vigor, reduce susceptibility to insect and disease, and to improve long-term forest sustainability and resilience to large-scale wildfire. In general, conifer saplings up to 7 inches dbh would be thinned.

Non-commercial thinning may be accomplished using mechanized equipment in all units except units 814, 828, and 857. Thinning in these units would be done by hand. Stands would remain fully stocked and no reforestation would be required. The slash created by these activities would either be limbed and bucked to within 18 inches of the ground or mechanically treated (grapple piling, chipping or slash busting). Three units would have material piled and burned within 300 feet of Forest Road 10 (units 2001, 2002, 2090).

Trees less than 7 inches dbh are considered not to have commercial value, although in recent years smaller diameters have been used for chips, hog fuel, and other products. The market for small diameter trees is undependable, so it is unknown at this time whether trees below 7 inches dbh would be merchantable. However, such opportunities would be explored.

Connected Actions to Commercial and Non-Commercial Thinning and Timber Harvest

Reduction in the fuels (slash, etc) generated by these activities would occur on approximately 3,276 acres (2,466 broadcast burn and 810 pile burn), and require 49 miles of fireline. Burn control lines would be constructed either mechanically or by hand but would not exceed 18 inches of bare mineral soil. After the activity fuels burning is complete, these lines would be rehabilitated as necessary.

Roads used for access and haul of forest products would include 57 miles of closed road that would be temporarily reopened, 13.9 miles of new system road would be constructed, 6.6 miles of temporary road would be constructed, 104 miles of open road would be maintained and 36 miles of open road would be reconstructed. Closed roads re-opened for temporary access would be re-closed after project activities are completed. Temporary roads would be obliterated after project activities are completed.

Tree seedlings would be planted on about 2,006 acres to achieve desired stocking densities and species compositions. Vexar® tubing would be placed around planted seedlings to control animal damage.

Newly constructed Road 11 (preliminary designation) would remain open to OHVs from Howard Creek to Bull Prairie, a distance of 0.7 miles.

Road Obliteration

Upon conclusion of project activities, approximately 31 miles of existing road would be obliterated. Obliteration may include recontouring, cultivating, removing drainage structures, mulching, seeding, and planting. An additional 8 miles of closed road would be hydrologically stabilized by removing culverts, installing passive (no or low-maintenance) drainage features and revegetating where needed, but leaving the remainder of the road bed intact, in effect preserving these road routes for potential use for resource management activities in the future, thereby minimizing future environmental effects.

ALTERNATIVE 2

Objective

The intent of this alternative is to conduct commercial and non-commercial thinning and timber harvest, fuels reduction, prescribed burning, reforestation and other vegetation management actions on as many stands as possible that were initially identified in the proposed action, while constructing only temporary roads < 1 mile long to minimize road densities and protect water quality (Figure 2.5).

Figure 2.5. Alternative 2

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Description

This alternative would utilize only reconstructed existing roads or newly-constructed temporary roads < 1 mile long. Construction of temporary roads would not result in any new stream crossings. Old roads or road beds that are known to occur in some areas proposed for thinning, timber harvest, fuels reduction, and other vegetation management actions (but which are not in the present inventory or shown on current maps) that may be used to access proposed project activity units would be considered to be new temporary roads.

Commercial Thinning and Timber Harvest

Commercial thinning using a variety of silvicultural prescriptions would occur on approximately 2,502 acres (2,210 acres ground-based and 292 acres skyline). These actions would reduce tree density to recommended stocking levels for each plant association. Diseased, suppressed, or deformed trees would be preferentially removed to promote overall forest stand health. For all action alternatives for this project, snags and down wood would be retained at levels exceeding those specified by the Forest Plan as discussed later in the Wildlife section (3.6) of Chapter 3. Thinned material that is merchantable would be utilized. This alternative would produce an estimated volume of 12,510 hundred cubic feet (Ccf) of raw forest material.

Non-Commercial Thinning

Non-commercial thinning would occur on approximately 4,887 acres to reduce tree density to recommended stocking levels for each plant association, promote tree vigor, reduce susceptibility to insect and disease, and to improve long-term forest sustainability and resilience to large-scale wildfire. In general, conifer saplings up to 7 inches dbh would be thinned.

Non-commercial thinning may be accomplished using mechanized equipment in all units except units 814, 828, and 857. Thinning in these units would be done by hand. Stands would remain fully stocked and no reforestation would be required. The slash created by these activities would either be limbed and bucked to within 18 inches of the ground or mechanically treated (grapple piling, chipping or slash busting). Three units would have material piled and burned within 300 feet of Forest Road 10 (units 2001, 2002, 2090).

Trees less than 7 inches dbh are considered not to have commercial value, though in recent years smaller diameters have been used for chips, hog fuel, and other products. The market for small diameter trees is undependable, so it is unknown at this time whether trees below 7 inches dbh would be merchantable. However, such opportunities would be explored.

Connected Actions to Commercial and Non Commercial Thinning

Reduction in the fuels (slash, etc) generated by these activities would occur on approximately 2,906 acres (2,180 broadcast burn and 726 pile burn), and require 44 miles of fireline. Burn control lines would be constructed either mechanically or by hand and would not exceed 18 inches of bare mineral soil in width in RHCAs, and would average 18 inches or less outside RHCAs. After the activity fuels burning is complete these lines would be rehabilitated as necessary.

Roads used for access and haul of forest products would include 57 miles of closed road that would be temporarily reopened, 13.9 miles of new system road would be constructed, 6.6 miles of temporary road would be constructed, 104 miles of open road would be maintained and 36 miles of open road would be reconstructed. Closed roads re-opened for temporary access would

be re-closed after project activities are completed. Temporary roads would be obliterated after project activities are completed.

Tree seedlings would be planted on about 2,006 acres to achieve desired stocking and shift stand compositions. Vexar® tubing would be placed around planted seedlings to control animal damage.

Newly constructed Road 11 (preliminary designation) would remain open to OHVs from Howard Creek to Bull Prairie, a distance of 0.7 miles.

Roads used for access and haul of forest products would include 36 miles of open road that would be reconstructed, 63 miles of closed road that would be temporarily reopened, and 106 miles of open road that would be maintained. No new system roads would be constructed, and 10 miles of temporary roads would be constructed. Closed roads re-opened for temporary access would be re-closed after project activities are completed. Temporary roads would be obliterated after project activities are completed.

Tree seedlings would be planted on about 1,716 acres to achieve desired stocking densities and species compositions. Vexar® tubing would be placed around planted seedlings to control animal damage.

Road Obliteration

Same as described in Alternative 1.

ALTERNATIVE 4

Objective

The intent of this alternative is to conduct commercial and non-commercial thinning and timber harvest, fuels reduction, prescribed burning, reforestation and other vegetation management actions on as many stands as possible that were initially identified in the proposed action, while doing so without project activities occurring in, or new or temporary roads constructed in areas asserted by Oregon Wild to be undeveloped in character outside of inventoried roadless areas (Figure 2.6).

Figure 2.6. Alternative 4

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Description

Commercial Thinning and Timber Harvest

Commercial thinning using a variety of silvicultural prescriptions would occur on approximately 2,454 acres (2,132 acres ground-based and 322 acres skyline) in the same manner as described for the preceding alternatives. This alternative would produce an estimated volume of 12,270 hundred cubic feet (Ccf) of raw forest material.

Non-Commercial Thinning

Non-commercial thinning would occur on approximately 4,583 acres. As described above for Alternatives 1 and 2, non-commercial thinning may be accomplished using mechanized equipment in all units except units 814, 828, and 857 where thinning would be done by hand to the same standards, and three units (2001, 2002, and 2090) would have material piled and burned within 300 feet of Forest Road 10 in the visual corridor. Opportunities for the economic utilization of trees less than 7 inches dbh would be explored.

Connected Actions to Commercial and Non Commercial Thinning

Activity fuel reduction would occur on 1,941 acres (1,131 broadcast burn and 810 pile burn), and require 40 miles of fireline. This fireline would be constructed and rehabilitated as described above for Alternatives 1 and 2.

Roads used for access and haul of forest products would include 36 miles of open road that would be reconstructed, 63 miles of closed road that would be temporarily reopened, and 106 miles of open road that would be maintained. Approximately 7.8 miles of new system road and 5.1 miles of temporary road would be constructed. New system road would be closed and roads re-opened for temporary access would be re-closed after project activities are completed. Temporary roads would be obliterated after project activities are completed.

Tree seedlings would be planted on about 1,583 acres to achieve desired stocking densities and species compositions in the manner described above for the preceding alternatives.

Road Obliteration

Same as described in Alternative 1.

ALTERNATIVE 5

Objective

The intent of this alternative is to conduct commercial and non-commercial thinning and timber harvest, fuels reduction, prescribed burning, reforestation and other vegetation management actions on as many stands as possible that were initially identified in the proposed action, while emphasizing wildlife and wildlife habitat primarily for big game (elk and deer), neotropical birds, and other sensitive or species of concern (Figure 2.7).

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Figure 2.7. Alternative 5.

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The intent of this alternative would be met by:

- minimizing road construction and potential fragmentation of wildlife habitat;
- minimizing road construction in undeveloped portions of the project area, including the Howard and Battle Creek drainages;
- minimizing effects to cover and refuge areas for elk, including portions of the Kelsay, Battle and Howard Creek drainages, and the Road 1007 areas; and
- creating forage in some large areas of cover with minimal or no roads.

Description

Commercial Thinning and Timber Harvest

Commercial thinning using a variety of silvicultural prescriptions would occur on approximately 2,206 acres (1,945 acres ground-based and 261 acres skyline) in the same manner as described for the preceding alternatives. This alternative would produce an estimated volume of 11,030 hundred cubic feet (Ccf) of raw forest material.

Non-Commercial Thinning

Non-commercial thinning would occur on approximately 4,886 acres. As described above for the preceding alternatives, non-commercial thinning may be accomplished using mechanized equipment in all units except units 814, 828, and 857 where thinning would be done by hand to the same standards, and three units (2001, 2002, and 2090) would have material piled and burned within 300 feet of Forest Road 10 in the visual corridor. Opportunities for the economic utilization of trees less than 7 inches dbh would be explored.

Connected Actions to Commercial and Non Commercial Thinning

Activity fuel reduction would occur on 1,941 acres (1,131 broadcast burn and 810 pile burn), and require 40 miles of fireline.

Activity fuel reduction would occur on 2,758 acres (2,032 broadcast burn and 726 pile burn), and require 36 miles of fireline. This fireline would be constructed and rehabilitated as described above for the preceding alternatives.

Roads used for access and haul of forest products would include 36 miles of open road that would be reconstructed, 62 miles of closed road that would be temporarily reopened, and 105 miles of open road that would be maintained. Approximately 7.2 miles of new system road and 5.0 miles of temporary road would be constructed. New system road would be closed and roads re-opened for temporary access would be re-closed after project activities are completed. Temporary roads would be obliterated after project activities are completed.

Tree seedlings would be planted on about 1,420 acres to achieve desired stocking densities and species compositions in the manner described above for the preceding alternatives.

Road Obliteration

Same as described in Alternative 1.

MANAGEMENT REQUIREMENTS AND PROJECT DESIGN ELEMENTS

The Umatilla National Forest uses two general types of mitigation: management requirements and project design elements. Management requirements are standards that are established to protect forest resources, and are implemented during or after the projects to meet Forest Plan and other direction. Project design elements are actions designed for a specific project to reduce or prevent undesirable effects from proposed activities. Project design elements can include avoiding the effect, minimizing the effect by limiting the action, rectifying the effect, reducing the effect through maintenance, or compensating for the effect. The action alternatives include the following management requirements and project design elements. Unless noted otherwise in the decision document, these management requirements and project design elements would be incorporated into each of the action alternatives for implementation.

The management requirements would be implemented to meet the stated objectives. These requirements represent standard operating procedure for the protection of forest resources. The source for the requirements is the Forest Plan guidelines and provisions developed by the Umatilla National Forest.

Monitoring and Evaluation

The following are descriptions of monitoring needed to assure the desired outcome of the various projects. Monitoring for both implementation (whether the project was implemented as planned) and effectiveness (whether overall management objectives were met) would occur. Forest Service personnel would conduct monitoring in areas that have the highest probability of showing effects. At a minimum, monitoring would be consistent with the Forest Plan Monitoring Strategy. Monitoring identified as essential would occur if the project is implemented. Other monitoring would be completed as funding permits. An implementation plan would be prepared prior to project implementation that would be used to identify the person(s) responsible for implementation and track project administration and monitoring activities.

Forest Plan Monitoring

During project lay-out, units would be spot checked by Forest Service personnel to assure that riparian protection, as delineated by PACFISH requirements and Best Management Practices is implemented as stated. Boundaries that do not meet requirements would be adjusted accordingly.

Number, size, and distribution of snags and down logs within a sample of units would be field checked by Forest Service personnel. This monitoring is considered essential.

The Forest Service contract representative would monitor during and after activities to ensure sediment and soil compaction objectives are met. If objectives are not met, Forest Service personnel would identify and implement corrective action and document modifications to be used in future projects.

The District noxious weed coordinator or crew would conduct noxious weed species surveys prior to initiation of harvest or other ground disturbing activities within the project area.

Forest Service personnel would spot check activities during implementation to determine whether noxious weed mitigation measures are implemented. Deviations would be corrected immediately.

For 5 years after activities are completed, the District noxious weed coordinator or crew would conduct an annual inventory of the project analysis area and access routes to determine if existing noxious weed populations have spread or if new sites have occurred.

After prescribed fire treatments, Forest Service personnel would field check a sample of burn units to determine whether the prescription and mitigation (i.e. mortality, mineral soil exposure, fuel load reductions, etc.) have been met. If objectives or mitigation has not been met, additional burning may be delayed or the fire prescription and procedures adapted to ensure the mitigation is achieved.

Potential Knutsen-Vandenburg (KV) Projects

The following projects and opportunities have been identified as possible candidates to receive funding under the Knutsen-Vandenburg Act. These are commonly referred to as KV funds and are collected from the sale of timber. If harvest occurs, KV funds might not be generated for all enhancement projects. If KV funds are limited, other funding sources would be necessary, or the unfunded project would not be implemented.

Sale area enhancement opportunities associated with the action alternatives include:

- Reforestation
- Noxious Weed control
- Planting hardwoods in riparian areas.
- Installation of guardrails/gates on roads in the area to improve road closure effectiveness
- Road Obliteration
- Fencing around aspen stands and planting aspen.
- Noncommercial thinning
- Treatment of debris created by noncommercial thinning

KV Projects Requiring Future Analysis

These are opportunities that may be pursued in the future and are not currently proposed under the action alternatives. These projects are not reasonably foreseeable future projects. If these projects are initiated, additional NEPA analysis would be required:

- Wildlife underburning (for forage enhancement)
- Replacement and/or removal of fish barriers (culverts)
- Maintaining instream structures.
- Reconstruction of water sources.
- Range improvement fence construction and reconstruction
- Reducing conifer encroachment in meadows

Project Design Elements

Project design elements are practices that the interdisciplinary team developed during this analysis to address site-specific environmental concerns that were not sufficiently addressed by existing management requirements.

Erosion

All applicable project-specific Best Management Practices (USDA Forest Service, 1988, 2005b) would be incorporated into the design and implementation of project activities to protect water quality (and other resources), and to meet Forest Plan standards and guidelines, Clean Water Act and Oregon Dept. of Environmental Quality requirements.

Low-impact road design criteria and construction methods would be based on Forest Service specifications and standards [(FSH 7709.56 – Road Reconstruction handbook, chapt. 4 (WO5.87, Amendment 1)] that:

- avoids areas of steep ground, unsuitable soils and high erosion potential,
- minimizes the total area of disturbance,
- controls erosion with adequate and appropriate drainage features and protective cover, and timely revegetation of disturbed areas.

Where new system roads are constructed across stream channels, an appropriately-sized culvert would be installed and the roadbed within the RHCA would be rocked to reduce the potential for sediment reaching the stream.

Opportunities would be sought to improve drainage from existing roads by outsloping or insloping, and cross-draining water onto areas most capable of spreading and infiltrating runoff.

Newly-constructed roads would be closed to public motorized use. Methods of closure would be based on site-specific conditions and could include entrance scarification, installing berms and waterbars, and/or installing barricades or gates.

Ground-based equipment would operate in areas where the average slope is less than 35 percent in order to reduce the potential for soil disturbance.

Equipment crossing ephemeral draws would be confined to designated crossings.

Use of heavy equipment would be suspended when soil is too wet to support heavy equipment and unacceptable soil and erosion effects may result.

Use of heavy equipment would be suspended when there is excessive dusting up of soil.

All skid trails and landings would be designated and approved by Forest Service personnel to meet the Best Management Practices and applicable management requirements before thinning and harvest and would be located on already disturbed areas where possible. There would be no skidding off designated skid trails. Dispersed campsites would not be used as landings or skid trails.

Forwarder/skid trails generally would be located no closer than 50 feet apart, except where converging.

All skid trails, forwarder trails, and landings would be rehabilitated as necessary to reduce soil erosion and compaction. This may include seeding, water-barring, sub-soiling of landings, and other appropriate measures prior to the winter following use.

Skyline yarding corridors would be located approximately 150 feet apart, except where converging. Downhill yarding generally would be avoided, unless it offers opportunities to minimize potential adverse environmental effects when compared to other methods.

Fire control lines on slopes exceeding 35 percent (average), and in other sensitive areas where soil disturbance is of concern would be constructed by hand. Fire line would be rehabilitated by constructing water-bars and seeding as necessary.

Roads

Dust abatement on roads (if required for safety or resource protection) would be conducted according to applicable Forest Service specifications and standards and BMPs. Dust abatement adjacent to the Welch Cr. Campground and activity units ***crw***, ***caw***, ***cat***, ***cma***, ***bgc*** and ***ac*** may need to be more frequent to reduce effects on campsites. Water drafting sites must be approved by the Forest Service. Location, quantity, and timing of water use for dust abatement would be approved by the appropriate resource specialists to protect fisheries and water quality. Under no circumstances would more than 10 percent of a stream's instantaneous flow be pumped for dust abatement. Magnesium or calcium chloride may be used for dust abatement if the amount of log haul would make continued watering otherwise necessary, and low stream flows limit the availability of water.

All snowplowing would occur in a way that prevents erosion damage to roads and streams and meet applicable road maintenance contract specifications and include:

- no side casting of snow into streams,
- no plowing during breakup conditions,
- use of equipment of the size and type commonly used to remove snow and that would not cause damage to the road (use of dozers requires specific approval).
- use of shoes or runners to keep the plow blade a minimum of two inches above the road surface unless agreed otherwise'
- openings in berms to prevent accumulation of runoff, and trenches in the snow surface to direct runoff flows into areas that allow for spreading and absorption of water.

Fish

All riparian areas would be protected from adverse effects during project activities according Forest Plan, PACFISH, and other applicable policies, guidelines and standards, as well as Best Management Practices for the protection of water quality. No thinning and harvest would occur in PACFISH Riparian Habitat Conservation Areas (RHCAs):

- within 300 feet on either side of Class 1 and 2 (fish-bearing) streams,
- within 150 feet of Class 3 waters (non-fish bearing perennial streams, ponds and wetlands greater than 1 acre in size),
- within 100 feet of Class 4 waters (ephemeral or intermittent streams, springs, seeps, ponds, and wetlands less than one acre in size.

If a tree falls into a RHCA or unique habitat buffer, that portion inside the protected area would be left in place. If trees are inadvertently damaged within a RHCA, trees that are determined to be a safety hazard may be felled and left in place.

Work in streams would only occur from July 15 to August 15 to reduce sediment mobilization and potential adverse effects on fish. No equipment would cross streams during harvest and thinning activities. For culvert removal activities, applicable mitigation measures found in the Aquatic Restoration Programmatic Consultation Biological Opinion (2007) would be applied.

Wildlife

Unique habitats (such as talus, rocky outcroppings, scab habitats, cliff faces, wallows and meadows) would be protected.

Hazard trees in thinning and harvest units would be felled and left in place.

Snags, downed wood and green tree replacements would be retained in the densities specified in the wildlife section (3.6) of this DEIS and the Wildlife Specialist Report. Scattered single snags would be retained and where possible, left in clumps.

Except in the Forest Road 10 visual corridor, one slash pile per acre would be left for hiding cover for rodents and other wildlife in noncommercial thinning units (if hand- or machine-piled).

If a goshawk nest site is located during project design and implementation, the site would be protected by not conducting activities on 30 acres of the most suitable nesting habitat around the site, and establishing a 400-acre post-fledging area around the core nest area that meets guidelines for structural composition as described in Reynolds and others (1992). Project activities could occur in this post-fledging area if they retain late and old stand structure or would promote these conditions.

If raptor nest sites are encountered during project design and implementation the nest tree and surrounding area would be protected. The level of protection would vary by species and would be determined by the District wildlife biologist.

Clumps ranging in size from 1/10 acre up to 1/2 acre in size of small diameter conifers would be left in stands that are non-commercially thinned (including those stands that are commercially harvested first and then non-commercially harvested). Clumps of uncut small diameter conifers

(totaling 1 to 2 acres) would be left for approximately every 30 acres in commercial thinning and timber harvest units.

Where possible, a 20 to 25-foot wide strip of small diameter conifers would be retained in stands that are non-commercially thinned (including those stands that are commercially harvested first and then non-commercially harvested) along roads that are open year-round and seasonally to reduce the visibility of elk and deer along these routes. Stem densities would be greatest adjacent to the road and would gradually decrease farther into the stand until they meet prescribed spacing.

The largest snags and downed wood in project activity units would be retained; no snags or downed wood larger than 24 inches (dbh for snags, small end diameter for downed wood) would be felled or removed from project activity units. If such snags are felled as a hazard, they would be left on the ground and not removed.

Snags retained in units should be located away from open roads and potential firelines to reduce the chance they would be removed later by woodcutters and hazard tree felling associated with burning.

Measures would be taken to reduce unacceptable fire effects to retained snags, downed wood, or green tree replacements, including pulling slash away from or constructing fire line around these features.

Retained snags would represent a variety of decay classes including recently dead trees with tight bark. Broken-top and hollow snags, and green trees and snags with visible cavities would also be retained where available.

Range

Prior to thinning and harvest activities taking place, fences and gates in the vicinity would be operable and functioning as intended. All gates would remain closed while cattle are in or near project activity areas.

Existing structural range improvements (fences, gates, waterholes, etc.) would be protected. Improvements that are damaged during project activities must be repaired to Forest Service standards.

Fence right-of-ways and stock driveways and trails would be cleared of slash produced by project activities.

No burning would occur while livestock are in the area.

Safety

Where conditions and safety permit, trees would be felled away from riparian areas, residual conifers, snags designated for retention, dispersed campsites, trails, research plots (ecology plot center markers and condition and trend transect markers) and improvements such as fences, stock ponds, section corner monuments, and mining claim markers, etc.

Danger trees would be identified by Forest Service personnel along haul routes and project use roads and the hazard mitigated. Danger trees may be removed during construction / reconstruction of a road segment except in RHCAs.

Fuels, hazardous materials and explosives would be handled, transported and stored in accordance with all applicable federal (29 CFR part 1910.120) and state laws, and Forest Service policies and procedures.

Invasive Plants

Gravel, fill, sand stockpiles, quarry sites, and borrow material would be inspected for invasive plants and treated before transport and use. Only gravel, fill, sand, and rock that is judged to be weed free by District or Forest specialists will be used.

Road blading, brushing and ditch cleaning in areas with high concentrations of invasive plants would be conducted in consultation with District or Forest specialists; invasive plant prevention practices would be incorporated as appropriate.

A copy of known noxious weed infestations and identification material would be included in the thinning and timber harvest contract packages. Known infestations would be treated by the Forest Service prior to implementation of activities according to the Umatilla National Forest Environmental Assessment for the Management of Noxious Weeds (1995) and standards outlined in the Pacific Northwest Region Final Environmental Impact Statement for the Invasive Plant Program (2005).

Off-road equipment coming onto National Forest lands would be cleaned by whatever cleaning methods are necessary to ensure that it is free of invasive plant seeds, or material that could contain or hold seeds.

Revegetation activities would use certified weed-free seed. Native grasses and forb seed would be used if available, otherwise non-persistent exotic species would be used. Hay and straw used for mulch or erosion control also would be certified weed-free.

Air Quality

All project-related burning would comply with federal and state laws, regulations, policies and applicable smoke management plans, and avoid smoke intrusion into sensitive areas.

Cultural Resources

All known cultural resource sites would be protected. Field crews would consult with the Forest archaeologist prior to and during on-the-ground project design and implementation. If new cultural resource sites are discovered during project activities, they would be protected and the Forest archeologist would be notified immediately for assessment and to determine appropriate actions.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter discusses the physical and biological environments of the Farley Vegetation Management Project analysis area and the likely effects on those environments resulting from the proposed action alternatives. It presents the results of the scientific analyses used for comparing the alternatives, and the reasons for selecting the preferred alternative, which seeks to achieve the best balance of long-term benefits to forest resources and viable economic value within acceptable limits of environmental risks.

The current condition of various resources is described, followed by the environmental effects of each action on that resource. Current conditions are the result of past management actions (or inactions) and natural processes. Environmental consequences are those direct or indirect effects likely to be caused by the proposed project activities in the immediate project area and in the present to very near time frame. Cumulative effects could occur when the direct and indirect effects of the proposed project activities are combined with the effects of other past, present, or reasonably foreseeable future activities occurring within the project analysis area and that could be observed within or outside of the immediate project area and/or beyond the immediate time frame. A list of past, present, and reasonably foreseeable future actions is presented in Appendix C.

IMPORTANT NOTE: Throughout this document, data values (such as acres, miles of road, etc) have been rounded for ease of reading and use, so category values may not exactly match total values. In addition, the Geographic Information Systems (GIS) technologies and the supporting physical, spatial, and temporal data bases used to generate the resulting information and graphical representations continue to evolve. This was especially the case during preparation of this DEIS during a transition by the Umatilla National Forest to ArcGIS v9.2 with its underlying *geodatabase* format. Use of legacy data bases and formats in an evolving technological environment can result in small discrepancies in calculated values and graphical representations. Such discrepancies are likely to be observed in this DEIS but they should be viewed as being relatively insignificant (in a statistical sense). Furthermore, these data and associated graphical representations are intended to assist the overall decision process – they are not legal documents (for the purposes of precise location and boundaries, for example) and are not intended to be used as such.

3.1 FOREST VEGETATION

This section largely consists of the resource discipline specialist reports (and biological evaluation) by District and Forest silviculturists and botanists prepared for the Farley Vegetation Management Project. These reports and additional supporting information are contained in the project analysis file at the North Fork John Day Ranger District in Ukiah, OR.

SCALE OF ANALYSIS

In this DEIS, the analysis area for forest vegetation for the Farley Vegetation Management Project is the landscape of the Desolation Creek watershed (HUC[1]1707020204). The Desolation Creek watershed covers an area of approximately 69,675 acres, of which 56,228 acres are National Forest System lands. Approximately 13,447 acres (about 19 percent) is under other ownership, much of it by Hood River County (Oregon) that manages its lands primarily for grazing and timber production. The Farley Vegetation Management Project area consists of the National Forest lands in the Desolation Cr. watershed. The specific areas (treatment units) that would be affected by proposed commercial and non-commercial thinning and timber harvest, prescribed burning, reforestation and other associated project activities, including road construction, reconstruction, and obliteration / stabilization are shown on maps for each of the proposed action alternatives (Figures 2.4 – 2.7 above).

This section evaluates the effects of proposed silvicultural activities (commercial and non-commercial thinning and timber harvest, prescribed burning and reforestation) on forest stand structure and stocking density relative to historical and desired future conditions as directed by the Umatilla National Forest Land and Resource Management Plan (U.S. Dept. of Agriculture. Forest Service, 1990, as amended – hereafter referred to in this document as the Forest Plan). Also assessed are the potential effects of proposed activities on endangered and sensitive plants, and noxious weeds.

AFFECTED ENVIRONMENT

Overview of Forest Conditions in Analysis Area

Disturbances (such as wildfire, fire suppression, tree mortality from insects and disease, and timber harvest) are largely responsible for the existing conditions of the forested landscape in the Farley project analysis area. Disturbance influences stand structure and species composition by reducing vigor and killing trees, either selectively or non-selectively.

Insects have been a prominent disturbance agent in the area. Spruce budworm caused widespread damage and mortality in the fir species in the late 1940s and 1950s as well as in the 1980s. Mountain pine beetle caused heavy mortality in the lodgepole pine in the 1940s and 1970s. Both insects reached the large epidemic stage due to favorable species compositions and increased availability of stressed host trees. Spruce budworm and mountain pine beetle are examples of selective disturbance, as they target specific tree species as hosts.

Tree diseases in the area include fungal root diseases and stem decays. *Annosus* and *Armillaria* root rots are the most prominent and are actively causing damage and mortality in the true firs. Indian paint fungus (stem decay) is reducing vigor in the grand fir. These diseases are not unusual for the types of stands in the Farley area and appear to be occurring at characteristic levels when taken as a whole across the landscape. However, at the individual stand level they

[1] HUC - Hydrologic Unit Code. A hydrologic unit is a drainage area defined by hydrographic and topographic criteria that delineate an area drained by a river system, a reach of a river, and its tributaries in that reach. Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to twelve digits based on the six levels of classification in the hydrologic unit system.

may create more intense disturbance where species compositions are comprised primarily of host trees.

Balsam woolly adelgid populations have been on the rise, and the insect is currently causing mortality in subalpine fir in some stands. Recent aerial mapping has shown an increase in mortality in subalpine fir in the project analysis area as well as throughout the North Fork Ranger District and adjacent forests.

Timber harvest has been a disturbance agent in the area over the past several decades. Selective removal of certain tree species has influenced stand compositions. A substantial portion of past timber removal activities was in response to insect- and disease-caused mortality.

Fire, its historical cycles and subsequent suppression by humans, also has had an influence on the project analysis area as a whole. Fires in the area tend to become "stand-replacement" fires, creating a disturbance that returns the vegetation in the fire area to early seral stages and "resets" the stand structure to stand initiation.

Forest Stand Structure

Compared to historical conditions, structural diversity of forest stands across the landscape of the project analysis area has decreased; with the loss of old forest structure and an increase in the occurrence of lodgepole pine. The mosaic (arrangement on the landscape) of stands and structures has changed over the years with fire suppression and other management practices (Hessburg and others 1999).

On the cool sites, the area has had a loss of multi-storied old forest, primarily due to past spruce budworm damage, wildfires and harvest. Many stands have shifted structural stages due to heavy mortality from insects and disease, experiencing a loss of the large tree component and retaining damaged/unhealthy understory trees. Past harvest dating from the early 1970s and 1980s shifted structural stages back to stand initiation (SI) or understory re-initiation (UR). Powell (1998) analyzed current and historic patch sizes of structural stages in the Desolation Creek watershed, finding that mean patch sizes for the stem exclusion open canopy (SEOC), stand initiation and understory reinitiation stages are larger now compared to conditions in 1939.

On the dry sites, changes in stand species composition directly influence stand structure. Fire suppression has allowed stands to follow a different successional path, by allowing some tree species to grow in stands where they would not commonly be as successful in. As canopies close in and the ground becomes more shaded, shade-tolerant species (and some fire-intolerant) species regenerate and prosper with more ease than the shade-intolerant species. This has caused a shift in the composition of some of the stands across the landscape, from pine- and larch-dominated overstories and understories, to dominance by fir and lodgepole pine either in the overstory or understory. Past harvest selections have accelerated this shift by removing more of the ponderosa pine and larch than other species. Table 3.1.1 shows the area (in acres) in various forest size classes in the project analysis area.

Table 3.1.1. Forest stand size classes in the Farley analysis area (in acres).

Size Class	Description	Acres	Percent
Saplings	<5" DBH, seedlings and saplings	9,002	16
Poles	5" to 9" DBH, Pole-size trees	12,833	23
Small trees	9" to 21" DBH, Small-diameter trees	33,365	59
Large trees	>21" DBH, Medium and large trees	1,022	2
	TOTAL	56,222	100

Table 3.1.2 presents the results of the forest stand structure analysis conducted for this project. Gray cells show where the current percentage (C%) is above the historical range (H%) for a structural class. Black cells show where the current percentage is below the historical range. Deviations were noted only when the current percentage differs from the historical range by more than two percent. Historical ranges (H%) were derived from Hall (1993), Johnson (1993) and USDA Forest Service (1995), and are summarized in Blackwood (1998).

Table 3.1.2. Current and historic forest stand structural classes (in percent of analysis area) by potential vegetation group.

Potential Vegetation Group		Forest Structural Classes							Acres
		SI	SEOC	SECC	UR	YFMS	OFMS	OFSS	
Cold	H %	1-20	0-5	5-20	5-25	10-40	10-40	0-5	23,353
	C %	36	25	1	0	29	0	2	
Moist	H %	1-10	0-5	5-25	5-25	40-60	10-30	0-5	20,122
	C %	28	20	0	1	43	1	0	
Dry	H %	5-15	5-20	1-10	1-10	5-25	5-20	15-55	9,498
	C %	12	28	9	17	26	3	1	

DEFINITIONS

C Current Condition (percent of area)
H Historic Condition (percent of area)
SI Stand Initiation (single layer of seedlings and saplings becoming established after disturbance)
SEOC Stem Exclusion Open Canopy (fast-growing trees occupy site, understory excluded by lack of moisture)
SECC Stem Exclusion Closed Canopy (fast-growing trees occupy site, understory excluded by lack of sunlight)
UR Understory Re-initiation (understory becoming established after overstory trees begin to die)
YFMS Young Forest Multi-Strata (3 or more layers, mix of sizes and ages, large trees scarce, high horizontal and vertical diversity
OFMS Old Forest Multi-Strata (multi-layer stand, old trees in overstory)
OFSS Old Forest Single-Stratum (single layer stand, old trees in overstory)

Environmental Consequences

Direct and Indirect Effects of No Action on Forest Stand Structure

No action in the analysis area would leave the current stand structures as they are. In the case of Old Forest Single-Stratum (OFSS) structure, active management would be the only foreseeable avenue for promoting an increase in this structural stage. With the current condition of the other younger structural stages, and assuming fire suppression would continue, the chance that this

part of the project analysis area would be able to recover its historical range of OFSS would be small. The level of shade-tolerant species within many stands would make it difficult for ponderosa pine and western larch to succeed to the point of becoming the primary large trees across these areas in the future. More likely, large pine and larch would continue to decline in numbers, slowly maintaining less and less of a presence in the drier portion of the landscape. In the case of Old Forest Multi-Strata (OFMS) structure, many stands of young fir (the future OFMS) are currently in an unhealthy condition, having suffered in the recent spruce budworm epidemic and drought conditions, and are continuing to be susceptible to the insects and diseases present in the project analysis area. Potentially, these trees may not be relied upon to contribute to large tree structure in the long term. Since grand fir is a shade tolerant species and has shown an ability to regenerate under more heavily vegetated conditions, new trees would eventually become established and grow where the opportunities exist. Seedling establishment likely may take many years and achieving the large size and stand conditions defined as OFMS likely would take 100-200 years beyond that.

No Action would forego the opportunity to thin stands to increase structural diversity and encourage growth in trees that could become the large trees of the future. Improving the growth rate of healthy overstory trees in young forest multi-strata stands would allow them to move most quickly in the size class where they would qualify as old forest. Within the Farley project analysis area landscape, the establishment of large areas of lodgepole pine regeneration from recent past fires could further delay the development of large trees, as other species would have to compete with the plentiful lodgepole to succeed.

The Forest Plan, when describing the goals and desired future conditions for the Forest, often mentions diversity in habitats and visual resources, and healthy and natural-appearing forests. The loss of OFSS and OFMS structure across the Farley landscape has had a direct effect on all those components. Leaving the analysis area in its current state (taking no action), would do little to achieve the goals and desired future conditions, and would most likely allow conditions to continue their decline.

Cumulative Effects of No Action on Forest Stand Structure

The Interior Columbia Basin Environmental Management Project (ICBEMP; in Quigley and others, 1996), and Hessburg and others (1999) also discussed patterns of living and dead forest structure on the landscape from both a current and historical perspective as affected by changes in disturbance processes. Hessburg and others (1999) found that in the Blue Mountains, old single-story structures had declined “by nearly 63 percent”. No Action, coupled with these trends from the past, would have the cumulative effect of perpetuating these trends.

Direct and Indirect Effects Common to All Action Alternatives on Forest Stand Structure

All action alternatives focus on treatments that would promote the long-term increase of old forest structure (Table 3.1.3), which currently is well below its historic range of variability throughout the project analysis area. Thinning would be one of the means of accomplishing this and would directly affect the path each stand takes toward old forest structure. Thinning would shift the site’s growing potential to fewer trees, allowing those trees to grow larger more quickly (Powell 1998). Research conducted in the Blue Mountains and central Oregon has shown that

"substantial increases" in individual tree growth can occur following a thinning from below (Powell 1998). Since most of these stands are young, development of large trees would be a long process (100+ years), but the action alternatives would start the treated stands down this path.

The effects expected under all of the action alternatives generally would be the same. The difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative.

Table 3.1.3. Area (acres) proposed to be treated to promote old forest structure, by forest type and alternative.

Potential Vegetation Group	Total Acres	Area proposed to be treated to promote old forest structure (in acres and percent)									
		No Action		Alternative 1		Alternative 2		Alternative 4		Alternative 5	
Cold Upland Forest	23,353	0	0	4,126	18%	3,986	17%	4,027	17%	3,556	15%
Dry Upland Forest	9,498	0	0	1,093	12%	1,056	11%	1,093	12%	1,056	11%
Moist Upland Forest	20,122	0	0	2,523	13%	2,325	12%	2,198	11%	2,155	11%

The stands being treated to promote OFMS would be harvested with seed tree or shelterwood methods, due to their current unhealthy or dying condition. The treatments would immediately minimize the current impacts of insects and disease, and combined with planting, set these stands up for a healthy future. The effect of this treatment would be to shift the current structure of Young Forest Multi-Strata (YFMS), Stem Exclusion Open Canopy (SEOC) or Understory Re-initiation (UR) in the cold and moist upland forests to UR, SEOC, or Stand Initiation (SI) structure (Table 3.1.4).

Table 3.1.4. Potential Change in Structural Stage Following Treatment.

Potential Change in Structural Stage With Treatment (Acres)	No Action	Alternative 1	Alternative 2	Alternative 4	Alternative 5
SEOC to SI	0	654	559	516	491
SEOC to UR	0	198	150	198	150
SEOC to SEOC (no change)	0	1,305	1,305	1,068	1,305
UR to UR (no change)	0	33	33	33	33
YFMS to SI	0	1,425	1,229	1,140	1,001
YFMS to UR	0	292	255	292	255
YFMS to YFMS (no change)	0	497	497	497	497
SI to SI (no change)	0	3,338	3,338	3,272	3,338

Selection of the silvicultural treatments was guided by standards in the Forest Plan and the Eastside Screens that directs the treatment of an area in regard to stand structures when one or both of the late and old structural stages fall below their historical range of variability. Growing old forest structure is a long-term process, but any enhancement that could be initiated now with silvicultural treatments would have far-reaching effects in the future. Influencing species composition and individual stand health now with thinning would encourage individual trees to prosper, ultimately speeding the process of becoming old forest structure. Improving stand health by influencing species composition with removal and planting would promote healthy trees that have a chance to grow into Old Forest (OF) structure. Table 3.1.5 summarizes the types of silvicultural treatments proposed for this project (also see Figures 2.4 – 2.7 above).

Table 3.1.5. Silvicultural treatment type by alternative (acres).

Alternative	Thinning	Regeneration Harvest and Replanting	Total
1	5,663	2,079	7,742
2	5,579	1,788	7,367
4	5,360	1,655	7,015
5	5,579	1,492	7,071

Cumulative Effects of All Action Alternatives on Forest Stand Structure

As discussed under No Action, ICBEMP (Quigley and others 1996), and Hessburg and others (1999) also discussed patterns of living and dead forest structure on the landscape. The intent of the prescriptions for all action alternatives is to begin bringing stand structures and their pattern on the landscape back to historical conditions. When considered with past trends, this treatment would begin to return conditions toward a more diverse and resilient landscape, particularly with a regard to OFSS and OFMS. Other activities in the analysis area that could affect forest stand structure include reforestation of the Sharps Ridge and Otter fire areas.

Forest Stand Stocking Density

A little more than half of the acres within the Farley analysis area are classified as “dense” as identified by Forest GIS database queries (Table 3.1.6). Trees in these dense stands tend to be stressed by competition with their neighbors for light and water. Stressed trees are more susceptible to insect attack or disease infestation, and are usually slower growing than trees in open stands (Powell 1999). In addition, stand density strongly influences the ability to quickly move mid-structure stands (such as SECC, YFMS, and UR) into a late-structure condition (OFSS or OFMS). Without thinning, dense stands would require a very long time period to move from a mid-structure to a late-structure condition.

Table 3.1.6. Area (acres and percent) of overstocking in the Farley analysis area, by forest type.

Potential Vegetation Group	Acres of Overstocking (on National Forest Lands in Desolation Cr. Watershed – the Farley project analysis area)	Percent of Analysis Area
Cold Upland Forest	14,668	26
Moist Upland Forest	6,878	12.2
Dry Upland Forest	7,232	12.9
TOTAL	28,878	51.1*

***IMPORTANT NOTE:** The vegetation report from the Desolation Ecosystem Analysis (Powell 1998) identified only 4.5 percent of forest stands in the Desolation Creek watershed as overstocked. In contrast, this analysis for the Farley Vegetation Management Project DEIS identified 51.1 percent of the area as overstocked. This apparent discrepancy is best explained by the approach used in the 1998 analysis of stratifying existing cover types within Potential Vegetation Groups into seral stages that resulted in unwarranted emphasis being placed on stocking levels associated with late-seral tree species. Also, more refined criteria for evaluating stocking levels have been developed since the Desolation Ecosystem Analysis was completed in October 1998. These refined criteria (Powell 1999) were used in this analysis; consequently, current information more accurately describes the stocking condition of forest stands in the watershed.

Insects and disease have been more prevalent in stands in the project analysis area due to the stress caused by dense stocking. The spruce budworm epidemic in the 1980s and early 1990s resulted in extensive defoliation, dead tops, sparse crowns and tree mortality was an example of what can occur in stands of trees stressed for water and nutrients by competition. Many stands within the project analysis area were adversely affected by the budworm and still remain in poor health. Insect and disease damage currently is evident in the project analysis area, including mortality in subalpine fir caused by the balsam woolly adelgid, and mortality in grand fir and Douglas-fir from root rots (Schmitt and Scott 2007).

Lodgepole pine grows prolifically in the project analysis area, often after a wildfire, as regeneration in harvested areas, or following an insect or disease disturbance in an established overstory. Most stands of lodgepole in the project analysis area are overstocked and thus are susceptible to future bark beetle attack. Substantial portions of the watershed have sustained bark beetle outbreaks in dense stands of lodgepole in the past (Powell 1998) and can be expected to do so in the future (Schmitt and Scott 2007).

The amount of lodgepole pine-dominated stands in the area may be within the natural or historic range of variability, and therefore, the potential for future mountain pine beetle epidemics may be within historic ranges of variability (as lodgepole pine stands follow their characteristic life cycle). However, the resulting widespread mortality from potential epidemics and associated risk of intense and large-scale wildfire in the Farley project analysis area may be unacceptable from social, other resource management, and economic perspectives.

Environmental Consequences

Direct and Indirect Effects of No Action on Forest Stand Stocking Density

Thinning would not occur with No Action, which would leave stands at higher risk from disturbances. Insects and diseases would be expected to be more prevalent where trees are stressed and weakened by competition for light, moisture, nutrients and growing space. Stands with denser understories would be at higher risk of wildfire.

Direct and Indirect Effects Common to All Action Alternatives on Forest Stand Stocking Density

All action alternatives would reduce stocking in the treatment units, primarily by commercial and non-commercial thinning (Table 3.1.7). Removal of some trees in the treatment units would allow remaining trees more access to sunlight, nutrients, water and growing space, which would improve the overall health of affected stands. Maintaining or improving tree health could reduce damage and mortality from insects and disease, and create a more long-lived and resilient stand. Selection of the silvicultural treatments was guided by the Forest Plan.

The effects expected under all of the action alternatives generally would be the same. The difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative.

Table 3.1.7. Acres and percentage of Farley analysis area to be thinned by alternative.

	No Action	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Acres to be thinned	0	5,663	5,579	5,360	5,579
% of Analysis Area	0	10.1%	9.9%	9.5%	9.9%

Cumulative Effects Common to All Action Alternatives on Forest Stand Stocking Density

Past activities of timber harvest, fire suppression and wildfire contributed to the undesirable stocking conditions observed in current forest stands within the project analysis area. The proposed thinning would counteract the effects of these past activities by creating more sustainable stand densities in the treated units, and a more resilient landscape.

Biological Evaluation for Plants Listed as "Sensitive"

Listed Sensitive Plants

Two sensitive plant species on the Regional Forester's Sensitive Species List (dated January 2008) occur in the Farley project analysis area. Determinations of potential project effects are summarized in Table 3.1.8 below.

Table 3.1.8. Sensitive plants occurring in Farley analysis area.

Species	Scientific Name	Species Code	Status	Occur-rence	Effects
Mountain moonwort	*Botrychium montanum*	BOMO	S	D	NI
Bolander's spikerush	*Eleocharis bolanderi*	ELBO	S	D	NI

Codes:

Status

E	Federally Endangered
T	Federally Threatened
S	Sensitive species from Regional Forester's list
C	Candidate species under Endangered Species Act

Occurrence

HD	**Habitat Documented** or suspected within the project analysis area or near enough to be impacted by project activities
HN	**Habitat Not** within the project analysis area or affected by its activities
D	Species **Documented** in general vicinity of project activities
S	Species **Suspected** in general vicinity of project activities
N	Species **Not documented** and not suspected in general vicinity of project activities

Effects Determinations (Sensitive Species)

NI	No Impact
MIIH	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
WIFV	Will Impact Individuals or Habitat with a Consequence that the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species
BI	Beneficial Impact

Examination of the Umatilla National Forest sensitive plant coverage in GIS shows two sensitive plant locations in the Farley analysis area. Project activities such as commercial and non-commercial timber harvest, prescribed burning and transportation system modifications and use have the potential to affect these locations

Mountain Moonwort *(Botrychium montanum)*

A small population of *Botrychium montanum* (mountain moonwort)(BOMO), listed as sensitive in Oregon on the Regional Forester's Sensitive Species list, is outside but proximal to unit ***bwa*** proposed for thinning and burning in alternatives 1 and 2.

Direct and Indirect Effects

Potential direct impacts to mountain moonwort from project implementation include direct physical disturbance from mechanical equipment, direct trampling by boots, burial if located in a landing site, and intense heat from burning if located in heavy fuels areas. An indirect effect on mountain moonwort from thinning and burning activities would be the associated reduction in canopy cover. Shade is an important factor in the habitat of these plants so thinning activities

could result in a reduction in available habitat. Given the location of the moonwort population outside of the treatment unit, the reduction in canopy cover would not impact shade present at the existing plant location but would reduce the amount of available habitat for potential expansion of the population into adjacent areas.

Since this location of BOMO is outside of a project activity unit, proposed activities would have no impact on *Botrychium montanum* (a determination of NI).

Required Project Design Criteria

The Forest Botanist would confirm its location to ensure that it is outside of thinning unit ***bwa*** before project implementation. Its location would be flagged by the Forest Botanist if a 'no activity zone' is needed.

Bolander's spikerush *(Eleocharis bolanderi)*

Another sensitive plant, *Eleocharis bolanderi* (ELBO), a sensitive spikerush, occurs at the edge of proposed commercial thinning unit *cat* along road 1010-030. This unit is proposed for thinning with subsequent mechanical piling and burning in alternatives 1, 2, 4, and 5.

Habitat of this spikerush is associated with local hydrology so plants are most often found along the edges of intermittent channels in headwater regions of streams, and on gently sloping ground. The plant needs full light but thrives on poor soils, so it can occur both in dry forest openings and in biscuit-mound or scab grasslands. Generally, in locations along channels it is protected from timber and fuels management projects by the PACFISH buffers.

Direct and Indirect Effects

One population of this spikerush occurs at the edge of proposed unit 'cat' along road 1010-030; it is associated with roadside hydrology (ditch line) where PACFISH buffers are not applied. This site would need to be avoided during harvest operations and subsequent mechanical piling and burning activities. The reduction in canopy cover would have an indirect beneficial effect on Bolander's spike rush, as this plant species occurs in openings so the removal of trees would create additional open areas for the plant to occupy.

With avoidance of activities at the plant location site, the project would have no impact on *Eleocharis bolanderi* (determination NI).

Required Project Design Criteria

The Forest Botanist would provide GPS information so that the location is clearly marked on contract maps and the area designated as a "no activity zone".

Cumulative effects to sensitive plant species:

All ground disturbing activities (mining, grazing, logging, road building, activities associated with fire suppression, construction of campgrounds) in the past, starting with Euro-American

settlement in the 1880's, have possibly contributed to a reduction/degradation in potential habitat for mountain moonworts and Bolander's spikerush. This is speculative and difficult to evaluate since inventory and mapping of protected, endangered, threatened and sensitive (PETS) plant species did not really begin until the 1900's.

Implementation of the proposed Farley project with 'no activity zones' designated and implemented to protect sensitive plant species would likely be beneficial to the sensitive species located in the project area. The reduced risk of stand-replacing wildfire would be beneficial to the shade-loving mountain moonwort. The opening up of the forest canopy would be beneficial to Bolander's spikerush.

Little information is available about *Eleocharis bolanderi*, which was known only from historic records (1940s) until it was located in Grant and Malheur counties in 2002. It is a low-growing, fine-leaved, clumpy, grass-like species that favors intermittent stream channels and seasonally moist areas. Bolander's spikerush is palatable and does get grazed, however, it does not appear to be a favored forage. Several populations that are in active allotments across the Umatilla NF show evidence of establishment of new plants, in spite of the presence of aggressive non-native grasses. Although no formal monitoring has yet been undertaken, recent and current levels of grazing appear to be allowing persistence and possibly increase of *Eleocharis bolanderi* at recently documented sites.

The ground disturbing activities listed in the paragraph above have undoubtedly contributed to and would continue to contribute to the introduction and spread of invasive plant species. The present patterns of recreational use with dispersed campsites and ATV use contribute to the continued spread of invasive plant infestations. Past and ongoing noxious weed inventory/treatments on approved infestation sites in the Farley project area continue to reduce the risk of invasive plant spread/increase in the project area. Invasive plant sites not yet approved for treatment would continue to be inventoried and would continue to spread to newly disturbed ground.

The spread of invasive plant species is second only to habitat destruction for endangering imperiled species (Flather et. al. 1994). The proposed Farley project with its associated ground disturbing activities would have substantial potential to spread the already existing invasive plant infestations that have not yet been approved for treatment.

Invasive Plants / Noxious Weeds

The risk of proposed activities causing noxious weeds to become established and/or spread within the analysis area generally would be proportional to the number of acres subjected to the various treatment activities under each alternative. As the amount of acres treated (thinning, harvesting, burning) increases, the risk of noxious weed establishment/ and spread would be expected to increase.

Table 3.1.9 shows noxious weeds of concern within the Farley analysis area and their associated priority category. Several categories are used to prioritize noxious weed species on the Forest list for treating and inventorying:

Table 3.1.9. Noxious weed species (and associated priority category) in the Farley analysis area.

Species	Common Name	Priority (for control efforts)	
Centaurea biebersteinii	Spotted knapweed	New Invader/Established	High
Centaurea diffusa	Diffuse knapweed	New Invader/ Established	High
Cynoglossum officinale	Hound's tongue	New Invader/Established	High
Linaria vulgaris	Yellow Toadflax	New Invader	High
Potentilla recta	Sulfur Cinquefoil	New Invader/Established	Low
Taeniatherum caput-medusae	Medusa-head	New Invader	Low
Hypericum perforatum	St. John's wort	Established	Low
Cirsium arvense	Canada thistle	Established	Low
Cirsium vulgare	Bull thistle	Established	Low
Centaurea solstitialis	Yellow star thistle	Potential Invader	High

Priority Categories

Potential Invaders are noxious weed species that occur on lands adjacent to the Umatilla National Forest but which have not been documented to occur on lands administered by the Forest.

New Invaders are noxious weed species of limited distribution that probably can be eradicated if early treatment can be implemented.

New Invaders/Established are species that are presently controllable but that are approaching "Established" and that are prioritized for early treatment.

Established species are widespread in large populations; containment strategies are used to prevent their further spread.

Existing infestations of noxious weeds in the analysis area are relatively small and densities are low. There are only approximately 243 acres of inventoried noxious weed infestations on National Forest lands in the analysis area. Most of the noxious weed sites described in Table 3.1.10 are located along road corridors. From these points of initial infestation, weed species become opportunistic in invading suitable microhabitats adjacent to the initial infestation site or in areas where soil disturbance occurs. Most of the noxious weed species of the Umatilla National Forest thrive in open full sunlight in disturbed soils in which native species have been diminished or displaced (conditions commonly associated with roads). Conversely, a few noxious weeds species would tolerate shade (most notably hound's tongue, and to a lesser extent, spotted knapweed) and can invade understory habitat. Most of the noxious weeds species found in the analysis area are easily spread by vehicle traffic making road corridor weed sites of high concern. Compared to other areas of the District and Forest, the overall risk of noxious weed spread from existing populations is low.

Table 3.1.10. Noxious weeds in Farley analysis area.

Species Code	Common Name	Number of Sites	Average No. of Plants per Acre	Acres
CEBI2	Spotted Knapweed	10	31	50
CEDI3	Diffuse Knapweed	10	10	30
CYOF	Houndstongue	9	71	110
LIVU2	Yellow Toadflax	4	8	2
PORE5	Sulfur Cinquefoil	13	Many	50
TACA8	Medusahead	1	Many	1
HYPE	St. John's wort	*	*	*
CIAR4	Canada Thistle	*	*	*
CIVU	Bull Thistle	*	*	*

*These species are not intensively inventoried but considered to be widespread. Biological controls, if available, are considered to be already established.

Environmental Consequences

Direct and Indirect Effects of No Action on Invasive Plants / Noxious Weeds

If the no action alternative was selected, no activities would be implemented. Existing native vegetation would continue to stabilize soil and consume resources (i.e. nutrients, water, and space), which would help reduce invasion by noxious weed species.

Direct and Indirect Effects Common to All Action Alternatives on Invasive Plants / Noxious Weeds

The thinning, timber harvest, burning/reforestation as well as the road construction/reconstruction, maintenance, and stabilization/obliteration activities proposed in each action alternative could cause noxious weeds to spread and/or become established in the analysis area. As the amount of acres treated increases, the potential for weeds to spread or become established increases. Depending on alternative, thinning and timber harvest activities are proposed to occur on approximately 7,037 to 7,735 acres, and burning is proposed to occur on approximately 1,941 to 3,276 acres. There are 10 inventoried noxious weed infestations totaling approximately 66 acres within project activity units proposed for Alternatives 1, 2 and 5, and nine inventoried noxious weed infestations totaling approximately 64 acres within project activity units proposed for Alternative 4. Alternatives 1, 2, and 5 are mostly identical in the low chance of weed spread when compared to each other because they all have the same 10 weeds sites that total 66 acres in or near treatment units in these alternatives. Alternative 4 has a slightly lower chance of weed spread than the rest of the actions alternatives because it has one less noxious site that is two acres in size in or adjacent to a treatment unit. Due to the location, small size and low densities of these infestations, and the mitigation measures to be employed, there is a low risk that invasive plants / noxious weeds would spread from these sites due to the proposed activities under all alternatives.

Cumulative Effects on Invasive Plants / Noxious Weeds

Past road construction and maintenance, recreation, grazing, timber harvest, fire and other soil disturbance have provided environments for noxious weed species to become established within the analysis area, although these activities have resulted in relatively few acres of infestations of high priority noxious weeds as compared to other areas on the District and Forest. Livestock, wildlife, and vehicles not associated with the project would continue to be a vector for weed seeds to be spread within the analysis area.

The cumulative effects of all action alternatives on the establishment and spread of high priority noxious weeds is expected to be low due to the mitigation proposed to be implemented and due to the current conditions in and adjacent to proposed activities.

The cumulative effects of all action alternatives on the establishment and spread of low priority noxious weeds is greater than that of high priority noxious weeds, due to the lack of treatment on those species. Low priority noxious weeds are those species that are considered widespread throughout the forest and generally are less competitive. Low priority noxious weeds within the analysis area (bull thistle, Canada thistle, and St. John's wort) are generally less persistent than high priority weeds and are out competed by forest canopy and competing understory vegetation, resulting in a reduction of these weed species in higher seral stage plant associations. The proposed activity methods and mitigation would minimize ground disturbance, which would allow the existing competing vegetation to reduce the spread and establishment of low priority weeds.

Consistency With the Forest Plan and Other Applicable Natural Resource Management and Environmental Laws, Regulations, Policies and Programs.

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the Farley analysis area.

3.2 FIRE and FUELS

SCALE OF ANALYSIS

In this DEIS, the analysis area for fire and fuels for the Farley Vegetation Management Project is the forested landscape of the Desolation Creek watershed (HUC 1707020204), and for air quality with respect to prescribed burning, in the adjacent airsheds. The Forest Plan specifies the resource management direction and desired future condition for National Forest System lands, and provides guidelines and standards for the vegetation management and associated activities proposed for this project.

This section evaluates the effects of proposed vegetation management activities with respect to wildfire and fuels, and prescribed burning and air quality on:

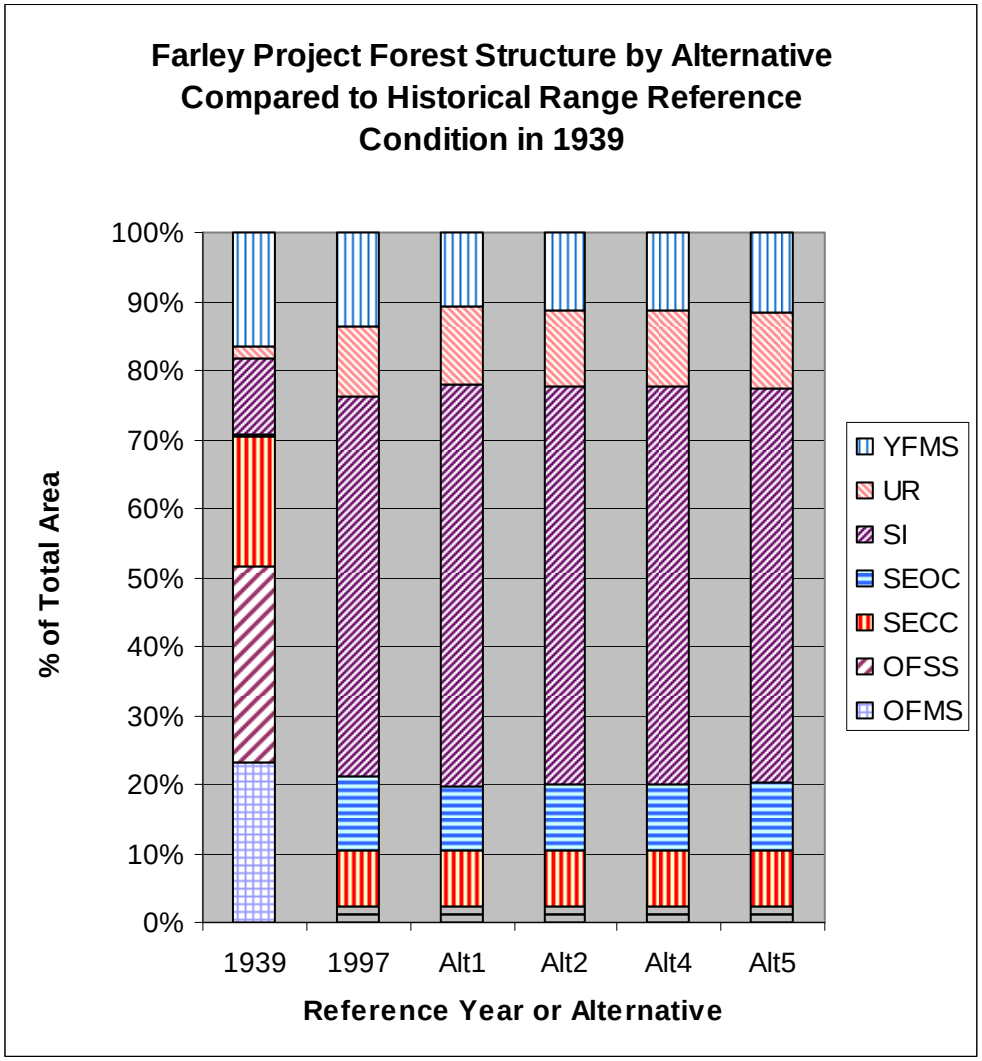
- forest stand structure (including stocking density and species composition) relative to historical conditions,
- fire regime and condition class,
- wildfire risk, and
- air quality as affected by prescribed burning and fuels treatments.

AFFECTED ENVIRONMENT

Stand Structure and Historic Range of Variability (HRV)

Figure 3.2.1 shows the distribution of stand structure classes in the Farley analysis area in 1939 (reference condition), in 1997, and the distribution likely to result from each action alternative. Substantially more stand initiation (SI) structure is present in the Farley analysis than has existed historically. In contrast, old forest structure - Old Forest Single Story (OFSS) and Multi-Story (OFMS) – currently is quite rare. Currently the Stem Exclusion Open Canopy (SEOC) structure class is over-represented compared to the historic range of variability (HRV). Other stand structures (Young Forest Multi-Story, YFMS, Stem Exclusion Closed Canopy, SECC, and Understory Reinitiation, UR) are within HRV.

Figure 3.2.1. Distribution of stand structure classes in the Farley project area in 1939, 1997, and the distribution likely to result from each action alternative.



Environmental Consequences

Direct and Indirect Effects of No Action on Stand Structure

No action would result in continuation of current conditions, and ecological trends and processes, including the potential for wildfire in the future.

Direct and Indirect Effects Common to All Action Alternatives on Stand Structure

There is little appreciable difference among the alternatives in terms of effect on stand structure HRV. Some of the SEOC and YFMS structure areas would be converted to SI or UR structure through overstory removals. Thinning of dense young stands could accelerate growth of individual trees and aid stand development in the long term, but fire hazard would be increased for up to 5 years by the slash generated by non-commercial thinning. Young stands may be particularly vulnerable due to low canopy base heights and small diameter thin-barked trees that

are more easily killed by fire. Older forests tend to be more resistant to low and moderate intensity fires due to higher average crown base heights and thicker barked larger diameter trees that are not as easily killed by fire.

Fire Regime and Condition Class

Fire regime is the concept used to describe the prevailing fire conditions under which native flora and fauna evolved in an ecosystem. Fire regime is the combination of fire frequency, predictability, intensity, seasonality and extent of fire.

Fire severity describes the effects of fire in the forest ecosystem. In high severity fire regimes, fires generally are of high intensity that kill most or all trees in a stand (stand replacement). In low severity fire regimes, most fires are of low intensity and many of the larger trees in a stand survive. Moderate or mixed severity fire regimes result in patches of high and low mortality (Agee 1998).

Natural or historic fire regime attempts to describe the role of fire in an ecosystem in the absence of modern human mechanical intervention, but includes the influence of aboriginal burning (Agee 1993, Brown 1995). From an ecosystem restoration perspective, the structure, composition and function of vegetation in the pre-settlement fire environment are of particular interest.

Coarse scale definitions for natural (historic) fire regimes have been developed by Hardy and others (2001) and Schmidt and others (2002), and interpreted for fire and fuels management by Hann and Bunnell (2001). Five national categories of natural fire regimes are based on the average number of years between fires (fire frequency), combined with the intensity and severity of effects of the fire to the dominant overstory vegetation (Table 3.2.1).

Table 3.2.1. Natural fire regime groups.

Fire Regime Group	Fire Return Frequency	Fire Intensity/Severity
I	0-35 years	Low to mixed severity (surface fires most common with less than 75 % of the overstory vegetation replaced)
II	0-35 years	High severity (stand replacement with greater than 75% of the dominant overstory replaced)
III	35-100+ years	Mixed (less than 75 % of the overstory vegetation replaced)
IV	35-100+ years	High severity (stand replacement with greater than 75% of the dominant overstory replaced)
V	>200 years	High severity (stand replacement with greater than 75% of the dominant overstory replaced)

Most of the Farley analysis area is in fire regime I (28%) and IV (70%) as described in Table 3.2.2. Fire regime was estimated from potential forest vegetation type (Powell et. al. 2007). Hot or warm and dry potential forest types generally are classified as fire regime I or II. Moist forest types generally are classified as fire regime III or IV, and cold forests as fire regime IV or V.

Table 3.2.2. Fire regime and acres within Farley analysis area.

Fire Regime	Acres	Percent
I	19611	28
II	343	<1%
III	220	<1%
IV	49043	70
V	0	0

Source/Notes: page 34 in PNW-GTR-709, Potential *Vegetation Hierarchy for the Blue Mountains Section of Northeastern Oregon, Southeastern Washington, and West-Central Idaho* (Powell and others, 2007) Fire regime classification is based on Plant Association Group and includes private land.

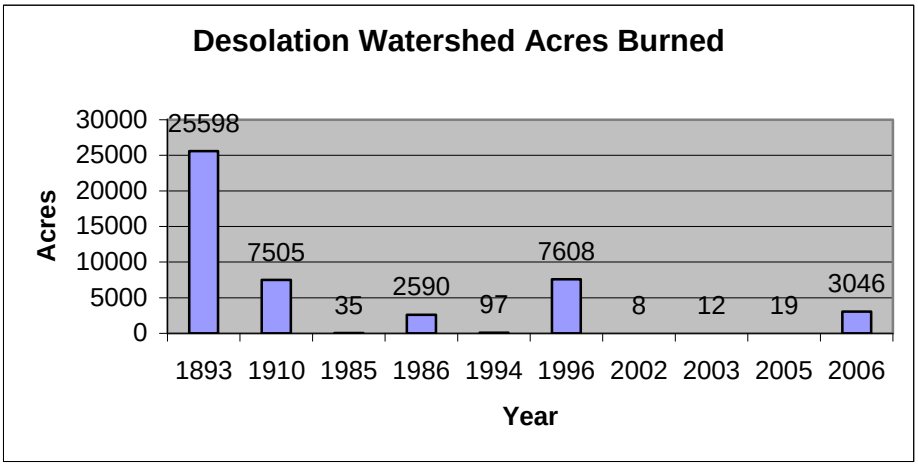
It is important to note that fire regimes are conceptual and do not occur as discrete areas on a landscape. Just like vegetation distribution, they are dynamic and continuous in their distributions. The concept that fire regimes are related to vegetation types serves to guide vegetation management by considering the likelihood and magnitude of a potential fire disturbance event.

Some fire regimes have been altered by fire exclusion and land management practices. In the Western United States, alteration of fire regimes by fire exclusion has been greatest in dry forests, primarily those dominated by ponderosa pine, Douglas-fir, or both (Graham and others 2004). The scope and degree of fire regime alteration is uncertain. Mixed severity regimes may have been more common and low severity regimes less common before the present period of fire suppression (beginning in the early 1900s) in dry forests of the Pacific Northwest (Hessburg and others 2007).

Some dry forest stands now contain increased accumulations of fuels compared to fuel conditions prior to fire exclusion. Abundant surface and ladder fuels, and low canopy base heights may facilitate the development of high intensity crown fire during severe fire weather conditions in any forest stand.

Fire history in the analysis area is summarized in Figure 3.2.2. Except for the 1893 fire, all others have occurred during the period of fire suppression. Current policies and climatic conditions have resulted in an overall mean fire return interval for the project area of approximately 14 years and a fire rotation of 171 years.

Figure 3.2.2. Fire history in the Farley analysis area.



The concept of fire regime condition class (FRCC) was developed to describe departures from historical rates of fire occurrence or other disturbance agents. Areas of departure may exhibit vegetation conditions uncharacteristic of expected natural ecosystem conditions. There are three FRCC levels. Level 1 areas show little or no departure from the pre-suppression era while level 3 areas are highly departed from pre-suppression era conditions. Table 3.2.3 shows the FRCC determinations for the Farley analysis area.

Table 3.2.3. Fire regime condition classes (FRCC) in the Farley analysis area.

FRCC	Acres	Percent
1	6,328	11
2	28,166	50
3	21,522	38

Note: Does not include private land.

The areas of FRCC 1 are represented by grasslands, riparian areas and moist forest types. Areas within FRCC 2 are mostly in the dry forest types on low to mid elevations and cold forest types at the middle and upper elevations. FRCC 3 areas are primarily dry forest types at lower and middle elevations. FRCC class 2 and 3 areas are not departed from historical conditions so much due to fire exclusion. Departures are mainly due to stand fragmentation, changes in species composition and stand structure, harvest of large diameter trees, depletion of large snags, and some associated blowdown from past timber harvest that has occurred on approximately 42 percent of the project area. Fire exclusion has had an effect on vegetation condition departure from natural conditions, on some of the warmer, drier sites.

Environmental Consequences

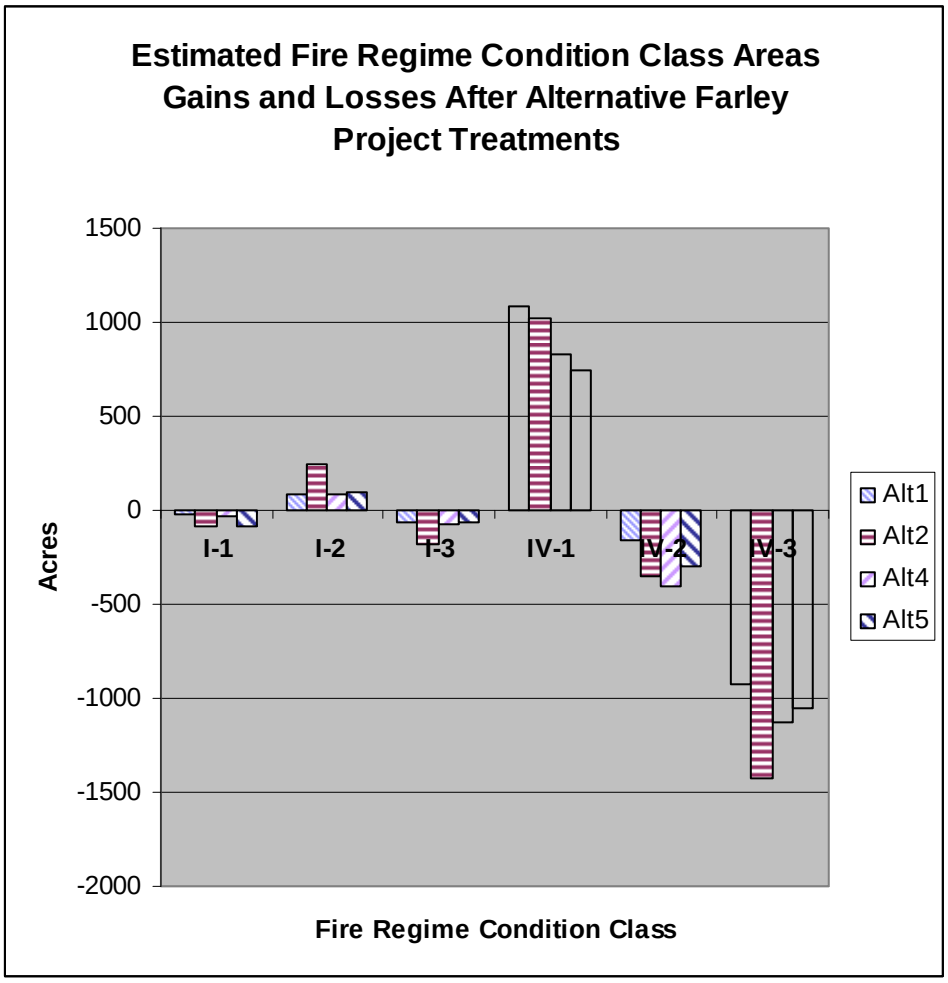
Direct and Indirect Effects of No Action on Fire Regime Condition Class

No action would result in continuation of current conditions, ecological trends and processes, including the potential for wildfire in the future.

Direct and Indirect Effects Common to All Action Alternatives on Fire Regime Condition Class

The changes in areas (acres) in fire regime condition class are graphically depicted in Figure 3.2.3.

Figure 3.2.3. Condition Class changes by Fire Regime (in acres) resulting from the Farley Vegetation Management Project.



The increase in acres in fire regime IV, condition class 1 (FRCC IV-1) is due primarily to thinning treatments in areas of Fire Regime IV condition class 2 and 3 that thin out ladder fuels in the understory and increase spacing between crowns to reduce crown fire potential. In addition, natural and activity-generated fuels left on the ground would be reduced either by piling and burning or broadcast burning. This would reduce the intensity of subsequent planned or unplanned fire in these areas. Periodic treatments every 5 years or so would be required to maintain this condition.

The reductions in FRCC I-1 areas primarily are due to non-commercial thinning of dense young stands where the silvicultural prescription is to lop and scatter the slash and leave it on the site to

decompose, temporarily increasing the fire hazard. Proposed non-commercial thinning would shift FRCC I-1 and 2 and FRCC IV-1 and 2 areas to FRCC I-3 and IV-3, respectively, for up to 5 years after which they would return to pre-project FRCC.

There would not be much immediate change in progression to restore historical conditions to the landscape under any of the alternatives. There would still be an overabundance of young stand initiation and a scarcity of old growth in the treated units as well as throughout the analysis area. Thinning and fuel reduction treatments might accelerate growth and promote such conditions if the landscape is not subjected to extensive stand replacement fire.

Wildfire Risk

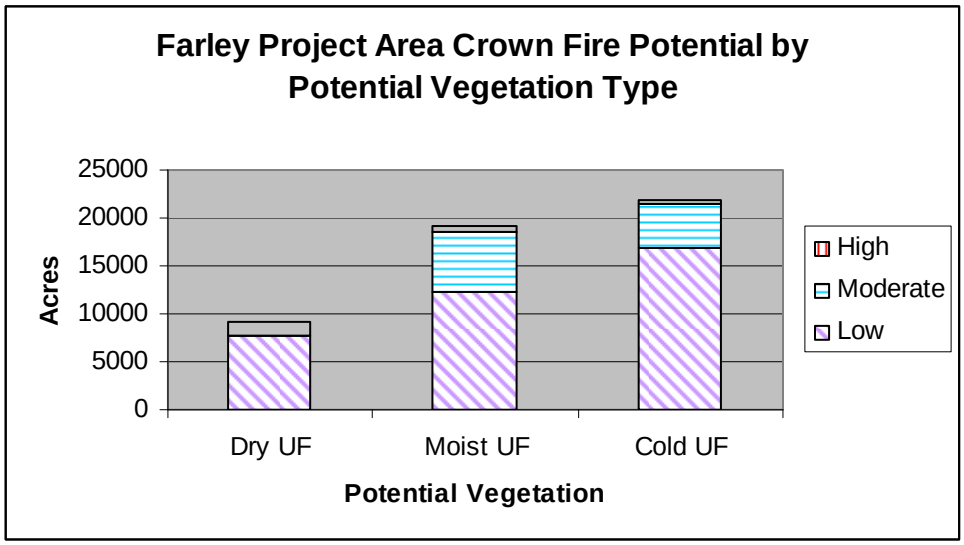
On the Umatilla National Forest, vegetation and dead material typically is driest during the summer months. Dry lightning events cause most of the fires. Table 3.2.4 summarizes fire occurrence on the Farley analysis area from 1970 thru 2007. The area has experienced 233 fires between the years 1970 and 2007. Ignition sources are listed in the database as 154 lightning-caused and 79 human-caused.

Table 3.2.4. Fire occurrence in the Farley analysis area from 1970 to 2007.

Size	# Fires
Class A (0-.25 acres):	191
Class B (.25-10 acres):	31
Class C (10-99 acres):	5
Class D (100-299 acres):	1
Class E (300-999 acres):	2
Class F (1,000-4,999 acres):	1
Class G (5,000 + acres):	2
Total:	**233**

Stand replacement fire generally is considered to be a severe and undesirable event, even though this may be the typical but infrequent pattern of fire events in the longer return interval fire regimes. Tree density thresholds (Powell 2005) were used to evaluate crown fire potential on each forest stand in the Farley project. The results of this analysis are shown for each potential vegetation group in Figure 3.2.4. These results do not suggest any great deviation from fire regimes from a stand perspective (although this method does not consider the effects of weather, topography, crown base height or ground fuel loading). However, the location of some of the stands with high crown fire potential could be a concern with respect to forest resource management goals other than restoration of fire- adapted ecosystems.

Figure 3.2.4. Crown fire potential by potential vegetation group within the Farley analysis area.



The Umatilla National Forest Plan provides guidelines only for small diameter fuels in some of the land management area categories. Small diameter woody fuels (3 inches and less) have the greatest influence on spread rate and intensity of surface fires and associated torching and crowning. Coarse woody debris (CWD) typically is defined as dead standing and downed pieces larger than 3 inches in diameter (Harmon and others 1986).

Coarse woody debris (CWD) is an important component in the structure and functioning of forest ecosystems. From the time a tree dies until it is fully decomposed, it contributes to ecological processes as a standing snag and fallen woody material lying on and in the soil. An optimum quantity of downed CWD within an acceptable fire hazard risk is about 5 to 10 tons per acre for the Hot Dry Upland Forest (UF) Fire Regime I, and about 10 to 30 tons per acre for the Cool Moist and Cold Dry UF Fire Regimes IV (Brown 2003). Based on preliminary surveys of proposed project activity units in the Farley project area, downed CWD currently exceeds recommended levels on approximately 3,800 acres mostly in the Cool Moist and Cold Dry UF areas. Approximately 5,795 acres of dense young stands or stand understories are proposed for non-commercial thinning. Activity fuels in these areas (as well as in the commercial harvest areas) would need to be treated to reduce fire hazard.

Environmental Consequences

Direct and Indirect Effects of No Action on Wildfire Risk

No action would result in continuation of current conditions, and ecological trends and processes, including the potential for wildfire in the future.

Direct and Indirect Effects Common to All Action Alternatives on Wildfire Risk

Wildfire risk is not expected to change appreciably under any of the proposed alternatives. Risk of wildfire largely is dependent on ignition potential and fuel conditions, which are largely dependent on weather conditions. Most ignitions since 1970 (66%) have been caused by lightning. Human-caused ignitions (30% since 1970) could potentially increase with increased road access, but suppression effectiveness could also be increased. However, the obliteration of approximately 39 miles of existing closed roads proposed under all alternatives may lessen the risk of human-caused ignitions as well as suppression effectiveness.

Fire hazard would increase in areas where fuels generated by project activities are in excess of prescribed treatment maximums. Determining the risk associated with this untreated slash is difficult to ascertain but risk could be higher if large areas of untreated slash were created in a short time. Short term fire regime condition class effects may be greatest in the non-commercial thinned areas where thinning slash is left to decompose. Fire hazard could be elevated for up to 5 years.

From a fuel management perspective, there is not much overall difference between the alternatives except for the number of acres treated. FARSITE free burning model simulations on the untreated landscape days predicted fire sizes ranging from 4,000 to slightly over 22,000 acres over 7 to 10 days.

Throughout the Farley project area, stands are overstocked by smaller-sized trees that present continuous vertical fuel continuity that can contribute to crown fire initiation. In addition, fuel loads in lodgepole and mixed conifer stands (Fire Regime III, IV and V) have sufficient surface fuels that fire intensity would be high enough to initiate crown fire without ladder fuels. High tree density causes forest stands to be more vulnerable to crown fire initiation at any age, and also extends the duration of a stand's exposure (by 20 to 30 years) to crown fire hazard (Keyes and O'Hara 2002).

Fire danger would temporarily be increased due to the fuels (slash) created by the proposed activities in all action alternatives. The increase in potential fire activity would be of short duration (1-5 years), until associated prescribed burning is completed. In the longer term (20-30 years after treatment) fire danger would be decreased.

Air Quality and Prescribed Burning

Air quality was analyzed at a much broader scale. The Oregon Department of Environmental Quality has identified sensitive areas as "Smoke Sensitive Receptor Areas" for the State of Oregon as directed by the Clean Air Act. Section 169 of the Clean Air Act also provides protections from visibility impairment for designated Class I Airsheds above designated Wilderness areas. The proposed treatment units are 40 air miles from the nearest designated Class I Airshed. Class II Airsheds cover all other areas. Wilderness areas with Class II Airshed areas are not directly protected under the Oregon Visibility Protections Program (OAR 340-20-047, Section 5.2).

The airshed over and around the Farley analysis area currently meets air quality standards for Class II Airsheds (Oregon Smoke Management Annual Report, 2001). Smoke Sensitive Receptor Areas are areas established around cities that are not meeting the federal Clean Air Act

standards for particulate matter less than or equal to 10 and 2.5 micrometers in diameter (PM^{10} and $PM^{2.5}$). The closest Smoke Sensitive Receptor Areas and their approximate distance and direction from the analysis area are:

- La Grande, Oregon, 52 air miles Northeast.
- Pendleton, Oregon, 60 air miles North.
- Baker City, Oregon, 48 air miles East.
- John Day, Oregon, 38 air miles South/southwest.

The nearest designated Wilderness Area Class I Airsheds are the Strawberry Mountain Wilderness near John Day, Oregon (approximately 40 air miles away), and the Eagle Cap Wilderness east of La Grande, Oregon (about 65 air miles away).

All thinning and harvest units could have a prescribed fire component that would create emissions that could affect air quality and public health. The communities most likely to be affected would include Dale, Granite, and Meadowbrook, Oregon.

Environmental Consequences

Direct and Indirect Effects of No Action on Air Quality

No action would result in continuation of current conditions, and ecological trends and processes, including the potential for wildfire in the future. Air quality effects of wildfire are difficult to predict (and likely are outside the scope of this analysis) but could greatly exceed the emissions from prescribed burning proposed under the project action alternatives.

Direct and Indirect Effects Common to All Action Alternatives on Air Quality

Smoke emissions from prescribed burning associated with project activities were estimated using the First Order Fire Effects Model ver. 5.5 (FOFEM) which simulates emissions only from ground fuels. Table 3.2.5 presents estimated emissions for PM^{10} and $PM^{2.5}$ particulate matter for each alternative.

Table 3.2.5. Estimated PM^{10} and $PM^{2.5}$ emissions (in tons) from prescribed burning by alternative.

		Alternative				
	Proposed Action (analyzed, but not considered as viable alternative)	**1**	**2**	**3 (analyzed, but not considered as viable alternative)**	**4**	**5**
PM 10	5,171	1,058	929	644	855	798
PM 2.5	4,314	845	736	518	674	625

PM^{10} (particulate matter equal to or less than 10 micrometers in size)
$PM^{2.5}$ (particulate matter equal to or less than 2.5 micrometers in size)
Estimates from First Order Fire Effects Model (Keane and others, 2007, FOFEM version 5.00),

Prescribed burning associated with Farley project activities would comply with the Clean Air Act and be conducted in accordance with the operational guidelines agreed to by the USDA - Forest Service and the Oregon Department of Environmental Quality. Prescribed burning would comply with the Oregon Smoke Management Implementation Plan and would be conducted within the guidelines of the Smoke Management Program. The State could impose restrictions on burning when smoke could be carried into sensitive areas, or air quality is likely to be degraded.

Prescribed burning would be used where practical and needed to reduce fuel loads to the desired conditions (generally 12 tons per acre or less) and standards specified by the Forest Plan. Prescribed burning may include pile burning (decks, hand piles or machine piles), underburning, or jackpot burning to dispose of residual fuel loading. Burning would be done when season and weather conditions allow for safe burning, and with prescriptions that effectively reduce fuel loads while minimizing detrimental effects to remaining trees.

Burning would take place under conditions favorable to effective mixing and dispersal of smoke. The effects associated with prescribed burning would be of short duration and have little effect on Class I Airsheds and Smoke Sensitive Receptor Areas due to the remoteness of the project area. Some local communities may be affected for short periods of time due to smoke settling in valleys overnight.

All action alternatives could remove material from 3 inches in diameter and larger to be used as fuel, chips, or sawlogs. Such utilization would reduce the amount of anticipated emissions.

Prescribed burning would require construction of containment lines to prevent the spread of fire beyond treatment areas. Wherever possible, measures would be taken to minimize the amount of fireline constructed, such as using existing roads and combining units with common boundaries into larger units for the purposes of burning and fire line construction. In areas where fireline must be constructed, it would be sufficient to stop the spread of the fire while minimizing soil disturbance. Where practical and appropriate, fire line would be constructed by tractor. Sensitive areas would have fire line constructed by hand or, if feasible, use the technique of wet lining. All constructed fire line would be limited to an average of 18 inches wide of exposed mineral soil regardless of construction method.

Cumulative Effects of All Alternatives

Other proposed and reasonably foreseeable projects (reforestation, road decommissioning, culvert replacement, noxious weed control, grazing, etc) would not substantially affect fuel loadings or fire behavior. Road decommissioning would limit access to some areas and may inhibit efforts to contain wildfires.

Activities conducted under all action alternatives would overlap approximately 700 acres of ground previously treated by prescribed fire within the last 10 years, resulting in:

- further reduction in fuel loads in the overlapping areas;
- achievement or maintenance of desired fuel loads as specified by the Forest Plan;

- increased continuity or connection of other adjacent or nearby areas where fuel reduction activities have occurred previously, thus reducing overall fuel loads on the landscape of the project area; and
- maintaining areas in fire regimes already in Condition Class 1

Consistency with the Forest Plan

Implementation of any of the alternatives would be consistent with the goals, objectives, and standards and guidelines of the Forest Plan. Fire suppression would continue in the analysis area during the project and into the future. Where appropriate and as needed, low intensity prescribed fire (jackpot and broadcast burning) or mechanical methods could be used to treat activity generated fuels to reduce fire hazard. This project would not affect or prevent potential opportunities to conduct fuels treatment or prescribed fire projects in the future.

3.3 SOILS

SCALE OF ANALYSIS

In this DEIS, the analysis area for soils for the Farley Vegetation Management Project is the Desolation Creek watershed (HUC 1707020204), specifically those areas of National Forest System Lands on which vegetation management and associated project activities are proposed to occur. Proposed commercial and non-commercial thinning and timber harvest, prescribed burning, reforestation and other associated project activities, including road construction, reconstruction, and obliteration / stabilization for each of the proposed action alternatives are described in Chapter 2. The specific areas (treatment units) that would be affected by these activities are shown on maps (in Figures 2.4 – 2.7 above).

The Umatilla National Forest Plan (USDA – Forest Service, 1990, as amended) specifies the resource management direction and desired future condition for National Forest System lands, and provides guidelines and standards for the vegetation management and associated activities proposed for this project. This section evaluates the effects of proposed vegetation management activities on:

- detrimental soil condition
- effective ground cover

The Forest Plan provides management direction for resource management activities with respect to soils as summarized below.

Detrimental Soil Condition (DSC)

At least 80 percent of an activity area (harvest / thinning / prescribed burn unit) is to be maintained in a condition of acceptable productivity potential. Acceptable productivity potential is defined as:

- less than 20 percent increase in bulk density (a measure of soil compaction) in volcanic-ash derived soils and a less than 15 percent increase in bulk density in other forest soils;
- soil displacement of less than 50 percent of the topsoil or humus enriched A1 and/or AC horizons from an area of 100 square feet or more which is at least 5 feet in width;
- molding of soil in vehicle tracks and rutting of less than a 6-inch depth; and
- soils that are not burned severely due to prescribed fire.

Soil conditions exceeding these levels of acceptable productivity potential are considered detrimental soil conditions (DSC).

Effective Ground Cover

Management activities should be designed and implemented to retain sufficient ground vegetation and organic matter to maintain long-term soil and site productivity. The number of treatment units exceeding the minimum effective ground cover is used for comparison of the proposed action alternatives. Effective ground cover is defined as all living or dead herbaceous or woody debris and rock fragments greater than 0.75 inch in diameter in contact with the ground surface. This includes tree or shrub seedlings, grass, forbs, litter, chips, etc. Table 3.3.1 presents the minimum percent effective ground cover (compared to potential) that must be achieved (as specified by the Forest Plan) following any soil-disturbing activity.

Table 3.3.1. Minimum effective ground cover following soil-disturbing activities.

Erosion Hazard Class	**Minimum Percent Effective Ground Cover**	
	1st Year	**2nd Year**
Low (very slight, slight)	20-30	30-40
Medium (moderate)	30-45	40-60
High (severe)	45-60	60-75
Very High (very severe)	60-75	75-90

AFFECTED ENVIRONMENT

Water infiltration into soils can be affected by effective ground cover (including vegetation and slash/coarse wood). Generally, when effective ground cover decreases, soil infiltration decreases and runoff increases leading to increased potential for erosion.

Soils in the analysis area generally support cold upland plant associations except for the lowest elevations which support warm, dry plant associations. Deep soils at upper elevations generally maintain adequate available soil moisture throughout most of the growing season while those at lower elevation in the drainage usually dry enough to induce stress in trees and understory vegetation in late summer (USDA Forest Service 1999). Meadow areas contain deep alluvial and glacial till-derived soils, which are particularly important due to their water holding capacity and productive potential.

The best available science indicates that the soil/ecological types in the Farley Project area may be more resilient to disturbance than the generalized Forest Plan standards and guidelines originally assumed (Curran and others 2005; Craigg and Howes 2005, in Page-Dumroese and others 2007). Monitoring and observation on the Umatilla National Forest tend to support the premise of greater resiliency in some soil/ecological types and that current Forest Plan standards and guidelines may be more than adequate; nevertheless, these remain in effect until amended or revised and must be met.

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects of No Action on Soils

Conditions in the analysis area would remain much the same as now. Slow accumulation of woody material, including smaller branches and duff, would continue unless interrupted by wildfire. Organic material buildup on the surface would increase productive capacity somewhat but increase the risk of widespread, high-severity wildfire that could remove large amounts of this material at once over large areas. The low severity, mosaic pattern of prescribed fire would not occur with subsequent release of nutrients for plant uptake and invigoration. Road conditions would remain much the same except road maintenance would not occur on utilized closed road sections, and temporary and system road construction would not occur.

Direct and Indirect Effects Common to All Alternatives on Forest Soil Resources

As differences among the alternatives are relatively minor, the effects of each of the action alternatives generally would be similar as described below. The relative difference among alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. In general, compared to Alternative 1, relatively less soil disturbance would result from Alternatives 2, 4, and 5. Details on a specific treatment unit basis may be found in the forest soils specialist report in the project file. Table 3.3.2 summarizes the acres of soils affected by alternative by select measures, including Detrimental Soil Condition (DSC) according to Forest Plan criteria.

Obliteration of about 31 miles of existing closed road is proposed in each of the action alternatives; this is converted to an acre basis in Table 3.3.2. The area covered by these roads would return to productive capacity that would increase over several years as soil physical, biological and chemical processes improve and the sites revegetate.

Road stabilization proposals in each of the action alternatives would improve or eliminate current erosion problems and future erosion hazard potential. Stabilization of approximately eight miles of existing closed road is proposed in each of the action alternatives; this also is converted to an acre basis in Table 3.3.2. Culverts would be removed and natural drainage patterns re-established, passive drainage features would be installed where necessary, and the areas needing it would be revegetated, but the road templates would remain for potential future use, thus minimizing potential adverse environmental effects over the long (> 25-50 year) time period. Return to full productive capacity in these areas would not be expected to be achieved in the short (0 to 3-5 year) to mid (3-5 to 20-25 year) time periods.

Table 3.3.2. Summary comparison (by alternative) of effects on soils of Farley project activities.

	ALTERNATIVE				
	No Action	**1**	**2**	**4**	**5**
Total Area (Acres) Affected By Proposed Project Activities	0	7,741	7,367	7,084	7,070
Estimated Area (Acres) of Detrimental Soil Condition (DSC) in all Treatment Units following project activities	386 *(existing condition)*	756	741	686	730
New system roads (in acres - calculations assume a 20 foot width)	0	34	0	19	17
New temporary road (in acres)	0	17	24	12	12
Road obliteration (acres)	0	75	75	75	75
Pile burning (in acres)	0	799	715	799	715
Constructed fireline (in acres)	0	57	51	47	41
Road stabilization (in acres)	0	19.4	19.4	19.4	19.4
Treatment Units Exceeding Forest Plan Standards for DSC following project activities	0	0	0	0	0
Treatment Units Exceeding Forest Plan Standards for Effective Ground Cover following Project Activities	0	0	0	0	0

Compared to Alternative 1, about 3.4 more miles, or approximately 7 acres of temporary road would be constructed under Alternative 2. Alternatives 3 and 4 would result in about 5 acres less in temporary road than Alternative 1.

Commercial Thinning and Timber Harvest

All action alternatives would utilize ground-based or skyline harvest systems depending on site conditions, primarily slope. Skyline-yarded units in the soil types and vegetative conditions found in the Farley project area can be expected to result in detrimental soil conditions (DSC) values in the range of 0-3 percent. Cut-to-length processors and full-suspension forwarders result in DSC values in activity units in the 2 to 4 percent range with lesser compaction in the shallower soil types. Whole-tree log yarding with skidders and pile burning of slash creates detrimental soil conditions generally in the 4-8 percent range.

Non-Commercial Thinning

Hand thinning operations have no direct adverse effects on soils. Thinning slash, whether left in place or hand-piled, remains largely within the treatment units. Burning of the slash often occurs from 1 to 3 years later and rarely is hot enough to produce severe burning effects on the soil.

Mechanical Fuels Treatment

Grapple-piling is not expressly proposed in this project but might be considered in portions of thinning or harvest units to reduce the resulting and/or existing slash. Grapple-piling operations create detrimental soil conditions in the range 0-2 percent.

Prescribed Burning

Forest Plan and other management direction for burning rarely create severe burn conditions, with the total area of severely burned soils usually about 2 to 10 percent of the treatment unit. Machine-constructed firelines may have soil disturbance levels exceeding Forest Plan DSC

criteria, typically for compaction and displacement. Keeping the fireline size and depth into mineral soil to only the extent needed for fire control minimizes soil impacts.

Effective Ground Cover

The Forest Plan includes standards and guidelines for effective ground cover remaining after ground-disturbing activities based on site-specific erosion hazard potential. Timber harvest, thinning, and fuels treatments would be designed to keep exposed mineral soil within acceptable levels to minimize erosion hazard. Appropriate Best Management Practices would be employed to minimize and mitigate potential erosion and sedimentation due to project activities that expose soils to erosive forces.

Land Stability

Land stability is of some concern in the Farley project area, primarily related to proposed road construction. Much of the area is quite stable, however, there are some areas of mapped slumps/slides within the project area. Proposed roads have been field verified for location relative to slump or slide areas for any potential stability problems. Thinning and timber harvest activities would not be expected to trigger any mass movement.

Cumulative Effects on Soils

Natural processes and previous management activities over the past several decades have produced existing conditions currently observed in the project area. Activities include road building, timber harvest, site preparation, livestock grazing, fire suppression and prescribed fire.

Prior tractor/skidder logging effects in some units proposed for vegetation management actions in this project generally has recovered. After completion of activities conducted under this proposed project, several years of relative inactivity from ground-disturbing operations would be desirable to allow natural processes to stabilize the area. Subsequent prescribed fire and thinning activities would be suitable if it is not possible to complete (all) desired treatments in this entry.

The proposed harvest and thinning systems and/or operating conditions have been developed in response to concern about adverse soil effects. Use of harvester/forwarder equipment, and designated skidding routes minimizes additional displacement and compaction. In conjunction with use of existing trails or landings, proposed activities can be expected to stay well within Forest Plan guidelines for detrimental soil conditions including consideration of residual effects from prior activities.

Areas of prescribed burns may add incrementally to the total area of severely burned soils in the area, but would be minimal if performed according to the proper burning prescription. Tree planting activities would not contribute measurably to detrimental soil condition.

Consistency with the Forest Plan and Other Applicable Natural Resource Management and Environmental Laws, Regulations, Policies and Programs.

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource

managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the Farley analysis area.

3.4 WATER QUALITY and HYDROLOGY

SCALE OF ANALYSIS

The geographic scope of this analysis is the Desolation Creek watershed, which is part of the North Fork John Day River Subbasin (HUC #17070202). The watershed covers 69,675 acres, of which 56,228 acres are Umatilla National Forest lands managed by the North Fork John Day Ranger District. Approximately 13,447 acres (19 percent) is under other ownership, primarily Hood River County which manages its lands primarily for grazing and timber production. The analysis area contains four sub-watersheds: Lower Desolation Creek (HUC 170702020404), Desolation Creek-Kelsay Creek (170702020403), Upper Desolation Creek-Battle Creek (170702020402), and North Fork Desolation Creek (170702020401).

This section of the DEIS discusses the potential effects of proposed project activities on:

- the regulatory status of water quality in the analysis area;
- sediment from roads (as indicated by road density, number of stream crossings, and the Watershed Erosion Prediction Project model);
- water yield and peak flows evaluated using the Equivalent Clearcut Area (ECA) model (Ager and Clifton, 2005).

Water quality and aquatic habitat conditions including stream temperature, stream bank and channel characteristics, riparian vegetation, and other aquatic ecological parameters are further addressed in the fisheries section of this document.

AFFECTED ENVIRONMENT

Water Quality Regulatory Status in Analysis Area

The beneficial uses of waters designated by State of Oregon water quality regulations for waters in the John Day River Basin (which includes the Desolation Creek watershed and the Farley project area) are listed in Table 3.4.1.

Table 3.4.1. Designated beneficial uses for waters in the John Day River Basin.

Public Domestic Water Supply	Anadromous Fish Passage
Private Domestic Water Supply	Salmonid Fish Rearing
Industrial Water Supply	Salmonid Fish Spawning
Irrigation	Resident Fish and Aquatic Life
Livestock Watering	Wildlife and Hunting
Boating	Fishing
Aesthetic Quality	Water Contact Recreation

The beneficial uses that have potential to be affected by thinning and timber harvest, road construction and stabilization / obliteration, and prescribed burning activities proposed for the Farley Project are:

- anadromous fish passage,
- salmonid fish rearing and spawning, and
- resident fish and aquatic life.

Section 303 of the Clean Water Act requires states to identify water bodies that do not support designated beneficial uses and to compile a list of water bodies with impaired water quality that do not meet beneficial use standards [known as the 303(d) list]. Table 3.4.2 lists the water bodies in the Desolation Creek watershed on Oregon's 303(d) list for 2004-2006. Project effects on water temperature are discussed in the fisheries section. No streams are listed as sediment-impaired; however, because of existing conditions (roads and stream conditions) and proposed activities, sediment may be a concern and is addressed in this analysis.

Table 3.4.2. Stream reaches in the Farley analysis area that do not meet beneficial use standards [are on the Oregon 303 (d) – list] for water temperature.

Water Body	Reach (designated by River Mile)	Season	Temp. Criteria	Beneficial Uses
Desolation Creek	0 to 3.5	January 1 – June 15	13.0 degrees Celsius	Salmon and steelhead spawning
Desolation Creek	0 to 3.8	Year Around	16.0 degrees Celsius	Core cold water habitat
Junkens Creek	0 to 7	Year Around	12.0 degrees Celsius	Bull trout spawning and rearing
N. F. Desolation Creek	0 to 6.6	Year Around	12.0 degrees Celsius	Bull trout spawning and rearing
Sponge Creek	0 to 2.7	Year Around	12.0 degrees Celsius	Bull trout spawning and rearing

Water Quality Management Plans (WQMPs) for achieving beneficial use support and water quality standards (called Total Maximum Daily Loads or TMDLs in the Clean Water Act) are required to be prepared and implemented for water bodies on the 303(d) list. TMDLs for temperature in the John Day River Basin are in development and scheduled for completion in 2009. TMDL implementation plans would incorporate existing Forest Service procedures, policies, and management directions, such as the Region 6 Aquatic Restoration Strategy, PACFISH, regulatory agency Biological Opinions, the Umatilla National Forest Plan, and Clean Water Act requirements.

Regulatory Compliance

Clean Water Act

In accordance with the 1990 Forest Plan (p. 4-77) and as required by the Clean Water Act and laws of the State of Oregon (OAR Chapter 340-341), the proposed activities for the Farley project include design criteria and implementation of Best Management Practices (BMPs) to protect water quality (USDA 1988). The Umatilla National Forest is implementing active restoration to improve water quality in Desolation watershed and is actively collaborating in the TMDL process with Oregon Department of Environmental Quality (ODEQ) in the John Day River Basin.

Floodplains, Executive Order 11988

Executive Order (EO) 11988 requires the Forest Service to avoid "to the extent possible the long and short term adverse impacts associated with the ... occupation ... or modification of floodplains..." Farley project activities do not propose to occupy any floodplain. Instead, the project proposes to obliterate or stabilize approximately 9 miles of existing closed roads, and remove a net of 39 to 44 stream crossings in floodplains/RHCAs.

Wetlands, Executive Order 11990

Executive Order (EO) 11990 requires the Forest Service to "avoid to the extent possible the long and short term adverse impacts associated with the ... destruction or modification of wetlands." The Farley Project does not propose to modify any existing wetlands. It proposes to obliterate or stabilize a net of approximately 2.5 miles of roads and remove two crossings, which are currently modifying wetlands.

Municipal Watersheds

There are no designated municipal watersheds in the Farley analysis area.

Safe Drinking Water Act

There are no Source Water Areas in the Desolation Creek Watershed.

Sediment from Roads

Natural background erosion rates in the Desolation Creek watershed are in the range of 1-6 tons of sediment per square mile of watershed per year. Increases in erosion rates occur episodically and generally in response to climatic conditions and disturbance. High intensity precipitation and wildfire are the primary natural disturbance processes that influence erosion, hydrology and sediment transport in watersheds and the associated physical and biological conditions in those watersheds.

Human activities related to resource management also have a major influence. The effect of the road system (and skid trails) in a watershed on erosion, sediment transport, and physical and biological conditions in stream systems often exceeds that of all other activities combined, especially in forested mountainous areas. The road system connects directly to the stream system at road crossings. Crossings are often the places where eroded soil enters streams. Currently there are 182 stream crossings (on both Forest Service and county roads) in the analysis area. There are 2.16 miles of road per square mile of watershed area (Table 3.4.3).

Table 3.4.3. Roads, riparian roads, and road density in Desolation Creek watershed.

Total Roads	**Watershed Area**	**Total Road Density**
235 mi.	109 sq. mi.	2.16 mi./ sq. mi.
Riparian Roads	**Riparian Area**	**Riparian Road Density**
37.5 mi.	15.9 sq. mi.	2.36 mi./sq. mi.

The Watershed Erosion Prediction Project (WEPP) model was used to evaluate road activity effects on sediment production on a watershed basis. WEPP is a continuous simulation, process-based model originally developed by the Agricultural Research Service that incorporates climate, soil, ground cover, and topographic conditions to estimate sediment production and transport. WEPP modules were adapted to forest applications by the Forest Service Rocky Mountain Research Station and are increasingly used for project-level analysis (U.S. Dept. of Agriculture, Forest Service, 2006). The Forest Service WEPP Road module was used to estimate erosion and sediment production for the purposes of comparing existing conditions with the effects of proposed management actions (road construction, maintenance, and use).

Erosion and sediment transport rates are highly variable both spatially and temporally. Neary and others (2005) suggest that the true value for erosion observations or predictions is likely to be within plus or minus 50 percent of the observed or predicted value. Therefore, WEPP model results should not be used or interpreted as quantitative predictions of the amount of sediment transported, but rather as a means to assess relative differences among proposed action alternatives.

WEPP simulations estimate that approximately 1.8 tons per square mile per year of erosion occurs from the existing road system (Table 3.4.4), or about 30 percent above background using the higher rate of natural background erosion. Assumptions for this WEPP road analysis are documented in the project file. Model results of erosion leaving the road surfaces are summed annual averages, in tons/acre/year, and percent differences for comparing relative natural background conditions (hillslopes), existing disturbances (roads), and Farley project effects.

Table 3.4.4. Estimated sediment production from roads in Desolation Creek watershed.

Road Category	**WEPP Run**	**Erosion Factor (tons / acre)**	**Miles Road**	**Acres***	**Erosion (tons)**
Open gravel	1	0.19	80	240	45.6
Open native	3	0.71	60	180	127.8
Closed gravel	4	0.08	50	150	12
Closed native	5	0.13	40	120	15.6
		TOTALS	230	690	201
Watershed area = 109 mi2					1.8 tons / square mile / year

*Assumes 3 acre per mile of road, with pullouts and intersections

Environmental Consequences

Direct and Indirect Effects of No Action on Sediment from Roads

Existing erosion and sediment transport in the analysis area would continue generally at present levels. Surface runoff would largely be determined by the location and intensity of precipitation events and their duration. The existing 235 miles of roads would continue to erode and cause sedimentation in the vicinity of the 182 crossings. Hill slope erosion would continue to enter the drainage ditches of the road system, reducing their effectiveness. No change in road use would occur including any stabilization or obliteration of existing roads. Road-related erosion would remain about the same over time, contributing approximately 30 percent above-baseline erosion and sediment production in the watershed (Figure 3.4.1, Table 3.4.6).

Direct and Indirect Effects Common to All Alternatives on Sediment from Roads

Road construction activities are generally the largest sources of accelerated sediment production because of clearing and removal of vegetation and exposure of large areas of erodable surfaces (Belt and others 1992). These activities would result in localized, short-term increases in sediment production. New road construction would incorporate design, construction, and engineering practices that are intended to reduce sediment production. Road obliteration activities are a short term disturbance with some potential for erosion; however, obliteration improves infiltration and reduces runoff and erosion (Luce 1997). Road obliteration would result in a long term net decrease in erosion and sediment transport on a watershed scale when completed. The effects of road construction and road stabilization/obliteration would be mitigated by Best Management Practices such as working when the soil is dry; working when class 4 streams are dry; drainage control, sediment control, and seeding.

Existing Forest Service roads would receive maintenance consisting of blading the road surface, cleaning out ditches and culverts of accumulated sediment, and removing encroaching vegetation. Road maintenance activities may result in short term, low intensity, localized sedimentation, particularly if precipitation occurs during or shortly thereafter. These practices can be expected to reduce road-derived erosion and sediment transport for 3 to 5 years, when maintenance is likely to be needed again. "Extensive research has demonstrated that improved design, building, and maintenance of roads can reduce road-related surface erosion ..." (Gucinski, et al 2001).

Over the long term (5 to 30 years), the combination of road activities (addition of up to 14 miles of new system roads, stabilization of 8 miles and obliteration of 31 miles of existing roads, reduction in road density, and reduction in the number of stream crossings would result in a decline in road-related erosion and sediment production by about 16 percent compared to existing background conditions, at the watershed scale. An approximate timeline of activities was developed to represent annual sediment production over time for purposes of modeling (Table 3.4.5).

Table 3.4.5. Assumed timeline for WEPP modeling road activities for the Farley project.

Level Of Activity		Likely Effect On Sediment
Year 0	Baseline - current condition	Baseline
Year 1	Build all temporary roads, use 1/2 of total miles of road anticipated to be used to conduct project activities	Increase
Year 2	Build all new system roads, use all temporary and all miles of road anticipated to be used to conduct project activities	Increase
Year 3	Use all new system roads, obliterate 1/2 of the roads (planned for obliteration), use 1/2 of total miles of road anticipated to be used to conduct project activities	Increase
Year 4	Low-no use, obliterate other 1/2 of the roads (planned for obliteration), decommission roads (planned for stabilization*)	Net change +/-
Year 5	New Baseline, low-no use, reduction from obliteration & stabilization	Net decrease

*** NOTE:** Stabilization means stabilizing the road surface with vegetation while leaving the road prism largely intact, removing culverts and crossing structures, creating largely maintenance-free drainage features such as dips where appropriate and necessary, and securely blocking motorized access to the remaining length of roadbed. Stabilization (as opposed to obliteration which completely removes the road prism and restores the original slope contour) is done to preserve road access routes that may be needed for resource management activities (several years or decades) in the future.

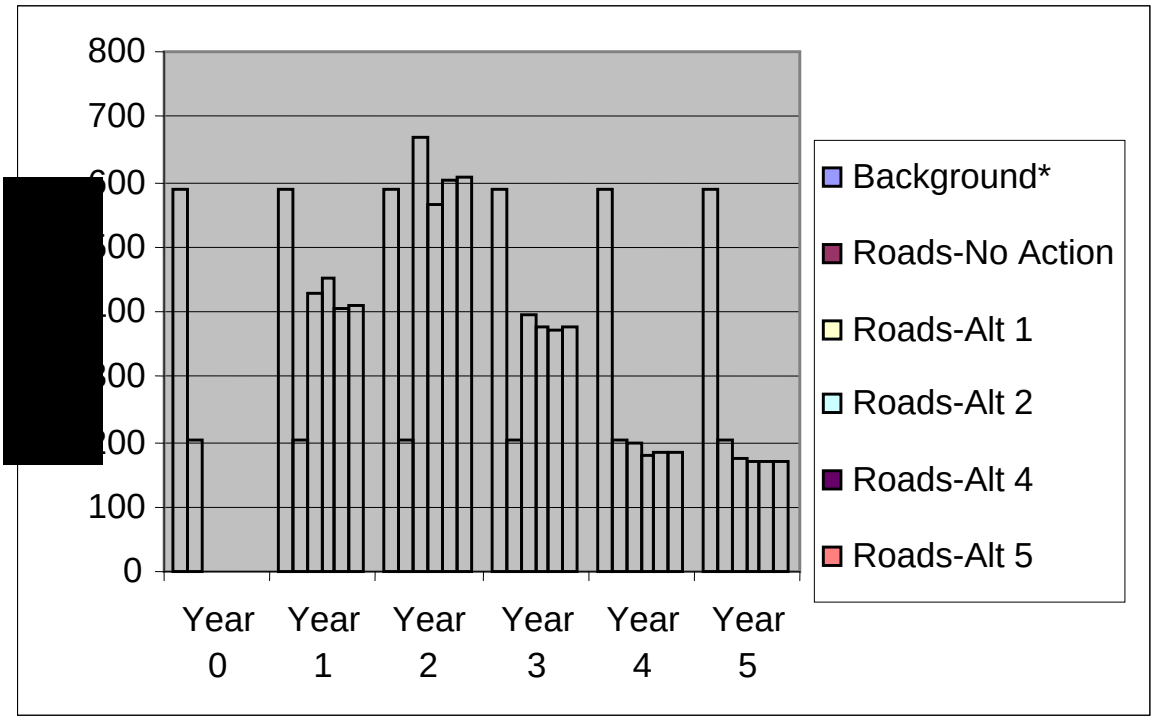
Table 3.4.6 summarizes change in road density, road miles and number of stream crossings resulting from each of the proposed action alternatives for the Farley project. The action alternatives result in decreases and would be expected to result in reduction of sediment mobilization and transport from roads.

Table 3.4.6. Net change in road density, road miles and number of stream crossings in the Desolation Creek watershed by alternative.

Alternative	Total Road Density	Net Change in Miles	Net Change in Number of Crossings
No Action	2.16 mi/ sq mi	0	0
1	1.93	-25.1	-39
2	1.80	-39	-44
4	1.87	-31.2	-42
5	1.86	-31.8	-41

Figure 3.4.1 presents WEPP model estimates of sediment production from roads in the Desolation Creek watershed by project year for the existing condition (background), no action, and each action alternative proposed for the Farley project.

Figure 3.4.1. Estimated erosion from roads (in tons) in the Desolation Creek watershed by alternative and project year.



Effects of Alternative 1 on Sediment from Roads

Direct and Indirect Effects

Alternative 1 proposes 2,848 acres of commercial thinning and timber harvest, 4,887 acres of mechanical non-commercial thinning, 2,466 acres of prescribed burning in harvest units and 810 acres of pile burning. Construction of approximately 14 miles of new system roads and approximately 6.6 miles of temporary roads, and 5 new stream crossings are proposed. Reconstruction is proposed for approximately 36 miles of existing roads, with maintenance on 143 miles. Also proposed as a connected action is stabilization or obliteration of approximately 39 miles of existing roads. The 6.6 miles of constructed temporary roads would be obliterated after use, and are not included in the 39 mile figure.

Increased traffic, road construction, thinning and timber harvest activities would increase road surface, cut-slope and fill-slope erosion, and sediment delivery to ditches and drainages during the project activities. Road surface erosion is estimated to increase approximately 2-fold compared to No Action in the first year. Road erosion would be greater in Year 2 because of new construction and road use. For Alternative 1 (when compared to No Action and Alternatives 2, 4, and 5), sediment production rates would be highest in Year 2 - 5, and remain slightly higher because this alternative involves the most new road construction. Erosion rates would remain elevated in Year 3 because of the new roads and road use before the proposed stabilization and obliteration of existing roads would begin to contribute to a reduction by Year 4. By Year 5, erosion would be less (~14 percent) than No Action because of the obliteration of approximately 31 miles and stabilization of 8 miles of existing road.

Alternative 1 proposes a net decrease in total road density from 2.16 miles of road per square mile of watershed area to 1.93 miles per square mile. Also, there would be a net decrease in the number of stream crossings from 182 to 143. In the long term, this would result in fewer sources of road- related erosion and sediment production than at present. However, new construction, reconstruction, and maintenance would take place before the planned obliteration and stabilization of 39 miles of existing road. There is a risk of short term, low intensity, localized increases in erosion and sediment transport to streams. In the long term, sedimentation is expected to have a moderate intensity, watershed-wide decrease under this alternative.

Effects of Alternative 2 on Sediment from Roads

Direct and Indirect Effects

Alternative 2 proposes 2,502 acres of commercial thinning and timber harvest, 4,887 acres of mechanical non-commercial thinning, 2,180 acres of burning in harvest and thinning units and 726 acres of pile burning. Construction of approximately 10 miles of temporary roads is proposed without any new stream crossings. Reconstruction is proposed for 36 miles, and maintenance is proposed on approximately 138 miles. The maintenance activities and effects are similar to Alternative 1. Also proposed as a connected action is stabilization or obliteration of approximately 39 miles of existing roads. The 10 miles of temporary roads would be obliterated after use and are not included in the 39-mile figure.

The effects of Alternative 2 on soil erosion and stream sedimentation would be similar to those described in Alternative 1. The effects would be mitigated by Best Management Practices as described in Alternative 1. Effects would generally be the same as Alternative 1 except as follows:

- estimated erosion and sediment production would be slightly higher in Year 1 because of the timing of temporary road construction.
- there would be no new road construction in Year 2.
- erosion increases would be from temporary and existing road use, and would be the lowest of the Alternatives.

The greatest decrease in erosion would occur in Year 4 and Year 5 under this alternative because no new system roads are constructed and the level of road stabilization and obliteration are the same.

Alternative 2 proposes a net decrease in total road density from 2.16 miles per square mile to 1.80 miles per square mile. Also, there would be a decrease in stream crossings from the present 182 to 138. In the long term, this would result in fewer sources of road-related sediment than at present. The timing, effects, and mitigations would be similar to Alternative 1.

Effects of Alternative 4 on Sediment from Roads

Direct and Indirect Effects

Alternative 4 proposes 2,454 acres of commercial thinning and timber harvest, 4,583 acres of mechanical non-commercial thinning, 1,131 acres of burning in harvest units and 810 acres of

pile burning. Construction of approximately 7.8 miles of new system roads and approximately 5.1 miles of temporary roads is proposed, including 2 new stream crossings. Reconstruction is proposed for approximately 36 miles, and maintenance is proposed on approximately 138 miles. The maintenance activities and effects are similar to Alternative 1. Also proposed as a connected action is stabilization or obliteration of approximately 39 miles of existing roads. The 5.1 miles of temporary roads would be obliterated after use, and are not included in the 39-mile figure.

The effects of Alternative 4 on soil erosion and stream sedimentation would be similar to those described in Alternative 1. The effects would be mitigated by Best Management Practices as described in Alternative 1.

Effects would generally be the same as Alternative 1 except as follows:

- estimated erosion and sediment production would be the lowest of any Alternative in Years 1 and 3, and the lowest total erosion of the Alternatives, because the fewest miles of temporary road would be constructed.
- there would be fewer miles of new road construction in Year 2 so erosion and sediment production rates would be intermediate between Alternative 1 and 2.
- in Year 3 erosion and sediment production rates would be very similar to Alternatives 2 and 5.

By Years 4 and 5, erosion rates would decline to below existing background levels.

Alternative 4 proposes a net decrease in total road density, from 2.16 miles per square mile to 1.87 miles per square mile. Also, there would be a net decrease in stream crossings, from the present 182 to 140. In the long term, this would result in fewer sources of road related sedimentation. The timing, effects, and mitigations would be similar to Alternative 1.

Effects of Alternative 5 on Sediment from Roads

Direct and Indirect Effects

Alternative 5 proposes 2,206 acres of commercial thinning and timber harvest, 4,887 acres of mechanical non-commercial thinning, 2,032 acres of burning in harvest units and 726 acres of pile burning. Construction of approximately 7.2 miles of new system roads and approximately 5 miles of temporary roads is proposed, including three new stream crossings. Reconstruction is proposed for approximately 36 miles, and maintenance is proposed on approximately 132 miles. The maintenance activities and effects are similar to Alternative 1. Also proposed as a connected action is stabilization or obliteration of approximately 39 miles of existing roads. The 5 miles of temporary roads would be obliterated after use, and are not included in the 39-mile figure.

The effects of Alternative 5 on soil erosion and stream sedimentation would be similar to those described in Alternative 1. The effects would be mitigated by Best Management Practices as described in Alternative 1.

Effects would be approximately similar to Alternative 4 except erosion and sediment production would be slightly greater because of the slightly more miles of existing roads used.

Alternative 5 proposes a net decrease in total road density, from 2.16 miles per square mile to 1.86 miles per square mile. Also, there would be a net decrease in stream crossings, from the

present 182 to 141. In the long term, this would result in fewer sources of road-related sedimentation. The timing, effects, and mitigations would be similar to Alternative 1.

Cumulative Effects on Sediment from Roads

Past activities including grazing, road construction, thinning and timber harvest, fire suppression, recreation, off highway vehicles, mining, and other disturbances have increased the level of erosion and sediment production above the natural background levels in the Desolation Creek watershed. WEPP model simulations suggest that existing roads (the largest source of sediment) contribute about 33 percent above background, with other activities contributing to a lesser degree.

Intensive livestock grazing before the 1950s still is affecting sediment transport as a result of stream bank and channel destabilization that has not recovered fully. The 1990 Forest Plan and its amendments require that streams be protected from livestock. Erosion effects of recent grazing are concentrated near water developments and in livestock trails. Two miles of Kelsay Creek and Park Creek have been fenced to protect streambanks and riparian areas and an additional 1.25 miles of riparian fencing is planned for 2008.

Mining in the past also affected stream bank and channel stability and erosion. Currently there are seven small-scale, non-mechanized mining claims in the project area.

In the short term, effects of project activities on erosion and sediment for all alternatives would be small, localized, and generally indistinguishable from background and within the range of natural variability. Over longer timeframes, effects would depend largely on the extent and type of natural disturbance (wildfire, high intensity precipitation, flooding) and human influences (such as road use and maintenance). In 1996 wildfire burned 7,608 acres in the Desolation Creek watershed (roughly equivalent to the area proposed for thinning, timber harvest, and other vegetation management activities for this project). In 2006 and 2007, wildfires burned 3,046 and 900 acres, respectively, within the analysis area. There is potential for future wildfires to occur in the analysis area that could result in increased runoff, erosion and sedimentation effects at the watershed scale.

Water Yield and Peak Flows

The relationship between change in forest canopy (by created openings, natural disturbance such as wildfire, or by thinning, timber harvest and prescribed burning) and change in water yield and peak flows has been investigated in numerous studies. Stednick (1995) found that in general, 20 percent of the forest cover of a watershed must be removed before a measurable increase in annual water yield was observed. In a local study in the upper Umatilla River watershed, effects on water yields and peak flows were not observed below 50 percent removal of forest cover (Helvey and Fowler 1995). These results and other recent literature indicate that the relationship between changes in forest cover and changes in peak flow, timing of peak flow, seasonal low flow, and annual water yield and is highly variable (Scherer 2000).

Stream channels are maintained by a range of flows. Increases in peak flows have potential to destabilize channels but few studies have documented a direct cause and effect relationship. Stream banks are generally stable in the Desolation Creek watershed where mature, deep rooted riparian vegetation and cobble substrate armor channel banks. There are localized reaches of

instability in meadows and areas of disturbance (livestock trailing, road crossings and recent wildfire). Stream bank stability is discussed in more detail in the following Fisheries section (see Table 3.5.5) and the resource discipline specialist reports.

Change in vegetation cover has potential to affect water yield and peak flows. Effects are analyzed using the Equivalent Clearcut Area (ECA) model following the methods described by Ager and Clifton (2005). The ECA model accounts for changes in the forest canopy caused by past timber harvest, road construction, and wildfires. Effects of thinning and timber harvest are pro-rated over time to simulate vegetation and hydrologic recovery.

Environmental Consequences

Direct and Indirect Effects of No Action on Water Yield and Peak Flows

The existing hydrologic regime of the analysis area would stay the same. Water yield and peak flows would largely be determined by variability of precipitation and biophysical conditions in the Desolation Creek watershed. Channel stability would continue to be influenced by current conditions, which include streamside roads and other localized areas of disturbance.

Direct and Indirect Effects Common to All Alternatives on Water Yield and Peak Flows

The Equivalent Clearcut Area (ECA) calculation for the watershed in its current condition (No Action) is 4.5 percent (Table 3.4.7). No measurable change in water yield or peak flows would be expected because all action alternatives are below the 15-20 percent "threshold" value as identified by Stednick (1995). The Farley project would be consistent with narrative guidance in the Forest Plan for water yield.

Table 3.4.7. Equivalent Clearcut Area (percent of watershed) for No Action (existing condition) and by action alternative as a result of vegetation management activities proposed for the Farley project.

Alternative	Equivalent Clearcut Area (percent of Desolation Cr. watershed)
No Action (Existing Condition)	4.5
1	11.3
2	10.8
4	10.6
5	10.3

The action alternatives propose thinning and timber harvest, mechanical fuel reduction, non-commercial thinning, prescribed burning, pile burning, road construction and road stabilization. The total area of timber canopy removal from the proposed activities in the analysis area would be small (about 5% increase in openings) compared to total forested area. The Equivalent Clearcut Area would range from 10.3 to 11.3 percent. No measurable effects to water yield or peak flows would be expected based on this amount of forest cover change.

Cumulative Effects on Water Yields and Peak Flows

Since 1976, there have been over 17,000 acres of timber harvest in the Desolation Creek watershed. The types of harvest include commercial thinning, partial cutting, clear cutting, overstory removal, and salvage. Many areas have had more than one harvest entry. Recent large wildfires in the Desolation Creek watershed include the Summit Fire (5,548 acres) and Bull Fire (2,060 acres) in 1996, Sharps Ridge Fire (3,046 acres) in 2006, and the Otter Fire (900 acres) in 2007. There are approximately 235 miles of roads in the Desolation Creek watershed, and these roads cover approximately 563 acres. Harvest, roads, and wildfires have affected the forest canopy in the watershed. With the passage of time and the re-growth of vegetation, the canopy recovers with respect to potential effects on water yield and peak flow.

In 2008, the current condition Equivalent Clearcut Area, using past harvest, existing roads, and past wildfires was calculated to be 4.5 percent of the Desolation Creek watershed. This percentage would increase to between 10.3 and 11.3 percent under the action alternatives proposed for the Farley project. Because these percentages are lower than levels noted by Stednick (1995) and other researchers, it is not expected that this project would measurably affect water yields or peak flows.

On-going and foreseeable future actions that have potential to affect water yields or peak flows include roads and wildfire. Road obliteration would reduce runoff efficiency and improve channel stability. A severe and extensive wildfire would potentially increase water yield and peak flows and affect channel stability.

Consistency with the Forest Plan and Other Applicable Natural Resource Management and Environmental Laws, Regulations, Policies and Programs.

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the Farley analysis area.

3.5 FISHERIES

SCALE OF ANALYSIS

In this DEIS, the analysis area for fisheries for the Farley Vegetation Management Project is the Desolation Creek watershed (HUC 1707020204) within the North Fork John Day River sub-basin.

The Umatilla National Forest Plan (USDA – Forest Service, 1990, as amended) specifies the resource management direction and desired future condition for National Forest System lands, and provides guidelines and standards for the vegetation management and associated activities proposed for this project. Other policies and directives under the Endangered Species Act also apply to natural resources management activities with respect to anadromous and native/resident fish species. This section of the DEIS assesses the potential effects of proposed project activities on fisheries and fish habitat in the analysis area, specifically:

- Predicted response of fish populations to habitat changes, including threatened and endangered species,
- water temperature,
- sediment / substrate embeddedness,
- stream bank stability,
- large wood in streams,
- pool frequency and quality, and
- road density / drainage density.

AFFECTED ENVIRONMENT

Fish Populations

The Farley analysis area contains approximately 233 miles of streams. Distribution of fish populations of concern with respect to this analysis are shown in Figure 3.5.1.

Table 3.5.1. Miles of stream (by class) within the Farley analysis area.

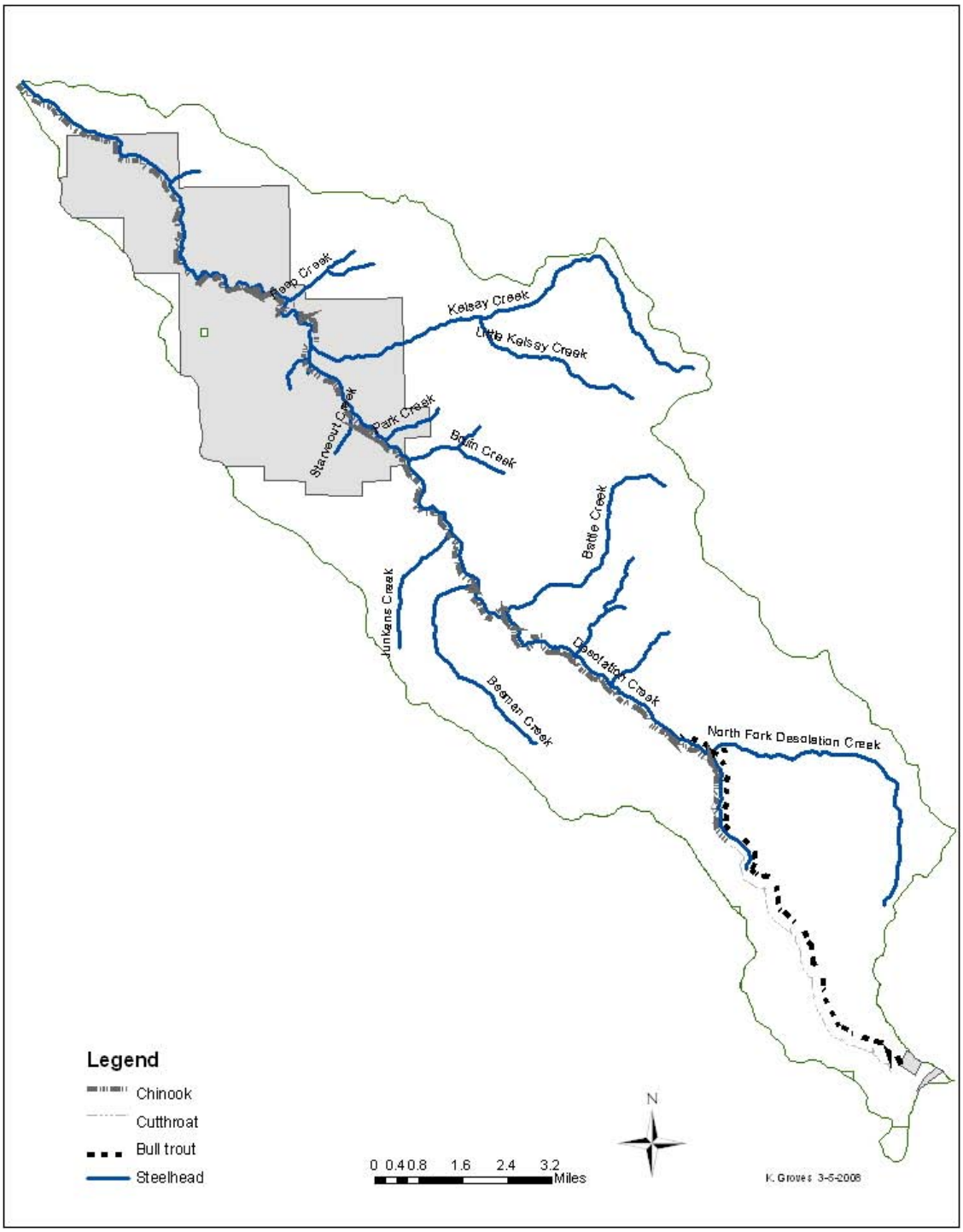
Subwatershed	Miles of fish bearing stream (Class 1 & 2)	Miles of perennial, non-fish bearing streams (Class 3)	Miles of intermittent streams (Class 4)	Total Stream Miles
Lower Desolation	12.6	10	24.3	46.9
Desolation Creek-Kelsay Creek	22.5	26.5	11.1	60.1
Upper Desolation-Battle Creek	22.1	21.4	33.3	76.8
North Fork Desolation	19.1	11.2	19.2	49.5

Streams within the analysis area host seven species of salmonids, five of which have been identified by the Interior Columbia Basin Ecosystem Management Project (ICBEMP) as key salmonids (fish viewed as important indicators of aquatic integrity). In addition to Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss*) (and the conspecific redband trout), streams in the analysis area contain westslope cutthroat trout (*Oncorhynchus clarkii*), bull trout (*Salvelinus confluentis*), brook trout (*Salvelinus fontinalis*), and mountain whitefish (*Prosopium williamsoni*).

Region Six of the U.S. Forest Service has listed bull trout, Mid-Columbia steelhead, Mid-Columbia Chinook salmon, westslope cutthroat trout, and redband trout as sensitive aquatic species present in the planning area. Sensitive species are species designated by the Regional Forester for special management consideration to reduce the likelihood of their becoming listed under the Endangered Species Act (ESA) as Endangered or Threatened.

In March 1999, the National Marine Fisheries Service (NMFS) listed Mid-Columbia steelhead as Threatened under ESA authority (Federal Register 1999). In 2005 NMFS designated critical habitat for mid-Columbia steelhead. All named streams within the Desolation Creek watershed are designated critical habitat for Mid-Columbia steelhead. The United States Fish and Wildlife Service (USFWS) listed Columbia River bull trout as Threatened under ESA authority in June 1998 (Federal Register 1998). Federally designated Species of Concern present in or near the planning area also include interior redband trout, and Westslope cutthroat trout.

Figure 3.5.1. Fish distribution for the Farley analysis area.



Environmental Consequences

Direct and Indirect Effects of No Action on Fish Populations

Because current vegetation would remain largely unaltered there would be no direct effects to fish species. Should a large wildfire occur in the analysis area there could be direct effects to fish populations. A large wildfire could potentially eliminate all fish from a burned-over stream as documented in the Bull, Tower, and Summit fires (1996), Meadow Fire (2001), and Bull Springs Fire (2003) which all occurred in similar stand conditions. Fish that remain would have to survive in a habitat degraded by loss of shade, increased sediment from ash and unprotected soil, loss of future large wood, etc.

Direct and Indirect Effects Common to All Alternatives on Fish Populations

Because most activities would occur outside of Riparian Habitat Conservation Areas (RHCAs), there would be little effect to aquatic habitat and the fish populations these habitats support. The only habitat parameters that may be affected in fish bearing streams are substrate embeddedness and large wood (as discussed below). Increases in fine sediments from stabilization and obliteration of approximately 39 miles of existing closed road could decrease reproductive success of fish by filling interstitial spaces between spawning gravel. This effect is likely short term and additional fines added to spawning gravels would be flushed from the stream in the following spring high flows prior to spawning. However, in the long term road stabilization and obliteration would be expected to lead to reduction in stream temperature and an overall reduction in the amount of sediment entering streams. The largest source of sediment was expected from road decommissioning and obliteration and this activity is the same in all alternatives so similar effects are expected in all action alternatives.

An increase in large wood from hazard tree cutting may provide a short term increase in hiding cover, shade and substrate for food sources. It may also indirectly lead to an increase in pool formation, which would also increase hiding cover and may increase areas of thermal refuge. Effects to large wood were also similar between action alternatives and so would have similar affects on fish populations for all action alternatives.

Cumulative Effects on Fish Populations

Historic management in the Desolation Creek watershed has followed a mosaic pattern, with most areas either intensely managed or nearly unmanaged. Although this pattern of management activity could cause fish population fragmentation, the fact that some fairly large areas remain mostly unmanaged could mean that reserve populations would be available for repopulation of restored areas. Fish occupying the managed areas would have been subjected to chronic effects for many years, but fish inhabiting the unmanaged areas would have escaped most of the chronic effects (except livestock grazing), although they have occasionally been subjected to episodic disturbances (fire, flood, etc.). Those unmanaged areas probably function as source areas for repopulation of disturbed areas.

It is likely that the cumulative effects of past and ongoing management activities and the proposed vegetation management activities would slightly increase the short-term risk for salmonids in the Farley analysis area. In the long-term though, reduction in chronic

sedimentation associated with roads, and the potential reduction in stream temperatures associated with road obliteration in RHCAs may benefit all populations of fish in subwatersheds within the analysis area.

Biological Evaluation - Determination of Effects (all action alternatives)

Species	Determination
Columbia River bull trout	NLAA
Steelhead	LAA
Steelhead critical habitat	LAA
Essential fish habitat	LAA
Redband trout	MI
Chinook salmon	MI
Westslope cutthroat trout	NI

DEFINITIONS:

NLAA – not likely to adversely affect
LAA - likely to adversely affect (short term)
MI – may impact
NI – no impact

Water Temperature

Over the period from 1993 to 2006 maximum water temperatures in the analysis area have varied from 50 to 83 ºF. Temperatures generally exceed state standards in every stream measured except Junkens and Beeman Creeks. South Fork Desolation Creek is the least affected by resource management activities in the analysis area. However, South Fork Desolation Creek lost a substantial amount of riparian vegetation during the 1996 Summit Fire.

Stream shade data were collected with a densiometer or solar pathfinder from 1992 through 2002 for Desolation Creek and its tributaries. There are extensive meadows in Kelsay, Little Kelsay and Sponge Creeks. No streams in the analysis area meet Forest Plan standards for stream shade. Only Beeman, Kelsay, and South Fork Desolation creeks have reaches that approached or exceeded stream shade requirements.

Environmental Consequences

Direct and Indirect Effects of No Action on Water Temperature

Because present vegetation would remain unaltered under there would be no direct effects to any riparian vegetation. Should a large wildfire occur in the analysis area, there could be indirect effects to stream temperatures. Loss of shade-providing trees adjacent to streams would directly increase stream temperatures. No new roads or stream crossings would be constructed so no additional riparian vegetation would be removed at these crossings.

Direct and Indirect Effects Common to All Action Alternatives on Water Temperature

No vegetation within the RHCAs of any of the subwatersheds would be disturbed during commercial and non-commercial thinning and timber harvest under any of the proposed action alternatives so no reduction in stream shading or increase in temperature is expected to be associated with these activities.

Roadside hazard trees would be cut and left where they fall in RHCAs. Some reduction in stream shade may occur if hazard trees within one tree height of the streams are felled. Hazard trees would be cut along a total of 126 miles of road. Only 3.6 miles of this total are within 100 feet of a perennial stream; the small number of hazard trees that are felled over this distance likely would not create a measurable change in stream temperatures.

Approximately 39 miles of existing closed roads would be stabilized or obliterated under all alternatives. Approximately 9 miles are within RHCAs including 44 existing stream crossings. Restoration of these roads and stream crossings would contribute to additional vegetation recovery within RHCAs and a reduction in stream temperatures.

Approximately 3 miles of closed roads would be reopened in riparian areas for access for proposed project activities and may lead to a short-term loss of existing vegetation where trees and other shade-providing vegetation have re-grown on these roadbeds. There are five stream crossings associated with these closed roads.

Direct and Indirect Effects Unique to Alternative 1 on Water Temperature

Proposed underburning could back into riparian areas near project activity units and remove some vegetation that currently provides shade. Burning in or near riparian areas would be done under controlled conditions so vegetation loss near streams is unlikely. Associated with broadcast burning, approximately 48 miles of fire line would be constructed. Less than 300 feet of fire line would be constructed in Class 4 RHCAs and it would be done by hand. This is not expected to affect stream temperatures.

Approximately 20.5 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.5 miles of new system road would be constructed in RHCAs across five Class 4 streams. This would result in the loss of riparian vegetation and shade at the stream crossings. However, it is not likely that this loss of shade on the Class 4 streams would lead to a measurable change in water temperatures downstream in perennial or fish bearing streams. Overall vegetation loss in riparian areas should be low and vegetation would be expected to recover quickly. Shrubs and grasses would recover by the following year and seedlings would recover in 5-7 years.

Direct and Indirect Effects Unique to Alternative 2 on Water Temperature

Effects to temperature would be similar to those discussed under Alternative 1. Under this alternative no new roads would be constructed across streams. As a result vegetation would not be removed from the five stream crossings as in Alternative 1.

There would be nearly 300 less acres of underburning in this alternative though there would still be the possibility of fire backing into RHCAs so effects from burning are expected to be similar

to what was already discussed under Alternative 1. Less than 100 feet of fire line would be constructed in RHCAs under this alternative. This fire line would be on the outer edge of an RHCA and would not affect stream shade or temperature.

Approximately 10 miles of temporary roads would be constructed under this alternative. No temporary roads would cross streams so there would be no effect to stream shade or temperature.

Direct and Indirect Effects Unique to Alternative 4 on Water Temperature

Effects to temperature would be similar to those discussed under Alternative 1. There would be 424 fewer acres of underburning in Alternative 4 than in Alternative 1, though there would still be the same possibility of fire backing into RHCAs so effects from burning are expected to be the same as what was already discussed under Alternative 1. The same amount of fire line would also be constructed in RHCAs (300 feet) as in Alternative 1 so effects from fire line would be the same as already discussed in Alternative 1.

Approximately 12.9 miles of new system or temporary roads would be constructed under this alternative. As part of this construction, approximately 0.25 miles of new system roads would be constructed in RHCAs and across two Class 4 streams. It is not likely that this loss of shade on the Class 4 streams would lead to a measurable change in water temperatures downstream in perennial or fish bearing streams.

Direct and Indirect Effects of Alternative 5 on Water Temperature

Effects to temperature would be similar to those discussed under Alternative 1. There will be 587 less acres of underburning in this alternative though there would still be the same possibility of fire backing into RHCAs, so effects from burning are expected to be the same as what was already discussed under Alternative 1. Less than 100 feet of fire line would be constructed in RHCAs under this alternative. This fire line would be on the outer edge of an RHCA and would not affect stream shade or temperature.

Approximately 12.2 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.3 miles of new system road would be constructed in RHCAs across three Class 4 streams. It is not likely that this loss of shade on the Class 4 streams would lead to a measurable change in water temperatures downstream in perennial or fish bearing streams.

Cumulative Effects on Water Temperature

Past activities, including timber harvest and thinning in riparian areas, road construction and maintenance, grazing, wildfires, fencing riparian areas, construction of upland water sources, aspen stand restoration, and riparian planting likely have all affected stream temperatures. Past harvest activities (419 acres) removed some trees that provided shade within RHCAs. Road construction along or crossing creeks removed all riparian vegetation along the roadbed (for approximately 36 miles) often leaving long reaches of stream without shade. Past grazing of riparian areas removed vegetation that provided shade. Also, bank trampling by livestock resulted in higher stream width to depth ratios, thus creating a larger surface area with respect to depth that increased the efficiency of solar heating. Grazing practices have since been modified

and shade largely has recovered. Previous wildfires (1,671 acres in RHCAs) also burned riparian vegetation, leaving portions of streams without shade.

However, other past activities have increased shade and contributed to lower stream temperatures. Non-commercial thinning in RHCAs has allowed remaining trees and shrubs to grow larger so that after a brief period of reduced shade, they provide more shade than the original stand. Riparian exclosure fencing of portions of Kelsay and Park Creeks has allowed riparian vegetation to recover, providing more shade to the streams along 3.3 miles of stream. In addition, the construction of 45 upland ponds and development of six springs has diverted cattle from streams and reduced the impact to riparian vegetation on unfenced stretches of stream. Restoration of seven aspen stands in the past has increased shade along several streams. Riparian planting along seven miles of South Fork Desolation Creek also has led to an increase in riparian vegetation and a reduction in stream temperature. These cumulative effects now are reflected in existing conditions.

Riparian vegetation continues to be affected by grazing on remaining unfenced portions of stream within the two cattle grazing allotments in the analysis area. Activities that can increase shade and potentially decrease stream temperatures are riparian exclosure fencing on Kelsay Creek and riparian planting on Junkens and Beeman creeks in the Sharps Ridge fire area. Riparian exclosure fencing of an additional portion of Kelsay Creek would allow riparian vegetation to recover, providing more shade along 1.25 miles of stream. Riparian planting along Junkens and Beeman creeks in the fire area also would lead to an increase in riparian vegetation and a reduction in stream temperature.

Future foreseeable activities proposed for this watershed that would affect stream temperatures include additional riparian planting in the Sharps Ridge Fire area. Riparian planting along Junkens and Beeman creeks in the fire area would continue to contribute to an increase in riparian vegetation and a reduction in stream temperature.

Sediment/Substrate Embeddedness

Stream surveys in 1992 and 1993 visually estimated whether stream channel substrate embeddedness was greater or less than 35 percent (Table 3.5.4). These responses from individual habitat units were averaged per reach. The most recent stream surveys (2000 to 2002) measured substrate size distribution using the Wolman Pebble Count. Two pebble counts were taken in each reach and the results were averaged. Data are presented in Table 3.5.5. In general, streams in the analysis area have low percentages of fines. Only Howard Creek stood out as having potential sediment problems, where embeddedness was >35 percent in the reach surveyed.

Environmental Consequences

Direct and Indirect Effects of No Action on Sediment/Substrate Embeddedness

Because current vegetation would remain unaltered under this alternative there would be no direct effects to any riparian area that would result in sediment exposure. Should a large wildfire occur in the analysis area, there could be indirect effects to stream sediment. Loss of vegetation adjacent to streams would allow for a greater amount of sediment transport. No new roads or

stream crossings would be constructed so no additional sediment would be mobilized into creeks as a result of these crossings.

Direct and Indirect Effects Common to All Action Alternatives on Sediment/Substrate Embeddedness

No vegetation within the RHCAs of any of the subwatersheds would be disturbed during commercial and non-commercial thinning and timber harvest in this alternative. In addition, this project is located in a special fish management area so there is an additional emphasis on preventing soil exposure and sediment movement within 500 feet of fish bearing streams. With these additional restrictions it is not likely any sediment would reach streams as a result of vegetation management activities.

Roadside hazard trees would be cut and left where they fall in RHCAs. This would prevent any soil exposure or sediment reaching creeks as a result of this activity.

Approximately 39 miles of roads would be stabilized or obliterated as part of this project. Approximately 9 miles would be stabilized or obliterated within RHCAs including 44 existing stream crossings. Restoration of these roads would lead to a short term increase in soil mobilization and sediment entering streams. Restoration of these roads would likely lead to a short term increase in substrate embeddedness in Desolation Creek, North Fork Desolation Creek, and potentially Kelsay Creek. Long term removal of these roads from the landscape would lead to a decrease in chronic sediment input into affected streams and an improvement in overall substrate embeddedness.

Approximately 3 miles of closed roads would be reopened in riparian areas for access for project activities and may lead to additional soil exposure where vegetation had re-grown on these roadbeds. There are five stream crossings associated with these closed roads that could potentially lead to a short term increase in sediment input into the affected streams from loosening soil near the stream crossings.

Direct and Indirect Effects Unique to Alternative 1 on Sediment/Substrate Embeddedness

Proposed underburning could back into riparian areas where they occur in or near treatment units and remove some riparian vegetation and expose soil. Burning in riparian areas would be done under controlled conditions so vegetation loss near streams is unlikely. Riparian areas that may be affected by burning are primarily Class 4 RHCAs. Associated with broadcast burning, approximately 48 miles of fire line would be constructed. Less than 300 feet of fire line would be constructed in Class 4 RHCAs with one Class 4 stream crossing and it would be done by hand. Line construction would be limited near the stream channel and due to the intermittent nature of this stream channel it is not likely that a measurable amount of sediment would reach the fish-bearing stream downstream. Substrate embeddedness would not change as a result of this activity.

Approximately 20.5 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.5 miles of new system road would be constructed across Class 4 streams at five locations. This would result in soil exposure and sediment mobilized as a result of road construction and placement of the culverts at the five crossings. It is not likely that this

increase in sediment on these Class 4 streams would lead to a measurable increase in sediment or embeddedness downstream on perennial or fish bearing streams as these crossings are located in headwater areas and installation of the culverts would occur when the stream channels are dry. In addition the approaches to these crossings would be graveled to reduce the likelihood of sediment entering the stream channels after construction is complete.

Direct and Indirect Effects Unique to Alternative 2 on Sediment/Substrate Embeddedness

There would be approximately 300 fewer acres of underburning in Alternative 2 (compared to Alternative 1) although there would still be the possibility of fire backing into RHCAs so effects from burning are expected to be similar to what was already discussed under Alternative 1. Less than 100 feet of fire line would be constructed in RHCAs under this alternative. This fire line would be on the outer edge of an RHCA and would not cross a stream so it should not affect sediment or substrate embeddedness.

Approximately 10 miles of temporary roads would be constructed under this alternative. As no temporary roads would cross streams and there would be no temporary roads constructed within RHCAs, there would be no effect on sediment or substrate embeddedness.

Direct and Indirect Effects Unique to Alternative 4 on Sediment/Substrate Embeddedness

There would be 424 fewer acres of underburning in Alternative 4 (compared to alternative 1) though there would still be the possibility of fire backing into RHCAs, therefore, effects from burning are expected to be similar to what was already discussed under Alternative 1. The same amount of fire line would be constructed within the RHCA as in Alternative 1 so effects from this activity would be the same as already discussed above.

Approximately 12.9 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.25 miles of new system road would be constructed in RHCAs across two Class 4 streams. This would result in soil exposure and sediment mobilized instream as a result of road construction and placement of the culverts at the two crossings. It is not likely that this increase in sediment on these Class 4 streams would lead to a measurable increase in sediment or embeddedness downstream on perennial or fish bearing streams as these crossings are located in headwaters and installation of the culverts would occur when the stream channels are dry. In addition, the approaches to these crossings would be graveled to reduce the likelihood sediment entering the stream channels after construction is complete.

Direct and Indirect Effects Unique to Alternative 5 on Sediment/Substrate Embeddedness

There would be nearly 587 less acres of underburning in this alternative (compared to Alternative 1) although there would still be the possibility of fire backing into RHCAs so effects from burning are expected to be similar to what was already discussed under Alternative 1. Less than 100 feet of fire line would be constructed in RHCAs under this alternative. This fire line would be on the outer edge of an RHCA and would not cross a stream so it should not affect sediment or substrate embeddedness.

Approximately 12.2 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.3 miles of new system road would be constructed in RHCAs across three Class 4 streams. It is not likely that this increase in sediment on these Class 4 streams would lead to a measurable increase in sediment or embeddedness downstream on perennial or fish bearing streams.

Cumulative Effects on Sediment/Substrate Embeddedness

Past activities, including thinning in riparian areas, road construction and maintenance, grazing, wildfires, fencing riparian areas, construction of upland water sources, aspen stand restoration, riparian planting, and installation of instream structures likely have all affected sediment and substrate embeddedness. Past harvest activities (419 acres) exposed soil in RHCAs. Road construction along or crossing creeks removed all riparian vegetation along the roadbed (36 miles with 182 stream crossings) exposing soil and created some chronic sediment sources. Past grazing in riparian areas has caused unstable banks leading to inputs of sediment into streams and increases in substrate embeddedness through bank trampling. Grazing practices have since been modified and stream banks are recovering. Previous wildfires (1,671 acres in RHCAs) also burned riparian vegetation, leaving some areas of exposed soil. Approximately 30 percent of the in-stream structures intended to improve fish habitat that have been installed in the past are no longer functioning and are themselves contributing to bank destabilization and / or erosion.

However, other past activities have decreased the amount of sediment reaching streams and contributed to lower substrate embeddedness. Riparian exclosure fencing of portions of Kelsay and Park Creeks has allowed riparian vegetation and bank stability to recover, thus reducing the amount of sediment entering these streams. In addition, the construction of 45 upland ponds and development of six springs has diverted cattle from streams and reduced the impact to riparian vegetation and stream banks on unfenced stretches of stream. Restoration of seven aspen stands in the past increased bank stability along several streams flowing through these stands. Riparian planting along 7 miles of South Fork Desolation Creek has also led to an increase in stream bank stability and reduced sediment transport in the Summit Fire area. These cumulative effects now are reflected in existing conditions.

Stream bank stability and sediment conditions (embeddedness and percent fines) continue to be affected by grazing on remaining unfenced portions of stream in two grazing allotments in the analysis area. Activities that can reduce in substrate embeddedness and percent fines are riparian exclosure fencing on Kelsay Creek, riparian planting on Junkens and Beeman creeks in the Sharps Ridge fire area and road maintenance. Riparian exclosure fencing of an additional portion of Kelsay Creek would allow riparian vegetation and stream banks to recover, reducing sediment input along this stretch of creek. Riparian planting along Junkens and Beeman creeks in the fire area also would lead to an increase in stream bank stability and a reduction in sediment sources contributing to an increase in substrate embeddedness.

Future foreseeable activities proposed for this watershed that would affect sediment and substrate embeddedness include grazing and additional riparian planting in the Sharps Ridge Fire area. Riparian planting along Junkens and Beeman creeks in the fire area would continue to lead to an increase in stream bank stability and a reduction in sediment sources that contribute to substrate embeddedness.

Currently much of the past stream bank damage and other sources of sediment are recovering or would continue to recover in the future. Overall, there would still be some roads that would contribute sediment to streams. Grazing would still impact riparian vegetation and stream banks on some streams, but with current management little impact to stream banks should be seen. Activities proposed in this project could increase the amount of sediment entering streams, thus increasing substrate embeddedness in the short term. However, with the 39 miles of existing closed roads that would be obliterated or stabilized, there would be a net reduction in the amount of sediment entering streams over the long term. Alternative 2 would result in the greatest net reduction in sediment because no additional road stream crossings would be constructed.

Stream Bank Stability

Percent stable banks were measured for streams surveyed from 1992-2002 in the Desolation system. All reaches surveyed except Kelsay Creek reach 2 and Little Kelsay Creek met the 80 percent stable bank standards. Kelsay Creek has since been fenced to exclude cattle and bank stability has improved.

Environmental Consequences

Direct and Indirect Effects of No Action on Stream Bank Stability

Because current vegetation would remain undisturbed under this alternative, there would be no direct effects to any riparian area that would result in unstable banks. No new roads or stream crossings would be constructed, so no additional stream banks would be disturbed as a result of these crossings.

Direct and Indirect Effects Common to All Action Alternatives on Stream Bank Stability

No vegetation management activities would occur within the RHCAs of any of the subwatersheds in this alternative so there would be no disturbance to stream banks as a result of these activities.

Roadside hazard trees would be cut and left where they fall in RHCAs. This would prevent any stream bank disturbance as a result of this activity.

Approximately 39 miles of roads would be stabilized or obliterated as part of this project. Approximately 9 miles would be stabilized or obliterated within RHCAs including 44 existing stream crossings. Restoration of these 44 crossings would result in approximately 0.3 mile of stream banks returned to their original condition.

Approximately 3 miles of closed roads would be reopened in riparian areas for access to project activities and may lead to additional soil exposure where vegetation had re-grown on these roadbeds. There are five stream crossings associated with these closed roads. The crossings already exist so there would be no additional stream bank disturbance associated with reopening these closed roads.

Direct and Indirect Effects Unique to Alternative 1 on Stream Bank Stability

Proposed underburning could back into riparian areas where they occur in or near treatment units and remove some riparian vegetation on stream banks. Burning in riparian areas would be done under controlled conditions so vegetation loss near streams is unlikely. Riparian areas that may be affected by burning are primarily Class 4 RHCAs. Associated with broadcast burning, approximately 48 miles of fire line would be constructed. Less than 300 feet of fire line would be constructed in Class 4 RHCAs with one Class 4 stream crossing and it would be done by hand. Line construction would be limited near the stream channel and would not disturb the stream banks at the creek crossing.

Approximately 20.5 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.5 miles of new system road would be constructed across Class 4 streams at five locations. This would result in stream bank disturbance as a result of road construction and placement of the culverts at the five crossings. Using an average road width of 20 feet this would lead to an additional 200 feet of stream bank disturbance. This likely would not lead to stream bank instability as a culvert would be placed at the crossings and fill would be placed over the culvert to stabilize the crossing.

Direct and Indirect Effects Unique to Alternative 2 on Stream Bank Stability

There would be nearly 300 less acres of underburning in this alternative (compared to Alternative 1) though there would still be the possibility of fire backing into RHCAs so effects from burning are expected to be similar to what was already discussed under Alternative 1. Less than 100 feet of fire line would be constructed in RHCAs under this alternative. This fire line would be on the outer edge of an RHCA and would not cross a stream so there would be no effect to stream bank stability.

Approximately 10 miles of temporary roads would be constructed under this alternative. No temporary roads would cross streams and there would be no temporary roads constructed within RHCAs so there would be no effect to stream bank stability associated with this activity under this alternative.

Direct and Indirect Effects Unique to Alternative 4 on Stream Bank Stability

There would be nearly 424 less acres of underburning in this alternative (compared to Alternative 1) though there would still be the possibility of fire backing into RHCAs so effects from burning are expected to be similar to what was already discussed under Alternative 1. The same amount of fire line would be constructed in the RHCA as in Alternative 1 so effects from this activity would be the same as already discussed.

Approximately 12.9 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.25 miles of new system road would be constructed in RHCAs across two Class 4 streams. This would result in stream bank disturbance as a result of road construction and placement of the culverts at the two crossings. Using an average road width of 20 feet this would lead to an additional 80 feet of stream bank disturbance. This likely would not lead to stream bank instability, as a culvert would be placed at the crossings and stabilized.

Direct and Indirect Effects Unique to Alternative 5 on Stream Bank Stability

There would be nearly 587 less acres of underburning in this alternative (compared to Alternative 1) although there would still be the possibility of fire backing into RHCAs so effects from burning are expected to be similar to what was already discussed under Alternative 1. Less than 100 feet of fireline would be constructed under Alternative 2. This fire line would be on the outer edge of an RHCA and would not cross a stream so there would be no effect to stream bank stability.

Approximately 12.2 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.3 miles of new system road would be constructed in RHCAs across three Class 4 streams. This would result in stream bank disturbance as a result of road construction and placement of the culverts at the three crossings. Using an average road width of 20 feet this would lead to an additional 120 feet of stream bank disturbance. This would not likely lead to stream bank instability as a culvert would be placed at the crossings and stabilized.

Cumulative Effects on Stream Bank Stability

Cumulative effects on stream bank stability are similar to those described above for stream temperature and sediment. Activities proposed in this project could cumulatively increase stream bank stability by removing crossing structures at 44 locations and returning the stream banks to a stable condition.

Large Wood in Streams

In-stream large wood information also was collected in 1992 -2002 using the Forest Service Region 6 protocol for Desolation Creek and its tributaries. All reaches surveyed met the standard of 20 pieces of Large Wood per mile except Desolation Creek in 2000, and the meadow reach of South Fork Desolation Creek.

Environmental Consequences

Direct and Indirect Effects of No Action on Large Wood in Streams

Because present vegetation would remain unaltered under this alternative there would be no direct effects to any riparian vegetation. Should a large wildfire occur in the analysis area there could be indirect effects to large wood in streams. New potential large wood may be created as a result of fire or existing large wood may be consumed. No new roads or stream crossings would be constructed so no additional riparian vegetation would be removed at these crossings.

Direct and Indirect Effects Common to All Action Alternatives on Large Wood in Streams

No vegetation within the riparian habitat conservation areas (RHCAs) of any of the subwatersheds would be disturbed during proposed project activities in this alternative, therefore no change in the amount of in-stream large wood is expected to be associated with these activities.

Hazard trees would be cut along 126 miles of road of which 5.8 miles are within 100 feet of a stream. Hazard trees would be cut and left where they fall in RHCAs. The amount of road affected is the same for all alternatives. Some increase in large wood may occur if hazard trees within a tree height of streams are felled into the stream. Approximately 2.6 miles are along Class 4 intermittent streams so an increase in large wood at these locations would not affect fish habitat. With the small number of trees that are felled along the remaining 3.2 miles of roads within 100 feet of streams, there would not likely be a measurable change in the amount of large wood in streams.

Proposed underburning could back into riparian areas where they occur in or near treatment units and create some potential future large wood. Burning in riparian areas would be done under controlled conditions so vegetation loss of existing large wood is not likely under any alternative. Associated with broadcast burning, fire line would be constructed around units. Between 100 and 300 feet of fire line would be constructed in Class 4 RHCAs by hand in the various alternatives. This activity is not expected to affect large wood.

Approximately 39 miles of roads would be stabilized or obliterated under all alternatives. Approximately 9 miles would be stabilized or obliterated within RHCAs including 44 existing stream crossings. Restoration of these roads would lead to additional vegetation recovery within these RHCAs and may eventually lead to an increase in the amount of potential large wood in streams.

Approximately 3 miles of closed roads would be reopened in riparian areas for access for project activities and may lead to a loss of existing vegetation where trees have re-grown on these roadbeds. This may lead to an increase in large wood at isolated locations.

Direct and Indirect Effects Unique to Alternative 1 on Large Wood in Streams

Approximately 20.5 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.5 miles of new system road would be constructed in RHCAs across five Class 4 streams. This would result in the loss of riparian vegetation and may create additional large wood if trees have to be felled in the RHCA to construct the road. It is not likely, however, that this would lead to a measurable increase in large wood. Since these crossings all occur on Class 4 channels, there would be no effect to fish habitat.

Direct and Indirect Effects Unique to Alternative 2 on Large Wood in Streams

Approximately 10 miles of temporary roads would be constructed under this alternative. No temporary roads would cross streams so there would be no effect to large wood under this alternative.

Direct and Indirect Effects Unique to Alternative 4 on Large Wood in Streams

Approximately 12.9 miles of new system and temporary roads would be constructed under this alternative. Approximately 0.25 miles of new system road would be constructed in RHCAs across two Class 4 streams. This would result in the loss of riparian vegetation and may create additional large wood if trees have to be felled within RHCAs to construct the road. It is not

likely, however, that this would lead to a measurable increase in large wood. Since these crossings all occur on Class 4 channels, there would be no effects to fish habitat.

Direct and Indirect Effects Unique to Alternative 5 on Large Wood in Streams

Approximately 12.2 miles of new system and temporary road would be constructed under this alternative. Approximately 0.3 miles of new system road would be constructed in RHCAs across three Class 4 streams. This would result in the loss of riparian vegetation and may create additional large wood if trees have to be felled within RHCAs to construct the road. It is not likely, however, that this would lead to a measurable increase in large wood. Since these crossings all occur on Class 4 channels, there would be no effects to fish habitat.

Cumulative Effects on Large Wood in Streams

Past activities, including thinning in riparian areas, road construction and maintenance, wildfires, aspen stand restoration, and riparian planting have all likely affected large wood in streams. Past harvest activities within RHCAs (approximately 419 acres) removed some trees that would have become potential large wood in streams. Road construction along or crossing creeks removed all riparian vegetation along the roadbed (36 miles); this removed trees that would have become large wood after it fell into the stream. Previous wildfires (1,671 acres in RHCAs) burned riparian vegetation, leaving portions of streams without large wood and creating new large wood along other stretches of streams. Non-commercial thinning in Riparian Habitat Conservation Areas encouraged remaining trees to grow larger so that they could become future large wood. Restoration of seven aspen stands in the past has lead to an initial increase in large wood after felling conifers in the stand and has provided for a greater amount of future large wood. Riparian planting along seven miles of South Fork Desolation Creek also has increased the speed of recovery of conifers and led to future large wood sooner than would have occurred naturally. These cumulative effects now are reflected in existing conditions.

Present activities that would lead to an increase in future large wood are riparian planting on Junkens and Beeman creeks in the Sharps Ridge fire area. Riparian planting along Junkens and Beeman creeks in the fire area would also lead to an increase in the speed of recovery of conifers and lead to future large wood sooner than would have occurred naturally.

Future foreseeable activities proposed for this watershed that would affect large wood include additional riparian planting in the Sharps Ridge Fire area.

Currently many of the streams are meeting large wood standards in the analysis area. Overall, activities proposed in this project are likely to lead to an increase in large wood, mostly in Class 4 streams.

Pool Frequency and Quality

Data on pool frequency was collected during 1992 to 2002 stream surveys. In the Desolation Creek watershed, average pool frequencies generally appear to be highest in South Fork Desolation Creek. Pool densities are compared to the median pool density of unmanaged streams in the Blue Mountain province as described for the ICBEMP analysis (McKinney and

others 1996) and in the methodology section of the Fisheries Specialist's Report). Only 13 of 40 reaches surveyed were less than or equal to the median pool density for unmanaged streams. South Fork Desolation is considered unmanaged and is likely to be at or near its natural pool frequency and quality. The mainstem of Desolation Creek has had many structures placed in it in the past to increase pool habitat.

Environmental Consequences

Direct and Indirect Effects of No Action on Pool Frequency / Quality

Because vegetation would remain unaltered under this alternative, there would be no direct effects to any riparian vegetation or in-stream fish habitat. Should a large wildfire occur in the analysis area, there could be indirect effects on pools as a related to large wood in streams. New potential large wood may be created as a result of fire, which can indirectly lead to new pool formation. As no new roads or stream crossings would be constructed under this alternative, no changes would occur to any stream channel.

Direct and Indirect Effects Common to All Action Alternatives on Pool Frequency / Quality

No vegetation within the riparian habitat conservation areas (RHCAs) of any of the subwatersheds would be disturbed during proposed project activities in this alternative so no change in the amount of large wood or number of pools is expected to be associated with these activities. In addition, this project is located in a special fish management area so there is an additional emphasis on preventing soil exposure and sediment movement within 500 feet of fish bearing streams. With these additional restrictions it is not likely any sediment would reach streams as a result of vegetation removal activities and so would not affect pool quality.

Hazard trees would be cut along 126 miles of road of which 5.8 miles are within 100 feet of a stream. Hazard trees would be cut and left where they fall in RHCAs. Some increase in large wood may occur if hazard trees within a tree height of streams are felled into the stream this could indirectly lead to pool formation. Approximately 2.6 of these miles are along Class 4 intermittent streams so an increase in large wood at these locations would not affect fish habitat. With the small number of trees that are felled along the remaining 3.2 miles of roads within 100 feet of streams there would not likely be a measurable change in the number of pools over the reach level.

Proposed underburning could back into riparian areas where they occur in or near treatment units and create some potential future large wood. This may indirectly increase the number of pools in the future. Burning in riparian areas would be done under controlled conditions so vegetation loss of existing large wood and indirectly the number of pools is not likely. Associated with broadcast burning, fire line would be constructed under each alternative. Depending on alternative, between 100 and 300 feet of fire line would be constructed in Class 4 RHCAs by hand. This would not affect the stream channel or large wood so would have no effect on the number or quality of pools in any alternative.

Approximately 39 miles of existing closed roads would be stabilized or obliterated as part of this project under all alternatives. Approximately 9 miles would be stabilized or obliterated within

RHCAs including 44 existing stream crossings. Restoration of these crossings would involve returning the stream channel to its natural state. This could lead to an increase in the number of pools at these crossings.

Approximately 3 miles of closed roads would be reopened in riparian areas for access for proposed project activities. These stream crossings currently exist so there would be no changes to the existing stream channel and no effect to existing pools.

Direct and Indirect Effects Unique to Alternative 1, 4 and 5 on Pool Frequency / Quality

Between 12 and 20.5 miles of new system or temporary roads would be constructed under these alternatives. Approximately 0.5 miles of new system road would be constructed in RHCAs across two to five Class 4 streams. This would result in the loss of riparian vegetation and may create additional large wood if trees have to be felled in the RHCA to construct the road. This road construction across creeks may also directly affect the number of pools. Since these crossings all occur on Class 4 channels, there would be no effects to fish habitat.

Direct and Indirect Effects Unique to Alternative 2 on Pool Frequency / Quality

Approximately 10 miles of temporary roads would be constructed under this alternative. No temporary roads would cross streams so there would be no effect to large wood or pools under this alternative.

Cumulative Effects on Pool Frequency / Quality

Some past activities, road construction and maintenance, grazing, wildfires, fencing riparian areas, construction of upland water sources, and installation of in-stream structures have all likely affected pools and pool quality. Road construction along or crossing creeks removed all riparian vegetation along the roadbed (36 miles with 182 stream crossings) and disturbing the stream channel at each crossings. Pools may have been lost at some of these crossings when culverts were installed; other crossings may have created pools downstream of culverts. Grazing of riparian areas in the past has led to loss of vegetation and bank trampling that destabilized stream banks and increased the amount of sediment entering streams, thus affecting pool quality. Grazing practices have since been modified and stream banks are recovering. Previous wildfires (1,671 acres in RHCAs) also burned riparian vegetation leading to indirect effects to large wood and pools. New large wood may have lead to new pool formation. Approximately 244 instream structures have been constructed to increase the number of pools in Desolation Creek and Kelsay Creek. Up to 70 percent of these structures are still functioning as pools. Riparian exclosure fencing of portions of Kelsay and Park creeks has allowed riparian vegetation and bank stability to recover, improving pool quality within and downstream of these exclosures. In addition, the construction of 45 upland ponds and development of six springs has diverted cattle from streams reducing the impact to stream channels on unfenced stretches of stream. These cumulative effects are reflected in existing conditions.

Currently much of the past effects to pools are recovering or would continue to recover in the future. Grazing would still impact pool quality, but with current management little impact to pools should be seen. Activities proposed in this project could cumulatively increase the number

of pools by removing crossing structures at 44 locations and returning the streambeds to their original condition or by adding more large wood to streams through hazard tree cutting.

Road Density and Location

Overall, the watershed has 2.1 miles of road per square mile (292 total miles of road) (Table 3.5.2). One percent of the Desolation Creek watershed is within the North Fork John Day Wilderness, 5 percent is within the Jump-off Joe Roadless Area, and 10 percent is within the Greenhorn Mountain Roadless Area (15% total in wilderness or roadless areas). There are 37.5 miles of road within RHCAs, 23.9 of those miles are within RHCAs of fish bearing streams. Table 3.5.2 below describes road density and proximity to streams in the analysis area for National Forest System lands. Areas where roads are concentrated in RHCAs are highlighted in the table below (RHCA road density greater than the road density outside of RHCAs). Data was obtained from GIS Analysis.

Table 3.5.2. Road densities in the Desolation Creek watershed.

Total Road Density	Road Density Within 300' of Class 1 & 2 Streams	Road Density Within 150' of Class 3 streams	Road Density Within 100' of Class 4 streams
2.7	2.3	1.6	1.8

The drainage density increase[2] currently is 2.6 percent for the Desolation Creek watershed. Based on the GIS stream layer and transportation layer, the number of Class 1-4 stream crossings was used to estimate the increase in channel length by subwatershed. The road length draining directly into a channel varies depending on the road drainage structure spacing and effectiveness, and on the topographic setting. A conservative estimate of 200 feet of road per stream crossing was used, and this additional mileage was used to calculate the expanded draining density, which is reported in percent increase. For this analysis to be considered functioning appropriately, the drainage density increase must be 3 percent or less; to be functioning at risk, the drainage density increase must be between 3 and 8 percent; and to be functioning at unacceptable risk, the drainage density increase must be 8 percent or greater.

Environmental Consequences

Direct and Indirect Effects of No Action on Road Density

Neither road density nor drainage density would change under this alternative.

Direct and Indirect Effects Unique to Alternative 1 on Road Density

The only actions that would affect road density or drainage density are the construction of new roads and stabilization or obliteration of existing roads. Closed roads to be reopened for access

[2] Drainage density increase is defined as the increase in stream length from connection to ditch lines at road-stream crossings. An estimate of 200 feet of additional stream length is used for each crossing.

for proposed project activities are already included in calculations for road density and drainage density.

Approximately 20.5 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.5 miles of new system road would be constructed in RHCAs across five Class 4 streams. This would result in the increase in overall road density but would not show a measurable increase in riparian road density. The five new stream crossings would add approximately 1000 feet to the drainage length, which is not measurable in terms of density at the watershed scale.

Approximately 39 miles of roads would be stabilized or obliterated as part of this project. Approximately 9 miles would be stabilized or obliterated within RHCAs including 44 existing stream crossings. This would reduce riparian road density. Restoration of these 44 stream crossings would reduce the drainage length and (taking into account the addition of the five new crossings) would change the drainage density increase from the existing 2.60 to 2.00 percent.

Direct and Indirect Effects Unique to Alternative 2 on Road Density

Ten miles of temporary roads would be constructed under this alternative. There are no new stream crossings as part of this alternative. This would temporarily increase the road density. No new permanent roads would be constructed. Effects from road obliteration would be the same as discussed for Alternative 1. Restoration of these 44 stream crossings would reduce the drainage length and because no new crossings would be constructed under this alternative the drainage density increase would be 1.96 percent.

Direct and Indirect Effects Unique to Alternative 4 on Road Density

Approximately 12.9 miles of new system or temporary roads would be constructed under this alternative. Approximately 0.25 miles of new system road would be constructed in RHCAs across two Class 4 streams. This would increase overall road density but would not show a measurable increase in riparian road density. The two new stream crossings would add approximately 400 feet to the drainage length, which is not measurable in terms of density at the watershed scale.

Approximately 39 miles of roads would be stabilized or obliterated as part of this project. Approximately 9 miles would be stabilized or obliterated in RHCAs including 44 existing stream crossings. Restoration of these 44 stream crossings would reduce the drainage length and (taking into account the addition of the two new crossings) would reduce the drainage density increase to 1.99 percent.

Direct and Indirect Effects Unique to Alternative 5 on Road Density

Approximately 12.2 miles of new system or temporary roads would be constructed under this alternative. As a part of the construction of roads, approximately 0.3 miles of new system road would be constructed in RHCAs across three Class 4 streams. This would result in the increase in overall road density but would not show a measurable increase in riparian road density. The

three new stream crossings would add approximately 600 feet to the drainage length, which is not measurable in terms of density at the watershed scale.

Approximately 39 miles of roads would be stabilized or obliterated as part of this project. Approximately 9 miles would be stabilized or obliterated within RHCAs including the 44 existing stream crossings. This would reduce the overall road density and the riparian road density. Restoration of these 44 stream crossings would reduce the drainage length and (and taking into account the addition of the three new crossings) would reduce the drainage density increase to 2.00%.

Cumulative Effects on Road Density

Roads can substantially elevate onsite erosion and sediment delivery, disrupt subsurface flows, and can contribute to increased peak flows. Road density is measured as the number of miles of existing road bed per square mile of area. Higher road densities indicate that there is more soil disturbance and a higher potential for sediment transport in the analysis area particularly if roads are concentrated in RHCAs. Drainage density is the mile of streams per square mile of watershed area. An increase in drainage density from the construction of roads and their associated ditch lines across streams would likely increase the transport of sediment directly to streams. The only past activities that have affected road density or drainage density are the construction roads which has been accounted for in the existing conditions. There are no present or future actions that would affect road density or drainage density. Because all alternatives include the obliteration or stabilization of approximately 39 miles of existing closed road, the overall cumulative effect to road density and drainage density would be a net loss of roads both in the upland and riparian areas and a net loss in the length of the drainage network. Alternative 2 would achieve the greatest net reduction in both drainage density and road density.

Consistency with the Forest Plan (All Alternatives)

The proposed action alternatives for the Farley project are consistent with Forest Plan direction regarding fish. None of the potential combined effects are expected to adversely affect PACFISH Riparian Management Objectives or steelhead/redband trout population viability. Application of PACFISH direction would maintain or improve fish habitat conditions in the analysis area. Riparian and stream channel conditions would be expected to improve with the proposed road decommissioning and obliteration activities. This would in turn increase the smolt habitat capability.

These alternatives are also consistent with the Basinwide Salmon Recovery Strategy (All-H Strategy) as it requires following existing management direction in the short-term and following ICBEMP science in the long-term. These alternatives are also consistent with Wy-Kan-Ush-Mi Wy-Kish-Wit - The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes. This restoration plan recommends that federal agencies follow existing land use and water quality laws and regulations.

3.6 WILDLIFE

SCALE OF ANALYSIS

The analysis area for the Farley project is the Desolation Creek watershed. It covers an area of approximately 69,675 acres, of which 56,224 acres are National Forest System lands. The scale of analysis differs based on the species and habitats being considered.

Late and old structure, old growth habitat, and habitat connectivity was assessed at the scale of the National Forest System lands within the Desolation Creek watershed, with consideration given to connectivity of late and old structure habitat and old growth to habitats on private lands within the watershed, and outside the boundaries of the analysis area. Snags and down wood were assessed at the scale of the Desolation Creek watershed for the dry upland, moist upland, and cold upland forest Potential Vegetation Groups (PVGs).

The scale of analysis for the Rocky Mountain elk varies depending on standards and direction given by the Forest Plan. The Forest Plan designates standards for elk habitat (Habitat Effectiveness Index - HEI, total cover, satisfactory cover, etc.) in the C3 (Big Game Winter Range – Desolation Winter Range #17) and the C7 (Special Fish Management) Management Areas. HEI was assessed on the entire winter range area for the C3 management area and the entire C7 allocation within the Desolation Creek watershed.

The scale of analysis for Endangered, Threatened, and Sensitive Species, Species of Interest, and Neotropical Migratory Birds was the suitable/potential habitat in the analysis area. Potential habitat was identified using the vegetation database in the GIS database for the North Fork John Day Ranger District. Vegetation data was queried based on habitat requirements and preferences of selected species. Vegetation data was intersected with the Farley analysis area and proposed treatment units.

AFFECTED ENVIRONMENT

Late and Old Forest Structure Habitat

Several species present on the Umatilla National Forest require late and old forest structure (LOS) habitat. Late and old forest structural stages include old forest multi-strata and old forest single-stratum stands. These species include pileated woodpecker, white-headed woodpecker, Lewis' woodpecker, pine marten, northern goshawk, Cooper's hawk, sharp-shinned hawk, flammulated owl, great gray owl, Vaux's swift, Townsend's warbler, Hammond's flycatcher, and others.

The Eastside Screens state that harvest is allowed in late and old structural stages that are above or within the historical range of variability (HRV) in order to maintain or enhance late and old structure habitat within a particular biophysical environment or to move one type of LOS habitat into an LOS stage that is below HRV). Harvest activities would not be allowed in those structural stages and potential vegetation groups that are currently below HRV.

In the dry upland forest potential vegetation group (PVG), the Farley analysis area is currently below HRV for the OFSS (old forest single stratum) structural class. The moist and cold upland forest PVGs are currently below HRV for the OFMS (old forest multi-strata), SECC (stem

exclusion closed canopy), and UR (understory reinitiation) structural classes, largely due to insect infestations that caused heavy overstory mortality and associated forest structure changes.

Environmental Consequences

Direct and Indirect Effects of No Action on Late and Old Forest Structure Habitat

In the short term (0 to 3 years), LOS habitat would maintain its current quality and extent in the analysis area. Single-stratum old forest would remain below HRV in the dry upland forest PVG. Multi-strata old forest habitat also would remain below HRV in the moist and cold upland forest PVGs. The amount of LOS habitat would be expected to change over time. With the existing management direction including fire suppression, late and old structure stands (multi-strata and single-stratum), young forest and stem exclusion closed/open canopy stands, and stands recovering from wildfire would develop old growth habitat features such as large trees, high standing and down wood densities, and multiple canopy layers, and would provide habitat for wildlife adapted to old growth and late and old forest structure (in the mid and long term).

However, growth in old and young forest stands would increase stand density and fuel loading, making the forest increasingly susceptible to stress, insect and disease outbreaks, and high-severity wildfire. A major disturbance on the landscape (such as fire) would change these stands to early seral, stand initiation-structural stages, resulting in reduced quantity and connectivity of late and old structure habitats. Old forest single-stratum and old forest multi-strata would be well below the historical range of variability in all potential vegetation groups after such an event, and would remain low for many years as the young stands grow.

Direct and Indirect Effects Common to All Action Alternatives on Late and Old Forest Structure Habitat

The effects expected under all of the action alternatives on late and old forest structure habitat generally would be the same. The differences among individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. No thinning or harvest activities are proposed in late and old forest structure stands. Non-commercial thinning, fuels reduction and broadcast burning, and road-related activities (construction, stabilization / obliteration, etc) would not affect the quality or quantity of LOS habitat in the analysis area.

By retaining the largest trees in proposed treatment units (thinning from below), commercial harvest activities would create late and old structure habitat in the long term. Proposed thinning and harvest in young forest stands would indirectly affect the availability and distribution of late and old structure habitat by delaying or reducing development of future late and old structure habitat in the future, primarily in the moist and cold upland forest potential vegetation groups.

Cumulative Effects on Late and Old Forest Structure Habitat

The amount, quality, species composition and distribution of late and old structure stands in the analysis area have been affected by natural disturbance processes and past resource management actions and events. These include commercial timber harvest totaling approximately 7,300 acres

(from 1980 to present), wildfire, disease and insect infestations, hazard tree felling and firewood cutting, and road construction. Within harvested late and old structure habitats, large trees often were targeted for removal; snags and down wood (density and average size) was also reduced in these stands. Past harvest reduced connectivity of LOS habitats, causing fragmentation. Disease and insect infestations (primarily spruce budworm) have had widespread effects on LOS habitat, converting these areas to early seral stands. In localized areas salvage harvest reduced the amount of snags and down wood that would have been used by a number of wildlife species. Hazard tree removal along Forest Road 10 felled snags and live trees that posed an imminent and likely danger of falling onto roads used by the public, generally out to a distance of 150 feet from the road. Firewood cutting also has reduced snag densities adjacent to open forest roads.

Wildfire has also affected LOS habitats. The Bull and Summit fires (in 1996) and the Sharps Ridge Fire (in 2006) burned substantial areas of LOS habitats in the analysis area, creating early seral habitats. Fire suppression is increasing the risk of intense, large-scale wildfire in many of these stands. Late and old structure stands are growing more densely stocked with trees and dead wood due to fire suppression. A high severity fire would convert these habitats to a condition that is unsuitable for many wildlife species associated with LOS habitats.

No project activities are proposed to occur in LOS habitats in the analysis area. Proposed activities would regenerate mid-seral stands that would have developed late and old structure habitat components in the long term. This level of effect would vary by alternative in proportion to the amount of area subjected to various silvicultural treatments. Proposed activities also would not reduce existing connectivity habitat. The connectivity habitat that currently exists between late and old structure stands and dedicated/managed old growth stands would be maintained under all of the action alternatives. Partial cutting (commercial thinning) would promote the development of late and old structure habitat features and move stands toward late and old structural stages that are currently below HRV.

Connectivity

The Eastside Screens require late and old structural stands and designated old growth areas to be connected to each other across the landscape. For this standard, connective habitat does not necessarily need to meet the same description of suitable habitat for a particular species, but provide “free movement” between late and old structural stands and old growth areas, for various wildlife species associated with the late and old structural condition. For the majority of the analysis area, late and old structural stands and old growth areas are connected to each other with medium to large trees, stands with variable widths greater than 400 feet, and attached with two or more different connections. Connectivity of late and old structure habitat and C1 and C2 old growth is poor in portions of the analysis area; these are typically associated with areas of past wildfire and harvest actions.

Environmental Consequences

Direct and Indirect Effects of No Action on Connectivity

In the short term (0 to 3 years), the existing connectivity corridor network between late and old structure stands and designated/managed old growth stands would remain the same. Indirectly,

connectivity habitat would change over time. With the existing management direction including fire suppression, stands in the project area would continue to grow into dense multi-layered stands. Openings created by past harvest and wildfire would grow into mid-seral stands composed of small and medium sized trees. These stands would provide connectivity corridors in the future. Increased stand densities, standing and down fuel loads, and multi-layer conditions would increase the susceptibility to wildfire and insect and disease outbreaks. A major disturbance on the landscape would change the composition and structure of connectivity habitat. As a result, late and old structure and old growth stands would be disconnected from other late and old structure stands in the analysis area. This would limit "free movement" between late and old structure and old growth stands within and outside the analysis area for wildlife species associated with these habitats.

Direct and Indirect Effects Common to All Action Alternatives on Connectivity

No commercial harvest or regeneration harvest activities are proposed for this project within the designated connectivity corridor network in the Desolation Creek watershed. Initial project design eliminated all potential treatment units that would have affected connectivity corridors between old growth and late and old structure stands. Therefore, the existing level of habitat connectivity would not change under any of the proposed action alternatives.

Non-commercial thinning would have no effect on the quality of connectivity habitat because overstory composition and structure would not be affected. Patches of understory vegetation (small diameter conifers) would be maintained in non-commercially thinned units to provide hiding cover for wildlife and maintain the quality of connectivity corridors. Non-commercial thinning would increase growth rates of residual trees.

Slash created in non-commercial thinning units would be lopped and scattered within the unit. These stands would not be burned, so all retained small diameter trees, patches of retained regeneration, and overstory trees would not be affected by this activity. Snags and down wood also would not be affected in non-commercial thinning units. Broadcast burning and pile burning would not affect connectivity corridors; these activities would occur entirely outside of connectivity corridors within commercial and regeneration harvest units. All commercial thinning and regeneration units would be (fire-)lined to prevent escape of prescribed fire. These stands would be burned during periods with weather and fuel conditions conducive to a low intensity underburn. The risk of connectivity habitat being affected by burning is minimal.

Roads used for project activities would not change the composition or structure of connective habitat in the project area. Maintenance and reconstruction of some roads may require the removal of some vegetation; this activity would not affect overstory composition or structure. New system roads that pass through connective corridors would not create barriers to the movement of wildlife. These roads would be relatively narrow (13 to 15 feet wide) and would be closed (or obliterated in the case of temporary roads) to motorized use following project activities.

Cumulative Effects on Connectivity

The amount, quality, species composition and distribution of late and old structure stands in the analysis area have been affected by natural disturbances and past resource management actions

as generally described above in Cumulative Effects on Late and Old Forest Structure Habitat. These actions and events all have contributed to the existing condition of connectivity habitat in the analysis area.

There is no commercial thinning or regeneration harvest within connectivity habitat proposed under any of the action alternatives. Non-commercial thinning of connectivity habitat would not affect its quality and would continue to provide for the free movement of late and old structure-associated wildlife. Proposed activities would regenerate mid-seral stands that would have developed late and old structure habitat components in the long term; the magnitude of effect would vary by alternative.

When the expected effects of project activities are combined with the residual and expected effects of past, present, and reasonably foreseeable future actions and events in the analysis area, there would be no cumulative reduction of connectivity habitat within the analysis area under any of the action alternatives. The connectivity habitat that currently exists between late and old structure stands and dedicated/managed old growth stands would be maintained under all of the action alternatives. The connectivity network in the analysis area would continue to meet the Forest Plan standards adopted from the Eastside Screens following project implementation.

DEAD WOOD HABITAT

The Forest Plan was amended in 1995 by the "Eastside Screens" and new snag requirements and replacement tree objectives were developed for the plant associations found on the Forest (written communication, March 22, 1996, Craig Dixon, District Ranger memorandum: Wildlife Tree and Down Wood Guidelines).

Snags

Snag (standing dead wood) densities currently exceed Forest Plan standards in all diameter classes for the dry, moist, and cold upland forest potential vegetation groups in the project analysis area. The Forest Plan indicates that the condition of habitat for species requiring standing dead wood for nesting, foraging, and roosting is good to excellent at the watershed scale.

Adjusted Snag Retention Standards for the Farley Project

The analysis area currently is underrepresented in some snag density groups in the dry, moist, and cold upland forest potential vegetation groups, when compared to the historical condition in these habitat types. The most current information available for a number of the snag-dependent species indicates that the current Forest Plan standards for snags may be lower than what is preferred by some species, including the pileated, hairy, and black-backed woodpeckers (Bull and others, 1997; Rose and others, 2001; Mellen and others, 2006). Therefore, snag retention guidelines for the Farley project would be increased compared to current Forest Plan standards (as presented in Table 3.6.1).

Table 3.6.1 Adjusted snag densities for the Farley analysis area.

Potential Vegetation Group	Diameter Class (inches dbh)	Snag Density (snags/acre)
Dry Upland	>10	4
	> 20	2
Moist Upland	>10	9
	> 20	2
Cold Upland	>10	9
	> 20	2

Snag density standards in the moist upland and cold upland forest potential vegetation groups represent a range of snags to be retained. The range in cold and moist upland stands is 6 to 12 snags per acre, with a target snag density of 9 snags over 10 inches dbh. Snag densities in the >20 inch dbh group in cold and moist forest stands, would range from 2 to 4 snags over 20 inches dbh per acre. In some stands, target snag densities may exceed what currently occurs in these stands. In these stands, all existing snags would be retained, unless they pose a hazard to operations.

Decayed Wood Advisor (DecAID) model output

The Decayed Wood Advisor (DecAID) model by Mellen and others (2007) is a statistical summary of empirical data from published research on wildlife and deadwood habitat. DecAID allows the user to relate the abundance of deadwood habitat for both snags and down logs to the frequency of occurrence of selected wildlife species that require deadwood habitat for some part of their life cycle.

DecAID data are presented at 30 percent, 50 percent, and 80 percent "tolerance levels." Tolerance levels are not indicators of population potential or viability, or of population "thresholds". Tolerance levels are equivalent to the potential (percent) for individuals to occur in an area that has certain deadwood characteristics. Tolerance levels also are equivalent to the percent of individuals in a population. In both cases, the lower the tolerance level, the fewer individuals would use the area relative to the habitat characteristic. DecAID tolerance levels may also be interpreted as three levels of "assurance": low (30 percent tolerance level), moderate (50 percent tolerance level), and high (80 percent tolerance level). The higher the tolerance level, the higher the "assurance" that habitat (snags/down wood) is provided.

DecAID output is only briefly summarized in this chapter. More detailed results and discussion are found in the wildlife specialist report in the project file at the North Fork John Day Ranger District in Ukiah, Oregon.

Snags in Dry Upland Forest

The ponderosa pine/Douglas-fir forest wildlife habitat type accounts for approximately 17 percent of the National Forest System lands within the Farley analysis area. For the DecAID analysis the white-headed woodpecker was used because it best represents the habitat type and structural stages that would be affected by the proposed activities. Existing condition estimates

of snag densities exceed the 80 percent tolerance level for the white-headed woodpecker in the >10-inch diameter group. For the >20-inch diameter group, snag density in the watershed occurs between the 50 percent and 80 percent tolerance levels for the white-headed woodpecker

Snags in Moist Upland Forest

The moist upland forest potential vegetation group occurs on approximately 36 percent of the analysis area. This potential vegetation group can be found throughout the analysis area; however, the greatest concentration of these habitats is in the central and southern portions of the analysis area and at higher elevations. For the DecAID evaluation the Eastside Mixed Conifer habitat type was selected because it most accurately represents the moist upland forest potential vegetation group. The pileated woodpecker was selected for the analysis in these habitats because it is associated with moist mixed conifer habitats. DecAID did not provide estimates for snag densities at either the 30 percent or 80 percent tolerance levels. Estimates for snag densities in the watershed fall below the 50 percent tolerance level for the pileated woodpecker in the ≥10-inch and ≥20-inch diameter groups

Snags in Cold Upland Forest

The cold upland forest potential vegetation group occurs on approximately 42 percent of the analysis area. This potential vegetation group is found at the highest elevations in the analysis area and where cold pockets exist interspersed with moist and dry forest habitats. For the DecAID evaluation the Lodgepole Pine habitat type was selected because it most accurately represents the cold upland forest potential vegetation group. The American marten selected for the analysis in these habitats because it is associated with cold, high elevation forest types. DecAID estimates of snag densities in the watershed exceed the 80 percent tolerance level for the marten in the ≥10-inch diameter group. Snag densities are below the 30 percent tolerance level in the ≥20-inch diameter group.

Environmental Consequences

Direct and Indirect Effects of No Action on Snags

In the short term (0 to 3 years), the distribution of snags across the watershed is expected to remain the same. In the mid and long term (3 to 20+ years), existing snags would decay and fall to the ground, increasing down wood in the analysis area. Snag densities have the potential to increase in the analysis area through naturally occurring (background) mortality and mortality caused by insect and disease outbreaks and wildfire. Snags resulting from such event(s) would fall and be relatively scarce until the regenerating stand becomes old enough to produce large trees and snags, a time period ranging from 60 to 100 years.

Direct and Indirect Effects Common to All Action Alternatives on Snags

The effects expected under all of the action alternatives generally would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each

alternative. Proposed commercial thinning activities would target green trees for removal; any removal of snags would be incidental to green-tree harvest activities. Snag densities within proposed commercial thinning units would meet the snag density retention rates described above for the Farley project (Table 3.6.1). These snag densities would contribute to high quality habitat for species requiring snags for some portion of their lives.

Snag densities would be expected to be reduced in regeneration harvest units. As a result, primary cavity excavator habitat would be reduced. However, snag densities would meet the adjusted snag density retention rates for the Farley project described above (Table 3.6.1), and would be sufficient to support wildlife dependent on this habitat feature.

Within non-commercial thinning units, there would be no cutting or removal of snags unless they pose a safety hazard to thinning operations. Generally, snag densities in these stands are relatively low due to past harvest and salvage activities. Adjusted snag density standards for the Farley project (Table 3.6.1) would apply to these units as well.

Use of the road system and construction of roads has the potential to affect snags. Snags that present a danger to operations would be felled to provide for safety in the work area and along system and temporary roads. This activity would reduce snag densities along system and temporary roads. Felled snags would be left on the ground to provide down wood habitat. The miles of open roads, closed roads, new system roads, and temporary roads used or constructed under each of the action alternatives is presented in Table 3.6.4.

Effects would vary in proportion to the miles of system and temporary road by alternative (Table 3.6.2). In the long term, temporary roads would revegetate and contribute to snag densities, while the area committed to new system roads would be removed from production (of vegetation) for the life of the road.

Table 3.6.2 Road construction and use (in miles) by alternative.

Alternative	New System Road Construction	Temporary Road Construction	Currently Closed Roads Proposed To Be Used For Project Activities	Currently Open Roads Proposed To Be Used For Project Activities
1	13.9	7	57.2	103.9
2	0	10.1	62.6	105.7
4	7.8	5.1	62.6	105.7
5	7.2	5.2	62.4	104.8

Burning of activity fuels within harvest units also has the potential to affect snags retained after harvest. The number of acres burned varies by alternative as presented in Table 3.6.3. Where accumulations of heavy activity-created debris are located near the base of a snag, there is a potential that it could be consumed. The timing (spring and fall) and intensity of burning (generally low due to high fuel moistures) would reduce the potential for snag loss in these stands. This effect is expected to be minor. Burning also has the potential to create snags through direct and delayed fire mortality, especially in moist and cold upland forest stands where trees are more susceptible to fire mortality. Fire-created snags would compensate for any snags that are lost during burning. Snag densities (as adjusted for the Farley project - Table 3.6.1) would remain above Forest Plan standards after fuels treatment activities. Pile burning generally would have minor effects on snags in treatment units.

Table 3.6.3. Acres of activity fuels treatment by alternative.

Alternative	Broadcast Burning (acres)	Piling/Burning (acres)
1	2,391	799
2	2,100	715
4	1,967	799
5	1,804	715

Effects of Alternative 1 on Snags

Direct and Indirect Effects

Proposed commercial, non-commercial, and regeneration harvest activities would have the same effects as those described under Direct and Indirect Effects Common to All Action Alternatives on Snags. However, the extent (acres) of these activities would vary by alternative. A total of 2,855 acres would be commercially thinned and regeneration harvested under Alternative 1. Snag densities would be reduced on these treatment acres, as well as 664 acres of non-commercial thinning/fuels treatment. Because this alternative would treat the most acres of any of the action alternatives, it would also have the greatest effect on snags within the analysis area. Using the adjusted snag retention guidelines for the Farley Project (presented in Table 3.6.1), snag densities at the stand scale would exceed current Forest Plan standards after project activities in the each of the potential vegetation groups (dry, moist, and cold upland forest) in the watershed.

Snag densities in the dry upland forest would continue to exceed the (DecAID model) 80 percent tolerance level for the white-headed woodpecker in the ≥10-inch group and be between the 30 and 50 percent tolerance levels for the ≥20-inch group. For the pileated woodpecker in moist upland forest habitat, snag densities would continue to be below the 50 percent tolerance level in the ≥10-inch and ≥20-inch diameter groups in moist upland forest vegetation in the analysis area. For the American marten snag densities would continue to exceed the 80 percent tolerance level in the ≥10-inch group and be below the 30 percent tolerance level in the ≥20-inch diameter groups in the cold upland forest potential vegetation group.

Under this alternative, 13.9 miles of new system road would be constructed. An additional 7 miles of temporary road would be constructed. Approximately 38 acres of habitat would be directly affected by road building. Approximately 26 acres would be permanently removed from production. The remaining 12 acres would be temporary road construction, and would provide for snag recruitment in the long term.

Effects of Alternative 2 on Snags

Direct and Indirect Effects

The environmental effects of commercial and non-commercial thinning and regeneration harvest under Alternative 2 would be the same as those described under Direct and Indirect Effects Common to All Action Alternatives on Snags. A total of 2,481 acres would be commercially thinned and regeneration harvested under Alternative 2. Snag densities would be reduced on these treatment acres, as well as 664 acres of non-commercial thinning/fuels treatment. Snags would be reduced on approximately 374 fewer acres under this alternative when compared to

Alternative 1. Using the adjusted snag retention guidelines for the Farley project (presented in Table 3.6.1), snag densities at the stand scale would exceed current Forest Plan standards after project activities in the each of the potential vegetation groups (dry, moist, and cold upland forest) in the watershed.

At the watershed scale, in the dry upland forest snag densities under Alternative 2 would continue to exceed the 80 percent (DecAID model) tolerance level for the white-headed woodpecker in the ≥10-inch group and be between the 30 and 50 percent tolerance levels for the ≥20-inch group. In the moist upland forest, snag densities for the pileated woodpecker would continue to be below the 50 percent tolerance level in the ≥10-inch and ≥20-inch diameter groups in moist upland forest vegetation in the analysis area. For the American marten, snag densities would continue to exceed the 80 percent tolerance level in the ≥10-inch group and be below the 30 percent tolerance level in the ≥20-inch diameter groups in the cold upland forest potential vegetation group under this alternative.

Under this alternative, there would be no construction of new system roads. Approximately 10.1 miles of temporary road would be constructed. Approximately 18.4 acres of habitat would be directly affected by road building. These acres would be temporarily removed from production, but, in the long term, would provide for snag recruitment.

Effects of Alternative 4 on Snags

Direct and Indirect Effects

The environmental effects of this alternative are the same as those described under Direct and Indirect Effects Common to All Action Alternatives on Snags. This alternative would commercially harvest and regeneration harvest approximately 2,432 acres. With respect to these harvest activities, the effects of Alternative 4 are approximately the same as Alternative 2. Using the adjusted snag retention guidelines for the Farley Project (presented in Table 3.6.1), snag densities at the stand scale would exceed current Forest Plan standards after project activities in the each of the potential vegetation groups (dry, moist, and cold upland forest) in the watershed.

At the watershed scale, the effects of this alternative on snag densities (and effects on white-headed woodpecker as indicated by DecAID model output) for the dry upland forest potential vegetation group would be the same as those under Alternative 1, as Alternative 4 would treat the same number of acres in the dry upland forest. For the pileated woodpecker, snag densities would continue to be below the 50 percent tolerance level in the >10-inch and >20-inch diameter groups in moist upland forest vegetation in the analysis area. In the cold upland forest PVG snag densities and effects on pine marten would be the essentially the same as those described (and calculated) for Alternative 2.

Under this alternative, 7.8 miles of new system road would be constructed. An additional 5.1 miles of temporary road would be constructed. Approximately 23.5 acres of habitat would be directly affected by road building. Approximately 14.2 acres would be permanently removed from production. The remaining 9.3 acres would be temporary road construction, and would provide for snag recruitment in the long term.

Effects of Alternative 5 on Snags

Direct and Indirect Effects

The environmental effects of this alternative are the same as those described under Direct and Indirect Effects Common to All Action Alternatives on Snags. This alternative would commercially harvest and regeneration harvest approximately 2,184 acres; the fewest acres when compared to the other action alternatives. Broadcast burning would occur on approximately 1,804 acres under this alternative, also the smallest amount when compared to the other action alternatives. Therefore, snag habitat would be expected to be affected the least under this alternative. Using the adjusted snag retention guidelines for the Farley Project (presented in Table 3.6.1), snag densities at the stand scale would exceed current Forest Plan standards after project activities in the each of the potential vegetation groups (dry, moist, and cold upland forest) in the watershed.

At the watershed scale, the effects of this alternative on snag densities (and effects on white-headed woodpecker as indicated by DecAID model output) for the dry upland forest potential vegetation group would be the same as those under Alternative 1, as Alternative 5 would treat the same number of acres in the dry upland forest. For the pileated woodpecker snag densities would continue to be below the 50 percent tolerance level in the ≥10-inch and ≥20-inch diameter groups in moist upland forest vegetation in the analysis area. For the American marten, snag densities would continue to exceed the 80 percent tolerance level in the ≥10-inch group and be below the 30 percent tolerance level in the ≥20-inch diameter groups in the cold upland forest potential vegetation group under this alternative.

Under this alternative approximately 7.2 miles of new system road would be constructed, and an additional 5.2 miles of temporary road would be constructed. Approximately 22.5 acres of habitat would be directly affected by road building. Approximately 13.1 acres would be permanently removed from production. The remaining 9.4 acres would be temporary road construction, and would provide for snag recruitment in the long term.

Cumulative Effects on Snags

Past actions and events in the Farley analysis area that have affected snag densities include timber harvest and road construction, wildfire, insect and disease outbreaks, hazard tree removal, and firewood cutting. Past harvest and salvage activities throughout the analysis area (totaling 7,300 acres on National Forest System lands since 1980) have directly affected snag density through the removal of dead standing trees ≥10 inches dbh. These activities also reduced potential recruitment of snags by removing green trees; typically, the largest trees in treatment units were harvested. Currently, there is approximately 22-30 percent more area in the moist and cold upland potential vegetation groups without snags than occurred historically. This is largely due to past clearcutting and removal of snags. Past wildfire (most recently the Sharps Ridge and Otter Fires) created snags through direct and delayed fire mortality in portions of the fire that burned at high and moderate intensities.

A series of medium to large fires since the mid 1990s has affected portions of the upper Desolation Creek watershed. These fires resulted in high snag densities, providing habitat for a number of primary cavity excavators (PCEs). Over time (5-10 years), the snag habitat quality for primary cavity excavators in these fire areas has declined. Currently, these older burns

(particularly the interior areas) receive little use by PCE species. The majority of fires in the analysis area have been small and have had little effect on snag densities. Insect and disease outbreaks (spruce budworm and mountain pine beetle) also have affected snag densities in the analysis area. These disturbances caused heavy overstory mortality, creating high-density patches of snags in affected areas.

Past firewood cutting removed snags adjacent to open roads within the analysis area. Generally, roads in the analysis area are not deficient in snags. Hazard tree felling affected snags in a similar fashion as fuelwood cutting; snag densities adjacent to open roads were reduced. All of these activities have combined to create the existing condition of snag habitat in the analysis area and watershed.

Present and reasonably foreseeable future actions and events in the analysis area with a potential to affect snags include personal use woodcutting, hazard tree felling, and prescribed burning. Firewood cutting and hazard tree felling would have similar effects; these activities would reduce snag densities along roads. Hazard tree felling would also remove defective trees (broken tops, frost cracks, diseased, etc) that would be recruited as snags in the future. These trees are important habitat features for primary cavity excavating species. It is expected that the demand for fuel wood will remain the same or increase in the future, further reducing densities of high quality snags (western larch and Douglas-fir), and leaving lower quality and less-long lived species in their place.

When the expected effects of the proposed action alternatives are combined with the residual and expected effects of past, present, and reasonably foreseeable future actions in the analysis area, they would all add to past reductions in snags in the watershed, but the combined effect on snag densities at the watershed scale is expected to be relatively minor. At the stand scale, potential habitat (nesting, foraging, and roosting) for primary cavity excavating birds would be reduced. However, using the adjusted snag retention guidelines for the Farley project (Table 3.6.1), snag densities would exceed Forest Plan standards in all treated stands. By meeting these standards, sufficient habitat for snag-dependent species would be maintained within treatment units, as snags in treatment units would be in varying states of decay, a mix of available species, and be distributed in a way that contributes to habitat quality. Snag densities at the watershed scale would continue to exceed Forest Plan standards and provide sufficient habitat for primary cavity excavating birds and other snag-dependent wildlife. At the watershed scale, the distribution of snags would be expected to become more consistent with conditions that occurred on the landscape historically.

Snag Replacement Trees

Adjusted Snag Replacement Standards for the Farley Project

Snag replacement trees (“green” trees) were analyzed to determine the potential for recruitment of dead tree habitat over time across the landscape. The Eastside Screens and green tree replacement objectives developed for plant association groups found on the Forest (written communication, March 22, 1996, Craig Dixon, District Ranger memorandum: Wildlife Tree and Down Wood Guidelines). As with snag retention guidelines discussed above, green tree replacements for the Farley Vegetation Management Project would be adjusted based on

silviculture and wildlife specialist input to provide more green leave trees and future snags in proposed thinning and timber harvest units (Table 3.6.4).

Table 3.6.4. Forest Plan and Farley Project green tree replacement guidelines (per acre).

Vegetation Type	Forest Plan Standard	Standard for Farley Analysis Area
Dry Upland – Ponderosa Pine	8	10
Moist Upland – Mixed Conifer/South Associated	16.3	20
Cold Upland – Lodgepole Pine	6	12

These adjusted standards would apply to all treatment types and would be met following all treatment activities, including broadcast burning. Currently, all of the stands proposed for commercial thinning or regeneration harvest are fully stocked, and meet current Forest Plan green tree replacement objectives for density and size of replacements by potential vegetation group.

Where possible, leave trees (and snags) would be clumped so that multiple small islands would remain in treatment units (regeneration harvest units) following treatment. Depending on fuels conditions following harvest, pre-treatment of fuels (mulching, pulling fuels away from pockets of leave trees, etc.) may occur to reduce potential mortality of green replacement trees.

Environmental Consequences

Direct and Indirect Effects of No Action on Snag Replacement Trees

In the short term (0 to 3 years), snag replacement trees (live/green) would continue to occupy the project area at or near current densities and size classes, exceeding Forest Plan objectives. In the mid and long term (3 to 20+ years), green tree replacements would decrease in response to disease and insect outbreaks. In the absence of fire, disease and insect outbreaks would affect dense multi-strata stands. Although green tree replacements may decrease in the future due to mortality, it is unlikely that green tree replacement levels would fall below Forest Plan objectives. In the long term, mortality of overstory trees would increase standing and down fuel loads, increasing the risk of high severity wildfire. Wildfire of this type would change the composition and structure of forested stands in the analysis area. Depending on the intensity and severity of the fire, this would reduce or even eliminate green replacement trees currently occupying the affected areas. After a severe fire event, it could take in excess of 80-100 years to regain sufficient quantities of replacement trees, in all size classes, to meet the Forest Plan objectives.

Direct and Indirect Effects Common to All Action Alternatives on Snag Replacement Trees

Proposed project activities would directly and indirectly affect green (snag replacement) trees in the analysis area. Commercial thinning and regeneration harvest would reduce the density of green trees in treatment units; however, all treated stands would be fully stocked after treatment. Green (snag replacement) tree objectives (Table 3.6.6) would be met following project activities;

these adjusted standards would exceed Forest Plan standards for green tree replacements. Green tree replacements would also be met in mechanical and hand non-commercial thinning units following harvest, where larger diameter trees that meet retention objectives are available.

The effects of burning would be the same under all of the action alternatives; the effect would vary according to the number of acres burned under each action alternative. Low intensity broadcast burning and pile burning would potentially affect a small number of overstory trees. Under all of the action alternatives, burning would not reduce green tree replacements to below the adjusted guidelines for the Farley project (Table 3.6.6); these elevated retention levels would mitigate for expected mortality in green leave trees.

Cumulative Effects on Snag Replacement Trees

Past actions and events in the Farley analysis area that affected green replacement trees include timber harvest, wildfire, and reforestation. Harvest reduced the number of green trees in treatment units; at times, silvicultural practices left few if any green tree replacements. In general, areas with deficient green tree replacement currently have sufficient regeneration to grow into a fully stocked stand in the long term. Past harvest also targeted large diameter trees that has led to a high proportion of green trees less than 20 inches and a lower proportion of trees greater than 20 inches in harvested stands. High severity wildfire has occurred in a number of locations within the upper Desolation Creek watershed in recent years, resulting in 100 percent mortality of green trees in some areas. Other small wildfires in the analysis area have had little effect on green tree replacements. Reforestation activities following harvest re-established a green tree component in treated stands, allowing for green tree replacements in the future. These actions and events have combined to create the existing condition of green tree replacements in the analysis area.

Present and reasonably foreseeable future actions and events that have the potential to affect green tree replacements include reforestation activities in the Sharps Ridge fire area. These activities will re-establish a green tree component in the fire area, allowing for green tree replacements and future snags in these areas.

When the expected effects of these alternatives are combined with the residual effects of past actions and events, there would be no cumulative increase in acres below Forest Plan green tree replacement objectives. Green tree replacements would exceed Forest Plan green tree replacement objectives under all action alternatives.

Down Wood

Dead down wood is dependent on disturbances creating snags and snags subsequently falling to the ground. Down wood will remain on site until it decomposes, is burned up in a wildfire, or is physically or mechanically removed. Generally, down wood occurs as scattered pieces, clusters, and/or piles of logs and/or limbs within the affected area. For this analysis current vegetation survey (CVS) data was used to provide information on down wood in the Desolation Creek watershed.

Forest Plan Requirements for Down Wood

Down wood densities are based on the Eastside Screens and guidance developed for plant association groups on the Forest (written communication, March 22, 1996, Craig Dixon, District Ranger memorandum: Wildlife Tree and Down Wood Guidelines). Down wood density is designed to meet future down wood habitat needs in combination with natural mortality. When compared to Forest Plan standards for down wood density, current estimates of down wood in the analysis area exceed the Forest Plan minimum standard for the dry, cold, and moist upland forest potential vegetation groups.

Environmental Consequences

Direct and Indirect Effects of No Action on Down Wood

Over the short term (0 to 3 years), dead down wood would continue to occupy the watershed at or near the current density in the dry upland, moist upland, and cold upland forest potential vegetation groups. Over the next three to 10 years, falling snags would be the primary factor contributing to the recruitment of down wood habitat, potentially increasing down wood densities across the watershed. In the long term, stands would continue to develop multi-layered conditions, resulting in competition for resources and stress. Potential increases in the incidence of insects and disease would cause mortality in these stands, increasing potential standing and down wood. Increases in down wood density would increase fuel loading and the risk of wildfire. Large scale, high severity wildfire would reduce down wood densities by consuming down wood. A fire of this type could reduce down wood densities below Forest Plan standards immediately following the fire. Down wood would eventually increase as snags created by a fire of this type begin to fall. After a series of continued disturbances on the site, down wood densities likely would fall below the Forest Plan standard because of the diminished source of green trees and snags.

Direct and Indirect Effects Common to All Action Alternatives on Down Wood

Generally, the effects on down wood would be the same for each of the action alternatives. The effect (extent) would vary by the number of acres under each alternative that are subjected to activities that would affect down wood. Proposed commercial thinning and regeneration harvest activities would directly and indirectly affect down wood in proposed treatment units. In proposed treatment units with large diameter fuels in excess of Forest Plan standards, down wood would be removed to reduce the risk of wildfire. Down wood would also be crushed, broken apart, or otherwise displaced by machinery operating in proposed treatment units. These activities would also indirectly affect the future abundance of down wood by reducing snag densities.

Regeneration harvest would meet green tree replacement guidelines after harvest. Although densities of down wood would be reduced, they would meet Forest Plan standards following treatment. Down wood retained in these stands would be distributed throughout the treatment units as singles and small high-density patches (not piles). A variety of decay classes, structures, sizes, hollow logs, and other special features highly valued by wildlife would be retained. Because snag densities would meet or exceed Forest Plan standards, recruitment of down wood is not expected to be adversely affected in the mid and long term.

Non-commercial thinning would not directly affect down wood in treatment units. Generally, machinery (slashbuster, mulcher, etc.) would be used to treat these stands. Use of machinery in treatment units would crush, break, or displace some portion of the down wood in these units. However, it is not expected that down wood densities would be measurably affected.

Fuels treatment within non-commercial thinning units would affect down wood within treatment units in a similar manner as that described for commercial thinning. Down wood densities would meet or exceed Forest Plan standards in these proposed treatment units. The largest down wood in treatment units would be retained where it is available.

Pile burning generally would not affect down wood. Broadcast burning (acres vary by alternative) has the potential to affect down wood densities in treated stands. However, there is a potential that down wood, particularly smaller diameter material, would be consumed or charred during burning. Charring would reduce the quality of down wood for primary cavity excavators due to reductions in insects that use down wood (ants, beetle larvae, etc). Locally heavy accumulations of activity-created fuels may result in consumption of down wood in patches ranging in size from one to several acres. Underburns would also be expected to create snags within the burn area. Snags created by burning would compensate for down wood that may be consumed during this activity. Although patches within burned units would have little or no down wood, it is expected that Forest Plan standards for down wood would be met within individual treatment units following burning.

Tractor fire lines used to contain broadcast burns would likely displace down wood, and may result in it being broken apart. This occurrence would not measurably reduce down wood densities.

The proposed treatment activities would reduce mortality in treated stands, ultimately reducing snag recruitment and down wood levels. High snag and down wood densities would be maintained in untreated areas adjacent to treatment units. .

Cumulative Effects on Down Wood

Past actions and events in the Farley analysis area that have affected down wood include timber harvest and salvage and associated burning, wildfire, personal-use firewood collection, and prescribed underburning. Past harvest activities affected down wood densities by removing or piling and burning dead wood within treatment units prior to the existence of forest plan standards. Associated activity fuels burning after harvest also reduced down wood densities, creating areas within existing regenerating stands with little or no down wood. Salvage harvest of dead and dying trees reduced future down wood recruitment. Wildfire generally consumed down wood within affected areas.

Personal use firewood cutting has reduced snag and down wood densities adjacent to open roads in the analysis area. A reduction in snags adjacent to open roads indirectly affects the availability of down wood in these areas. Areas away from open roads or in inaccessible areas have not been affected by this activity. Prescribed underburning and activity fuels burning in the Kelsay Timber Sale area have had relatively minor affects on down wood. Past activities and events have combined to create the existing condition of down wood habitat in the analysis area.

Present and reasonably foreseeable future actions that would affect down wood include firewood cutting, prescribed fire, and activity fuels burning associated with the Kelsay Timber Sale. The Park underburn would burn approximately 200 acres. It is not expected that this activity would have an adverse affect on down wood densities. This is also the case with burning in the Kelsay Timber Sale area, although the potential to consume retained down wood would be higher under this project due to harvest-created slash on the ground. Although the potential to consume down wood in these units is greater, it is expected that Forest Plan standards for down wood will be met following burning.

When the expected effects of these alternatives are combined with the residual and expected effects of past, present, and future actions in the analysis area, there would be a cumulative reduction in down wood. This reduction in down wood densities would not adversely affect wildlife species requiring this habitat feature. The expected affects on down wood, under this project and when combined with other past, present, and future actions in the watershed, are expected to be minor at the watershed scale. Down wood is expected to remain at or near existing densities at the watershed scale following treatment. Although down wood densities would be reduced by the proposed activities, Forest Plan standards for down wood would continue to be met in individual treatment units and within the watershed.

Management Indicator Species

The Forest Plan designates Management Indicator Species (MIS) to represent larger groups of animals associated with the major habitat types on the Forest. Habitat conditions for management indicator species, as well as for all other wildlife species on the Forest must be managed to maintain viable populations. MIS species for the Forest are presented in Table 3.6.5.

Table 3.6.5. Wildlife Management Indicator Species (MIS) on the Umatilla National Forest.

Management Indicator Species	Habitat Type
Rocky Mountain Elk	General forest habitat and winter range
Pileated woodpecker	Dead/down tree habitat (mixed conifer) in mature and old stands
Northern three-toed woodpecker	Dead/down tree habitat (lodgepole pine) in mature and old stands
Pine marten	Mature and old stands at high elevations ($\geq$ 4,000 ft.)
Primary cavity excavators	Dead/down tree (snag) habitat

Rocky Mountain elk, pileated woodpecker, pine marten, and primary cavity excavators are known to occur in the analysis area. There have been no observations of the northern three-toed woodpecker in the analysis area; however, suitable habitat for this species is present. Because suitable habitat is present for all of these species, the effects of the proposed activities will be analyzed for all of the MIS listed above.

Rocky Mountain Elk

The Rocky Mountain elk inhabit the entire Desolation Creek watershed. The analysis area for elk is entirely within the Desolation Big Game Management Unit.

The big game habitat effectiveness model in the Forest Plan (USDA Forest Service 1990, Appendix C) is used to predict the influence of forest resource management activities on elk and other big game species. The HEI model is based on research by Thomas and others (1988) and software by Hitchcock and Ager (1992). The model is biologically based using the distribution of cover and forage, cover quality, and road factors to help indicate how effective an area will be in supporting big game. It was intended to be a relative measure of effectiveness, and does not consider many factors (such as weather, predation, disease, hunting, harvest, etc) that would influence the "actual" number of elk in an area.

The Umatilla Forest Plan establishes standards and guidelines for elk habitat for many of the management areas on the Forest. Table 3.6.6 compares the Forest Plan standards with the current condition of elk habitat in the analysis area and summarizes existing HEI and cover values in the C7 management area.

Table 3.6.6. Existing Habitat Effectiveness Index (HEI), cover, and Forest Plan standards for the Farley Analysis Area.

Management Area	Forest Plan Standards			Farley HEI Analysis [1]			
	HEI	Satisfactory Cover	Total Cover	HEI	Satisfactory Cover	Total Cover	Open Road Density
C7 – Special Fish Management (Desolation Cr. watershed)	45 (No less than)	10% (Minimum) 15-20% (Desirable)	30%	53	1.6%	42.8%	1.3 mi/sq mi

Shading indicates values that are currently below Forest Plan standards.

The existing HEI value in the C7 management area is consistent with the Forest Plan. Satisfactory cover in the C7 management area is currently below Forest Plan standards; total cover (satisfactory and marginal cover combined) meets Forest Plan standards in this management area allocation.

The evaluation criteria used in this analysis to measure effects to elk and their habitats are total cover, satisfactory cover, habitat effectiveness index (HEI), and elk vulnerability. Open road density is a component of the habitat effectiveness index.

Environmental Consequences

Direct and Indirect Effects of No Action on Rocky Mountain Elk

In the short term (0 to 3 years), elk habitat would essentially remain unchanged in the analysis area. The amount of satisfactory and total cover, and the HEI values in the C7 management areas would remain the same in the short term.

In the mid and long term, stands would continue to grow, recover from past insect and disease disturbance and harvest, and develop a multi-story structure, thus increasing the amount of total cover in the C7 management areas. Satisfactory cover levels in the C7 management area would approach Forest Plan standards in the long term as stands regenerate and marginal cover stands mature. HEI in the C7 management area would likely increase with an increase in satisfactory cover due to an improved distribution and abundance of this cover type

An increase in cover and multi-layer condition would increase the risk of high severity wildland fires in the analysis area. A large scale fire event similar to the Tower or Summit Fires (1996) is possible given that the Farley analysis area has similar vegetative conditions. A fire of this scale would result in widespread reduction of total cover and satisfactory cover in the analysis area and a marked increase in foraging habitat; HEI in the C7 management areas would decrease due to an increased abundance of forage habitat and the lack of cover habitat. The elk population in the analysis area is expected to remain stable in the mid and long term. Open road densities are also not expected to change in the short or long term.

Direct and Indirect Effects Common to All Action Alternatives on Rocky Mountain Elk

The effects expected under all of the action alternatives generally would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative.

In the C7 management area, total cover and HEI standards would be met after treatment under all of the action alternatives. Although satisfactory cover levels in the C7 management area would continue to be below standards, there would be no change in satisfactory cover levels from the existing condition under all of the action alternatives. There would be no treatment in satisfactory cover in the C7 management area; therefore, there would be no reduction in satisfactory cover habitat in the C7 management area. See Table 3.6.7 for post-harvest HEI and cover levels for the C7 management area.

Table 3.6.7. A comparison of standards and existing conditions for Rocky Mountain elk habitat in the Farley analysis area.

	Alternative 1			**Alternative 2**			**Alternative 4**			**Alternative 5**		
Manage-ment Area	HEI	Satis-factory Cover	Total Cover	HEI	Satis-factory Cover	Total Cover	HEI	Satis-factory Cover	Total Cover	HEI	Satis-factory Cover	Total Cover
C7	54	1.6%	39.9%	53	1.6%	40.5%	53	1.6%	40.6%	53	1.6%	41.1%

Shaded fields indicate values that are below Forest Plan standards, but **unchanged** when compared to the existing condition.

Meeting the HEI and total cover standard for elk in the C7 management area would continue to provide high quality, effective elk habitat. By meeting the Forest Plan standard in these

management areas, habitat within the watershed would continue to contribute to the elk population management objectives of the State of Oregon.

Treatment of forested habitat under all action alternatives would affect the quality of these stands for elk. See Table 3.6.8 for an accounting of commercial harvest, regeneration harvest, and non-commercial harvest by alternative. Elk would be expected to avoid areas where project activities are occurring. Movements away from work areas would be short in distance and temporary. After activities ceased, elk would return to the treated stands to forage on lichens and other residue made available by treatment activities and stimulated forage in the years following treatment. Commercial thinning would reduce stand densities and down woody debris in treated stands. Although stand densities would be reduced, commercially-thinned stands would continue to provide cover habitat (at a lower quality than pre-harvest conditions), and would continue to be used by elk as thermal and escape cover following treatment. Understory vegetation (grasses, forbs, shrubs) would be stimulated by reducing canopy closure in commercially thinned stands. Elk would be more visible in these stands following harvest. Where these stands are adjacent to open roads, there would be an increase in elk vulnerability.

Table 3.6.8. Acres of proposed silvicultural treatment by alternative.

Silvicultural Treatment	Alternative 1	Alternative 2	Alternative 4	Alternative 5
Commercial Thinning	390	353	390	353
Non-Commercial Thinning (NCT) Only	4,886	4,886	4,652	4,886
NCT in Commercial Thinning Units	47	0	47	0
Regeneration Harvest	2,418	2,128	1,995	1,831
NCT in Regeneration Harvest Units	865	657	703	644

Non-commercial thinning would reduce understory tree densities, increasing sight distances in treated stands. Hiding cover for elk would be reduced as a result, increasing vulnerability to hunting. Maintenance of small-diameter screening vegetation along open roads and untreated islands of regenerating conifers within non-commercially thinned stands would reduce potential vulnerability of elk. Removal of a portion of the small diameter trees in these stands would stimulate grass and forbs growth where overstory canopy closure allows, improving forage for elk. Non-commercial understory thinning would increase growth rates of residual trees, creating cover faster than is these stands were left untreated.

Treatment of regeneration harvest units would have the greatest effect on elk habitat. Regeneration harvest stands would be open following treatment. Elk vulnerability would increase substantially in these areas following harvest, especially where these units are adjacent to open roads. Forage production would increase in these stands following treatment. Although elk would feed in these stands at times when disturbance is minimal, it is unlikely that elk would loiter in these stands during high use periods, such as hunting season. Patches of green retention trees in regeneration harvest units would provide some structure that would aid in concealing or breaking up the outline of elk. This would be spotty, and would not mitigate for increased vulnerability in these stands.

Burning would generally have a beneficial effect on elk habitat. Low intensity broadcast burning would consume accumulated small diameter litter and logging slash, and stimulate growth of forage. Forage would improve for several years following burning. Torching of single trees and small patches of dense vegetation could occur; however, cover habitat (satisfactory, marginal, and hiding cover) would be minimally affected by burning.

Reductions in dense understory vegetation may affect elk calving habitat. It is likely that commercially thinned stands would be used for calving due to retention of a portion of understory vegetation and down wood. Regeneration harvest units would not be use for calving following treatment due to reductions in down wood and vegetation; these stands would be open following treatment. Creation of foraging habitat in close proximity to dense multi-strata habitats would improve forage for lactating cows, while adjacent multi-strata habitat would provide cover and concealment for calves. It is not expected that treatment activities would affect calving or result in reductions in calf survival. Calving habitat in riparian corridors would not be affected by the proposed activities under any of the action alternatives.

Use of the existing road system, particularly closed roads, would increase road-related disturbance through increased traffic volumes. Elk would likely avoid these roads in favor of areas with fewer disturbances, and would return when activities cease. Clearing of vegetation from existing closed roads would make these routes more accessible to non-permitted ATV use following implementation, potentially increasing disturbance on elk. Temporary and new system road construction would also affect elk and elk habitat. These roads occur where there are currently no existing travel routes; consequently, elk would likely move away from these areas during construction and use of roads. After harvest, these roads would not constitute a barrier to the movement of elk. Temporary roads would be obliterated after use. New system roads would be closed using gates or barricades after implementation is complete. Disturbance along these roads would likely persist due to non-permitted use; it would be several years before effective closure methods and enforcement would reduce this occurrence.

Approximately 31 miles of road obliteration and 8 miles of stabilization (of existing closed roads) is proposed in the Farley project. This would further reduce disturbance to big game

Effects of Alternative 1 on Rocky Mountain Elk

Direct and Indirect Effects

This alternative would subject the most acres to silvicultural treatment activities (2,848 acres of commercial thinning and timber harvest and 4,887 acres of non-commercial thinning) when compared to the other action alternatives. Also, this alternative proposes the most road-related activities; approximately 36 miles of currently open forest system road would be reconstructed, and 13.9 and 6.6 miles of new and temporary road would be constructed, respectively. In addition, all alternatives propose (as connected actions) stabilization of approximately 8 miles and obliteration of 31 miles of closed, existing road.

Habitat fragmentation associated with silvicultural treatment activities would alter the distribution of elk in the vicinity of treatment units. This alternative would create the most openings in forested stands when compared to the other action alternatives. Cover levels would also be reduced the most under this alternative.

Conversely, HEI would increase under this alternative. HEI in the C7 management area would be 54 following project activities, a slight increase from the existing condition of 53. This increase is the result of changes in the distribution of cover and forage stands on the landscape, and changes in the relative abundance of marginal cover in the C7 management area.

Although HEI would increase, this alternative would have the greatest effect on elk vulnerability due to the proposed level of project activities and road-related activities. Fragmentation associated with silvicultural treatment activities would alter the distribution of elk in the vicinity of treatment units. Approximately 1,439 acres of regeneration harvest is adjacent to year-round or seasonally open forest roads under this alternative. Although these created openings would provide excellent forage for elk, where they are associated with open roads their use would be altered due to road-related disturbance.

This alternative would also have the largest affect on elk as a result of road-related project activities. Although elk populations would not be expected to be measurably affected by project activities, distribution and patterns of use could change, largely due to further fragmentation of habitat in the watershed.

Effects of Alternative 2 on Rocky Mountain Elk

Direct and Indirect Effects

This alternative would result in fewer acres of created openings than would occur under Alternative 1. This alternative would regeneration harvest 1,439 acres of habitat adjacent to open forest roads, the same as Alternative 1 and with similar effects. Under this alternative HEI would remain the same as the existing condition with a value of 53 after project activities.

However, in terms of overall road-related disturbance, this alternative would have the least effect of all the proposed action alternatives. All new road construction (approximately 10 miles) to reach thinning and timber harvest units would be temporary and would be obliterated following completion of project activities. As with all alternatives, approximately 36 miles of existing open road would be reconstructed.

Effects of Alternative 4 on Rocky Mountain Elk

Direct and Indirect Effects

This alternative would result in 7.8 miles of new forest system road construction and the fewest miles of temporary road when compared to the other action alternatives. This alternative would create fewer openings (less fragmentation) in forested stands when compared to Alternatives 1 and 2. Approximately 1,313 acres of regeneration harvest would occur adjacent to open forest roads, 126 fewer acres when compared to Alternatives 1 and 2. HEI would remain the same under this alternative when compared to the existing condition. However, fragmentation associated with silvicultural treatment activities would alter the distribution of elk in the vicinity of treatment units. Disturbance and vulnerability associated with open roads would be reduced somewhat under this alternative when compared to Alternatives 1 and 2.

Effects of Alternative 5 on Rocky Mountain Elk

Direct and Indirect Effects

This alternative would regeneration harvest and commercially thin the fewest acres when compared to the other action alternatives. This alternative would create the fewest openings in forested stands (less fragmentation) when compared to the other action alternatives. Because this alternative would treat the fewest acres with a regeneration harvest prescription and have the fewest acres of regeneration harvest adjacent to open forest roads (1,251 acres), effects on distribution and habitat use would be the least under this alternative. Also, silvicultural treatment activities would not occur in several areas where elk are known to frequent during high disturbance periods (hunting season), reducing potential effects to security areas. HEI would remain at 53 (the existing condition) following project activities.

Cumulative Effects on Rocky Mountain Elk

Past actions and events in the analysis area (primarily composed of management area C7) that affected elk and elk habitat include approximately 7,300 acres of timber harvest (since 1980) and associated road construction, road closures, private land timber harvest, wildfire, noxious weed treatment, underburning, ATV trail system construction, and livestock grazing. Timber harvest has affected forest structure and composition, reducing the amount of cover habitat in the analysis area.

Timber harvest also has fragmented habitat, creating a mosaic of forested stands and man-made openings. Due to decreased cover and the creation of openings, elk have become more vulnerable to hunting. Conversely, the amount of foraging habitat for big game has increased in response to past harvest, improving foraging habitat in the analysis area.

Road construction associated with timber harvest increased road densities and disturbance within the analysis area. Increased open road densities make elk more vulnerable. Research has found that they tend to select for habitats farther away from open roads (Rowland and others, 2004).

Approximately half of the roads in the Desolation Creek watershed were closed to motorized access in the early 1990s. Existing road density in the watershed is 2.1 miles per square mile. Open road densities are approximately 1.05 miles per square mile. Development of an OHV trail system (using existing closed roads and new trail construction) in the Desolation watershed also has increased disturbance to big game..

Timber harvesting on private land also has further fragmented habitat in the Farley analysis area, especially along the National Forest System boundary. Cover often is present on the National Forest side of the boundary, while open, regenerating stands are present on the other.

Prescribed fire within the analysis area has improved forage habitat quality and quantity by reducing encroachment of conifers into foraging habitat and invigorating forage growth. Prescribed fire had no adverse effect on cover habitat for elk. Proposed burning (the Kelsay activity fuels and Park underburn) would have a beneficial affect on forage condition.

Wildfire has had profound effects on elk habitat, particularly in the upper portion of the watershed. A number of large fires have occurred since the mid-1980s, with the most recent occurring in 2006. These fires reduced cover habitat, converting it to open grasslands with regenerating small diameter conifers. Forage quality in these fire areas improved for 5 to 10 years following the fire, but has largely decreased in older fires.

Intensive livestock grazing of sheep and cattle from the late 1800s through the mid 1900s adversely affected range and habitat conditions. Livestock grazing altered the structure and composition of habitat by repeated overgrazing. Grazing practices have since been changed and allotment management plans balance livestock utilization with big game management objectives, resulting in a shared utilization of the forage resource. Current grazing in the watershed is not adversely affecting rangeland condition or adversely affecting wild ungulate (deer and elk) populations.

Noxious weed treatment has slowed the spread of noxious weeds into National Forest System lands in the watershed. Reductions in noxious weeds maintain or improve range condition. Noxious weed treatment would continue to reduce the size of existing weed sites and treat new sites as they occur in the watershed. This would also have a beneficial effect on summer and winter range for big game.

When the expected effects of the proposed action alternatives are combined with the residual and expected effects of past, present, and future actions and events in the analysis area, there would be a cumulative reduction in marginal cover and total cover in the Farley analysis area. Satisfactory cover would not be reduced under any of the action alternatives.

HEI, which is a cumulative measure of the effectiveness of an area for providing elk habitat, would be maintained or increase, depending on the alternative. Forest Plan standards for total cover and HEI would continue to be met following project activities. Although habitat would be affected to some extent by proposed project activities, untreated cover stands and interior security habitat still would be well distributed throughout the watershed, and proposed project activities would maintain a high level of big game habitat effectiveness in the analysis area. As a result, it is unlikely that the elk population would be adversely affected by the proposed activities.

Pileated Woodpecker

Preferred habitat (foraging and nesting) for the pileated woodpecker includes dense moist forest types (mixed conifer) in late seral stages with a high density of dead down wood habitat (Marshall and others 2003; U. S. Dept. of Agriculture, Forest Service, 1990). Stands should include large diameter (>21” dbh) snags and down wood (U. S. Dept. of Agriculture, 1990; Bull and Holthausen 1993). In general, this habitat is scattered through the middle and upper elevations within the analysis area. Patch size and connectivity of these habitats appears to be good based on GIS analysis.

Table 3.6.9 describes suitable pileated woodpecker habitat in the Farley analysis area. Habitat was identified based on stand vegetation data; commonly, several suitable habitat blocks are adjacent to one another, increasing actual patch size on the ground. The largest blocks and highest concentrations of foraging and reproductive habitat occur in undeveloped areas within the watershed. There are approximately 10 blocks of contiguous nesting habitat greater than 300 acres in the analysis area. The existing number and distribution of suitable habitat blocks over 300 acres in size meets Forest Plan standards and guidelines.

Table 3.6.9. Suitable pileated woodpecker habitat in the Farley analysis area.

Habitat Type	Existing Habitat

	Acres	Percent (of total)
Reproductive	8,706	40%
Foraging	12,810	60%
Total Habitat	**21,516**	

Environmental Consequences

Direct and Indirect Effects of No Action on Pileated Woodpecker

In the short term (0 to 3 years), suitable pileated woodpecker habitat would maintain its current quality and extent in the analysis area. In the mid and long term (3 to 20+ years), the structure and composition of pileated woodpecker habitat would change. In this time frame, multi-strata conditions in suitable pileated woodpecker habitat would continue to develop. Stand densities would increase, and locally high concentrations of insects and disease would provide foraging and nesting habitat by creating snags. Young stands in an unsuitable condition for pileated woodpecker foraging or nesting would also develop multi-strata characteristics in the mid and long term, increasing the amount of suitable habitat in the analysis area and improving its distribution. Higher stand densities and increased standing and down fuel loads would increase the risk of wildfire in these stands. Wildfire would change the composition and structure of suitable pileated woodpecker habitat for as long as 80-100 years as stands reseeded themselves and grew into a structural stage and size class where snags are large enough to provide potential nesting and foraging sites for pileated woodpecker.

Direct and Indirect Effects Common to All Action Alternatives on Pileated Woodpecker

The effects expected under all of the action alternatives essentially would be the same. The difference between individual alternatives (in terms of magnitude of effects) would be proportional to the number of acres subjected to the various treatment activities under each alternative. Table 3.6.10 describes the number of acres of various treatments within suitable pileated woodpecker habitat by habitat type and treatment type.

Table 3.6.10. Expected effects on pileated woodpecker habitat by habitat type and treatment type by alternative.

Habitat Type	Alternative	Acres Treated	% Reduction Suitable Habitat	Treatment Type		
				Commercial Thinning	*Non-Commercial Thinning*	*Regeneration Harvest*
Nesting	**Alt 1**	1010	9.6	185	163	662
	Alt 2	953	8.9	185	163	605
	Alt 4	906	8.4	185	163	558
	Alt 5	880	8.1	185	163	532
Foraging	**Alt 1**	1296	7.1	218	163	915
	Alt 2	1127	5.8	218	163	746
	Alt 4	1116	5.7	218	162	736
	Alt 5	1021	5.0	218	163	640

Commercial thinning and regeneration harvest would reduce overstory canopy densities in suitable foraging habitat under all of the action alternatives. Commercially thinned foraging habitat generally would have 35 to 45 percent canopy closure after project activities. Regeneration units would have much lower canopy closure (with scattered dense islands of retained trees). Remaining snag densities would meet the adjusted standards for the Farley project (Table 3.6.1). It is expected that pileated woodpecker would continue to use commercially-thinned foraging habitat the edges of regeneration harvest units and retained islands of green trees. Suitable pileated woodpecker foraging habitat (treated and untreated stands) would continue to be well distributed through the moist and cold upland forest habitat types following treatment.

It is likely that commercially-thinned stands would not be used for nesting after treatment (in the short and mid-term) due to reductions in canopy density. Regeneration harvest activities also would reduce stand densities below levels preferred by this species for nesting. It would take much longer for regeneration harvest units to reach a suitable condition for pileated woodpecker nesting than it would for commercially-thinned stands. Reductions in suitable nesting habitat would range from 8.1 to 9.6 percent, depending on which alternative is implemented. In the mid and long term, canopy density would increase in treated stands.

Non-commercial thinning would not affect overstory structure or composition and down wood densities would meet or exceed Forest Plan standards. Snag and down wood densities would be reduced on portions of non-commercial thinning acres that are also treated for fuels. Mechanical fuels treatment activities reduce the abundance of foraging and nesting substrates (snags and down wood) and can reduce potential prey (mainly ants) abundance through dead wood removal and burning (Bull and others, 2005). Although foraging habitat quality may be reduced on a portion of the non-commercial thinning acres, treated pileated woodpecker habitat would be classified as suitable foraging and nesting habitat after project activities.

Broadcast burning in suitable pileated woodpecker habitat has the potential to affect snags and down wood retained during harvest. Green tree replacements and retained snags would be clumped within treatment units. Although the timing of burning would reduce the effects, it is expected that down wood and snags would be affected by burning. Retention of elevated snag and green replacement tree densities would ensure that Forest Plan standards are met following burning.

Piling and burning of activity-created slash also would occur in pileated woodpecker habitat and could reduce the abundance of the primary prey (ants). However, piles would be located away from green tree replacements, snags, and retained down wood and would be burned at times based on fuel moisture and weather when effects to these habitat features would be unlikely. It is not expected that burning would negatively affect prey availability for this species.

Hazard tree felling along haul routes and temporary and new system road construction could minimally affect habitat for the pileated woodpecker. Snags and defective live trees deemed imminent or likely to fall within a potential failure zone that intersects travel routes would be felled, reducing potential nesting and foraging sites adjacent to these roads.

Cumulative Effects on Pileated Woodpecker

Past actions and events that have affected pileated woodpecker habitat include timber harvest and salvage, wildfire, hazard tree felling, and firewood cutting. Timber harvest has occurred on approximately 7,300 acres in the analysis area since 1980. Timber harvest has altered the structure and composition of stands, created openings, and fragmented habitat. These activities reduced habitat for this species by removing large trees and snags, affecting late and old structure characteristics, and reducing stand densities below levels preferred by this species.

Timber harvest on private land also has reduced potential habitat for this species. An unknown number of acres of pileated woodpecker habitat have been converted to early seral stands. The vast majority of suitable pileated woodpecker habitat now exists on National Forest System lands in the in the Desolation Creek watershed.

Wildfire has had variable effects on pileated woodpecker and their habitat in the analysis area. Low and moderate intensity wildfire created potential foraging and nesting habitat by creating snags while maintaining stand structure and composition. High and moderate intensity wildfire that caused heavy overstory mortality reduced potential pileated woodpecker habitat by altering stand structure, reducing canopy closure, and reducing stand complexity. Firewood cutting and hazard tree felling has reduced snag densities adjacent to open roads. Snags potentially used as foraging or nesting habitat were removed by this activity. Areas away from open roads or in inaccessible areas adjacent to roads have not been affected by this activity.

Present and reasonably foreseeable future activities and events that affect or have the potential to affect pileated woodpecker habitat include firewood cutting and hazard tree felling. Firewood cutting would have similar effects as those discussed above. Hazard tree felling along roads within the analysis area would remove snags and defective trees that are most likely to be used by this species.

When the expected effects of these alternatives are combined with the residual and expected effects of past, present, and future actions and events in the analysis area, there would be a cumulative reduction in nesting and foraging habitat and potential nesting, foraging, and roosting structures (snags) for this species in the areas proposed for silvicultural treatment activities. All of the action alternatives would contribute to past reductions in pileated woodpecker habitat by reducing potential nesting habitat through commercial thinning and regeneration harvest. Foraging and nesting habitat reduction would be spread throughout the analysis area, and is not expected to adversely affect this species. The size and distribution of pileated woodpecker habitat within the analysis area would continue to meet Forest Plan standards following project activities. Under all of the action alternatives, the quantity, quality, and distribution of suitable pileated woodpecker habitat in the analysis area would provide for the long-term presence of this species.

Northern Three-Toed Woodpecker - *not known to occur in analysis area, limited habitat*

Preferred habitat for the northern three-toed woodpecker includes late successional, cold/moist forest types (lodgepole/mixed conifer) with high standing-wood density, generally at higher-elevations (Marshall and others, 2003). The northern three-toed woodpecker has generally been associated with old growth lodgepole pine stands. Suitable habitat for this species is restricted to the extreme southeast corner of the Desolation Creek watershed. However, the northern three-toed woodpecker has not been observed in the Farley analysis area.

Pine Marten

Preferred habitat for the pine marten includes late successional, moist forest types (mixed conifer) near developed riparian areas with high down wood densities, generally above 4,000 feet in elevation (Ruggiero and others, 1994). This species depends mainly on small mammals such as red-backed voles, squirrels, and snowshoe hare for food. In the winter, the marten forages beneath the snow in down wood for prey. Observations of marten have generally occurred in dense, moist, mature conifer stands with abundant down wood in the upper elevations of the analysis area, particularly along Forest Road 1010. Table 3.6.11 describes suitable marten habitat in the Farley analysis area.

Table 3.6.11. Suitable pine marten habitat in the Farley analysis area.

	Existing Condition	
Habitat Type	**Acres**	**Percent (of total)**
Reproductive	554	4%
Primary Foraging	4,737	32%
Secondary Foraging	9,522	64%
Total Habitat	**14,813**	

Suitable primary foraging and reproductive habitat is scattered through the southeast portion of the analysis area, occurring as small to medium sized blocks. Secondary foraging habitat generally occurs in the mid and upper portions of the watershed. Connectivity between suitable reproductive and foraging habitat is relatively poor. Foraging habitat connectivity is good throughout the majority of the watershed. The upper portion of the watershed has poor foraging habitat connectivity due to past wildfires in this area. There are approximately 20 blocks of suitable foraging habitat over 160 acres in size in the watershed (the largest being approximately 2,000 acres in size); this meets the Forest Plan standards for the size and distribution of suitable marten habitat.

Environmental Consequences

Direct and Indirect Effects of No Action on Pine Marten

In the short term (0 to 3 years), there would be no change in the quality or distribution of pine marten habitat in the analysis area. In the mid (3 to 20 years) and long term (> 20 years), the quality and distribution of pine marten habitat would change. In this time frame, old forest and young forest stands would continue to develop multiple canopy layers and increased canopy density. Mortality resulting from insects and disease in stressed stands would increase snag and down wood densities, improving the condition of foraging habitat for the pine marten. Reproductive habitat also would increase through continued stand development. The distribution of suitable reproductive habitat also would improve in the mid and long term, providing for connectivity between foraging and reproductive habitats. However, higher fuel loading would increase the risk of high severity wildfire that would cause heavy overstory mortality and consume down wood used for denning and foraging. It would take upwards of 80-100 years for

mixed conifer stands to develop a composition and structure that would provide suitable pine marten foraging and reproductive habitat after an event such as this.

Direct and Indirect Effects Common to All Action Alternatives on Pine Marten

In general, the direct and indirect effects expected under all of the action alternatives would be the same. The difference between individual alternatives (in terms of magnitude of effects) would be proportional to the number of acres subjected to the various treatment activities under each alternative. No project activity units are proposed in pine marten denning habitat.

Table 3.6.12 summarizes proposed project activities in suitable pine marten habitat by alternative and treatment type. With the adjusted snag and green tree replacement standards proposed for the Farley project (which exceed current Forest Plan standards – Tables 3.6.1 and 3.6.4), snag and down wood densities remaining in commercial thinning units would provide suitable habitat for marten.

Table 3.6.12. Acres of suitable pine marten habitat proposed to be treated by alternative and treatment type.

Habitat Type	Alternative	Acres Treated	% Suitable Habitat Reduction	Treatment Type		
				Commercial Thinning	*Non-Commercial Thinning*	*Regeneration Harvest*
Forage	**1**	1,815	8.3	191	440	1,185
	2	1,641	7.1	185	440	1,016
	4	1,615	6.9	191	437	988
	5	1,434	5.7	185	440	809

The number of non-commercial thinning acres also would be essentially the same for all action alternatives. Non-commercial thinning would not affect the suitability of marten foraging habitat.

Regeneration harvest within suitable pine marten foraging habitat would have the same effects under all of the action alternatives; differences in the effects of each alternative would be proportional to the number of acres subjected to the various treatment activities under each alternative. Retention of down wood, snags and green tree replacements would meet or exceed Forest Plan standards in regeneration harvest units after treatment (according to the adjusted guidelines for the Farley project described in Tables 3.6.1 and 3.6.4). In time, overstory structure would develop in these treatment units; the presence of down and standing dead wood would make these areas suitable foraging habitat in the long term.

Slash created by treatment activities would be scattered throughout units and broadcast burned or piled and burned. Pile burning would not affect retained down wood and snags in these treatment units. Broadcast burning has the potential to affect retained snags and down wood and affect residual green trees in harvest units. It is expected that this affect would be relatively minor, and that snags created during burning would compensate for snags and down wood lost to broadcast burning. Forest Plan standards for snags and down wood would be met or exceeded in all treatment units following silvicultural treatment and burning activities.

Temporary and new system road construction would not adversely affect this species or its habitat. Temporary roads would be obliterated after treatment. New system roads would be closed following project activities and would revegetate in the mid and long term. Marten would readily cross new system roads while moving between habitats within their home range (Hargis

and McCullough 1984). New roads would not measurably increase vulnerability of marten to predation because the created openings would be narrow (limited exposure while crossing) and research indicates avian predation on marten is a minor mortality factor in northeast Oregon (Bull and Heater 2001).

Cumulative Effects on Pine Marten

Past actions and events that have affected pine marten habitat include timber harvest, firewood cutting, and wildfire. Timber harvest altered stand structure and composition, created openings in the forest canopy, and fragmented habitat. Harvested areas are in varying stages of regeneration, but generally do not provide suitable habitat for this species. Snag and down wood densities (important for denning) also were affected by harvest and associated slash burning. Firewood cutting has reduced the density of snags adjacent to open forest roads but the residual effect of this activity is relatively small because marten are unlikely to den or rest in areas adjacent to open roads. Multiple wildfires in the upper portion of the watershed have affected pine marten habitat. High and moderate intensity portions of these fires would no longer be considered suitable habitat for this species due to changes in stand structure and composition. Low intensity areas where overstory mortality was low would be considered habitat for this species. These actions and events all have combined to create the existing condition of marten habitat in the analysis area.

When the expected effects of the each of the proposed alternatives are combined with the residual and expected effects of past, present, and future activities and events in the analysis area, there would be some cumulative reduction in foraging habitat. Each of the proposed alternatives would reduce the availability of foraging habitat for the pine marten to some degree. However, the size, distribution, and connectivity of suitable habitat would continue to meet Forest Plan standards following project activities under all action alternatives. Reproductive habitat would not be affected under any of the action alternatives. There would be no cumulative effects of project activities on pine marten habitat.

Primary Cavity Excavators

Primary cavity excavator (PCE) species refers to bird species that create holes for nesting or roosting in live, dead, or decaying trees. Secondary cavity users such as owls, bluebirds, and flying squirrels may use cavities later for denning, roosting, and/or nesting. Primary cavity excavators (PCEs) with the potential to occur on the Umatilla National Forest are listed in Table 3.6.13 along with their preferred habitat type; all 16 of them have the potential to occur in the analysis area.

Table 3.6.13. Primary cavity excavators with the potential to occur in the Farley analysis area.

Common Name	Habitat Community	Nest Tree Size[1]
Lewis' woodpecker	Ponderosa pine, riparian cottonwood, oak woodland and burned stands.	13 - 43 inch (") diameter at breast height (dbh)
Red-naped sapsucker	Riparian cottonwood, aspen, conifer forest. Mid – high elevations.	11" dbh Average
Williamson's sapsucker	Mid – high elevation, mature or old conifer forests (ponderosa pine, fir, lodgepole pine, etc. with large dead trees present.	27" dbh. Average
Downy woodpecker	Riparian cottonwood, willow, aspen, mixed-deciduous, and mixed-conifer.	8" dbh Minimum.
Hairy woodpecker	Mixed-conifer, ponderosa pine, and adjacent deciduous, stands.	17" dbh Average
White-headed woodpecker	Open ponderosa pine or mixed conifer, dominated by ponderosa pine.	26" dbh Average
Three-toed woodpecker	Coniferous, mixed conifer-deciduous forests. Prefer burned tracts and montane spruce or aspen.	12" dbh Minimum
Black-backed woodpecker	Coniferous forests especially burn over stands.	12" dbh Minimum
Northern flicker	All forest types with older open forest and edges adjacent to open country.	22" dbh Average
Pileated woodpecker	Mature coniferous, deciduous, and mixed forests.	20" dbh Minimum
Black-capped chickadee	Mixed woodland, deciduous and coniferous forests.	4" dbh Minimum
Mountain chickadee	Open canopy, ponderosa pine, lodgepole pine, and other conifer forests.	4" dbh Min.
Chestnut-backed chickadee	Prefers low elevation, mesic coniferous forest of pine.	4" dbh Minimum
Red-breasted nuthatch	Coniferous forests with mid to late seral stages..	12" dbh Minimum
White-breasted nuthatch	Mature ponderosa pine and mixed-conifer forests. Oak woodlands	12" dbh Minimum
Pygmy nuthatch	Mature to old ponderosa pine or mixed conifer with ponderosa pine dominant.	12" dbh Minimum

[1] Marshall and others, 2003; Thomas 1979

Environmental Consequences

Direct and Indirect Effects of No Action on Primary Cavity Excavators

In the short term (0 to 3 years), there would be no change in existing PCE habitat in the Farley analysis area. Over time, the structure and composition of forested stands would change. Regenerating and young stands would develop overstory vegetation and trees large enough to be used by some cavity excavators in the mid (3-20 years) and long term (> 20 years). In the absence of fire, dry forest stands would continue to be invaded by fire-intolerant tree species. Historic dry forest stand structure and tree species composition would occur on progressively fewer acres within the Desolation Creek watershed over time. Already dense habitats (typically moist and cold upland forest) would become denser. Insects and disease would affect stressed stands, providing foraging and nesting habitat for a number of PCE species, including the pileated, hairy, and northern three-toed woodpeckers. Fuel loading also would increase in the mid and long term, increasing the risk of large and intense wildfire similar to the Summit, Tower, and Sharps Ridge Fires. PCE species like the black-backed, northern three-toed, hairy, and Lewis' woodpecker initially would be attracted to these fire areas, but after approximately 10 to 15 years few PCE species would use these areas due to reduced insects (for forage) in burned stands. It could require 100 years or more to reestablish an overstory structure and composition and produce snags that would be used by the pileated woodpecker, Williamson's sapsucker, and white-headed woodpecker following a stand-replacing wildfire.

Direct and Indirect Effects Common to All Action Alternatives on Primary Cavity Excavators

In general, the direct and indirect the effects expected under all of the action alternatives would be the same. The difference between individual alternatives (in terms of magnitude of effects) would be proportional to the number of acres subjected to the various treatment activities under each alternative. Habitat for the red-naped sapsucker, downy woodpecker, pygmy nuthatch, black-capped chickadee, white-headed woodpecker, and Lewis' woodpecker is not present within treatment units. Effects to all other PCE species are evaluated below.

Commercially thinned stands would be "thinned from below", retaining the largest trees in these stands. Commercial thinning would reduce stand densities to levels suggested by silvicultural specialists for the various potential vegetation groups and plant associations within treatment units. Canopy closure in these commercially thinned stands would be approximately 40 percent following treatment. In commercially thinned stands, ponderosa pine, Douglas-fir, and western larch would be favored for retention. Lodgepole pine and grand/white fir would generally be targeted for removal (unless they are > 21 inches dbh). Black-backed and northern three-toed woodpecker are associated with habitats that have a high proportion of these tree species and would be unlikely to use these stands following treatment due to reduced stand densities and changes in the species composition. Structural and compositional changes in commercially thinned stands would not adversely affect suitability of habitat for the Williamson's woodpecker, hairy woodpecker, chestnut-backed chickadee, white-breasted nuthatch, or the red-breasted nuthatch. Reduced structural diversity has the potential to reduce the abundance of red-breasted nuthatch in these stands. In contrast, the northern flicker and mountain chickadee favor sites with lower canopy closure compared to other PCE species; commercial thinning is expected to improve habitat conditions for these species.

Regeneration harvest would create openings where dense forest was once present. Green tree replacements and snags would meet the replacement guidelines adjusted for the Farley project (Tables 3.6.1 and 3.6.4), which exceed current Forest Plan standards) following treatment. Snags and green trees would be clumped within treatment units where possible. These clumps would emulate pre-treatment conditions of composition, structure, and snag/down wood densities. Single trees and snags would also be distributed through treatment units. Due to changes resulting from regeneration harvest, the pileated woodpecker, black capped, and northern three-toed woodpecker would not use these stands for breeding after treatment. Patches retained within these stands may be used by these species for foraging, if passing between suitable habitat patches. The Williamson's sapsucker has been noted as breeding in selective cuts and thinnings (Marshall and others 2003). Although the majority of these units would likely be unsuitable, this species would use edges and suitable patches for foraging and nesting following treatment. Hairy woodpeckers have been observed foraging and nesting in regeneration harvest units and heavily thinned stands (Marshall and others 2003) where large snags remain in adequate numbers. This species would continue to use regeneration units and suitable patches within these units for foraging and nesting following treatment at rates similar to pre-harvest conditions due to their affinity for more open stands. The northern flicker and mountain chickadee are also expected to thrive in regeneration harvest stands. The abundance of red-breasted and white-breasted nuthatch and the chestnut-backed chickadee are adversely affected by regeneration harvest (Sallabanks and others 2002); they may occur in these stands following harvest but their abundance would be substantially reduced.

Non-commercial thinning would have little effect on PCE bird species. Northern flicker, mountain chickadee, and other species that prefer open habitats would continue to use non-commercially thinned stands for foraging and nesting (where snags are available) following treatment.

Given the mosaic of habitats available to PCEs in the Farley analysis, including habitat within treated stands, there would be no measurable effect on PCE populations under any of the proposed action alternatives. More detailed discussions of potential effects on the PCE species listed in Table 3.6.13 are found in the wildlife specialist report in the project record available for review at the North Fork John Day Ranger District.

Cumulative Effects on Primary Cavity Excavators

Past actions and events in the Farley analysis area that have affected PCE species habitat include timber harvest, road construction, wildfire, and insect and disease outbreaks. Past harvest activities throughout the analysis area (approximately 7,300 acres on National Forest System lands since 1980) have affected the composition and structure of forested stands. These activities also reduced potential recruitment of snags by removing green trees, generally the largest. These activities reduced habitat for PCE species requiring dry and moist old forest stands and dense mixed conifer stands, and fragmented large blocks of these habitats. Past wildfire (most recently the Sharps Ridge and Otter Fires) created open regenerating stands with high snag densities. A series of medium to large fires has affected portions of the upper Desolation Creek watershed. These fires resulted in high snag densities, providing habitat for a number of primary cavity excavators, such as the black-backed and hairy woodpecker. Over time (5-10 years), the quality of these fire areas for primary cavity excavators has declined;

currently, these older burns (particularly interior areas) receive little use by PCE species. Insect and disease outbreaks (spruce budworm and mountain pine beetle) have altered stand structure and composition by causing varying levels of mortality and creating high-density patches of snags in affected areas. These actions and events have combined to create the existing condition of PCE habitat in the analysis area.

When the expected effects of the action alternatives are combined with the residual and expected effects of past, present, and reasonably foreseeable future actions in the analysis area, they would all add to past reductions in dense mixed conifer habitat for PCEs. Expected effects on PCEs would be variable - some species prefer more open stands, others do not. Treatment would occur in portions of stands while adjacent untreated portions of stands would retain existing structure and composition. Treated and untreated stands would continue to provide a mosaic of habitat types and snag densities for PCE bird species. The connectivity of these various habitats would not be reduced by the proposed activities. Primary cavity excavating bird species would continue to find adequate nesting and breeding habitat within the analysis area following the proposed project activities.

Threatened, Endangered, Proposed, Candidate, and Sensitive Species

This section is a summary of the Terrestrial Wildlife Biological Evaluation for the Farley Vegetation Management Project; more detailed discussions can be found in the wildlife specialist report in the project file available for review at the North Fork John Day Ranger District in Ukiah, OR. Federally "listed" species includes those identified as endangered, threatened, proposed, or candidate species by the Fish & Wildlife Service under the Endangered Species Act (ESA) (U.S. Dept. of Interior, 1999; 2001). Sensitive species are those recognized by the Pacific Northwest Regional Forester as needing special management to meet National Forest Management Act obligations and requirements (U. S. Dept. of Agriculture, Forest Service, 2008). Sensitive species addressed on the Umatilla National Forest include those that have been documented ***(D - valid, recorded observation)*** or are suspected ***(S - likely to occur based on available habitat to support breeding pairs/groups)*** to occur within or adjacent to the Umatilla National Forest boundary. Federally-listed (under ESA) and sensitive species with a potential to occur on the Umatilla National Forest are listed in Table 3.6.14. This determination is based on observation records, vegetative and wildlife species inventory and monitoring, published literature on the distribution and habitat utilization of wildlife species, and the experience and professional judgment of wildlife biologists on the Umatilla National Forest.

Table 3.6.14. Federally ESA listed and Region 6 Sensitive Species with a potential to occur on the Umatilla National Forest.

Species	U.S Fish & Wildlife Service	Regional Forester's Sensitive Animals	Umatilla NF Occurrence[1]
Painted turtle *Chrysemys picta*		Sensitive	S
Northern Bald Eagle *Haliaeetus leucocephalus*		Sensitive	D
American Peregrine falcon *Falco peregrine anatum*		Sensitive	S
Upland sandpiper *Bartramia longicauda*		Sensitive	S
Gray wolf *Canis lupus*		Endangered	D
California wolverine *Gulo gulo*		Sensitive	S
Canada lynx *Lynx canadensis*	Threatened		(historically transitory)
Columbia spotted frog *Rana luteiventris*		Sensitive	D
Inland tailed frog *Ascaphus montanus*		Sensitive	D
Townsend's big-eared bat *Corynorhinus townsendii*		Sensitive	D
Lewis' woodpecker *Melanerpes lewis*		Sensitive	D
White-headed woodpecker *Picoides albolarvatus*		Sensitive	D

[1] S = Suspected, likely to occur based on habitat availability to support breeding pairs/groups within Forest boundary
D = Documented, reliable, recorded observation within the Forest boundary.

Species Eliminated From Further Effects Analysis

Painted Turtle

Painted turtles have not been observed in the analysis area or on Umatilla National Forest. The painted turtle would not be affected because preferred habitat does not occur in the affected area and the species does not occur in the analysis area.

Peregrine Falcon

Peregrine falcons have been observed foraging on the District during the fall migration (non-breeding season). The peregrine falcon would not be affected by the proposed activities because

preferred nesting habitat does not occur in the affected area and the species is not known to occur in the analysis area. Although the peregrine falcon may pass through the District occasionally, the potential for this species to pass through the analysis area is small.

Townsend's Big-Eared Bat

Limited roosting habitat is present for this species in the analysis area. There have been no formal surveys for this species in the analysis area; there are several abandoned mines (with shafts) and old guard stations that may provide roosting habitat for this species. These habitat features are not located within potential treatment units. Potential roosts and hibernacula would not be affected by the proposed Farley project.

Species Known to Occur or Having a Potential to Occur in the Analysis Area

Based on District records, wildlife observations, surveys and monitoring, and published literature concerning distribution and habitat utilization, Federally-listed species and Region 6 Sensitive Species with the potential to occur in the Farley analysis area include the gray wolf, Canada lynx, bald eagle, Columbia spotted frog, upland sandpiper, inland tailed frog, California wolverine and Lewis' and white-headed woodpecker.

Bald Eagle - seasonally present in analysis area

Bald eagle wintering habitat is present in the lower elevations of the analysis area. Wintering bald eagles are commonly noted along the North Fork John Day River between the months of November and March. Bald eagles have been observed on Desolation Creek at the Forest Road 1003 crossing during the winter. However, National Forest System lands in the analysis area (upstream of approximately FS road 1003) would not be considered potential nesting habitat.

Environmental Consequences

Direct and Indirect Effects of No Action on Bald Eagle

In the short term (0 to 3 years), there would be no change in suitable eagle wintering habitat, or potential nesting habitat/perches near the mouth of Desolation Creek. Perches (large diameter dead conifers and scattered cottonwood) would continue to be recruited and lost at existing rates. Forage resources are also expected to be stable in the short, mid, and long term. Overstocked Douglas-fir and ponderosa pine stands adjacent to Desolation Creek (primarily north facing slopes, bottoms of draws, and spring areas) may experience disease, fire, or insect mortality in the mid to long term. Habitat suitability would not be reduced for the eagle in the event that insect and disease outbreaks occur.

Direct and Indirect Effects Common to All Action Alternatives on Bald Eagle

No silvicultural treatment (commercial and non-commercial thinning and regeneration harvest) activities are proposed to occur in eagle wintering habitat.

Cumulative Effects on Bald Eagle

Past actions and events in the watershed that affected bald eagle habitat include timber harvest (primarily private lands). Past timber harvest removed large diameter snags and green trees adjacent to lower Desolation Creek where eagles are known to forage. These activities reduced potential roosting sites. Past harvest of private and National Forest System lands adversely affected water resources in the watershed, reducing anadromous and resident fish populations. Past actions and events have combined to create the existing condition of bald eagle habitat in the analysis area. There are no ongoing or reasonably foreseeable future actions in the watershed with the potential to affect the bald eagle or its habitat. When the expected effects of the proposed project activities are combined with the residual and expected effects of past, present, and future activities and events, there would be no affect on the bald eagle or its habitat in the analysis area.

Determination and Rationale (All Action Alternatives)

These alternatives (1, 2, 4, and 5) would have **no impact** on this species or suitable habitat. The rationale for this determination is as follows:

- Suitable bald eagle wintering (roosting) and nesting habitat is located approximately 5 miles downstream and downslope of proposed treatment units. No silvicultural treatment activities proposed for this project would occur in suitable bald eagle nesting or roosting habitat.
- Perches and potential nest trees would not be impacted by proposed activities under any of the action alternatives.
- Bald eagles are not present in the project area during the period when proposed project activities would occur.

Upland Sandpiper *- not known to occur in analysis area, very limited habitat that may be improved by project activities*

Upland sandpiper habitat primarily consists of open grasslands with water or intermittent creeks nearby. This includes large meadows and grasslands (1,000-30,000 acres), usually surrounded with trees (lodgepole pine and some ponderosa pine), or in the middle of sagebrush communities, and generally at elevations from 3,400 to 5,000 feet (Csuti and others, 1997; NatureServe Explorer 2007; Marshall and others, 2003).

Approximately 2,964 acres of open grassland habitats are present in the analysis area. The largest wet meadow in the analysis area measures 147 acres in size. The largest complex of dry grassland habitat (3 blocks of habitat) measures approximately 1,300 acres in size. The upland sandpiper has not been observed in the analysis area or on the District. Observations have occurred approximately 5-10 miles north of the analysis area near the town of Ukiah and in the Bridge Creek State Wildlife Area. Based on literature regarding this species, the size, distribution, and composition of grasslands in the analysis area indicate that these habitats are marginally suitable for this species.

Environmental Consequences

Direct and Indirect Effects of No Action on Upland Sandpiper

In the short term (0 to 3 years), there would be no change in potential sandpiper habitat in the analysis area. Over time, conifer (primarily lodgepole pine) encroachment into grassland meadows would reduce their size. Given the existing condition of potential habitat and expected reductions in habitat quality over time, it is unlikely that the upland sandpiper would utilize the analysis area.

Direct and Indirect Effects Common to All Action Alternatives on Upland Sandpiper

No silvicultural treatment activities (commercial and non-commercial thinning or regeneration harvest) for this project are proposed to occur in potential habitat for this species.

Approximately one mile of existing road that bisects Desolation Meadows would be obliterated under all action alternatives that would occur during the summer when the road and meadow are dry, and would avoid the nesting period for this species, if present in the area. Obliteration of this road would improve habitat for this species by improving the hydrologic connectivity of the meadow and eliminating non-permitted use that occasionally occurs.

Cumulative Effects on Upland Sandpiper

Past actions and events in the watershed that affected sandpiper habitat include livestock grazing that occurred at very high stocking levels in the past. Livestock grazing at these densities contributed to degradation of grassland and shrubland habitats, and adversely affected invertebrate communities that sandpiper depend upon for food. Past actions and events have combined to create the existing condition of potential upland sandpiper habitat in the analysis area.

In recent years, grazing practices have been altered, improving the condition of grasslands and meadows in the analysis area. Current stocking levels in grazing allotments are much lower than what historically occurred and is not adversely affecting potential habitat for this species.

When the expected effects of this alternative are combined with the residual and expected effects of past, present, and future actions and events in the analysis area, there would be no adverse affect on the upland sandpiper or its habitat. Road obliteration in Desolation Meadows would have a beneficial affect on habitat for this species.

Determination and Rationale (All Action Alternatives)

These alternatives (1, 2, 4, and 5) would have **no impact** on this species or potential habitat. The rationale for this determination is as follows:

- The upland sandpiper has not been observed in the analysis area and currently is not known to occur in the analysis area.
- Vegetation management activities would not occur in potential sandpiper habitat.

- Approximately one mile of road obliteration would occur in potential sandpiper habitat. This would occur outside of the breeding season for this species and would positively impact the quality of potential habitat.

Gray Wolf - *not known to occur in analysis area, suitable habitat available*

The wolf is a habitat generalist inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features (Verts and Carraway 1998). Habitat preference for the gray wolf is prey-dependent rather than cover-dependent. Wolves prey mainly on large ungulates, such as deer and elk, and to a lesser extent on small mammals. The gray wolf prefers areas with few roads, generally avoiding areas with an open road density greater than one mile per square mile (NatureServe Explorer 2007).

Currently wolves are not known to occur in the analysis area. Numerous unconfirmed sightings of gray wolves have occurred on the North Fork John Day Ranger District in the past several years. The Idaho wolf population has been increasing steadily, and dispersal into the Blue Mountains is expected in the future. Habitat for this species occurs throughout the Farley analysis area, primarily in roadless and undeveloped habitats in the mid and upper elevation, and potential prey is readily available.

Environmental Consequences

Direct and Indirect Effects of No Action on Gray Wolf

The quality of gray wolf habitat is not expected to change in the short term (0 to 3 years). In the mid and long term, open road densities are not expected to change. Big game populations (prey) are also expected to be relatively stable in the mid and long term (at or slightly below state management objectives). In the long term, openings (meadows) potentially used for denning or as rendezvous sites may experience some conifer encroachment over time; however, the size or number of these openings would not be significantly reduced.

Direct and Indirect Effects Common to All Action Alternatives on Gray Wolf

Wolves are habitat generalists. Proposed silvicultural treatment activities would not directly affect habitat suitability or the quality of habitat for this species. If a wolf were to be present in the analysis area, it likely would avoid areas where project activities are occurring.

Construction of new system or temporary roads would occur under all proposed action alternatives, with the number of miles constructed dependent on the alternative. These roads would be closed or obliterated following completion of project activities. Post-project disturbance from these roads would be minimal.

Proposed project activities would affect wolf prey habitat under all of the Action Alternatives. Project activities would cause short-term disturbance to elk, but the population is not expected to be affected measurably under any of the action alternatives. Refer to the Rocky Mountain Elk section of this DEIS for a discussion of the effects of project activities on elk.

Cumulative Effects on Gray Wolf

Past actions and events in the analysis area that affected potential habitat and prey in the analysis area include timber harvest, road construction, road closures and timber harvest on private lands adjacent to National Forest System lands. Road construction associated with timber harvest increased road densities within the analysis area, making the area less suitable for gray wolf. Conversely, since the early 1990s road closures associated with access and travel management on the south end of the Umatilla National Forest have reduced open road densities. Wolves generally prefer habitat with road densities of 1 mile per square mile or less; currently road densities are 1.05 miles per square mile. An unknown amount of timber harvest activity has occurred in the past on private lands adjacent to National Forest System lands that has affected big game habitat and populations, and has increased road densities.

All potential wolf habitat in the analysis area currently occurs on National Forest System lands. Past actions and events have combined to create the existing condition of potential gray wolf habitat in the analysis area. There are no present or reasonably foreseeable future actions and events that have the potential to affect potential wolf habitat and prey resources in the analysis area. When the expected effects of these alternatives are combined with the residual and expected effects of past, present, and future actions and events in the analysis area, there would be no adverse affect on potential gray wolf habitat. The proposed activities under these alternatives would not increase open road densities in the analysis area. All new system roads would be closed after project activities are completed. Treatment activities would maintain big game habitat effectiveness levels in the C7 management area above Forest Plan standards. It is expected that potential prey populations would support the gray wolf, if present in the analysis area.

Determination and Rationale (All Action Alternatives)

Under all of the action alternatives, there would be no impact on the gray wolf. The rationale for this determination is as follows:

- The gray wolf is not currently known to occur in the analysis area or on the District.
- No denning or rendezvous sites have been identified on the District; therefore, there would be no impact on these habitats.
- Habitat suitability and quality for the gray wolf would not be impacted by the proposed activities.
- There would be no change in existing open road densities under any of the action alternatives; open road densities would remain at levels generally believed suitable for the gray wolf.
- Habitat effectiveness for prey would be maintained at current levels or increase in the C7 management area. An adequate prey base would be maintained within the analysis area to support potential gray wolf.

California Wolverine *- not known to occur in analysis area, very limited habitat*

The wolverine prefers high elevation, conifer forest types, with limited exposure to human interference (Ruggiero and others, 1994; Wolverine Foundation, 2007). Natal denning habitat includes open rocky slopes (talus or boulders) surrounded or adjacent to high elevation forested habitat that maintains a snow depth greater than 3 feet into March and April (Ruggiero and others, 1994; Wolverine Foundation, 2007). The wolverine is an opportunistic scavenger, with large mammal carrion the primary food source year-round.

The wolverine currently is not known to occur in the analysis area. The analysis area contains approximately 90 acres of open rocky slopes at an appropriate elevation to provide natal denning habitat. Snow tracking surveys conducted across the District, since 1991, for wolverine, fisher, American marten, and lynx have resulted in no suspected sets of wolverine tracks in the analysis area.

Canada Lynx *- not known to occur in analysis area, suitable habitat available*

The Canada lynx habitat consists of coniferous forests between 4,100-6,600 feet in elevation that have cold, snowy winters and an adequate prey base of snowshoe hare. Primary vegetation often is subalpine, grand and Douglas-fir, with lodgepole pine as a major seral species.

The Blue Mountains are considered to be on the fringe of the range of Canada lynx and a few lynx were known to have occurred in the Blue Mountains historically. Unconfirmed observations have been reported, however, snow track surveys during the 1990s and intensive scratch pad surveys during 1999, 2000, and 2001 failed to detect lynx in the analysis area.

That portion of the Umatilla National Forest that would be affected by the Farley project has been classified as ***unoccupied, mapped lynx habitat***. Suitable lynx habitat is present in the upper elevations of the analysis area as summarized in Table 3.6.15.

Table 3.6.15. Lynx Habitat in the Farley analysis area.

Lynx Analysis Unit	Habitat Type	Total Acres Within Analysis Area
Granite	***Foraging***	*4,275*
	Denning	*2,037*
	Total Suitable Habitat	**6,312**
Kelsay	***Foraging***	*16,221*
	Denning	*1,414*
	Total Suitable Habitat	**17,635**

Environmental Consequences

Direct and Indirect Effects of No Action on Lynx

The quantity, quality, and distribution of suitable lynx habitat is not expected to change in the short term. In the mid and long term, dense mixed conifer stands providing suitable habitat would have an elevated risk of wildfire due to high fuel loading (caused by insects and disease). A wildfire would convert dense suitable denning habitat to open unsuitable lynx habitat.

Connectivity of suitable lynx habitat would be reduced as a result. Over time, dense regeneration in wildfire areas would move these areas into suitable foraging habitat for the lynx.

Direct and Indirect Effects Common to All Action Alternatives on Lynx

In general, the effects expected under all of the action alternatives would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. The proposed activities would have no direct or indirect effects on the Canada lynx, as it is not present in the analysis area. Silvicultural treatment activities would have direct effects on the quality and quantity of suitable lynx habitat. Commercial harvest would have short-term effects on understory vegetation used for cover by potential lynx prey. Although cover for prey would be reduced by treatment activities, it would increase in the years following harvest due to increased understory production. Commercially-thinned foraging habitat would continue to be suitable after harvest. Regeneration harvest areas would not be considered suitable foraging habitat after treatment due to reductions in cover used by lynx prey. Retention of clumps of vegetation and down wood at densities that meet or exceed Forest Plan standards, and planting and natural regeneration after harvest would contribute to snowshoe hare habitat in the long term. Non-commercial thinning areas would no longer be considered suitable foraging habitat after treatment. Table 3.6.16 summarizes proposed project activities in lynx habitat.

Table 3.6.16. Suitable lynx habitat potentially affected by proposed project activities by alternative and treatment type.

Lynx Analysis Unit	Habitat Type	Alternative	Acres Treated	% Suitable Habitat Reduction	Treatment Type (acres)		
					Commercial Thinning	*Non-Commercial Thinning*	*Regeneration Harvest*
Granite	Total Habitat	Alt 1	659	7.8	2	575	82
		Alt 2	659	7.8	2	575	82
		Alt 4	584	6.6	2	563	19
		Alt 5	659	7.8	2	575	82
Kelsay	Total Habitat	Alt 1	2162	12.0	52	526	1584
		Alt 2	1877	10.4	5	525	1347
		Alt 4	1703	9.5	52	386	1265
		Alt 5	1681	9.3	5	526	1150

The Lynx Conservation Assessment and Strategy (LCAS) by Ruediger and others (2000) states that no more than 15 percent of an LAU should be converted to an unsuitable condition by harvest activities in a 10-year period. Under the proposed action alternatives the conversion of suitable habitat to an unsuitable condition would be less than 15 percent for the Granite and Kelsay LAUs at the analysis area scale; this would also be true at the project area scale.

Cumulative Effects on Lynx

Past actions and events in the analysis area that affected habitat for the lynx include timber harvest and thinning, wildfire, aspen restoration, and snowmobile trail grooming and use. Timber harvest has affected forest structure and composition, reducing the amount of suitable foraging and denning habitat in the analysis area. Non-commercial thinning of overstocked small-diameter conifer stands also reduced potential foraging habitat for the lynx by reducing the quality of these habitats for the primary prey species. Wildfire has also affected the suitability of potential lynx habitat. High severity fire changed suitable habitat to an unsuitable condition. Regenerating stands that provide snowshoe hare forage above the snowline are present in older burns. More recent high severity fires (1990 to present) are still largely unsuitable habitat because regeneration is not tall enough to provide winter forage for potential prey. Past actions and events have combined to create the existing condition of lynx habitat in the Granite and Kelsay LAUs.

Present and reasonably foreseeable future actions, and events with a potential to affect lynx habitat include snowmobile trail grooming and snowmobile use resulting in human disturbance where it previously did not occur. Also grooming of snowmobile trails and snowmobile use within the Desolation Creek watershed and the Granite and Kelsay LAUs compacts snow, increasing potential access to lynx habitat for competing predators (such as coyote, cougar, and bobcat). It is not expected that the miles of groomed trails in the watershed or the LAUs would change in the near future.

When the expected effects of these alternatives are combined with the residual and expected effects of past, present, and future actions and events, there would be no adverse effect on the Canada lynx. The distribution and connectivity of suitable habitat in the LAUs and the watershed would be maintained under all action alternatives. Maintaining well distributed forage habitat in close proximity to denning habitat and providing for connectivity between patches of habitat, lynx habitat in the Farley analysis area and LAUs would conserve suitable lynx habitat.

Determination and Rationale (All Action Alternatives)

Under all of the action alternatives, there would be **no impact** on the Canada lynx. The rationale for this determination is as follows:

- The Canada lynx is not present in the analysis area (Desolation Creek watershed), the Kelsay or Granite LAUs, or on the North Fork John Day Ranger District; there would be no direct or indirect effects on this species.
- Suitable lynx habitat would continue to be well distributed through the watershed, and connectivity of suitable lynx habitat within the watershed and to habitat outside the watershed (elsewhere in the Kelsay and Granite LAUs) would be provided for.
- Conversion of suitable habitat to an unsuitable condition would meet timber harvest project planning standards contained in the Lynx Conservation Assessment and Strategy (Ruediger and others, 2000) under all alternatives.
- The level of effect or proposed project activities is relatively minor when compared to the availability of suitable habitat in the Desolation Creek watershed and the Kelsay and Granite LAUs.

Columbia Spotted Frog *- known to occur in analysis area*

The Columbia spotted frog frequents waters and associated vegetated (grassy) shorelines of ponds, springs, marshes, and slow-flowing streams and appears to prefer waters with a bottom layer of dead and decaying vegetation (NatureServe Explorer 2007; Csuti and others 1997; Corkran and Thoms 1996). There have been numerous observations of the Columbia spotted frog in the analysis area, ranging from the lowest elevations near the mouth of Desolation Creek to the headwaters of the North Fork and South Fork Desolation Creek. Man-made ponds, wet meadows, and off-channel stream habitats within the analysis area provide breeding habitat for this species. Desolation Meadows has been noted as having high densities of Columbia spotted frogs.

Environmental Consequences

Direct and Indirect Effects of No Action on Columbia Spotted Frog

In the short term (0 to 3 years), the quality and extent of Columbia spotted frog habitat would not change. In the mid and long term, continued recovery of riparian habitat would improve habitat quality for this species. Riparian areas would continue to recover from past disturbances, resulting in increased riparian shading (overstory and shrubs) along streams and pond edges. In the long term, the risk of high severity wildfire would also increase due to increasing fuel loads. A wildfire of this type would consume riparian vegetation used by the spotted frog for cover; however, streams and ponds would continue to provide breeding habitat.

Direct and Indirect Effects Common to All Action Alternatives on Columbia Spotted Frog

All commercial and non-commercial thinning and regeneration harvest activities would occur outside of Riparian Habitat Conservation Areas (RHCAs) under all of the action alternatives. There would be no direct effects on this species or potentially occupied habitat under any of the action alternatives. There is a potential that sediment could reach streams as a result of the proposed activities.

Cumulative Effects on Columbia Spotted Frog

Past actions that affected potential spotted frog habitat include cattle grazing, timber harvest aspen restoration, and gravel pit/pond construction. All or parts of two grazing allotments are located in the analysis area. Past cattle grazing affected potential habitat by altering the structure and composition of riparian communities. Past cattle grazing also created potential breeding habitat through the creation of water sources (ponds) where they previously did not exist. Past timber harvest occurred within and adjacent to riparian habitat in the analysis area. Past timber harvest resulted in disturbance to riparian habitats, a reduction in stream shading, and reduced habitat quality. Rock pit ponds created by road construction associated with timber harvest increased available habitat for the spotted frog in upland areas. Aspen restoration activities (fencing, planting, etc.) have improved riparian habitat condition and increased shade. These

past activities have combined to create the existing condition of potential spotted frog habitat in the analysis area.

Present and reasonably foreseeable future actions in the analysis area include livestock grazing, road obliteration, and aspen restoration. Compared to historical grazing, current grazing is occurring at relatively low levels within the analysis area, and is not adversely affecting potential spotted frog habitat. Obliteration of approximately one mile of road through Desolation Meadows would have a beneficial effect on spotted frog habitat by improving the connectivity of wet meadow habitat by reestablishing hydrologic connectivity between the two sides of the road. At this time, spotted frogs are located in the stream or springs adjacent to the meadow, and would not be affected. When the expected effects of this alternative are combined with the residual and expected effects of past, present, and future actions, and events in the analysis area, there would be no adverse effect on potential spotted frog habitat or populations within the analysis area.

Determination and Rationale (All Action Alternatives)

Proposed project activities for all action alternatives would have ***no impact*** on the Columbia spotted frog or its habitat. The rationale for this determination is as follows:

- All proposed silvicultural treatment would occur outside of Riparian Habitat Conservation Areas (including streams, wet meadows, ponds, and springs) where spotted frogs would be located.
- There would be minimal sediment delivery to suitable habitat

Inland Tailed Frog *- not known to occur in analysis area, potentially present, suitable habitat available*

The tailed frog differs from other frogs found on or adjacent to the Umatilla National Forest by selecting cold, high gradient, boulder and cobble dominated streams for breeding. Streams with dense overstory shade are preferred. Froglets and adults are closely associated with the streams, often hiding in gravel and cobble substrates. Tadpoles cling to boulders and cobbles, and full development of this species require as many as 5 years to complete.

This species has not been observed in the analysis area. However, there is the potential that this species is present in the analysis area. Junkens, Beeman, and the upper North Fork Desolation creeks, and several high gradient spring-fed streams north and west of Jump Off Joe Lake are considered suitable habitat for this species.

Lewis' Woodpecker *- seasonally present in analysis area, limited habitat*

The Lewis' woodpecker is listed as a Region 6 Sensitive Species. It is also a Management Indicator Species (MIS) on the Umatilla National Forest. The Lewis' woodpecker is typically associated with open ponderosa pine woodland habitat near water, and also has been associated with stand replacement fires (5 to 10 years post-fire). The Lewis' woodpecker is an aerial insectivore that uses dominant snags in burned areas for perching. This species utilizes large diameter dead and dying trees near streams for nesting. This species typically nests in pre-existing cavities, but will also excavate cavities.

This species has been observed in the lowest elevation portions of the analysis area. Currently, there are approximately 111 acres of habitat in the analysis area with a structure and composition indicative of suitable Lewis' woodpecker habitat. Portions of older fires (Bull and Summit) would be considered suitable habitat for this species. As snags fall in the future, portions of the Sharps Ridge and Otter Fires would become suitable due to the affinity of this species for older burned areas.

Environmental Consequences

Direct and Indirect Effects of No Action on Lewis' Woodpecker

In the short term (0 to 3 years), there would be no change in existing Lewis' woodpecker habitat under this alternative. In the mid and long term, shade tolerant (fire intolerant) tree species would continue to encroach into historically open ponderosa pine habitats. Increased stand densities would increase competition for resources and stress, making stands more susceptible to insects and disease, and fuel loads would increase. The risk of high severity wildfire would increase accordingly. Post-fire habitats would be utilized by this species for both foraging and nesting.

Direct and Indirect Effects Common to All Action Alternatives on Lewis' Woodpecker

No suitable Lewis' woodpecker habitat would be treated under any of the action alternatives. Commercial harvest of approximately 124 acres of mixed conifer stands in a potential vegetation type appropriate to the Lewis' woodpecker would occur under all of the action alternatives. Harvest would favor the retention of large trees and ponderosa pine to promote conditions that occurred historically. Treatment would encourage the development of large ponderosa pine in open stands, habitat that is preferred by Lewis' woodpecker habitat in the long term.

Cumulative Effects on Lewis' Woodpecker

Because there would be no direct or indirect affects on this species under all of the action alternatives, there would also be no cumulative affects on this species. Treatment of existing vegetation in a manner that would promote the restoration of Lewis' woodpecker habitat would have a beneficial affect on this species and its habitat.

Determination and Rationale (All Action Alternatives)

Proposed actions under all alternatives would have **no impact** on the Lewis' woodpecker or suitable habitat for this species. The rationale for this determination is as follows:

- There would be no treatment activities within suitable habitat for this species, so there would be no direct or indirect impacts.
- Treatment would encourage the development of suitable habitat by favoring ponderosa pine and retaining the largest trees in potential habitat. In the mid and long term, suitable late and old structure ponderosa pine-dominated stands would result.
- The proposed activities would not impact post-fire habitats that may be used by this species.

White-Headed Woodpecker *- known to occur on North Fork John Day Ranger District, suspected to occur in analysis area, very limited habitat*

The white-headed woodpecker is listed as a Region 6 Sensitive Species. It is also a Management Indicator Species (MIS) in the Forest Plan. The white-headed woodpecker differs from many of the other primary cavity excavators identified as MIS in the Forest Plan because of its exclusive selection of mature, single-stratum ponderosa pine- dominated habitats. This species relies almost exclusively upon the seeds from large ponderosa pine cones for its foraging needs. This species will also utilize insects that are gleaned off ponderosa pine trees. Large ponderosa pine snags are utilized for nesting purposes. Habitats that historically supported open stands of large diameter ponderosa pine now support mixed ponderosa pine, Douglas-fir, grand fir, and larch stands, and no longer provide suitable habitat for the white-headed woodpecker.

The white-headed woodpecker has been observed on North Fork John Day Ranger District and is suspected of occurring in the analysis area. Currently, there are approximately 100 acres of old forest single-stratum ponderosa pine in the analysis area that would be considered suitable habitat for the white-headed woodpecker.

Environmental Consequences

Direct and Indirect Effects of No Action on White-headed Woodpecker

In the short term, there would be no change in existing suitable habitat for this species. In the mid and long term, shade tolerant tree species would continue to encroach into historically open ponderosa pine habitats. The composition of these stands would change, with a higher proportion of shade tolerant tree species present in these stands. Ultimately, large diameter ponderosa pine trees and snags would be less common, reducing habitat quality for the white-headed woodpecker.

Direct and Indirect Effects Common to All Action Alternatives on White-headed Woodpecker

No suitable white-headed woodpecker habitat would be treated under any of the proposed action alternatives. Commercial harvest would favor the retention of large trees and ponderosa pine in to encourage the development of large open ponderosa pine stands, habitat that would contribute to white-headed woodpecker habitat in the long term.

Cumulative Effects on White-headed Woodpecker

Because there would be no direct or indirect impacts on this species under all of the action alternatives, there would also be no cumulative impacts on this species. Silvicultural treatment in a manner that would promote the restoration of white-headed woodpecker habitat would have a beneficial effect on this species and its habitat.

Determination and Rationale (All Action Alternatives)

All proposed action alternatives would have **no impact** on the white-headed woodpecker or suitable habitat for this species. The rationale for this determination is as follows:

- There would be no treatment activities within suitable habitat for this species, so there would be no direct or indirect impacts.
- Proposed treatment activities would encourage the development of suitable habitat by favoring ponderosa pine and retaining the largest trees in potential habitat. In the mid and long term, suitable late and old structure ponderosa pine-dominated stands would result.

BIOLOGICAL EVALUATION – Endangered, Proposed , Threatened, Candidate, and Sensitive Wildlife Species and Habitat

Table 3.6.17 summarizes the potential effects of activities proposed for the Farley Vegetation Management Project on endangered, proposed, threatened, candidate, and sensitive wildlife species and habitat.

Table 3.6.17. Biological Evaluation - summary of determinations of effects on endangered, proposed , threatened, candidate, and sensitive wildlife species and habitat.

Species	Status	Determination			
		Alt.1	Alt. 2	Alt. 4	Alt. 5
Bald eagle *Haliaeetus leucocephalus*	Sensitive	NI	NI	NI	NI
Upland sandpiper *Bartramia longicauda*	Sensitive	NI	NI	NI	NI
Gray wolf *Canis lupus*	Endangered	NE	NE	NE	NE
California wolverine *Gulo gulo*	Sensitive	MIIH	MIIH	MIIH	MIIH
Canada lynx *Lynx canadensis*	Threatened	NE	NE	NE	NE
Columbia spotted frog *Rana luteiventris*	Sensitive	NI	NI	NI	NI
Inland tailed frog *Ascaphus montanus*	Sensitive	NI	NI	NI	NI
Lewis' woodpecker *Melanerpes lewis*	Sensitive	NI	NI	NI	NI
White-headed woodpecker *Picoides albolarvatus*	Sensitive	NI	NI	NI	NI

Definitions

NE No effect on a proposed or listed species or critical habitat

NLAA May affect, but not likely to adversely affect a listed species or critical habitat

LAA May affect and likely to adversely affect a listed species or critical habitat

NI No Impact to R6 sensitive species individuals, populations, or their habitat

MIIH 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.

WI Will impact indivuduals or habitat with a consequence that the action will contribute to a trend toawards federal listing or cause a loss of viability to the population or species.

Species of Interest

These are species that are "of interest" to the public at the local or regional level, or were identified as a species of concern by the U.S. Fish and Wildlife Service. Generally, species of interest or concern come from state threatened, endangered, and sensitive species lists. Occurrence determinations are based on observation records, vegetative and wildlife species inventory and monitoring, published literature on the distribution and habitat utilization of wildlife species, and the experience and professional judgment of wildlife biologists on the Umatilla National Forest. Many of these species are considered uncommon or their status is unknown. Table 3.6.18 lists the species of interest that could occur, based on observations or the presence of potential habitat in the analysis area.

Table 3.6.18. Species of interest in the Farley analysis area.

Common Name	Scientific Name	Oregon Status (1998)
California bighorn sheep	*Ovis Canadensis californiana*	None
Birds		
Northern goshawk	*Accipiter gentilis*	Sensitive-Critical
Olive-sided flycatcher	*Contopus cooperi*	Sensitive-Vulnerable
Great gray owl	*Strix nebulosa*	Sensitive-Vulnerable
Bats		
Long-eared myotis	*Myotis evotis*	Sensitive-Undetermined Status
Long-legged myotis	*Myotis volans*	Sensitive-Undetermined Status
Yuma myotis	*Myotis yumanensis*	None

California Bighorn Sheep – not present in analysis area

Suitable California bighorn sheep habitat is not present in the analysis area. The California bighorn sheep has not been observed in the analysis area. The nearest population of California bighorn sheep is located approximately 15 miles northwest of the analysis area on Potamus Creek.

Northern Goshawk

The northern goshawk has been observed in the Farley analysis area. Preferred habitat for the goshawk consists of coniferous forests with a mosaic of structural stages.

There are approximately 1,042 acres of suitable nesting habitat and 27,590 acres of suitable foraging habitat in the analysis area (Table 3.6.19). During reconnaissance a goshawk nest was discovered in the north-central portion of the analysis area.

Table 3.6.19. Suitable northern goshawk habitat in the Farley analysis area.

Habitat Type	Existing Habitat	
	Acres	Percent (of total)
Reproductive	1,042	4%
Forage	27,590	96%
Total Habitat	**28,632**	

Environmental Consequences

Direct and Indirect Effects of No Action on Northern Goshawk

Potential goshawk nesting and foraging habitat would remain unchanged in the short term (0 to 3 years). In the mid and long term, stands would continue to grow and develop multiple dense canopy layers. Young stands would develop large trees and openings created by past harvest would fill in over time. The availability of nesting habitat would increase in the long term due to a greater abundance of large trees and dense multi-layered habitat. However, foraging habitat would be reduced as the area grows denser and more homogeneous, resulting in fewer microhabitats for prey species. The multi-layer condition would increase the susceptibility of stands to high-intensity wildfires and insect or disease outbreaks that could affect goshawk habitat.

Direct and Indirect Effects Common to All Action Alternatives on Northern Goshawk

No silvicultural treatment activities in suitable goshawk nesting habitat are proposed under any of the action alternatives. In general, the effects expected under all of the action alternatives would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. Silvicultural treatment activities (commercial and non-commercial thinning and regeneration harvest) would occur in potential goshawk foraging habitat under all of the action alternatives (Table 3.6.20).

Table 3.6.20. Acres of northern goshawk habitat treated by alternative, habitat type and treatment type.

Habitat Type	Alternative	Acres Treated	Treatment Type (acres)		
			Commercial Thinning	Non-Commercial Thinning	Regeneration Harvest
Foraging	Alternative 1	2810	339	671	1800
	Alternative 2	2518	286	672	1560
	Alternative 4	2389	339	583	1467
	Alternative 5	2269	286	672	1310

Commercial thinning in suitable foraging habitat would reduce stand densities and canopy closure. The goshawk prefers dense stands with complex habitats. Although canopy density would be reduced, foraging goshawk would continue to use these stands following treatment. Reducing stand densities (by commercial and regeneration harvest) and understory vegetation

(by non-commercial thinning) would allow goshawk to maneuver and hunt better in these habitats. Reductions in snags and down wood would reduce potential prey habitat, but is not expected to affect goshawk prey as it would be compensated for by increased accessibility of foraging habitat through thinning. Forest Plan standards for snags and down wood would be met. In the mid and long term, canopy closure and understory vegetation layers would increase, and commercially thinned foraging habitat would provide suitable nesting habitat.

Regeneration harvest would create openings within dense forest stands. Goshawk largely would avoid regeneration harvest units but may forage along edges and leave patches. In the long term, regeneration harvested stands would provide suitable foraging habitat for the goshawk.

Non-commercial thinning would reduce understory regeneration of conifers. Non-commercial thinning would not affect the suitability of northern goshawk habitat. Where dense regeneration currently exists, thinning may improve access to goshawk by opening up stands.

Slash burning would not affect potential goshawk nesting or foraging habitat suitability. Potential prey may be reduced as a result of consumption of small diameter down woody material, slash piles, and brush. Burning is not expected to measurably affect prey species for the goshawk because untreated habitats would be available and well distributed throughout the analysis area, affected areas would meet Forest Plan standards for large wood that contribute prey habitat, and pile and broadcast burning would be of low intensity and would burn in a mosaic fashion.

Road maintenance and construction is not expected to affect the goshawk. If a goshawk nest is discovered during layout project or implementation, project activities would be adjusted and seasonal road use restrictions would be applied to meet the guidelines provided in the “Eastside Screens”. An existing nest is located approximately 200 yards from Forest Road 1010-040. Use of the portion of this road that lies in the post-fledging area established for this nest for project activities would not be allowed prior to July 1 to reduce disturbance.

Cumulative Effects on Northern Goshawk

Past actions and events in the watershed that affected northern goshawk habitat include timber harvest and wildfire. Past harvest affected the structure and composition of forested habitats and the distribution of late and old structure stands in the analysis area. Past harvest reduced old forest structural stages and overstory canopy closure desired for nesting. Harvest activities have created a patchwork of structural stages across the landscape, increasing foraging areas for goshawk. Private land harvest in the analysis area has been more intensive than on National Forest System lands. Harvested private lands may be used for foraging, however the vast majority of suitable nesting habitat is located on NFS lands. Past actions and events have combined to create the existing condition of goshawk habitat in the analysis area. High severity wildfire in the upper portion of the watershed has changed suitable nesting and foraging habitat to unsuitable habitat or habitat used only sporadically by foraging goshawk. Residual suitable habitat in these fire areas is generally not connected to adjacent habitat and the distribution of suitable habitat and connectivity habitat is poor within fire areas.

Present actions in the analysis area with the potential to affect this species include fire suppression and the North Fork Aspen Restoration Project. Fire suppression has contributed to changes in stand structure and composition across the analysis area, encouraging the

development of dense multi-strata stands preferred by the northern goshawk for nesting. Aspen restoration would thin conifers from existing stands and fence them to exclude livestock and deer and elk. This project would aid in the restoration of a habitat (aspen) that is important nesting and foraging habitat for the goshawk.

Currently, there are no ongoing or reasonably foreseeable future activities proposed in the analysis area that affect of have the potential to affect the goshawk or its habitat. There would be no direct or indirect effects on suitable goshawk nesting habitat under all of the action alternatives. Therefore, there would be no cumulative effects on this species. When the effects of these alternatives are combined with the residual and expected effects of past, present, and future actions in the analysis area, there would be a cumulative reduction in high quality foraging habitat for this species. However, this reduction would not adversely affect the goshawk due to because foraging habitat would continue to be well distributed throughout the analysis area.

Olive-Sided Flycatcher

Preferred habitat for the flycatcher consists of coniferous forest associated with openings and edges near streams and wet areas (Marshall and others 2003). This includes burned areas with snags and scattered tall, live trees, riparian zones, edges of late and early-successional forests, and open or semi- open forest stands with low canopy cover (Marshall and others 2003). Tall, prominent trees and snags that serve as foraging and singing perches are a common feature of nesting habitat (Marshall and others 2003). Preferred habitat for this species is present and it has been observed in the analysis area.

Environmental Consequences

Direct and Indirect Effects of No Action on Olive-sided Flycatcher

In the short term (0 to 3 years), the quality of habitat for the olive-sided flycatcher would not change. In the mid and long term, riparian communities would continue to develop along existing successional pathways - canopy closure would increase, stands would develop large trees with multiple canopy layers, and riparian vegetation would continue to recover from past disturbance. High severity wildfire would create edge habitat and create large diameter snags potentially used by the flycatcher as perches.

Direct and Indirect Effects Common to All Action Alternatives on Olive-sided Flycatcher

In general, the effects expected under all of the action alternatives would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. Under all of the action alternatives, no harvest or thinning activities are proposed to occur in Riparian Habitat Conservation Areas (RHCAs). Commercial thinning would thin stands from below, retaining the largest trees in treatment units (those preferred for nesting). Thinning would decrease canopy closure, reduce stand density, and encourage the growth of understory vegetation, all of which are habitat attributes selected for by this species. It is unlikely that commercial thinning would adversely affect this species or suitable habitat. Burning (broadcast

and pile burning) would not affect habitat suitability for this species; large overstory trees and snags used for perching and nesting would be minimally affected by this activity.

Regeneration harvest would have variable effects on the olive-sided flycatcher. Snag densities for the Farley project would exceed Forest Plan standards in all treatment units and edge habitats would be created by this harvest type. Habitat for this species would be created by these activities due to its preference for stands with low canopy closure and scattered large trees and snags and edge habitats. However, research indicates that nesting success in these human-created habitats is much lower than occurs in unharvested or recently burned stands (Altman in Marshall and others 2003; Robertson and Hutto 2007). These areas may represent an ecological trap where nest success is too low to maintain existing populations, but other breeding habitat would be well distributed following harvest in adjacent mixed conifer stands throughout the analysis area.

Broadcast and pile burning is not expected to adversely affect olive-sided flycatcher habitat in riparian or upland habitats. Underburns (including pile burning) would be of low intensity. High fuel moisture levels would make it unlikely that riparian habitat preferred by this species would be affected. It is expected that a few retained green trees and snags would be killed or consumed by proposed burning but this would create perches for this species.

Cumulative Effects on Olive-sided Flycatcher

Past actions and events that affected the olive-sided flycatcher included timber harvest and wildfire. The most recent wildfire in the watershed (Sharps Ridge) created ideal foraging habitat along the fire perimeter (edge habitat along mid-seral young forest vegetation). Past harvest also reduced stand densities and created edge habitats, and appears to have created habitat for this species. However, harvest in riparian habitats reduced overstory and streamside vegetation and reduced, habitat conditions for the olive-sided flycatcher. Past actions and events have combined to create the existing condition of olive-sided flycatcher habitat in the analysis area. There are no present or future actions that are affecting or have the potential to affect olive-sided flycatcher habitat in the analysis area.

When the expected effects of these alternatives are combined with the residual and expected effects of past, present, and future actions and events, there would be a cumulative reduction in suitable habitat for this species. Under all of the action alternatives, population reductions are likely in the immediate vicinity of treatment units, but untreated upland and riparian area habitats would continue to provide excellent habitat for this species throughout the analysis area.

Great Gray Owl

The great gray owl is the largest owl found in Oregon. In the Blue Mountains, they are most often found in Douglas-fir/grand fir and western larch/lodgepole pine forests. Late and old structure stands, and stands in mid-seral conditions provide ideal nesting habitat for this species, while adjacent meadows and other openings provide foraging habitat. Approximately 4,164 acres of suitable habitat adjacent to meadows (>10 acres in size) are present in the analysis area.

Environmental Consequences

Direct and Indirect Effects of No Action on Great Gray Owl

In the short term (0 to 3 years), there would be no change in existing suitable nesting habitat for this species. In the mid and long term, the risk of wildfire would increase in dense stands used by this species for nesting. Large-scale stand replacement wildfire would convert suitable nesting habitat to an unsuitable condition. Great gray owl may utilize openings created around the periphery of a fire, but would be unlikely to utilize interior habitats until these stands regenerate.

Direct and Indirect Effects Common to All Action Alternatives on Great Gray Owl

In general, the effects expected under all of the action alternatives would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. In owl nesting habitat, commercial thinning is proposed to occur on 60 acres under each alternative, with regeneration harvesting occurring on 281 acres (Alternative 4) to 356 acres (Alternative 1). Snag and down wood densities would be reduced in commercially thinned stands, reducing potential nesting structure for this species. Cover for potential prey would be reduced through treatment of down wood and disturbance of understory vegetation by machinery. However, available prey is expected to occur in treatment stands following harvest. Commercially thinned habitats would continue to be classified as suitable nesting habitat after treatment. Reductions in stand density and canopy closure may improve accessibility of these stands to foraging.

Regeneration harvest would convert suitable nesting habitat to an unsuitable condition due to significant reductions in stand density. Large trees and snags would be retained in these stands and would provide perches for great gray owl. These areas would be considered suitable foraging habitat after treatment until regenerating conifers reduced the ability of aerial predators to observe the ground, a period of 10 to 15 years. Noncommercial thinning in stands adjacent to suitable foraging habitat (meadows and open grasslands) and suitable nesting habitat would improve foraging habitat for this species by making prey more visible.

Cumulative Effects on Great Gray Owl

Past actions and events that affected the great gray owl and its habitat include timber harvest and wildfire. Timber harvest activities reduced potential nesting habitat for this species but foraging habitat was created. Past wildfire reduced both nesting and foraging habitat for this species. These past actions and events have combined to create the existing condition of great gray owl habitat in the analysis area. There are no ongoing or future actions in the watershed with a potential to affect this species or its habitat.

When the expected effects of these alternatives are combined with the residual and expected effects of past, present, and future actions and events, there would be a cumulative reduction in suitable nesting habitat, and an increase in foraging habitat for this species. Nesting habitat would be available in untreated stands and riparian corridors within the analysis area. The

degree to which habitat would be affected under the action alternatives would be similar, and is not expected to adversely affect this species or habitat availability.

Bats

The following species are assessed as a group: long-eared myotis, long-legged myotis, and Yuma myotis. Forest dwelling bats often use large-diameter snags with exfoliating bark and rock crevices as roosts. Potential roost habitat (large-diameter snags with exfoliating bark) for forest bats occurs throughout the analysis area. In general, bats have not been specifically surveyed within the analysis area. However, Whitaker and others (1981) considered the long-eared bat to be "the most abundant bat in northeastern Oregon forests", while the Yuma myotis was considered "exceedingly scarce". These three species probably are year-long residents in the analysis area.

Environmental Consequences

Direct and Indirect Effects of No Action on Bats

Potential roosting habitat would remain unchanged in the project area in the short term (0 to 3 years). Over time, stands in the project area would continue to grow and develop dense multi-layered canopies, with large diameter snags providing roosting habitat. However, dense multi-layer conditions would increase the susceptibility to high-intensity wildfires and insect or disease outbreaks. Insect and disease outbreaks would create potential roosting habitat. Wildfire also would create snags for roosting, but due to the limited time snags are suitable for roosting (while the bark is exfoliating), a high severity wildfire would create a shortage of roosting habitat for an extended period.

Direct and Indirect Effects Common to All Action Alternatives on Bats

Proposed commercial thinning and regeneration harvest would target both green timber and dead standing trees (snags). Snags also would be felled in treatment units for safety reasons. Hazard tree felling along roads (existing and closed system roads, new system roads, and temporary roads) also would affect snags. Snag reductions are not expected to adversely affect habitat for forest-dwelling bats because Forest Plan standards would be met or exceeded according to the adjusted snag retention guidelines for the Farley project (Table 3.6.1). Untreated areas (particularly riparian habitats) with high snag densities would continue to be well distributed throughout the analysis area, providing excellent roosting habitat for these species.

Cumulative Effects on Bats

Past actions and events in the watershed that would cumulatively affect bat habitat include timber harvest, wildfire, and personal use firewood cutting. Timber harvest altered stand structure and composition and removed a portion of the large green trees and snags within affected areas. Removal of large snags with exfoliating bark reduced potential roosting habitat for bats. Reductions in large diameter green trees also reduced potential future roost snags. Wildfire both consumed and created potential roost snags for bats. The longevity of these

habitats is relatively short because all of the trees in high severity portions of the fire were killed. These trees would be available for a relatively short time while their bark is exfoliating. Low and moderate severity portions of fire areas would provide roost habitat over a longer period of time due to the presence of a green overstory for snag recruitment. Personal use firewood cutting reduced densities of large snags in the analysis area, especially close to open roads. Newer, less decayed stands (often with bark attached or beginning to slip) are generally more sought after than older snags that do not provide good roosting habitat. These past actions and events have combined to create the existing condition of bat habitat in the watershed.

Present and future actions and events with the potential to affect bats roosting habitat includes personal use firewood cutting. When the residual and expected effects of past, present, and reasonably foreseeable future activities are combined with the expected effects of these alternatives, there would be no adverse effect on roosting habitat or bat populations in the analysis area. Effects on snags are expected to be relatively minor. Forest Plan standards for snags would continue to be met or exceeded following treatment under all of the Action Alternatives according to the adjusted snag retention standards for the Farley project. Retained snags in treatment units and adjacent untreated upland stands and riparian habitats would contribute to the conservation of these species in the long term.

Neotropical Migratory Birds

Neotropical migratory birds are those that breed in the U.S. and winter south of the border in Central and South America. Continental and local declines in population trends for migratory and resident landbirds are an international concern. Partners in Flight (PIF) led an effort to complete a series of Bird Conservation Plans for the continental United States to address declining population trends in migratory landbirds. The Partners in Flight Bird Conservation Plans are used to address the requirements contained in Executive Order (EO) 13186 (January 10, 2001, Responsibilities of Federal Agencies to Protect Migratory Birds).

Neotropical migrants account for a substantial portion of the avian biological diversity in the Desolation Creek watershed (U. S. Dept. of Agriculture, Forest Service, 1999). Of the 122 species of birds known or suspected to occur, 57 species (approximately 47 percent) are neotropical migrants. Forty of these species are associated with riparian habitats, while 32 species use old growth. Twenty-eight species use aspen groves for nesting or foraging habitat. Twenty-nine species use sapling/pole stands for either nesting or foraging. Nineteen species use the stand initiation structural stage; many of these are generalist or edge-associated species.

Environmental Consequences

Direct and Indirect Effects of No Action on Neo-tropical Birds

The current condition of habitats for neo-tropical migratory birds in the analysis area would not change in the short term (0 to 3 years). No change is expected for riparian, shrub, meadow and aspen habitats. Bird species that rely on multiple strata and high canopy closure would likely remain static. Dry forest could continue to fill in with fir due to continued fire suppression, which could further restrict development of old forest habitat. Insect and disease damage would continue. Snags likely would increase in number, benefiting many snag associated species. The area would remain prone to fire, and there would be few opportunities to restore larch and

ponderosa pine where fir has encroached. If small or low intensity fire were to occur, species associated with edge and burned habitats would thrive, and more single story ponderosa pine habitat might result. If a larger stand-replacing event took place, the now-scarce old forest habitats could be lost.

Direct and Indirect Effects Common to All Action Alternatives on Neo-tropical Birds

The effects expected under all of the action alternatives generally would be the same; the difference between individual alternatives (in terms of magnitude of effect) would be proportional to the number of acres subjected to the various treatment activities under each alternative. Proposed thinning and timber harvest in the Farley analysis area seeks to reduce overstocking and fuel loads and promote forest stand health and resiliency. In the short term (0 to 3 years), these stands generally would not provide adequate habitat for many bird species of concern.

A small amount of commercial thinning is proposed in dry forest that would promote development of a large tree, single-layered canopy with an open understory dominated by herbaceous cover, scattered shrub cover, and pine regeneration. This would occur on 6 to 7 percent of the total project acres. No treatments would occur in dry forest stands classified as old forest, and all trees > 21 inches dbh would be left. Bird species that favor open stands of old ponderosa pine have declined as these stands have grown in with more shade-tolerant species. Understory burning and thinning would be beneficial to this group.

Closed canopy forest and multiple layered stands in mesic mixed conifer (moist upland forest) and subalpine (cold upland forest) habitat would be reduced. Thinning and regeneration harvest would reduce the amount of tree canopy and understory layers within treated stands. These additional patchy openings in the landscape would aggravate the existing lack of cover in the short term. Many of these areas are prone to insect and disease. Outbreaks of mountain pine beetle and balsam wooly adelgid are currently causing extensive mortality of lodgepole pine and subalpine fir throughout the west. Thinning and timber harvest treatments to remove diseased trees and replace them with more resilient species would eventually lead to more and better bird habitat.

Noncommercial thinning would have little or no effect on birds of concern, and would eventually lead to larger diameter trees and provide more future habitat for birds associated with late successional stages. Tree planting would provide future habitat with more resilient tree species that better reflect the historical mix of species.

Post-harvest fuels treatments (mastication, underburning, etc) would remove some shrubs, grasses, and seedlings from the understory, temporarily reducing cover and decreasing foraging habitat for some birds. If activities occur during springtime, harvest activities and burning could temporarily disrupt ground nesting birds.

The reduction of crown and ladder fuels would reduce habitat for some birds, but it also would reduce the chances that a large scale fire would eliminate large areas of forest habitat. Because no timber harvest would occur in old forest, and all trees > 21 inches dbh would be left in thinning and timber harvest units, existing patches and elements of old forest would remain. Snags would be left at levels that exceed the Forest Plan.

No change is expected for riparian, shrub, meadow and aspen habitats in the short term, since no management activities are proposed.

Cumulative Effects on Neo-tropical Birds

There are approximately 13,448 acres of private land in the Desolation watershed, and extensive harvest has taken place on most of it. With approximately 30 percent of the national forest areas in the analysis area in a stand initiation or understory reinitiation stage, and a large interior private holding that has been previously harvested, opening up more forest canopy could be detrimental to many bird species. The Farley project proposes regeneration harvest of 1,831 acres (Alternative 5) to 2,418 acres (Alternative 1) that would create additional open patches in the forest canopy. In the short term, habitat for some birds would be reduced, but eventually these areas would improve. The requirement to leave all trees > 21 inches dbh and the retention of snags should reduce the overall effects caused by thinning and timber harvest.

The Otter Creek fire burned 640 acres within the Farley analysis area, creating additional snag habitat. The Otter Salvage project proposes to harvest burned trees on about 80 acres; the remaining approximately 560 acres of dead tree habitat will provide habitat for bird species associated with dead wood. The Sharps Ridge Fire burned approximately 3,046 acres in the analysis area; none of this fire area was salvaged. The entire 3,046 acres would be available for fire-adapted woodpeckers and other migratory birds.

Ongoing activities such as mining, grazing, and recreation have little cumulative effect on birds of concern in this area due to the limited intensity, location and duration of these activities.

Consistency with the Forest Plan and Other Applicable Natural Resource Management and Environmental Laws, Regulations, Policies and Programs.

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the Farley analysis area.

3.7 RECREATION AND VISUAL RESOURCES

SCALE OF ANALYSIS

In this DEIS the analysis area for recreation and visual resources for the Farley Vegetation Management Project is the Desolation Creek watershed (HUC 1707020204). The specific areas that would be affected by proposed commercial and non-commercial thinning and timber harvest, prescribed burning and other associated project activities (including road construction, reconstruction, and obliteration / stabilization) are shown on maps (Figures 2.4 – 2.7 above).

Project activities are proposed to occur in or adjacent to management areas designated by the Forest Plan as A4 – Viewshed 2. The Forest Plan specifies the resource management direction and desired future condition, and provides guidelines and standards for resource management activities proposed in these areas. This section evaluates the effects of proposed project activities on:

- Visual Quality
- Inventoried Roadless and Undeveloped Areas
- Recreation Opportunity Spectrum
- Trails And Dispersed Recreation
- Camping

Effects of harvest on visual quality in the Forest Road 10 corridor (which has specific management objectives specified by the Forest Plan) was determined using maps and by driving the route to observe the viewable area. Along much of the route, steepness of the terrain and existing vegetation along the road prevents broad views. This is particularly true along the north side of the road. Acres of harvest, thinning, road construction or road obliteration within undeveloped areas may not exactly match similar measurements in other specialist reports or sections of this DEIS because only the portion of the proposed activity unit or road that was within the undeveloped area was measured.

AFFECTED ENVIRONMENT

Recreation Opportunity Spectrum

Each Management Area designated by the Forest Plan is assigned a class under the Recreation Opportunity Spectrum (ROS). Each class is defined by the degree to which certain recreation experience needs are satisfied, based on the extent that the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. Proposed project activities could affect ROS. Table 3.7.1 describes the management area strategies (MAS) and ROS classes potentially affected by the Farley project activities.

Table 3.7.1. Recreation Opportunity Spectrum (ROS) Classes in management areas in the Farley analysis area potentially affected by project activities.

Management Area	Acres	ROS Class
A4 – Viewshed 2 (Forest Road 10)	3,345	Roaded Natural to Roaded Modified
C7 - Special Fish Management	31,807	Roaded Modified and Roaded Natural

Roaded Natural – Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

Roaded Modified – A considerably modified natural-appearing environment characterizes the area with considerable evidence of the sights and sounds of humans. Such evidence seldom harmonizes with the

natural environment. Interaction between users may be low to moderate, but evidence of other users is prevalent. Resource modification and utilization practices are evident and seldom harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.

Environmental Consequences

Direct and Indirect Effects of No Action

The No Action alternative would not affect current Recreation Opportunity Spectrum class conditions in throughout the Farley analysis area.

Direct, Indirect and Cumulative Effects Common to All Alternatives

Proposed project activities would only occur in management areas A4 (Viewshed 2) and C7 (Special Fish Management). None of the proposed activities under any of the proposed action alternatives would change the Recreation Opportunity Spectrum class as specified by the Forest Plan.

Camping

There are two developed campgrounds within the analysis area:

- Tollbridge Campground is located on Forest Road 10 a little over one mile northeast of Dale, Oregon. This developed campground not far from U.S. Highway 395 has seven campsites, one toilet facility, and an interpretive sign. The primary users of this campground are travelers needing a place to stay overnight on their way to another destination.
- Welch Creek Campground is located in the central part of the analysis area on Forest Road 10 about 15 miles southeast of Dale. This campground has five sites and one toilet facility. It is used primarily during the hunting season by both OHV and equestrian users.

Dispersed camping traditionally has been a popular activity in the area, particularly during the big game hunting seasons. Typically a dispersed campsite is near a road and consists of a rock fire ring and a hardened parking/camping surface for one to three families, often with a meat pole in the trees. Approximately 45 dispersed campsites are located in management areas in which project activities are proposed (Table 3.7.2), primarily located along Forest Roads 10 and 1010. Project activities could affect campers using these dispersed sites.

Table 3.7.2. Inventoried Dispersed Campsites by Management Area in the Farley analysis area.

Management Area	Number of Sites
A3	14
C7	31
Total	**45**

Environmental Consequences

Direct and Indirect Effects of No Action on Camping

Campers would remain undisturbed by dust, noise, smoke, or traffic. Dispersed campsite use patterns would remain the same.

Direct and Indirect Effects Common to All Action Alternatives on Camping

No activities are proposed near the Tollbridge Campground. However, six thinning and five timber harvest units are proposed within one mile of the Welch Creek Campground.

The silvicultural prescription for the harvest units would remove most of the mature trees, and for the thinning units would remove or thin out the small understory. Terrain would partially or completely block views of all units except thinning unit 2002. Since thinning would leave a fully stocked stand, views from the campground should not be affected. The only effect on the camping experience at Welch Creek would be noise and dust during thinning and harvest operations, which would be of short duration (one season).

However, Welch Creek Campground is located beside FS Road 10, which would be a primary haul route for the duration of the Farley project (3 to 5 seasons). Noise and dust could reduce the recreation experience for some campers. Appropriate and timely dust abatement measures could reduce some of these effects. Most use of Welch Creek Campground occurs in the fall during the hunting seasons, with summer use primarily by OHV riders.

Dispersed camping would be minimally affected by the proposed activities under all of the action alternatives. Fourteen dispersed campsites would be affected during project activities by noise and dust. Table 3.7.3 displays dispersed campsites that are within 300 feet of proposed harvest units. These sites would experience a more open stand of trees for a decade or two. This is particularly true for harvest units CRW, CMA, BGC, and AC which would have little remaining overstory after harvest. Some campers could avoid the five sites near these harvest units for an extended period until sufficient shade and vegetation make them more appealing. However, hunters would likely continue to use them because most available sites are occupied in the fall. Some campers could be displaced, but the effects would be limited to a small number of sites at a given time and would end with completion of activities in the adjacent unit (generally 1-2 weeks). Harvest would improve camper safety by removing weakened or dead trees that could fall and cause injury.

Table 3.7.3. Dispersed campsites within 300 feet of a proposed project harvest unit.

Alternatives 1, 2, 4, 5	
Project Activity Unit	**Dispersed Campsites within 300 feet**
CRW	1 site
CAW	1 site
CAT	8 sites
CMA	2 sites
BGC	1 site
AC	1 site
6 treatment units	14 dispersed campsites

Forest Roads 10, 1010, and 45 are the most popular areas for dispersed camping. Forest Roads 10, 1010 and 5505 would be major haul routes for timber harvest. Dispersed campsites along these roads would experience increased traffic, dust, and noise. As with Welch Creek Campground, most use of these sites occurs in the fall during the hunting seasons. Since hunters tend to be away from camp during the day, impacts to campers would be minimal.

Dispersed campsites could also be affected by smoke from prescribed burning. This generally would occur at the beginning (late spring/early summer) and end (late autumn) of the camping season when conditions allow for adequate control of fire. Late fall campers (primarily hunters) likely would be the most affected. Dense smoke could cause campers to relocate to another area, but the duration of this effect would be short (1-2 weeks).

Cumulative Effects on Camping

There would be no cumulative effects on any developed recreation sites or dispersed camping activity with any of the alternatives.

Trails and Dispersed Recreation

Thinning and timber harvest and associated burning and transportation system activities for this project could affect trail use and dispersed recreational activities in the analysis area. The main recreational use of the area is for big game hunting. The analysis area contains much of the Desolation Big Game Management Unit designated by the Oregon Department of Fish and Wildlife. Hunting seasons typically begin in late August (for archery) and extend through the mid November (for modern rifle). The Desolation Creek corridor is one of the few areas in northeastern Oregon that provides numerous desirable dispersed camp sites, good roaded access to backcountry portals, opportunities to hunt within roaded areas, and an adequate big game population. It is an area that has shown an ability to absorb a dramatic increase in use during the fall and yet retain a dispersed camping experience that can be as desirable as the hunting experience.

There are a number of other popular dispersed recreation activities in the area including:

- hiking
- horse riding
- All Terrain Vehicle (ATV) riding
- fishing

- sight seeing
- mushroom and huckleberry picking
- firewood gathering
- rock collecting & gold panning

There are almost 54 miles of developed trails within the analysis area and 14 developed trailheads. Trails serve hikers, equestrians, motorcycles (Class III OHVs) and four-wheelers (Class I OHVs). Also, all roads are considered open to OHV travel unless closed under the District's Access and Travel Management Plan (for example, Forest Road 10 is not open to OHVs). Approximately 10 miles of road are groomed for snowmobile use in the winter on the southeast portion of Forest Road 10 to Forest Road 45, and on Forest Road 45 to Indian Rock Lookout. There are no groomed cross-country ski trails in the analysis area. Desolation Fire Lookout and Desolation Guard Station are administrative sites in the analysis area that often are visited by the public; Desolation Lookout is accessed by a spur road off Forest Road 1010. Fishing also is popular, particularly in Desolation Creek, Lost Lake, and Jump-off Joe Lake. These lakes are annually stocked with fish by Oregon Department of Fish & Wildlife.

Environmental Consequences

Direct and Indirect Effects of No Action on Trails and Dispersed Recreation

No trails would be affected under this alternative. Dispersed recreation would also remain unchanged.

Direct and Indirect Effects Common to All Action Alternatives on Trails and Dispersed Recreation

There would be no effects on the following trails from this project: Blue Mountain, Jump-off Joe Lake, Sharps Ridge, South Fork Desolation, Squaw Rock, Cold Spring, Glade Creek, and Basin. The two administrative sites would remain unaffected. Also, there should be no effects on fishing, huckleberry picking, firewood gathering, rock collecting, or gold panning. Hunters could be temporarily displaced by harvest activities or burning. Mushroom picking could improve where prescribed burning takes place.

Snowplowing of portions of Forest Road 10 to support project activities could affect or eliminate snowmobiling opportunities along 10 miles of groomed trail for the duration of the project. Five trails designed for OHV use would be affected by roads proposed for use as haul routes for this project (Table 3.7.4). The portions of trail overlapping haul routes would be closed during active hauling for safety reasons (Table 3.7.5). Trail beds would be restored (ruts removed, placement of drainage structures, disguise of adjacent skid trails) when project activities are complete.

Table 3.7.4. Miles of trails affected by proposed timber harvest haul routes (by alternative).

Trail	Affected Trail Miles		Current Road Status	Accessed Harvest Units
	Alt 1 & 5	Alt 2 & 4		
Welch Creek	0.6	0.6	Open	CQU and CQS
Beeman Junkens	1.5	1.5	Open	CRW, CRV, CRT, CAW, CAU, CAV, and CRS
Bull Prairie	0.6	0.6	Closed	BFA, BFB, BHD, BIA, BKA, and BLA
Battle Creek	1.5	1.5	Closed	BOA, BAA, BPA, BOB, and BXA
Skinner Diggins	0.8	0	Proposed	BNA and BMA
Total Miles	5	4.2		

Table 3.7.5. Roads that also serve as a portion of OHV trails in the Farley analysis area.

Trail	Road#	Status of road portion of OHV trail
Beeman-Junkens	3988070	Part open, part closed
Sharp Ridge	3988080	Open
Beeman-Junkens	1007070	Open
Beeman-Junkens	1007	Open
Beeman-Junkens	1000140	Closed
Welch Creek	1000150	Open
Welch Creek	1000155	Closed
Battle Creek	1000210	Closed
Bull Prairie	1010220	Closed
Skinner Diggins	Segment 12 (on proposed alternative maps)	Proposed new road, to be closed after project activities

Harvest units would straddle or be directly adjacent to four trails (Table 3.7.6). Most of the stands in these units are heavily infested by insects/disease, and would be treated so that few trees would remain. Views along these segments of trail would be more open and evidence of harvest would be prominent. Trail users would be temporarily displaced when trails are closed during harvest (approximately for 1-2 weeks until harvest is completed). Units CAV, AB, and BHC straddle trails and could result in skid trails crossing or running adjacent to the trail bed. These skid trails would be disguised with debris or seeded upon completion of project activities so they do not confuse trail users or result in multiple trails. Any damage that occurs to the trail bed would be repaired prior to completion of project activities as described in the project design criteria. Most of the harvest units would be burned to prepare for tree planting. Trails would be closed during active burning, and smoke could cause discomfort for trail users for 1 to 2 weeks. Proposed activities would improve trail user safety in many places by removing dead and infected trees, which could otherwise fall in the trails.

Table 3.7.6. Trails within or directly adjacent to treatment units.

Trail	Treatment Units	Affected Trail Miles (estimated)				
		Alt 1	Alt 2		Alt. 4	Alt. 5
Lake Creek	AB	0.2	0.2		0.2	0.2
Beeman Junkens	CAW, CAV, CRW	0.7	0.7		0.7	0.7
Bull Prairie	BHD, BHC	0.3	0.3		0.3	0.1
Howard Creek	BWA, BJA	0.4	0.4		0.3	0.3
Total miles affected		**1.6**	**1.6**		**1.5**	**1.3**

Non-commercial thinning also would straddle or occur adjacent to the Beeman Junkens, Howard Creek, Bull Prairie, Battle Creek, Lost Lake, Welch Creek, and Cougar trails. Non-commercial thinning would open up the understory and improve sight distance on these trails. Also, the resulting increased tree growth would provide future shade to trail users and improve overall stand health that would reduce potential trail hazards. Trails would be closed during active burning of debris produced by thinning activities, and smoke could cause discomfort for trail users for 1 to 2 weeks. Mechanical thinning could create areas of soil disturbance across or adjacent to trails that would be rehabilitated by scattering debris or seeding.

Direct and Indirect Effects Unique to Alternative 1 on Trails and Dispersed Recreation

One of the proposed road construction segments (accessing harvest units BIA, BKA, and BLA) would create a new connection between the Howard Creek and Bull Prairie trails. Although these two trails already connect via Forest Road 1010, this new road would be closed to full-sized vehicles, thus separating them from OHVs and improving safety.

Cumulative Effects on Trails and Dispersed Recreation

In the long-term, the proposed harvest and thinning together with past harvest and prescribed burning and the ongoing Kelsey Tree Thinning project would benefit recreationists by creating a more open forest environment. An open forest setting is important for many recreation activities and would contribute to the overall experience for a visitor. Even with extensive past resource management in the analysis area, outdoor recreation use has steadily increased over time. When other past, present, or foreseeable future projects (Appendix C) are considered, this project would not be expected to result in any cumulative effects on the overall recreational experience.

Visual Resources

Proposed project activities could affect visual resources. The Forest Plan designates 3,024 acres in the Farley project analysis area as MAS A4 – Viewshed 2 adjacent to Forest Road 10. This area is to be managed as a natural appearing landscape; visual quality objectives are “partial retention” in the foreground and “modification” in the middleground.

Environmental Consequences

Direct and Indirect Effects Unique to No Action on Visual Resources

There would be no change to visual resources within the analysis area.

Direct and Indirect Effects Common to All Alternatives on Visual Resources

No thinning and harvest activities are proposed in the A4 management area that include the entire foreground, However, harvest activities would occur in the middleground and background as viewed from the road and river corridor, and would meet Forest Plan standards for visual resources. Most proposed harvest would occur north of Forest Road 10. The terrain along that side of the road is steep and densely vegetated, and it is unlikely that thinning and harvest activities would be visible from the road. Where thinning and harvest could be visible on the south side of the road, there already is evidence of past harvest; additional activities would not be expected to further reduce visual quality. In addition, thinning and harvest units would be irregular in shape to blend with other natural features in the middleground and background. The history of fires in the analysis area has created a patchy mosaic of different tree sizes and densities, and would further mask the proposed activities.

New road construction within the A4 management area has the potential to reduce visual quality. However, because of the steep terrain, location of proposed activities, and existing vegetation, the scenic integrity along this corridor would remain intact.

Approximately 4.7 miles of existing closed road would be obliterated in undeveloped areas under each alternative. Associated soil disturbance would detract from the natural color and texture of the surrounding areas. These effects would last 3-5 years until vegetation once again covers the soil, however, these effects would be limited by short sight distances caused by steep terrain and heavy vegetation. In the longer term, road obliteration would restore original natural lines and texture.

Cumulative Effects on Visual Resources

Past fires, timber harvest, and road construction have created a patchwork of vegetation densities and sizes in the middleground and background through the view corridor. In some cases, the lines of past management do not blend with the natural surroundings. The proposed thinning, harvest and prescribed burning would soften some of those lines so the patches blend with natural fire patterns. Proposed road obliteration also would help restore natural appearance after the disturbed soil has revegetated. As a result, visual quality within the area would improve in the long-term.

Candidate Wild and Scenic Rivers

Three streams within the Farley analysis area are considered candidates for Wild and Scenic River designation: Desolation Creek and its North and South Forks. After interdisciplinary analysis of these streams in 2005, all three were determined to meet the minimum eligibility requirements as specified by the Wild and Scenic Rivers Act and FS Manual 2351.

Environmental Consequences

Direct and Indirect Effects of No Action on Candidate Wild And Scenic Rivers

The candidate rivers would not be affected under this alternative.

Direct, Indirect, and Cumulative Effects Common to All Alternatives on Candidate Wild and Scenic Rivers

All harvest units were located a minimum of 0.25 miles away from the candidate rivers. Some non-commercial thinning units come within 0.25 miles of the candidate rivers, however, a fully stocked stand would be left, so there would not be an effect on the Outstandingly Remarkable Values of ecological diversity, wildlife, or recreation. Road obliteration is the only activity that would occur in Desolation Meadow. Removal of the roadbed should help restore the water table and benefit botanical values. Fisheries and wildlife populations would remain unchanged at the scale of the river corridors. Water quality also would remain unaffected. As a result, there would be no change in the eligibility of these three streams for Wild and Scenic River status.

Inventoried Roadless and Undeveloped Areas

Portions of two Inventoried Roadless Areas occur in the southern portion of the Farley analysis area:

- Jump-off Joe Inventoried Roadless Area
- Greenhorn Inventoried Roadless Area

No project activities are proposed within these Inventoried Roadless areas.

There are five small (<600 acres) and three large (>1000 acres) undeveloped areas in the analysis area that are not part of an Inventoried Roadless Area. Characteristics of undeveloped areas are:

- ***Natural Integrity*** (the extent to which long-term ecological processes are intact and operating) and ***Apparent Naturalness*** (whether an area appears natural to most people using the area)
- ***Solitude*** (isolation from the sights, sounds, presence of others and the development of man) and ***Remoteness*** (the perceived condition of being secluded, inaccessible, and self-reliant)
- ***Special Features*** (unique geological, biological, ecological, cultural, or scientific).

The five small undeveloped areas generally are adjacent to Wilderness or Inventoried Roadless areas. They do not possess wilderness characteristics, as defined by FSH 1909.12, Chapter 70 because of a lack of special features and proximity to open roads.

The three large undeveloped areas in the Farley analysis area provide a connective corridor between the North Fork John Day Wilderness and the two Inventoried Roadless areas. There is evidence of past mining, grazing, timber harvest, dispersed camping, fire suppression, OHV and trail use that detracts from their apparent naturalness and natural integrity. These undeveloped

areas are separated from each other by open Forest System roads and there are closed roads on their periphery. There is little expectation of not seeing or interacting with others due to existing roads and OHV trails, so there is little opportunity for solitude and remoteness. Also there may be some residual evidence of past fire suppression, although 10 years have passed and vegetation likely has reclaimed most of these areas. No special features (geological, biological, ecological, cultural, or scientific) have been noted in these undeveloped areas. Proposed project activities could affect the apparent undeveloped character of these areas. However, based on the above, these areas are not consistent with the inventory criteria for potential wilderness and would not qualify for, or be included in the inventory of potential wilderness (FSH 1909.12, Chapter 70).

Environmental Consequences

Direct and Indirect Effects of No Action on Undeveloped Areas

Inventoried Roadless Areas: The character of the Jump-off Joe and Greenhorn Inventoried Roadless Areas would not be affected. Ongoing activities such as grazing, fire protection, monitoring, and recreation would continue.

Areas with undeveloped characteristics**:** There would be no direct effect on the natural integrity or the appearance of naturalness in the areas in the analysis area with undeveloped characteristics. Changes would only occur through natural processes. Current biological and physical processes and ecosystem functions likely would continue at present magnitudes and rates. The long-term natural integrity of the undeveloped areas could be altered as an indirect effect of continued fire suppression or large-scale wildfire. There would be no direct or indirect effects on the current opportunities for solitude and remoteness in either the short or long term.

Direct and Indirect Effects Common to All Alternatives on Undeveloped Areas

Inventoried Roadless Areas: No activities are proposed to occur in these areas under any alternative. Therefore, the character of the Jump-off Joe and Greenhorn Inventoried Roadless areas would remain unchanged. Prescribed burning could creep into the roadless area. However fire is a natural component of the roadless areas and would not affect roadless character. These Inventoried Roadless areas would retain the characteristics making them suitable for wilderness designation.

Areas with Undeveloped Characteristics**:** Obliteration of 4.7 miles of existing closed roads within or adjacent to undeveloped areas would occur under all alternatives (Table 3.7.7). This would create soil disturbance that would remain visible for 3-5 years until vegetation reclaims the disturbed area. While this would initially reduce the apparent naturalness of these areas, restoration of these roads to the original landform would increase natural integrity and restore a sense of remoteness and solitude after vegetation covers the disturbed soil again.

Table 3.7.7. Activities proposed to occur within undeveloped areas outside of Inventoried Roadless Areas (by alternative).

Proposed Activities	Alternative			
	1	2	4	5
Timber Harvest	389	261	0	266
Non-commercial Thinning	289	289	0	289
TOTAL (acres)	678	550	0	555
New and/or Temporary Road Construction (miles)	7.1	2.3	0	4.3
Existing Closed Road Stabilization and/or Obliteration (miles)	4.7	4.7	4.7	4.7

Direct and Indirect Effects Unique to Alternative 1 on Undeveloped Areas

Alternative 1 would construct 13 new road segments within the large undeveloped area north of Forest Road 10. In particular, road segment 12 would effectively eliminate the undeveloped character of this area by intruding into its core, counteracting any gain achieved by the proposed obliteration of existing closed roads. Eleven harvest units (BIA, BKA, BLA, BRA, BNB, BWA, BMA, BNA, AE, AF, and AG) are proposed within this area. These units total 325 acres and would reduce the apparent naturalness, remoteness, and solitude throughout most of this area for up to 20 years.

Direct and Indirect Effects Unique to Alternative 4 on Undeveloped Areas

Only road obliteration activities would occur in undeveloped areas under this alternative.

Direct and Indirect Effects Common to Alternatives 1, 2 and 5 on Undeveloped Areas

Areas with Undeveloped Characteristics: Thinning and harvest activities proposed under these alternatives would reduce the appearance of naturalness, solitude and remoteness by creating tree stumps, debris, and soil disturbance (<5% of the area of the treatment unit). However, areas of disturbed soil would be rehabilitated so these effects would be transient. Skid trails would remain evident for 5-8 years. Tree stumps would take decades to decay; depending on the size, this could take up to 20 years before the stump is not identifiable to an untrained eye. All areas where activities are proposed would remain forested after treatment and many would be planted with a diversity of tree species appropriate to the site and according to the silvicultural prescription.

Non-commercial thinning would cause short-term loss of undeveloped character. Eleven non-commercial thinning units are proposed in undeveloped areas under these alternatives (Units 0124, 0232b, 0649, 0714, 2058, 2074a, 2074b, 2074c, 2077, 2109b, and 2109c). All of these units except 0649 and 0714 are located on the edges of the undeveloped areas. Both manual and machine thinning would leave numerous stumps that would detract from the undeveloped character of these areas. However, thinned trees would be of small diameter and the stumps would be expected to decay relatively quickly (5-15 years). In addition, machine thinning would

create localized areas of soil disturbance that would detract from the undeveloped character, but required erosion control and revegetation measures would rehabilitate these areas in 1-3 years.

Fuel treatments, either mechanical or with prescribed fire, would occur within harvest and thinning units. Where mechanical treatments occur, results would be similar to those identified for thinning, although debris would be less evident. Prescribed fire would help restore apparent naturalness by burning debris and stumps so they blend more with surroundings. Vegetation would be reduced in a mosaic pattern across the burned area, and would recover in 1-3 years; the mosaic pattern also would create a more natural appearance.

The overall effect of harvest, thinning, and fuels treatments would be to open up forest stands allowing for increased sight distances and development of larger trees in the future.

Direct and Indirect Effects Common to Alternatives 2 and 5 on Undeveloped Areas

Alternatives 2 and 5 would construct 2.3 and 4.3 miles, respectively, of new system and/or temporary road (Table 3.7.7) in the large undeveloped area north of Forest Road 10. This area is approximately 3,100 acres in size, although existing motorized trails traverse the north and west sides, effectively reducing it by about 330 acres. Alternatives 2 and 5 would still leave a connective corridor between the North Fork John Day Wilderness and the Jump-off Joe and Greenhorn Inventoried Roadless areas.

Cumulative Effects on Undeveloped Areas

Past activities that have occurred within the undeveloped areas include timber harvest, prescribed fire, construction of OHV trails, and dispersed recreation. Livestock grazing has occurred within all undeveloped areas for at least the past 100 years, as well as fire suppression activities (most recently the Bull, Summit, and Jump-off Joe fires). Grazing, maintenance of OHV trails, and fire suppression would continue to maintain the current conditions into the future. Additional roads could be decommissioned in the future, which would increase the area that offers an undeveloped character. The proposed activities would cumulatively decrease the undeveloped character (natural appearance, sense of remoteness and solitude) of this area for up to 20 years, but the effects would be transient as vegetation recovers. Residual effects of the proposed actions (i.e. stumps) would also blend with the residual effects of surrounding past activities.

Consistency with the Forest Plan and Other Applicable Natural Resource Management and Environmental Laws, Regulations, Policies and Programs.

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the Farley analysis area.

3.8 MINING, ENERGY, AND SPECIAL USES

SCALE OF ANALYSIS

The scale of analysis for Mining and Special Use resources with respect to the Farley Vegetation Management Project is the Desolation Creek watershed.

AFFECTED ENVIRONMENT

Mining and Mineral Materials

Exploration for locatable mineral deposits currently is taking place in the Farley analysis area. Most of the existing mining activity consists of small-scale placer claims and one lode claim. Continued interest in mineral resources is assumed although the actual amount and location of mining- and mineral materials-related activities are difficult to predict.

Oil and Gas

The Farley analysis area appears to have low potential value for oil and gas.

Special Uses

Special use permits in the Farley analysis area include three water lines and two water diversions for irrigation and drinking water supply. There are three commercial utility electric transmission lines. There are a number of easements and rights-of-way accessing existing patented mine claims (which are private domain).

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects of No Action on Mining, Energy, and Special Uses

There would be no effects to current mining claims or activities, minerals deposits, abandoned mines, and/or special uses from the activities proposed to be conducted under any of the alternatives. Large-scale wildfire could damage historic monument markers for mining claims and other resources associated with special uses.

Direct and Indirect Effects Common to All Alternatives on Mining, Energy, and Special Uses

Proposed project activities may have a localized and short-term effect on access to existing mining claims in and near the Farley project area. Obliteration of road 420 should not have any effect as no Plan of Operation has been submitted by the operator of a potentially-affected claim for the use of this road. As of January 25, 2008 there are no mining known mining Plans of Operation that would affect or be affected by proposed Farley project activities.

One abandoned mine site is near (just south) of project units ***bcb*** and ***bca***. It is accessed by Forest Road 1010 170. No hazards are identified at this time.

One abandoned mill-site with an unsafe, fallen-down cabin and a shaft (measuring approximately 4 x 4 x 15 feet) full of murky water is located within the project analysis area but

outside of proposed project activity units. This shaft is scheduled for temporary closure in the summer of 2008 and will not affect or be a hazard to proposed project activities.

Activities that would be conducted under proposed action alternatives would have no substantial effect on access to mineral materials (such as gravel and rock). Project unit ***crw*** which is off of the 1010 170 Road and could limit access to a rock pit located in the SW ¼ of Section 13, T08S, R33E. Currently there are no commercial mineral material permit holders.

Proposed project activities may have minor localized and short-term effects on access related to special uses in and near the Farley project area. These activities would not be expected to prevent any foreseeable future opportunities.

Cumulative Effects of All Action Alternatives on Mining, Energy, and Special Uses

Proposed vegetation management activities would not affect mining claims, monuments and improvements. Proposed activities may have long-term beneficial effects on special uses and mineral resources by maintaining existing and future opportunities. There are no other past, present and foreseeable future activities that would affect mining, energy and special uses.

Consistency with the Forest Plan and Other Applicable Natural Resource Management and Environmental Laws, Regulations, Policies and Programs.

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the Farley analysis area.

3.9 RANGE

SCALE OF ANALYSIS

The Farley analysis area includes portions of the Central Desolation and the Indian Creek Cattle and Horse (C&H) Allotments. The likely effects of proposed project activities on the amount of transitory range within each pasture and the change in distribution of livestock grazing in these allotments are the criteria used in this analysis to evaluate each proposed action alternative.

AFFECTED ENVIRONMENT

Range

Approximately 4,299 acres of the Central Desolation C & H Allotment are in the Farley analysis area (Table 3.9.1). It is divided into five units where 281 cow/calf pairs are authorized to graze from June 1st through September 30th. Approximately 49,353 acres of the Indian Creek C&H

Allotment is within the Farley analysis area (Table 3.9.1). This allotment covers a total of 82,007 acres and is divided into four units where 888 cow/calf pairs are permitted from June 16th through September 30th. Within the Farley analysis area, these allotments include 45 ponds, 6 water systems, and two miles of streamside fence to reduce livestock grazing effects on riparian corridors.

Table 3.9.1. Grazing allotments in the Farley analysis area.

Allotment	Acres within Farley analysis Area
Central Desolation	4,299
Indian Creek	49,353

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects of No Action on Range

Livestock grazing distribution on the uplands would stay the same or continue to decrease as stocking in timber stands grows denser and wood continues to accumulate on the ground. Livestock access would stay the same or decrease due to down wood and continuous small regeneration. Forage also would stay the same or continue to decrease due to the reduction of sunlight on the forest floor reducing forest floor vegetation.

Direct and Indirect Effects Common to All Action Alternatives on Range

Managing forests with harvest or prescribed fire would have long term benefits to livestock grazing management within the analysis area by increasing transitory range. Transitory range is defined in the Forest Plan as "…land that is suitable for grazing use of a nonenduring nature over a period of time, often found in the openings created by timber harvesting activities". For example, grass may cover the disturbed areas for a period of time before being replaced by trees or shrubs not suitable for forage.

Proposed thinning and timber harvest activities under all alternatives would increase the amount of transitory range in the Indian Creek and Central Desolation Allotments by approximately 7,037 to 7,735 acres, depending on alternative (Table 3.9.2). By increasing the amount of transitory range, it would be expected that livestock distribution would be spread more evenly throughout the pastures and reduce soil and vegetation disturbance in areas of concentrated use (such as water sources and riparian areas). The action alternatives would have the greatest increases in transitory range in the Battle Unit of the Indian Creek Allotment, and the Turner Unit of the Central Desolation Allotment. However, the increase in transitory range likely to result from the Farley project is relatively small compared to the total acres of the Central Desolation and Indian Creek Allotments, and likely would not result in substantial changes to livestock distribution in these allotments.

Table 3.9.2. Increase in transitory range as a result of proposed Farley project activities (by alternative.

	Alternative			
	1	2	4	5
Transitory Range Created (Acres)	7,735	7,389	7,037	7,092

The burning associated with proposed project activities could reduce the amount of forage for a period of 1 to 2 years. After this time, the amount and quality of forage would be expected to be higher than the existing condition due to the reduction in competition from small trees and/or shrubs and increase in grass species in forested plant communities. Burning also generally increases access to forage and livestock distribution within pastures.

Cumulative Effects on Range

The proposed silvicultural treatments under all action alternatives would open the forest canopy (to at least some extent) on 7,037 to 7,735 acres depending on alternative, and could permit more frequent and widespread fire in the future. This could result in improvements in forage production and accessibility in the treated areas.

Consistency with the Forest Plan and Other Applicable Natural Resource Management and Environmental Laws, Regulations, Policies and Programs.

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the Farley analysis area.

3.10 ECONOMICS

SCALE OF ANALYSIS

The economic analysis area for this DEIS is a five-county region in northeastern Oregon in which economic conditions of each county may potentially be affected by the proposed vegetation management activities - Grant, Umatilla, Union, Baker, and Morrow. Table 3.10.1 reports the best available estimated costs of proposed activities associated with the Farley project. These values largely are based on the Farley Logging and Transportation Plan prepared for this analysis (and available for review in the project file), and from local sources. Table

3.10.2 summarizes the activities, and proportion of each activity expected to take place each year.

Table 3.10.1. Costs of activities associated with the Farley project.

Cost/Benefit	Unit of Measurement	Value per Unit ($)
Value of Timber	MBF	*
Stump to Truck Costs	MBF	**
Road Maintenance	MBF	35.48
Brush Disposal and Erosion Control	MBF	12.25
Miscellaneous	MBF	2.50
Log Haul	MBF	75
New System Roads	Mile	45,000
Temporary Roads	Mile	18,000
Fire Line Construction	Mile	90
Reforestation	Acre	210
Pile Burning	Acre	65
Broadcast Burning	Acre	100
Non-Commercial Thinning	Acre	175

* Value per unit varies by species and diameter as outlined in the Farley Logging and Transportation Plan (page 12).

** Value of stump to truck costs is estimated with the equations for ground based systems outlined in the Farley Logging and Transportation Plan (page 5).

Table 3.10.2. Likely project timeline and proportion of activities occurring by year.

Activity	Year 0	Year 1	Year 2	Year 3
Road Construction	100%	--	--	--
Commercial Thinning	50%	50%	--	--
Reforestation	--	--	50%	50%
Pile Burning	--	50%	50%	--
Fire Line Construction	--	100%	--	--
Broadcast Burning	--	--	100%	--
Non-Commercial Thinning	25%	25%	25%	25%

Financial efficiency measures were calculated to provide a means of comparing the economic effects of alternatives. The Farley Vegetation Management Project was analyzed and compared using the Quicksilver program to estimate the Benefit-Cost ratios and the Net Present Values (NPVs) of project alternatives. Quicksilver is a financial analysis tool developed by the Forest Service to generate measures of financial efficiency. NPV is the standard criterion for deciding whether a project is economically justifiable (Office of Management and Budget, 1992). NPV is a way of comparing all monetarily valued costs and benefits, and is calculated by subtracting the discounted sum of total costs from the discounted sum of total benefits. The NPVs calculated are simply the discounted benefits associated with the Farley project minus the discounted costs in aggregate. All monetized values in this analysis are reported in 2008 dollars.

The relationship between benefits and costs is further assessed with the computation of Benefit-Cost ratios. The Benefit-Cost ratio is simply the discounted sum of benefits divided by the discounted sum of costs. A ratio greater than one suggests that the benefits associated with a project are greater than the costs. NPV provides a better measure of the overall level of benefits and costs as it reports the difference between benefits and costs at the aggregate level, rather than being a ratio of the two. These financial measures do not allow for the quantitative valuing of secondary impacts and should be balanced with a qualitative assessment of any desired or expected ecological and social effects associated with the alternatives.

Models of the local economy were built using IMPLAN Professional 2.0 software and 2006 data. IMPLAN models were then imported into the Forest Economic Analysis Spreadsheet Tool (FEAST) which is a Microsoft Excel based workbook designed to describe the impacts to employment and income by resource program, major industry and planning alternative (http://fsweb_col.ewz.r6.fs.fed.us/epm/imisupplement/PEIA.htm).

AFFECTED ENVIRONMENT

Economic Environment

According to the 2000 census the total population in the five-county area is 130,749. Grant, Union and Baker Counties are dominantly rural, and would likely be most influenced by agricultural industries.

The age distribution across counties is dominantly middle aged. Most individuals in each county are in the 25 to 54 year old age group, suggesting the majority of residents in the study area are of working age and likely dependent on their employment status to support themselves. The reservation for the Confederated Tribes of the Umatilla Indian Reservation is located in the project economic analysis area; American Indians make up 4.2 percent of the population of Umatilla county.

Given its location in the Farley economic analysis area, Grant County is the most likely to be affected. A major part of the local economy is driven by natural resources. Unemployment is greater in all counties compared to State and National levels. Grant County has the highest rate at 8.4 percent and Union County has the lowest at 6 percent. Potential jobs associated with the Farley project likely would be filled by local residents.

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Economic Effects of All Alternatives

With a cost of approximately $45,000 per mile, the construction of system roads severely affects the costs associated with certain alternatives. All road construction would occur in the first year of the project. Table 3.10.3 reports the NPVs and Benefit-Cost ratios for the proposed alternatives.

Table 3.10.3. Benefit-cost ratios and net present values (NPVs) associated with commercial timber harvest by alternative (in 2008 dollars).

Economic Measure	Alt. 1	Alt. 2	Alt. 4	Alt. 5
Benefit Cost Ratio	0.86	0.99	0.94	0.91
Net Present Value ($)	-638,822	-25,072	-252,711	-286,303

Source: USDA Forest Service, Quicksilver (economic model)

Proposed non-commercial thinning (NCT) is the same for Alternatives 1, 2 and 5 at 4,886 acres, and for Alternative 4 is 4,652 acres. One-forth of these total acres are assumed to be thinned in each year during the four year planning horizon. Total cost of NCT is estimated to be $175 per acre. Table 3.10.4 summarizes the NPV of proposed NCT costs by alternative. For a comprehensive net present value of all commercial timber harvest and non-commercial thinning activities, the values are summed by alternative and reported in Table 3.10.5.

Table 3.10.4. NPV of non-commercial thinning by alternative (in 2008 dollars).

	Alt. 1	Alt. 2	Alt. 4	Alt. 5
NPV	-830,701	-830,701	-790,917	-830,701

Source: USDA Forest Service, Quicksilver

Table 3.10.5. Total NPV by alternative (in 2008 dollars).

	Alt. 1	Alt. 2	Alt. 4	Alt. 5
NPV	-1,469,523	-855,773	-1,043,628	-1,117,004

Source: USDA Forest Service, Quicksilver

Table 3.10.6 reports the employment effects directly attributable to commercial timber harvest by alternative.

Table 3.10.6. Average annual employment attributable to timber harvest by alternative.

Resource	No Action	Alt. 1	Alt. 2	Alt. 4	Alt. 5
Timber	0	107	92	96	79

Source: USDA Forest Service, FEAST

Effects on industries occurring from a change in final demand are referred to as the "direct effects" of policy implementation. In other words, these are the effects (i.e. change in employment) resulting from the expenditures and/or production values specified as direct final demand changes. "Indirect effects," on the other hand, are the changes in inter-industry purchases as they respond to the new demands of the directly affected industries. Another type of indirect effect is referred to as "induced effects." The induced effects reflect changes in spending habits from individual households as income increases or decreases due to changes in production. For example, an increase in employment in the Agriculture, Forestry, Fishing and Hunting sector would be filled by unemployed individuals in the region and/or the in-migration of new households; and the increased income to those individuals would stimulate an increase in their demand for goods and services in the local area, which would in turn cause firms to respond by increasing employment and output. Although the primary activities associated with the project lie within the Agriculture and Manufacturing sectors, they also stimulate employment and economic activity in other sectors.

Similar to the employment impacts, the total income in the study area would be affected according to the activities associated with each alternative. Total income is the sum of employee compensation, proprietors' income and other property income. Table 3.10.7 summarizes the estimated change in total income in the analysis area across alternatives and resource program. Alternative 1 yields the greatest estimated increase in local income with $5,798,259. The lowest estimated change in total income is $4,268,798 associated with alternative 5.

Table 3.10.7. Average annual income attributable to timber harvest by alternative (in 2008 dollars).

Resource	No Action	Alt. 1	Alt. 2	Alt. 4	Alt. 5
Timber	0	5,798,259	4,995,849	5,223,394	4,268,798

Source: USDA Forest Service, FEAST

As reported in the case of employment effects, income is generated through direct, indirect, and induced effects. The greatest change in income across alternatives is experienced by the manufacturing sector, followed by the agricultural sector. Increases in local income are typically viewed as an economic benefit. However, such benefits must be weighed in accordance with the other social and ecological effects associated with project implementation.

Cumulative Effects of all Alternatives

Management activities on the Umatilla National Forest have effects on local economic conditions. In the case of the Farley project, local timber supplies would be affected. Timber harvests would occur under all alternatives. Alternative 1 has the highest rate of commercial thinning, and the other alternatives are simply subsets of that alternative. The change in timber production associated with the proposed alternatives stimulate both employment and income in the local area through the direct, indirect, and induced effects as described above. The effects to employment and income associated with the Farley project would be in addition to those created by two other projects underway in the same region. The Meadowbrook Integrated Resource Timber Contract (IRTC) is adjacent to the north-west corner of Farley analysis area, and the Otter Timber Salvage borders the analysis area to the north-east. Both projects generate jobs and income in addition to those reported for the Farley project.

The Farley analysis area has low population density and a high proportion of residents in the working age group. The counties making up the Farley analysis area are also experiencing unemployment rates higher than the state and national averages. Thus, the potential increase in employment opportunities associated with the alternatives would likely be filled by unemployed residents in the local area. This should serve to reduce local unemployment rates and increase resident incomes.

The relative importance of the travel and tourism industries is increasing. Thus, potential adverse effects of the alternatives on tourism activities should be taken into account. Given the scale of the timber harvest, it is not likely that the activities associated with the alternatives would have serious effects on the local economy outside the increase in jobs and income reported above. Also, given the high unemployment rates and relatively low potential changes in employment resulting from project implementation, it is not likely that it would affect household migration into and out of the local area.

Environmental Justice

As stated in Executive Order 12898, it is required that all federal actions consider the potential of disproportionate effects on minority and low-income populations in the local region. The principles of Environmental Justice require agencies to address the equity and fairness implications associated with Federal land management actions. The Council on Environmental Quality (CEQ) (1997) provides the following definition in order to provide guidance with the compliance of Environmental Justice requirements:

- "Minority population: Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis..."

None of the counties in the Farley analysis area have minority populations that meet the Environmental Justice criterion. Table 3.10.8 reports the proportion of families below the poverty level by county in the Farley analysis area.

Table 3.10.8. Poverty levels by county in the Farley economic analysis area.

County	Percent of Population below Property Level
Grant	11.2%
Umatilla	9.8%
Union	8.5%
Baker	10.1%
Morrow	11.3%
Oregon	7.9%

Source: US Census 2000

The Environmental Justice principles set forth in Executive Order 12898 and CEQ (1997) were considered in regards to the Farley Vegetation Management Project. The proposed alternatives for project activities were evaluated to determine if they adversely affect minority and low-income populations. The proposed alternatives do not differ substantially from one another. Effects to local communities are expected to be negligible, and there is no reason to suspect that any effects would disproportionately affect minority and low income populations in an adverse manner. Instead, the proposed actions associated with each of the alternatives may provide additional employment and income to the region that would be expected to benefit minority and low-income populations.

Summary

In regard to financial efficiency, cumulative effects are measured in terms of the costs and revenues associated with the commercial and non-commercial thinning activities. In terms of the financial efficiency, all action alternatives display negative NPVs. Alternative 2 most closely approaches neutral NPV with a value of - $25,072 and benefit-cost ratio of 0.99, while Alternative 1 has NPV and benefit-cost ratios of -$683,833 and 0.86, respectively. Alternatives 4 and 5 are approximately intermediate between these ranges.

However, this does not necessarily imply economic inefficiency. In determining economic efficiency, all costs, benefits and desired outcomes associated with the proposed activities should be taken into account, including those that may not be directly or immediately monetized such as future forest stand characteristics that are more consistent with historic conditions, and long-term sustainability and resilience to large-scale wildfire. Direct and indirect environmental and social effects and values associated with the forest resource management activities proposed by the Farley project should be considered along with the direct financial measures.

Consistency with the Forest Plan and Other Applicable Natural Resource Management and Environmental Laws, Regulations, Policies and Programs.

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the Farley analysis area.

3.11 CULTURAL RESOURCES

SCALE OF ANALYSIS

The scale of analysis for cultural resources for this DEIS is the National Forest Lands in the Desolation Creek watershed, and specifically those areas on which ground disturbing activities are proposed.

AFFECTED ENVIRONMENT

The Farley analysis area has been surveyed for cultural resources as part of previous projects. As a result, 16 sites have been identified within Farley project activity areas (including, roads, harvest units and burn units). Of these sites, 4 have been identified as eligible for listing on the National Register of Historic Places (NRHP), 7 as not eligible for listing on NRHP, and 5 were not evaluated.

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects of No Action on Cultural Resources

There would be no effect on cultural resources of no action. The biological, physical, and human-influenced conditions and processes that are occurring now would be expected to continue and present magnitudes and rates.

Direct and Indirect Effects Common to All Alternatives on Cultural Resources

In all action alternatives (1, 2, 4, and 5), all eligible and unevaluated sites would be avoided by all project activities. Those sites determined not to be eligible for listing on NRHP require no additional protection, however, they also would be avoided whenever possible.

Cultural resource consultation will be completed with the Oregon State Historic Preservation Office. Tribal consultation is ongoing and will also be conducted prior to any project activities. All project activities will be conducted in accordance with applicable laws and policies.

Cumulative Effects on Cultural Resources

In consideration of past, present, proposed, and reasonably foreseeable actions, no cumulative effects on cultural resources are anticipated from the proposed actions under any of the action alternatives.

Consistency with the Forest Plan and Other Applicable Natural Resource Management and Environmental Laws, Regulations, Policies and Programs.

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the Farley analysis area.

3.12 INCOMPLETE OR UNAVAILABLE INFORMATION

The CEQ regulations for implementing NEPA (40 CFR 1502.22) require that when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall make clear that such information is lacking. If the incomplete information is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement. If the information cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include:

- a statement that such information is incomplete or unavailable;
- a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
- a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and

- the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts, which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

During scoping, comments were received requesting that potential project effects be evaluated regarding:

- climate change and
- toxic substances.

This section addresses these issues in the context of incomplete or unavailable information with respect to the CEQ regulations implementing NEPA.

AFFECTED ENVIRONMENT

Climate Change

Potential emissions from this project (from prescribed burning, decomposition of plant material, and combustion of fossil fuels) undoubtedly would add to the global pool of "greenhouse" gases that could contribute to climate change. Although the El Niño/Southern Oscillation and the Pacific Decadal Oscillation (periodic variations in surface temperatures of the western Pacific Ocean) are the primary factors influencing climate variability in the Pacific Northwest, increasing temperatures and climate change on a global scale from increasing atmospheric concentrations of “greenhouse” gases (primarily carbon dioxide) is of growing concern (Climate Impacts Group, University of Washington, 2006a, 2006b). Climate models predict a future rate of warming for the Pacific Northwest (above the 1970-1999 average temperature) of approximately 0.5 degrees F per decade through at least 2050 (Climate Impacts Group, University of Washington, 2006a, 2006b). Temperatures are projected to increase across all seasons with the largest increases in summer (June-August). Precipitation is predicted to change only minimally on an annual basis, but with more of it falling as rain in winter and/or in episodic extreme events (Climate Impacts Group, University of Washington, 2006a, 2006b). The resulting altered snowmelt and runoff patterns could result in increased drought stress to forests (J.D. Little, written communication, 2007, in Jackson Thinning Environmental Assessment, Olympic National Forest, Olympia, Washington).

Wildfire and extensive forest mortality as a result of insect and disease are primary sources of unintentional carbon emissions from forests in the western United States (Stephens 2005), and can lead to large-scale loss of centuries’ worth of carbon storage. This effect could be exacerbated in coming decades by continued warming and changes in hydrological conditions (Westerling and others 2006). A strategy for maintaining carbon in storage in forests is to increase resistance to fire, drought, and insect and disease mortality by reducing the density of small trees by timber harvest, mechanical thinning and controlled burning (Stephens and Moghaddas, 2005). Some carbon inevitably would be released by human activities intended to increase forest resilience to wildfire and other disturbances potentially resulting from climate

change, but are likely to be of much smaller magnitude than sudden massive releases from large-scale wildfire and widespread loss of forest ecosystems over entire landscapes. In addition, sustainably managed forests likely can store more carbon over time than unmanaged forests because of their overall higher growth rates (Ruddell and others, 2007).

Environmental Consequences

Direct, Indirect and Cumulative Effects of No Action on Climate Change

Under the No Action Alternative, forest ecological processes with respect to climate change would continue at present magnitudes and rates in the Farley analysis area. Susceptibility to drought stress, insect and disease infestations, changes in stand structure conditions, large-scale fire and loss of economic and other forest resources values that may occur as a result of climate change also would continue.

Direct, Indirect and Cumulative Effects of all Alternatives on Climate Change

Potential emissions from this project (from prescribed burning, decomposition of vegetative matter, and combustion of fossil fuels) would add to the global pool of "greenhouse" gases. The magnitude of these emissions would be extremely small and unmeasurable in a global context, and could be expected to be of substantially less magnitude than large-scale wildfire and/or other climate-influenced disturbances.

Models used by the Forest Service such as the First Order Fire Effects Model (FOFEM) can estimate emissions from prescribed burning of particulate matter (2.5 and 10 micron diameter), methane, carbon dioxide and monoxide, and nitric and sulfur oxides. However, at present there are no scientifically accepted means to quantitatively assess the effects of forest management activities and disturbances such as fire, insects, and disease on global carbon cycle dynamics at the individual or multiple event or project scale. Therefore, evaluation of global climate change effects in NEPA documents at the event or project scale would be highly speculative and unlikely to provide meaningful information for the decision process. Evaluation of global climate change effects at the project or event scale may be appropriate in the future when scientific capabilities and uncertainties are better resolved; in general, the Forest Service supports this concept.

Toxics

Environmental Consequences

Direct, Indirect and Cumulative Effects of No Action and All Alternatives on Toxics

Air quality effects and compliance with Clean Air Act and ODEQ regulations and standards were evaluated and incorporated in the decision process, as discussed above in Section 3.2 Fire and Fuels. Emissions of regulated substances (particulate matter, 2.5 and 10 micron diameter) from prescribed burning were estimated using the First Order Fire Effects Model (FOFEM 5.5) and discussed in Section 3.2 Fire and Fuels. The only other emissions constituents that FOFEM 5.5 can estimate are methane, carbon dioxide and monoxide, and nitric and sulfur oxides.

Estimates of toxic compounds (of regulatory concern or interest) generated by the burning of wood or other vegetative material or by decomposition processes were not made because:

- specific compounds of concern were not identified during the scoping process;
- they likely are not significant issues of the proposed project with respect to NEPA;
- the information is unavailable, incomplete and not easily or economically obtainable; and
- the information likely would be very speculative in nature and unlikely to be useful in the decision process.

Consistency with the Forest Plan and Other Applicable Natural Resource Management and Environmental Laws, Regulations, Policies and Programs.

The forest and vegetation management and associated activities proposed by all of the alternatives are consistent with the goals, objectives, standards and guidelines of the Forest Plan, and all other applicable natural resource management and environmental laws, regulations, policies and programs. In addition, the proposed activities conform to the best available science and accepted professional practices for managing forest and other associated natural resources, and are in accordance with the best professional judgement of practicing professional resource managers in their respective fields of technical expertise and experience, for meeting the stated purpose and need for the proposed project activities in the Farley analysis area.

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AGENCY, PUBLIC AND TRIBAL INVOLVEMENT

TRIBAL and PUBLIC INVOLVEMENT

The National Environmental Policy Act (NEPA, 40 CFR 1501.7) requires a process that involves interested and potentially affected parties and the public for determining the scope of the issues to be addressed, and for identifying and assessing the significant environmental and resource management issues related to a proposed action. The North Fork John Day Ranger District invited participation from local, federal and state agencies, local tribes, environmental interest groups and individuals interested in, or potentially affected by the proposed action. These actions are briefly summarized below.

Tribal Involvement

On October 17, 2007, a Scoping Letter / Notice of Intent (to prepare and environmental impact statement) were sent to:

- Honorable Antoine Minthorn, Chairman of the Board of Trustees of the Confederated Tribes of the Umatilla Indian Reservation
- Honorable Samuel N. Penny, Chairman of Tribal Council Nimipuu Tribe
- Honorable Ron Suppah, Chairman of the Tribal Council of the Confederated Tribes of the Warm Springs Reservation

and to the appropriate natural resource advisory committee and technical staff of these tribes.

On November 13, 2007, the District Ranger of the North Fork John Day District met with the Natural Resources Committee of the Confederated Tribes of the Umatilla Indian Reservation, which expressed a desire for the Farley project to result in a net decrease in road miles.

Public Involvement

- On November 1, 2007 a Scoping Letter / Notice of Intent was sent to 126 individuals, State, Federal and local agencies and organizations, informing them of the intent to prepare an environmental impact statement and inviting comments for developing proposed project action alternatives.
- On November 20, 2007, a Notice of Intent (to prepare environmental impact statement) appeared in the Federal Register / Vol. 72, No. 223 / Notices (at page 65289), with a deadline for scoping comments to be received by December 12, 2007.

Written or e-mail responses were received from the Environmental Protection Agency – Region 10, one individual, a representative of a large forest products corporation, and four environmental interest organizations.

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Farley
Existing Condition
Figure 2.1

R. 31 E
R. 31 E
R. 32 E
R. 33 E
T. 7 S
T. 6 S
T. 8 S
T. 9 S
T. 10 S
R. 32 E
R. 33 E
R. 34 E
R. 35 E
R. 35 E

Moonshine Creek
Peep Creek
Kelsay Creek
Spring Creek
Starvout Creek
Park Creek
Little Kelsay Creek
Bruin Creek
Welch Creek
Battle Creek
Sponge Creek
Howard Creek
Beeman Creek
Junkens Creek
Desolation Creek
North Fork Desolation Creek

55
5212
3972
1003
1006
1009
5505
1011
1012
1014
3980
3988
3986
1007
1010
10

LEGEND

- Major Roads
- Closed Roads
- Open Roads
- Private Roads
- Seasonal Roads
- Analysis Area Bdry
- Forest Land
- Private Land
- Class 1 Streams
- Class 2 Streams
- Class 3 Streams
- Class 4 Streams
- Township-Range
- Forest Admin Bdrys

0 0.5 1 2 Miles

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Farley
Roads to Remove
Figure: 2.2

R. 31 E
R. 31 E
R. 32 E
R. 33 E
T. 7 S
T. 8 S
T. 9 S
T. 10 S
T. 6 S
T. 6 S
T. 7 S
T. 8 S
T. 9 S
R. 32 E
R. 33 E
R. 34 E
R. 35 E
R. 35 E

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3972
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1003
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Moonshine Creek
Peep Creek
1009
5505
1011
Kelsay Creek
1012
Spring Creek
Little Kelsay Creek
Park Creek
1014
Stanfield Creek
3980
3988
3986
1007
Welch Creek
Brush Creek
Battle Creek
Sponge Creek
Howard Creek
1010
Beeman Creek
Junkens Creek
Desolation Creek
North Fork Desolation Creek
4500
10

LEGEND

- Closed Roads
- Open Roads
- Private Roads
- Seasonal Roads
- Roads Obliterated
- Roads Stablilized
- Analysis Area Bdry
- Forest Land
- Private Land
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Township-Range
- Forest Admin Bdrys

0 0.375 0.75 1.5 Miles

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Farley Alternative 1 Figure: 2.4

R. 31 E
R. 31 E
R. 32 E
R. 33 E
T. 7 S
T. 8 S
T. 9 S
T. 10 S
T. 6 S
T. 6 S
T. 7 S
T. 8 S
T. 9 S
R. 32 E
R. 33 E
R. 34 E
R. 35 E
R. 35 E

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LEGEND

- Closed Roads
- Open Roads
- Seasonal Roads
- Proposed Thinning
- Proposed Harvest
- New System Rd
- New Temp Rd
- Analysis Area Bdry
- Forest Land
- Private Land
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Township-Range
- Forest Admin Bdrys

0 0.5 1 2 Miles

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Farley Alternative 2 Figure: 2.5

R. 31 E
R. 31 E
R. 32 E
R. 33 E
T. 7 S
T. 8 S
T. 9 S
T. 10 S
T. 6 S
T. 6 S
T. 7 S
T. 8 S
T. 9 S
R. 32 E
R. 33 E
R. 34 E
R. 35 E
R. 35 E

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LEGEND

- Closed Roads
- Open Roads
- Seasonal Roads
- Proposed Thinning
- Proposed Harvest
- New Temp Rd
- Analysis Area Bdry
- Forest Land
- Private Land
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Township-Range
- Forest Admin Bdrys

0 0.5 1 2 Miles

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Farley Alternative 4 Figure: 2.6

R. 31 E
R. 31 E
R. 32 E
R. 33 E
T. 7 S
T. 8 S
T. 9 S
T. 10 S
T. 6 S
T. 6 S
T. 7 S
T. 8 S
T. 9 S
R. 32 E
R. 33 E
R. 34 E
R. 35 E
R. 35 E

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LEGEND

- Closed Roads
- Open Roads
- Seasonal Roads
- Proposed Thinning
- Proposed Harvest
- New System Rd
- New Temp Rd
- Analysis Area Bdry
- Forest Land
- Private Land
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Township-Range
- Forest Admin Bdrys

0 0.5 1 2 Miles

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Farley Alternative 5 Figure: 2.7

R. 31 E
R. 31 E
R. 32 E
R. 33 E
T. 7 S
T. 8 S
T. 9 S
T. 10 S
T. 6 S
T. 6 S
T. 7 S
T. 8 S
T. 9 S
R. 32 E
R. 33 E
R. 34 E
R. 35 E
R. 35 E

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55
3972
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LEGEND

- Closed Roads
- Open Roads
- Seasonal Roads
- Proposed Thinning
- Proposed Harvest
- New System Rds
- New Temp Rds
- Analysis Area Bdry
- Forest Land
- Private Land
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream
- Township-Range
- Forest Admin Bdrys

0 0.5 1 2 Miles

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