BUCK CREEK UNDERBURN

Environmental Assessment

USDA Forest Service
Pacific Northwest Region

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

May 2002

Lead Agency: USDA Forest Service

Prepared By: Boateng & Associates, Inc.
3041 78th St. SE
Mercer Island, Washington 98040

Responsible Official: Jeff Blackwood
Forest Supervisor
Umatilla National Forest
2517 S.W. Hailey Ave.
Pendleton, OR 97801
(541) 278-3716

For Further Information: Janel Lacey
Planning Staff
North Fork John Day R.D.
P.O. 158
Ukiah, OR 97880
(541) 427-5394

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Jeff Blackwood, Forest Supervisor

Responsible Agency
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2517 S.W. Hailey Avenue
Pendleton, Oregon 97801

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INTRODUCTION

1.1 LOCATION

The estimated 4,637-acre project area considered for management under the proposed action is located on the North Fork John Day Ranger District, approximately three air miles northwest of the city of Granite, Oregon. It is bounded by Granite Creek to the south, Forest Road 1038 to the east, North Fork John Day Wilderness to the north and west. Approximately 641 acres of the project area lies within the North Fork John Day Wilderness. The legal description is: Grant County, T8S, R34E, Sections 13 and 24 and T8S, R35E, sections 14-30, and 35, Willamette Meridian, surveyed (Map 1, Appendix A).

A larger area referred to as the 'analysis area' was used to analyze effects on the fish, wildlife and soils resources. The analysis area includes a portion of the North Fork John Day River, Granite Creek, Buck Creek, Squaw Creek, Ten Cent Creek, Lick Creek, Indian Creek, West Ten Cent Creek, and East Ten Cent Creek. The area is described as subwatersheds 93A (Lower Granite), 93B (Ten Cent Creek), and 94A (North Fork John Day/Bear) (Map 2, Appendix A).

1.2 PURPOSE AND NEED

Historically, frequent, low intensity, surface fires helped to create and maintain an open, park-like forest, particularly in ponderosa pine stands. These fires consumed dead, down woody fuels and many of the small, less fire-resistant tree species like Douglas-fir, grand fir and lodgepole pine. The frequent fires resulted in a natural fuel loading that ranged from 1 to 8 tons/acre. Fire burned plant communities and forest stands to different degrees, leaving a mosaic of different ages and species; some communities served as natural barriers to fire spread. This fire regime for the ponderosa pine and some Douglas-fir vegetation types has been documented in numerous studies throughout the West, including the Blue Mountains where this project is located. Texts with references to these studies include: *Fire Ecology of the Pacific Northwest Forests* and *Landscape Pattern and Process in the Blue Mountain Ecosystems* by J.K. Agee, *Restoring Ecosystems in the Blue Mountains* by D. Caraher, and *Fire and Vegetation in the Blue Mountains—Implications for Land Managers* and *Ecology of Natural Underburning in the Blue Mountains of Oregon* by Fred Hall.

Wildfire has since been excluded from much of the forest ecosystem for almost a century due to past and current fire suppression policies. The fire exclusion resulted in the near elimination of a natural process from an ecosystem that evolved with and is dependent upon fire. Fire exclusion has reduced the mosaic of plant communities within the project area, and forested stands are now primarily uniform with respect to fuel load and climax condition. Thus, a fire that may have historically burned with relatively low intensity over a long time may now burn much more intensely, spreading rapidly and more completely over the landscape. Such fires are considered 'catastrophic' because overstory tree mortality is high and other resources such as soils and streams are severely impacted.

With the exclusion of fire, there has been an increase in two kinds of fuel—dead, down wood and small trees. Fuels within the project area have continued to build to current, abnormal loading levels, which range from 10 to 40 tons/acre and are classified as fuel model 2, 9, or 10 (see Fire and Fuels, Section 3.4). Recent drought and epidemic insect infestations have killed some of the Douglas-fir, grand fir, and lodgepole pine within the project area. With the increased number of small trees, a fire 'ladder' has become widespread that can carry fire into the crowns of large overstory trees. This type of fire burns hot with long flame lengths and can result in a stand-replacement fire that kills the overstory trees, rather than the characteristic low-intensity ground fire with which ponderosa pine forests evolved.

The majority of forest stands within the project area, including the portion within the North Fork John Day Wilderness, are a ponderosa pine vegetation type that contains heavy fuel loads in an arrangement capable of supporting catastrophic fire. Prevailing west winds and the topography often result in a general easterly spread of fire from this portion of the North Fork John Day River drainage system. The city of Granite, surrounding properties, and mining claims lie in the path of such fires. This threat to life, property, and resources has led to the continued suppression of wildfire within and outside the wilderness. Currently, little opportunity exists for lightning to play its natural role on the landscape.

As a result of these conditions, there is a need to reduce fuels within the North Fork John Day Wilderness and outside the wilderness near the city of Granite to restore natural barriers to catastrophic fire spread and allow stands to regain their natural, historic response to fire. There are four purposes: 1) reduce the risk and consequences of wildfire on the city of Granite and surrounding properties; 2) reduce overall fuel load; 3) reduce the horizontal continuity of remaining fuels; and 4) reduce the vertical continuity (i.e. ladder) of remaining fuels.

1.3 PROPOSED ACTION

In response to the purpose and need, the North Fork John Day Ranger District of the Umatilla National Forest proposes to mechanically pre-treat[1] ladder fuels on 1,500 acres and perform a series of prescribed underburns on 4,637 acres, including up to 641 wilderness acres. The first application of prescribed burning would occur in the spring or fall (depending on weather and fuel conditions) spread over three years with a second and possibly third application of fire occurring over a 10-year period.

Mechanical pre-treatment of ladder fuels would involve using chainsaws to remove some noncommercial-size trees that would otherwise burn intensely and threaten survival of the overstory trees. Pre-treatment would focus on lodgepole pine and grand fir, along with lesser amounts of ponderosa pine, Douglas-fir, and western larch. Cut trees would be pulled by hand away from the residual trees to prevent mortality during prescribed burning (which would occur at a later date). No mechanical fuel pre-treatment would occur within the wilderness portion of the project area.

[1] Fuels pre-treatment would involve falling saplings and small trees (also referred to as ladder fuels) on those areas where understories consist of crowded, mixed species. This would be similar to a light, non-commercial thinning.

Outside the wilderness, fire control lines would be constructed by hand (6.5 miles) or machine (9 miles) prior to ignition of prescribed fire. Hand-constructed fire line would have a 3 to 8-foot-wide clearing of fuels, with a 1 to 2-foot-wide exposure of mineral soil. Mechanically constructed fire line would use bulldozers or tractors to create a 10-foot-wide fuel clearing with 3 feet of mineral soil exposed. Fire line construction would be minimized by using existing roads, trails, topographic features, and natural fuel breaks as control points. No mechanical fire line would be constructed within Riparian Habitat Conservation Areas. Hand constructed fire line would be built in Riparian Habitat Conservation Areas to within 10 feet of intermittent (Class 4) streams or 20 feet of perennial (classes 1, 2, and 3) streams. Surface fuel clearing without soil disturbance would be completed to streamside where necessary to limit fire spread. Prescribed fire would be ignited either by hand using drip torches or aerially from a helicopter. Equipment that could be used to manage the fire includes: fire engines, all terrain vehicles, pumps, helicopters, bulldozers, tractors, passenger vehicles, and other supporting equipment. Cultural sites, buildings, structures, and other improvements and properties would be protected by a fire control line or by pulling fuels away by hand.

Within the wilderness, fire control lines would be constructed only by hand (1.5 miles) using Minimum Impact Suppression Tactics (MIST). Protection of Riparian Habitat Conservation Areas, cultural sites, buildings, structures, and other improvements would be the same as outside the wilderness. Fire would be ignited by hand or helicopter. The only motorized equipment that would be used within the wilderness would be helicopters, chainsaws, and water pumps.

1.4 MANAGEMENT DIRECTION

This Environmental Assessment process and documentation have been done in accordance with direction contained in the National Forest Management Act, the National Environmental Policy Act, the Council on Environmental Quality Regulations, Clean Water Act, Clean Air Act, and Endangered Species Act.

This Environmental Assessment is tiered to the Umatilla National Forest Land and Resource Management Plan FEIS and Record of Decision approved June 11, 1990, and the accompanying Land and Resource Management Plan (Forest Plan). This includes the clarifying direction of Plan Amendment #10: *Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California* (PACFISH), dated February 24, 1995. PACFISH defines Riparian Habitat Conservation Areas surrounding streams and other riparian features, and identifies associated Riparian Management Objectives. Within the Buck Creek analysis area, Riparian Habitat Conservation Area boundaries extend 300 feet from fish-bearing streams, 150 feet from perennial, non-fish-bearing streams, 150 feet from wetlands larger than one acre, and 100 feet from intermittent streams or wetlands smaller than one acre.

This Environmental Assessment is also tiered to the *Managing Competing and Unwanted Vegetation FEIS*, its Mediated Agreement, and the Record of Decision (December 8, 1988). This EA also incorporates by reference the *Environmental Assessment for the Management of Noxious Weeds* and its Decision Notice (May 24, 1995), the *North Fork of the John Day Wild and Scenic*

River Management Plan and associated Decision Notice (September 7, 1993), and the *Watershed Analysis for Granite Creek* (July 1997).

The Forest Plan identifies the type and intensities of management that may occur on Umatilla National Forest land through designation of management areas. A management area's Desired Future Condition describes how the Forest should look in order to provide the associated resources and values. Standards and Guidelines provide the guiding direction for achieving the Desired Future Condition. While there are several management areas within the analysis area, three occur in the areas proposed for treatment (Map 3, Appendix A).

1.4.1 A7 Wild and Scenic Rivers *(Forest Plan p. 4-121 to 4-127)*

The goal is to manage designated Wild and Scenic Rivers segments to appropriate standards for wild, scenic, or recreational river areas, as defined by the *Wild and Scenic River Act* (Public Law 90-542, October 2, 1968) and expanded by the *Omnibus Oregon Wild and Scenic River Act of 1988* (Public Law 100-557). The primary objective of Wild and Scenic River management is to protect and enhance the associated outstandingly remarkable values. The outstandingly remarkable values for the North Fork John Day Wild and Scenic River are: scenic, recreation, fisheries, wildlife, and historic/prehistoric. The river segment included in this analysis is designated 'wild'. Management goals include maintaining a naturally appearing shoreline and minimal signs of human activity. For all moderate to high intensity wildfires, the appropriate suppression response will emphasize a control strategy with an emphasis on protection of life and facilities. Wildfire suppression efforts will use low impact methods with an emphasis on Minimum Impact Suppression Tactics. Prescribed fire is permitted, with low-intensity, prescribed fires producing minimal scorch and rapid recovery being the most desirable.

1.4.2 B1 Wilderness *(Forest Plan p. 4-138 to 4-143)*

The goal is to preserve, protect, and improve the resources and values of the Forest wilderness, as directed by the *Wilderness Act of 1964*. In addition to emphasizing minimal human disturbance, forest standards stress that natural ecological succession will be allowed to occur without endangering adjacent lands. This includes the occurrence of natural fire.

Fire is considered an inherent part of the general wilderness ecosystem. All naturally occurring ignitions within the wilderness are prescribed fires until declared a wildfire. The Umatilla National Forest has prepared a Fire Management Action Plan for the management of natural ignitions within the wilderness. Minimum Impact Suppression Techniques will be applied on all wilderness fires.

Prescribed fires may be used as a tool within the wilderness in accordance with direction in the Forest Plan and in Forest Service Manual 2324.2 and 5140. The *Fire Management Action Plan for the North Fork John Day Wilderness* (prepared in 1994) analyzed the use of management-ignited, prescribed fire to reduce the risk of fire escaping the wilderness boundary and causing damage to private property, administrative sites, bridges, or other developed sites. Fuel treatment is also encouraged in order to allow fire to return to a more natural role in the ecosystem. The plan identifies the area within two miles of the wilderness perimeter as a candidate for fuel treatment measures, including management-ignited prescribed fires and/or mechanical fuel manipulations outside the wilderness boundary. Management-ignited prescribed fire inside the wilderness boundary could occur if there is no feasible alternative to treat fuel situations outside the boundary.

1.4.3 C7 Special Fish Management Area *(Forest Plan p.4-167 to 4-170)*

The goal is to maintain and enhance water quality and produce high levels of anadromous fish habitat. An emphasis will be placed on maintaining a near-natural setting with a variety of species present. Vegetation will be dense and high in diversity with shade and sufficient vegetation near stream courses present to influence water temperature, provide for bank stabilization, and limit sedimentation. Large woody material to provide stream structure will be maintained.

Fuel management activities should be designed to maintain and enhance anadromous fish habitat with the constraints of exposing no more than 10 percent mineral soil and maintaining 80 percent stream-surface shading. Average fuel residue depth should be 6 inches or less. Outside of riparian areas, prescribed fire may be utilized to meet resource objectives. Fuels should not exceed 9 tons/acre in the 0 to 3-inch diameter surface-material size class.

1.4.4 Smoke Management Plan and Fire Management Action Plan

In addition to Forest Plan Management Areas, other management direction that is applicable to this project includes the State of Oregon's *Smoke Management Implementation Plan* and the Umatilla National Forest *Fire Management Action Plan for the North Fork John Day Wilderness*.

The Smoke Management Implementation Plan provides protection zones around cities not meeting the Federal Clean Air Act PM-10 emissions standards. Under this plan, the cities of La Grande, Baker City, John Day, and Pendleton have special requirements to minimize the chances of smoke-producing activities adding to the current air quality problems. Specific requirements and guidelines can be found in the Smoke Management Implementation Plan.

The objectives of the wilderness Fire Management Action Plan are:

1. To permit lightning-caused fires to play, as nearly as possible, their natural ecological role, and
2. To reduce to an acceptable level, the risks and consequences of wildfire from escaping the wilderness.

The Fire Management Action Plan allows for use of management-ignited, prescribed fire to reduce the risk of fire escaping the wilderness boundary and/or causing damage to private property, administrative sites, bridges, or other developed sites. Fuel treatment is also encouraged in order to allow fire to return to a more natural role in the ecosystem.

1.5 DECISIONS TO BE MADE

This Environmental Assessment documents the results of the environmental analysis conducted for the proposed action and its alternatives. The Forest Supervisor will determine which alternative best meets the purpose and need. Specific determinations needed are:

1. Whether underburning and associated activities should occur, and if so, how much and where?
2. Necessary mitigation measures.
3. Monitoring measures to be implemented.

1.6 SCOPING PROCESS

Scoping is used to identify concerns (called 'issues') associated with the proposed action, to develop alternatives to the proposed action, and to determine the extent of environmental analysis necessary for reaching an informed decision. On February 4, 1997, a scoping letter and a map for this project were mailed to 223 interested groups, individuals, permittees, Granite City Council members, local land owners, mine claimants, and local, state, and tribal governments.

This project was also included in all quarterly issues of the Umatilla National Forest Schedule of Proposed Activities since the fall of 1997. Three letters and one phone call were received in response to scoping, including correspondence from the Granite City Council, a private individual, and Boise Cascade Timber and Wood Products Company.

1.7 KEY ISSUES

Public comments and management concerns generated several issues. The interdisciplinary team reviewed these and determined which issues were key. Key issues are defined as resource or other values that drive the development of an alternative, may be adversely affected by the proposed action, or "unresolved conflict regarding alternative uses of available resources" (NEPA sec. 102) (2)(e). Key issues provide the focus for the analysis and aid in developing alternatives.

1.7.1 Key Issue 1: Private Property and Mining Claims

Within the project area there are three parcels of private land and nine unpatented mining claims. The city of Granite and multiple other ownerships are located within three air miles outside of the project area. While the owners of these properties and mining claims recognize the risk to their properties inherent to a forest setting, they are also concerned about the risk of potential damage to their property from natural or management-ignited fire originating on the National Forest. The Forest Service is also concerned with the risk posed to private property, as well as the complications and safety hazards that wildland firefighting and structure protection incur for firefighters. This concern is a primary reason why taking suppression action on wildfire starts within and near the project area is a high priority.

The Issue Is: How best to reduce the risk to private property and mining claims during the implementation of management-ignited prescribed fire operations, and how best to reduce the risk of future wildfires and prescribed fires from burning onto private property and mining claims.

Key Indicators:

1. Acres of reduced fuel load surrounding private property and claims.
2. Proximity to existing breaks in fuels for landscape-scale protection.

1.7.2 Key Issue 2: Fisheries Habitat/Water Quality

The Forest Plan classifies about 80 percent of the project area as C7-Special Fish Management Area. This reflects the importance of this area to anadromous fish stocks (primarily chinook salmon and steelhead trout). All of the project area drains south into Granite Creek, which feeds

into the North Fork John Day River. The Forest Service is concerned that a catastrophic wildfire within the project area is inevitable given the high fuel loading, fuel arrangement, and past fire history. Such a high intensity fire would diminish the quality of the fish habitat by removing streamside vegetation (which shields water from solar radiation, provides hiding cover and food sources for fish, and entraps low levels of sediment). Also, as witnessed on a number of local fires in the last ten years, the area could experience direct fish kill, increased erosion and sedimentation due to loss of soil cover and cohesion, and increased runoff and peak stream flows. Fry emergence[2] and insects that provide food for fish could be reduced by an increase in fine sediment, further impacting fish populations. The proposed action also poses some risk of removing streamside vegetation and increasing soil erosion and sedimentation if improperly designed or implemented.

The Issue Is: How to protect salmon, steelhead, and their habitats while addressing the purpose and need.

Key Indicators:

1. Riparian Zone Health (as measured by changes in vegetation species diversity and composition).
2. Stream Functionality (as measured by changes in habitat complexity and quality, including large instream wood, amount of pool habitat, and quality of spawning substrate).
3. Water Temperature.
4. Suspended Sediments.

1.7.3 Key Issue 3: Fire Management

The philosophy of resource managers within the Forest Service has changed considerably in the past 75 years, from one of a strict fire suppression policy to that of managing fires and, where possible, using fire as a tool to affect fuel arrangement and loading in order to influence summer wildfire intensities. This change in philosophy has resulted from the realization that fire suppression alone will not prevent catastrophic wildfire. In fact, fire suppression contributes over time to an increased potential for damaging fires by allowing fuel to accumulate that would otherwise have been held in check by naturally occurring, low intensity fires.

In addition, expected results of a midsummer wildfire that escapes initial attack include high suppression costs, potentially high risk to both the public and firefighting personnel, and potentially serious air quality conditions.

The Issue is: How to reduce the chances of catastrophic fire, fire suppression costs, risk to the public and firefighters, and air quality problems.

Key Indicators:

1. Catastrophic fire potential.
2. Suppression costs and expected resource value loss.
3. Risk to firefighter and public safety.
4. Expected smoke emissions.

[2] Young fish (called 'fry') transitioning from living among the streambed gravel.

1.8 TRACKING ISSUES

Issues that were not considered to be key issues, but were determined to be important or required to disclose, were considered as issues to be tracked throughout the document. These tracking issues are generally of high interest or concern to the public, or are necessary to understand the full extent of the alternatives. Tracking issues provide additional information for the analysis but do not drive the formulation of alternatives.

1.8.1 Wildlife Species and Habitats

The analysis area contains habitat suitable for several threatened, endangered, or sensitive species, or species proposed for listing as threatened or endangered that could be impacted by this project. These include, gray wolf, bald eagle, Canada lynx, peregrine falcon, California wolverine, and Columbia spotted frog. In addition, several Forest Service Management Indicator Species (MIS) including elk, cavity excavators, and pine marten may be present. Habitat features important to some of these species (including old growth, snags, and large, down woody material) may be impacted. Finally, the project has potential to impact ground-nesting, or low-shrub-nesting birds if burning occurs during nesting season. The issue is: how will the proposed project affect threatened, endangered, sensitive, or MIS wildlife species and ground-nesting birds?

1.8.2 Aquatic Species

Aquatic species that are listed as threatened under the Endangered Species Act and that occur in the Buck Creek area are steelhead trout and bull trout. The Forest Service's Pacific Northwest Regional Forester listed other aquatic species as sensitive for the Region, including: westslope cutthroat trout, interior redband trout, chinook salmon, and margined sculpin. The Fish and Wildlife Service has also identified California floater as a species of concern. The issue is: how will the proposed project affect threatened, sensitive, and aquatic species of concern?

1.8.3 Noxious Weeds

Several species of noxious weeds are known to occur in the project area. Most of these are currently being successfully controlled. With the exposure of mineral soil through project activities such as underburning and fire line construction, there exists potential to increase the spread of noxious weeds in the project area. The issue is: how can the invasion and/or spread of noxious weeds be prevented?

1.8.4 Recreation

The main recreational pursuits in the project area are hunting and dispersed camping, although use of wilderness trails for hiking and sightseeing has recently increased. Proposed management activities will overlap with the fall hunting season. The issue is: to what extent will hunting and other recreational opportunities be affected by the project?

1.8.5 Cultural Resources

Historic and prehistoric sites exist within the project area, as identified from cultural heritage surveys. The issue is: how can these sites be protected from project impacts?

1.8.6 Wilderness

The North Fork John Day Wilderness (122,296 acres) was designated by Congress in 1984. The proposed action would affect approximately 641 acres in the southeast portion of the wilderness. Legislative guidance for management of the wilderness, which is administered by the Umatilla National Forest, is contained in the Wilderness Act of 1964 (PL 88-577). The Wilderness Act directs that the land be managed so it "*generally appears to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable.*" Wilderness is further defined as "*…in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled*[3]". The issue is: what is required to maintain the character of the wilderness, while improving the potential for restoring the natural role of fire within the wilderness?

1.8.7 Wild and Scenic River

The North Fork John Day River was designated a National Wild and Scenic River in 1988, and the segment of the river within the project area is designated *Wild*. This designation carries much the same management emphasis as the surrounding wilderness. The *North Fork of the John Day Wild and Scenic River Management Plan* (June, 1993) allows for the use of prescribed fire as a tool to meet vegetation management needs. The issue is: how does the project meet the requirements of the Wild and Scenic River designation?

1.8.8 Commercial Value of Timber Resource

Within the project area, outside of the wilderness, there is timber with commercial value that is susceptible to fire damage or loss. One concern is that unless timber harvest is completed either before or instead of underburning, this revenue will be lost. The issue is: will the project result in the loss of timber revenue from the treated area?

[3] Untrammeled means "*not subject to human controls and manipulations that hamper the free play of natural forces.*"

SECTION 2
ALTERNATIVES

This chapter describes the proposed action and alternatives to the proposed action, including a no action alternative. Topics discussed include: the process used to develop alternatives, alternatives considered but dropped from detailed study, alternatives developed in response to the key issues, mitigation common to all action alternatives, a monitoring plan for each action alternative, and a comparison of the alternatives.

2.1 ALTERNATIVE DEVELOPMENT

The alternatives were developed using issues and information gathered from various interested groups and individuals, government agencies, and District specialists. Each of the developed alternatives was designed to satisfy the purpose and need for action stated in Section 1 and to address one or more of the key issues. Mitigation measures were developed to minimize the potential environmental effects of each alternative. The interdisciplinary team also outlined a monitoring plan to measure the success and effectiveness of the project design and mitigation.

2.2 ALTERNATIVES DROPPED FROM FURTHER ANALYSIS

Four alternatives were identified, but dropped from further analysis for the following reasons:

2.2.1 Treatment Outside of Wilderness Only

This alternative would not underburn the estimated 641 acres of wilderness. Current fire management (fire suppression) would continue. This alternative was not developed further because it would only partially meet the objectives and direction of the *Wilderness Act of 1964*, the Forest Plan, the *North Fork John Day Wilderness Action Plan*, and the *North Fork John Day Wilderness Fire Management Action Plan*. Specifically, this alternative would not allow fire to act in its natural role within the wilderness because hazards to safety and property outside the wilderness would be too high.

2.2.2 Commercial Timber Harvest as Fuels Treatment

This alternative would use commercial timber harvest to recover wood fiber value outside the wilderness before underburning. This alternative was not developed further because the fuels that need to be reduced are not of a commercial size. Timber harvest would also have greater impacts on soil and water resources than other alternatives. In addition, the conditions necessary to control a prescribed fire would be such that only very small amounts of commercial-sized wood fiber would be consumed.

2.2.3 Hand Labor Fuel Treatment

Under this alternative, fuels would be piled by hand and burned. This alternative was not developed further due to the prohibitively high cost and lengthy time requirements to treat such a large area using manual labor alone.

2.2.4 Treatment Using Fire Only

This alternative would not pre-treat fuels. The fuels specialist and silviculturist field reviewed timber stands proposed for pre-treatment to consider this option. The review found that under the generally healthy overstory of ponderosa pine, western larch, and Douglas-fir, a vertical continuity of fuels is present. This 'fire ladder' exists due to a dense stocking of small and intermediate-sized ponderosa pine, lodgepole pine, Douglas-fir, western larch, and grand fir trees. Application of fire without pre-treatment to reduce vertical continuity would result in increased mortality in the overstory and in healthy ponderosa pine, Douglas-fir, and western larch in the understory. Fire would also kill species randomly, which would not advance restoration of historic species compositions. The number of prescribed ignitions required would be increased, subsequently increasing the cost of suppression and making safe application of prescribed fire more difficult. The opportunity to apply prescribed fire within the analysis area would be decreased due to fuel conditions.

2.3 ALTERNATIVES STUDIED IN DETAIL

2.3.1 Alternative 1 - No Action

No treatment of fuels would be initiated at this time. Fire ignitions would continue to be suppressed on National Forest System Lands within the analysis area. Fire within the wilderness would be managed in accordance with the *Region 6 Fire Management Plan,* because fire would not be allowed to resume its natural role within the wilderness. Other ongoing activities, such as road maintenance, recreational use, firewood cutting, etc. would continue.

2.3.2 Alternative 2 - Proposed Action

Objectives

- Reduce fuel loadings within treatment units from 10-40 tons/acre (existing) to 8 tons/acre or less (desired) in a cost-effective and timely manner.
- Promote historic, fire-resistant species compositions within the project area.
- Reduce the risk of catastrophic wildfire to an acceptable level within the project area.
- Develop conditions that would allow fire to resume its natural role within the North Fork John Day Wilderness.

Description

This alternative would reduce 'ladder'[4] fuels then underburn on 1,500 acres of mixed ponderosa pine and Douglas-fir stands; an additional 3,137 acres would be underburned only (including 641 acres of the North Fork John Day Wilderness). The area proposed for treatment would be divided into nine units, as shown in Map 4 (Appendix A), to make application of fire more manageable. Implementation could combine units or divide them into smaller areas as needed to meet resource objectives, weather conditions, and administrative needs. Treatments would occur over approximately 10 years.

[4] Ladder fuels are trees that are less than 9 inches diameter at breast height and are of sufficient density to be able to carry fire from the ground into the overstory.

Outside wilderness, ladder fuels would be pre-treated[5] using chainsaws to cut and remove saplings and small trees from mixed conifer stands on drier sites where understories are crowded and overstories are sparse with occasional large, old ponderosa pine, western larch, and Douglas-fir. Primarily lodgepole pine and fir saplings would be removed. Cut trees would be pulled away from residual trees by hand to protect the residual trees from damage during underburning. After pre-treatment, the resulting fuels would need to dry for two months to one year before underburning could take place.

Underburning would be accomplished on a total of 4,637 acres using a variety of tools to provide control of fire intensity and fire spread. Hand ignition using drip torches would be the method used along unit perimeters, sensitive areas, and for smaller burn blocks. ATV-mounted ignition systems would be used outside of the wilderness where terrain and fuel conditions allow. Aerial ignition would be used on large burn blocks due to increased safety, speed, and economy of ignition. Aerial ignition would also be used in some areas of extremely rough terrain, most of which occur within the wilderness, to avoid exposing large numbers of personnel to the potentially hazardous conditions found above Granite Creek near it's confluence with the North Fork John Day River. Ground-based mechanical ignition systems would not be used within the wilderness.

Ignition patterns would be tailored to meet prescribed weather, burn intensity, and topographic conditions. The most common ignition pattern would begin at the top of a slope, with strips of fire applied parallel to the slope as the applicator moves downhill (i.e. a strip head fire). A 'backing fire' (one that backs into the wind or downhill) would be planned where continuous fuels are present and conditions are favorable for continuous, even fire spread. Flanking burn patterns (fire is applied in strips that allow heat to build so fire can spread) could also be used where necessary. The Prescribed Fire Burn Plan would include specific prescription elements (weather, fuel moisture, etc.) to address the objective of achieving average flame lengths of less than four feet.

The number of underburning treatments would vary, with at least two and probably three treatments required in stands pre-treated to reduce ladder fuels and one to two treatments in remaining stands. Where stands are in Condition Class I (the fire regime within or near the historical range), underburning should only require one entry to maintain stand conditions. Many variables would affect the timing and location of underburning, making it impossible to specify a burning schedule in advance. In general, underburning would take place in either the spring or fall. Initial treatment would probably occur during the spring to take advantage of higher fuel moistures in heavy fuels. Second and third treatments would occur in either spring or fall, depending upon fuel conditions and burn objectives. Other factors that would influence the timing of underburning include wind, moisture levels, recreational high-use periods, wildlife mitigation, smoke management, and resource availability (i.e. personnel, equipment, etc.). Although burns are identified by unit, actual implementation may combine units, or divide them into smaller areas as needed to meet resource objectives, weather conditions, and administrative needs. Fire control lines would need to be constructed in order to manage fire spread and keep fire out of non-treatment areas. In many cases, existing roads, trails, and other natural barriers would provide the necessary protection. Where natural barriers do not exist, approximately 17 miles of fire control line would be constructed (8 miles by hand and 9 miles by machine). Control lines would be constructed by hand in areas where

machine use is not appropriate (e.g. steep slopes, wilderness, and Riparian Habitat Conservation Areas). Hand constructed line would clear fuels from a 3-to-8-foot wide area, exposing 1 to 2 feet of mineral soil. In other areas, control line would be constructed by machine, using bulldozers or tractors to create a 10-foot wide fuel clearing with 3 feet of mineral soil exposed.

Mitigation Measures

1. No pre-treatment of fuels will occur within Riparian Habitat Conservation Areas or in wilderness. Riparian Habitat Conservation Areas are defined as a width of 300 feet either side of the stream for fish-bearing streams, 150 feet for non-fish bearing, perennial streams, and 100 feet for intermittent streams and springs, ponds, and seeps less than one acre.
2. Burn prescriptions will be designed to imitate low intensity wildfire effects on soil exposure and dominant tree mortality. Prescribed fire will not be ignited in Riparian Habitat Conservation Areas unless necessary to control fire intensity and exposure of mineral soil. Mineral soil exposure will not exceed 10 percent.
3. Fire line within Riparian Habitat Conservation Areas would be constructed by hand to within 10 feet of intermittent (Class 4) streams or 20 feet of perennial (classes 1, 2, and 3) streams. Surface fuel clearing without soil disturbance would be completed to streamside where necessary to limit fire spread.
4. Ignition will not occur at or near large, dry snags and logs in order to preserve these habitat features.
5. Areas with concentrations of desirable hardwoods (such as mountain mahogany and bitterbrush) will be protected from burning, where necessary.
6. Waterbars will be constructed as needed across fire lines at locations marked by the Forest Service, to reduce potential for soil displacement and sediment transport.
7. Cultural sites that contain wooden structures or features that could be affected by the fire will be protected with methods that do not disturb the soil.
8. Mechanically built fire lines will be seeded and mulched as needed immediately following burning to reduce erosion potential and compaction. All mulch will be weed free.
9. All equipment to be operated in the project area will be cleaned in a manner sufficient to prevent noxious weeds from being carried into the project area. Cleaning will occur off National Forest System lands and will be inspected by the Forest Service. This requirement does not apply to passenger vehicles or other equipment used exclusively on roads.
10. All areas where previous timber harvest activities (e.g. log landings, slash piles) created large concentrated piles of woody debris (greater than 400 square feet) that burn down to mineral soil will be seeded with a mixture of certified weed-free seed.
11. Where possible, trails will be used for fire line to allow a more natural appearance. Fire line will be built to minimize visual impacts near trails or in areas that allow views into the burn. Natural barriers, streams, and landscape patterns will be used where possible to allow fire line to blend in.
12. The public will be notified of upcoming burn operations, including information on potential closures.

13. Structures such as trail bridges and signs in the wilderness will be protected.
14. Burn operations that would require trail closures will not occur during buck deer and elk rifle seasons.
15. Minimum Impact Suppression Tactics standards (described in Chapter 30 of the Region 6 Fire Management Plan) will be used for handline location, construction, and rehabilitation within the wilderness and Wild and Scenic River (management area B7).
16. Within the wilderness, helicopter use will be confined to burn operations (aerial ignition and potential fire control using water) and any emergencies. Landing zones will be outside wilderness, except in an emergency. Helicopters will not be used for monitoring within the wilderness after the burn is complete, except in an escaped fire situation.

Monitoring
The District noxious weed coordinator will inspect activities during implementation to determine whether mitigation measures and project risk management plans are implemented and effective. Deviations will be corrected immediately. For five years after activities are completed, the District noxious weed coordinator or crew will conduct an annual inventory of the treatment area and access routes to determine if existing noxious weed populations have spread or if new sites have occurred. Any noxious weeds found will be treated in accordance with the Umatilla National Forest Environmental Assessment on the Management of Noxious Weeds (USDA, 1995). This monitoring is considered essential.

To ensure that riparian areas and other unique habitats are protected as described in the mitigation section, the District hydrologist or fish biologist will monitor treatment unit boundary locations. Boundaries that do not meet mitigation requirements will be adjusted accordingly. This monitoring is considered essential.

The District hydrologist will spot-monitor during and after fire line construction and underburning to ensure soil displacement and compaction constraints are met. If constraints are not met, the fire prescription will be modified to the extent possible and the hydrologist will identify and document modifications to be used in future projects. This monitoring is considered essential.

During and immediately following underburn activities, the District fish biologist will monitor riparian areas to determine whether prescription objectives and mitigation (i.e. mineral soil exposure, overstory mortality, etc.) have been met. If objectives have not been met, additional burning will be delayed and fire prescription and procedures adapted to ensure the desired level of mitigation is achieved. This monitoring is considered essential.

2.4 COMPARISON OF ALTERNATIVES

2.4.1 Forest Vegetation

Under Alternative 1, no fuels reduction would take place and fire suppression would continue. Stands would continue to change from open, park-like, ponderosa pine to multi-layered, closed-canopy fir stands. Large, remnant ponderosa pine would continue to be lost as stands became

overstocked and susceptible to insect damage. These trees, and the structural diversity they create, would eventually disappear from the landscape. Vegetation patterns, composition, and structure associated with a natural fire regime would not be restored. The risk of large, catastrophic fire would continue to increase.

Under Alternative 2, fuel reduction through pre-treatment of ladder fuels and underburning would help restore the forest to its natural structure and fire regime. Over time, stands would begin to resemble historical patterns and compositions. This includes more open stands of larger trees, dominated by ponderosa pine, Douglas-fir, and larch, with few small or intermediate trees underneath. There would be fewer fire-intolerant species such as lodgepole pine and grand fir. Fire would release nutrients, currently held in litter and duff, back into the nutrient cycle, making them available for use by growing vegetation.

2.4.2 Fire and Fuels

Under Alternative 1, no areas would be treated to reduce fuels or modify stand structure. Those areas in Fire Regime I that are predominately open ponderosa pine (Condition Class 1) would accumulate fuels and experience an increase in understory stocking of both ponderosa pine and other, less fire resistance species. While currently at a low risk for a catastrophic fire, over time these stands will develop fuel profiles, which will increase the potential for high intensity, difficult to control fires. This would also mean increased risk for firefighters and the public.

In those areas of Fire Regime I where the understories have already seen in-growth of seedlings and saplings and/or understory fuels are above historic norms (Condition classes 2 and 3), the stands will continue to be at risk for moderate to high intensity midsummer wildfires. Aggressive suppression action utilizing control strategies will be the primary fire suppression response, limiting the ability to manage stand structure and fuels through fire suppression actions.

Alternative 2 would use pre-treatment of ladder fuels and underburning to reduce fuels within overstocked stands and promote fire resistant species as natural dominants. The intent is to decrease the risk of catastrophic fires. Currently approximately 70 percent of the project area has fuel loading and stand structure features that would support extreme fire behavior. Following treatment, only 20 to 30 percent of the area would still be at risk of catastrophic fire. Post treatment, 70 percent of the project area is expected to have fuel conditions that would burn with light to moderate fire intensity (flame lengths less than 4 feet). In addition, the remaining 20 to 30 percent of the ground at risk of catastrophic fire would not be contiguous, further reducing the risk of large fires. This change in expected fire behavior would result in slower spreading, more easily controlled wildfires with a corresponding reduction in fire suppression cost and the safety risk to firefighters and the public. Prescribed fire would pose less risk to firefighters and the public due to the conditions (higher fuel moisture, low wind, low air temperatures, etc.) under which it would be applied.

2.4.3 Fisheries Habitat and Water Quality

In the short-term, Alternative 1 would maintain the status quo regarding water quality and related effects on fish and fish habitat. Over time, the risk of catastrophic fire would increase. Effects of a catastrophic fire would include: direct fish kill, removal of streamside vegetation resulting in increased stream temperatures (from increased solar radiation), loss of fish hiding cover, loss of

food sources for aquatic organisms, increased erosion and sedimentation, and increased runoff and peak flows due to loss of soil cover and cohesion. In the event of a major wildfire, environmental quality would be reduced with resulting negative impacts to the area's aquatic habitats.

Alternative 2 would have slight impacts to fisheries habitat and water quality; much less than those from a catastrophic fire. Riparian zones could lose a few, large, shade trees, and areas with large fuel accumulations could be exposed to high temperatures during burning. A small amount of sediment would be mobilized, but not enough to measurably alter stream functionality.

SECTION 3
ENVIRONMENTAL CONSEQUENCES

This section discloses the potential effects of each of the alternatives described in Section 2. This includes cumulative effects, which are the impacts on the environment that result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). Effects are described in terms of increases/decreases, intensities, duration, and timing. This chapter also provides the scientific and analytical basis for the comparison of the alternatives. For more detailed information, refer to individual resource reports found in the Buck Creek Underburn analysis file at the North Fork John Day Ranger District.

Please note that the private property/mining claims, forest vegetation, fire/fuels, noxious weeds, and wilderness/recreation sections are discussed at the project scale because these resources are relatively stationary and are associated with a particular location. For the water, fish populations/habitat, and wildlife sections, the scale broadens to the analysis area, based on subwatersheds (Map 2, Appendix A), because of the mobility of these resources.

3.1 PRIVATE PROPERTY AND MINING CLAIMS

3.1.1 Existing Conditions

Within the project area there are three parcels of private land (totaling 1,160 acres) and nine unpatented mining claims that could be negatively impacted in the event of a catastrophic wildfire. In addition, the city of Granite and multiple other ownerships are located within 3 air miles of the project area. Prevailing west winds, assisted by the influence of topography, would carry wildfire from the project area in a generally eastward direction toward these properties.

3.1.2 Alternative 1 Environmental Consequences

Under this alternative, no areas would be treated for fuel reduction or stand structure modification. Those areas in Fire Regime I (see Section 3.4, Fire and Fuels, Figure 1) that are predominately open ponderosa pine would accumulate fuels and experience an increase in understory stocking of both ponderosa pine and other, less fire-resistant species. While currently at a low risk for a catastrophic fire, over time these stands would develop fuel profiles that would increase the potential for high intensity, difficult to control fires. In those areas of Fire Regime I where understory fuels are above historic norms (Condition classes 2 and 3), the stands would continue to be at risk for moderate to high intensity midsummer wildfires. Aggressive control strategies would be the primary fire-suppression response, both within and outside the wilderness.

Wildfire within the wilderness would continue to carry toward private properties and the city of Granite due to the continuity of fuels, prevailing weather patterns, and topography. Fuel conditions would continue to place private property and mine claims at above normal risk levels from the threat of fire spread. Over time, this threat would increase as the remaining areas with fuels in Condition Class 1 shift to Condition Class 2 or 3 (Figure 3).

3.1.3 Alternative 2 Environmental Consequences

This alternative would decrease fuel amounts and continuity on 4,637 acres. Currently approximately 70 percent of the area has fuel loading and stand structure features that would support extreme fire behavior. Following treatment, 20 to 30 percent of the area would still be at risk of catastrophic fire, while 70 percent of the area would be expected to have fuel conditions that would burn with light to moderate fire intensity. In addition, the remaining 20 to 30 percent of the ground at risk of catastrophic fire would not be contiguous. This change in expected fire behavior and fuel continuity would result in slower spreading, more easily controlled fires with a corresponding reduction in risk to private property and mining claims.

Underburning approximately 641 acres of the North Fork John Day Wilderness would reduce fuels near the wilderness boundary, such that future wilderness fires could be managed to maintain wilderness values without posing undue risk to private lands outside the wilderness. This would also complete a much larger, contiguous band of reduced fuel continuity outside the wilderness that would slow east/west fire movement allowing for more fire protection opportunities.

Cumulatively, the fuel reduction would connect with past fires and timber harvest to create a contiguous natural fuel break to the west of the city of Granite (Map 5, Appendix A). The large band of reduced fuels would lessen the chances of a catastrophic fire from the west threatening the city and surrounding properties. Threats to private land and mining claims within the project area would be similarly reduced. Successful protection of private property during future fire suppression would be more likely. Opportunities to use prescribed fire to manage fuels in the long-term would increase, as well as opportunities to accept and manage natural fires in the wilderness.

3.2 WATER

3.2.1 Existing Conditions

The analysis area comprises portions of three subwatersheds, totaling 20,128 acres (Table 1 and Map 2, Appendix A). The major portion of the analysis area includes Subwatershed 93A (Lower Granite) lying north of Lower Granite Creek. The eastern end of the analysis area is within Subwatershed 93B (Ten Cent Creek) and the western end is within Subwatershed 94A (North Fork of the John Day/Bear). Major streams within the analysis area include, from west to east: Indian Creek, Lick Creek, Buck Creek, Squaw Creek, and Ten Cent Creek. Each of the above-named creeks flows into Lower Granite Creek, which flows into the North Fork of the John Day River. Table 2 provides a summary of stream class information.

Consumptive water uses within the analysis area include mining, fire fighting, and road maintenance. Primary non-consumptive uses include habitat for resident fishes, aquatic life and wildlife; anadromous fish passage; salmonid fish rearing and spawning; recreation; and aesthetics. Primary downstream consumptive uses are irrigation, municipal water supply, and industrial usage.

Table 1. Land ownership within affected subwatersheds.

Subwatershed (SWS)		Total Area (acres)	Nat'l Forest (acres)	Private (acres)	% Nat'l Forest Ownership in SWS
93A	Lower Granite Creek	9,675	9,134	541	94.4
93B	Ten Cent Creek	4,169	3,533	635	84.7
94A	N. Fork John Day/Bear	6,300	6,300	0	100
Total		20,143	18,967	1,176	94.2

Table 2. Analysis area stream classes.

Subwatershed		Fish-bearing (Class 1 & 2) (miles)	Perennial Non-fish-bearing (Class 3) (miles)	Inter-mittent (Class 4) (miles)	Total (miles)
93A	Lower Granite Creek	14.5	11.1	34.1	59.7
93B	Ten Cent Creek	3.5	4.4	19.5	27.4
94A	N. Fork John Day/ Bear	12.2	4.4	23.7	40.3

The analysis area has a mixed maritime/continental climate in which most precipitation falls as snow, which accumulates in the higher elevations during the winter. This climate produces snowmelt, rain-on-snow, and random runoff regimes. Annual precipitation in the North Fork John Day River Subbasin ranges from 18 to 50 inches, depending on elevation (USDA, 1999). January is the coldest month and August is the warmest month.

Hydrology

Most of the total water yield in the area occurs during the snowmelt season of May and June. Except for periodic and localized thunderstorms, which may create locally heavy runoff for short periods, rainfall in the area is generally sparse from July through September. Water yields drop once snow has melted, and as groundwater stored in upland aquifers is depleted during the dry summers. Summer base flows are, therefore, low relative to the spring snowmelt period. Highest peak flows occur during rain-on-snow events and during unusually warm winter weather such as during Chinook winds.

Perceptible changes in hydrology occur when a threshold percentage of vegetation within a given watershed is altered or disturbed. Ager and Clifton in their paper *Determining the Risk of*

Cumulative Watershed Effects Resulting from Multiple Activities (1993) relate the percent of a subwatershed in the 0-30 year age class to indicate hydrologic risk (Table 3).

Table 3. Risk associated with reduction in forest cover (USDA, 1993).

Risk	% of Watershed with Forested Stands <30 years
Low	<15
Medium	15-30
High	>30

Risk evaluation may be further refined by combining road density data with the age class information to assess cumulative risk (USDA, 1993). Within the analysis area, stands younger than 30 years are less than 15% of the area, so hydrology has probably not been greatly affected by past timber management activities or recent fires. Furthermore, assessment of cumulative watershed risks (USDA, 1993) presented by the roads and current seral class conditions is rated as 'low' for Lower Granite (93A) and North Fork John Day/Bear (94A), and 'low-moderate' for Ten Cent Creek (93B) (Table 4).

Roads also impact watershed hydrology in a variety of ways. Bridges and roads in riparian areas can act much like dikes, channeling and diverting overland flow from its natural course, and impounding waters. Roads can intercept groundwater, increasing overland flow rates, thus affecting the timing and volume of stream flows as well as increasing sediment transport rates. There are approximately 55 miles of documented roads within the analysis area. (The system database does not include roads created by repeated cross-country driving or roads abandoned prior to the initiation of record keeping.) Many of the roads in the analysis area are gated and used only infrequently. Open roads in the analysis area appeared to be in good condition during the October 10, 2001 field visit.

A review of literature suggests that the effects of roads upon annual total water yield are variable, and that little increase occurs when less than 8 percent of a watershed is roaded (King and Tennyson, 1984). As roads comprise approximately 1 percent of the Lower Granite Subwatershed, 1.2 percent of the Ten Cent Creek Subwatershed, and 0.2 percent of the North Fork John Day/Bear Subwatershed, it is unlikely that roads in the analysis area have any measurable effect upon annual water yield on a subwatershed scale. However, accelerated runoff could be occurring at the smaller scale of individual first order streams.

Table 4. Roads and forest cover by subwatershed (not including private lands).

Subwatershed (SWS)		SWS Area (mi^2) (1)	Road Miles (1)	Road Density (mi/mi^2) (1)	Forested Acres (1)	Stands < 30 years (acres) (2)	Percent Stands < 30 years	Watershed Risk Rating (3)
#	Name							
93A	Lower Granite	14.3	36.1	2.5	6,899	770	11	Low
93B	Ten Cent	5.5	18.4	3.3	3,596	257	7	Low/Mod.
94A	North Fork John Day/Bear	9.8	0.6	0.1	6,251	593	9	Low
Total		29.6	55.1	1.9	16,746	1,620	10	--

Source: (1) North Fork John Day River Subbasin Draft Biological Assessment, 1999.

(2) Verbal communication, North Fork District Silviculturist, 2002.
(3) From Chart, p.7, USDA 1993.

Past mining within the analysis area greatly changed local hydrology. Portions of the Lower Granite Creek Subwatershed were placer-mined using bucket-line dredges, draglines, and doodlebugs in the 1930s. Capable of moving large volumes of alluvial material, operation of these processing plants significantly altered stream morphology, flow, riparian areas, floodplain function, and water quality. Operation of the plants, and earlier placer mining efforts, resulted in the relocation of channels, redistribution of channel deposits, bank destabilization, removal of fines, and channelization between banks armored with dredge tailings consisting of boulders and large rocks. Widths of disturbed areas range from several tens of feet to hundreds of feet. The Ten Cent Creek Subwatershed was mined hydraulically. This method of placer mining involved directing streams of water under high pressure at hillsides and banks (highbars), and processing the loosened gravels through washing plants. While the extent and degree of damage is less than that caused by the operation of bucketline dredges and doodlebugs, impacts were locally significant. Vegetation still has not totally reclaimed hydraulic mining sites in Ten Cent Creek.

Natural geomorphic and fluvial processes will probably require at least several thousand years to restore to "normal" the most highly impacted areas. To speed restoration along, dredge piles along the reach of Lower Granite Creek above the analysis area were re-contoured and seeded in 2000 and 2001. Periodic placer and lode mining in the Granite Creek watershed continues, though at a much smaller scale than in the past.

Sediment Production

Soils within the Buck Creek analysis area are of two general types: (1) residual soils that formed from bedrock, and (2) ash soils that formed from volcanic ash deposits that covered bedrock and the older residual soils. Residual soils are exposed in areas from which volcanic ash deposits have been eroded. Residual soils typically occur in upland areas and on south-facing slopes because such aspects are drier, subject to a higher fire frequency, and support less soil-stabilizing vegetation. Residual soils are characterized by a clay-loam texture, high bulk density (0.9 to 1.2 g/cm^2), and lower water-holding capacity than ash soils (Geist et al., 1989). In contrast, ash soils have very high water-holding capacity (0.31 cm/cm), which allows them to absorb and store precipitation, thus helping to reduce runoff. The bulk density of ash soils range from 0.6 to 0.7 g/cm^2, and ash soils are highly productive and promote lush forest vegetation. Although the silt-loam texture of ash soils makes them highly susceptible to surface soil erosion when disturbed, their high infiltration rate can counteract, to some extent, their high erodibilty by reducing overland flow.

Review of available soil survey information (USDA, 1978) indicates that ash-derived soils cover at least 50 percent of the analysis area, and that the surface soil erosion potential ranges from 'high' and 'severe' to 'very severe' in these areas. Another approximately 25 percent of the area is covered with soils having a moderate surface soil erosion potential. The remaining 25 percent of soils have low erosion potentials. The widespread presence of erodible soils in the analysis area presents a risk for abundant sediment transport to and by local streams if these soils are disturbed and adequate mitigatory measures are not taken.

Sediment levels in forest streams vary significantly with flow, and are highest during periods of spring snowmelt. Monitoring changes in sediment yield that result from management activities is challenging at the watershed scale due to high spatial and temporal variability (Bunte and McDonald, 1998). Monitoring of the Umatilla Barometer Watershed revealed that, during an eight-year period, annual sediment yield varied by an order of magnitude (10 times) (Harris and Clifton, 1999).

Soil erosion and related sedimentation has been increased within the analysis area through a number of management activities, such as road construction, timber harvest, and mining. Roads are the primary cause of management-related soil erosion. Although only small volumes of sediment continue to be persistently mobilized from road surfaces and ditches and transported to streams, mass wasting of road fill materials and hillslopes undercut by roads could introduce large volumes of sediment to streams. Roadfill material was demonstrated to be an important source of sediment in the Entiat Experimental Forest during the first year after a fire there (Helvey, 1980).

Since 1987, timber harvesting within the analysis area has been largely restricted to the Ten Cent Creek Subwatershed (93B), in which 744 acres or 20 percent of the forested portion of the subwatershed was harvested. Timber harvest in the Lower Granite Creek Subwatershed (93A) occurred before 1987, and there has been no documented harvest within Subwatershed 94A. Timber harvest since 1987 accounts for 4.4 percent of the forested portion of the analysis area. Although past timber harvests may have resulted in increased sediment loads, quantitative measurements of sediment yield were not conducted[6]. There is no direct data regarding sediment loads in nearby streams. However, since only a small percentage of the area has changed from a forested condition to an opening (due to harvest or wildfire), it follows that impacts from past logging are relatively small. This is supported by the findings of the High Ridge study area in the Umatilla Barometer Watershed (Helvey and Fowler, 1995).

Stream Temperatures

Past management activities (harvest, road construction, mining, and grazing) have also affected stream temperatures by reducing stream-side shade and causing stream channels to widen and shallow through sedimentation and destabilization of streambanks. State water temperature standards stipulate that the seven-day average of the daily maximum temperature is not to exceed the following values unless specifically allowed under a Department-approved basin surface water temperature management plan:

- 64°F.
- 55°F during times and in water that support salmon spawning, egg incubation, and fry emergence from eggs and gravels.
- 50°F in waters that support bull trout.

[6] Changes in the quantity of sediment in streams is difficult to measure, because of the physical differences in particle sizes, the erratic timing of introduction over large areas of land, and the limited duration of sediment concentrations at a given location. Since direct measurement of sediment is not possible at this time, sediment analysis was based on watershed conditions that can contribute to sedimentation, such as road length, area, and density; and fire history, harvest history, and soil analysis.

Water temperature data for the analysis area is sparse at this time. Review of available data, summarized in Table 4, suggests that water temperatures in much of the Lower Granite Creek basin currently do not conform to current water temperature guidelines during the summer months.

Table 5. Seven-day maximum temperatures in subwatersheds 93A, 93B, and 94A.

Creek	1992	1993	1994	1995	1996	1997	1998	1999	2000
Granite @ mouth (1)				70	71	71	72	70	74
Granite, near Ten Cent Creek (1)				70					
Granite, near Lick Creek (1)				71					
NFJD above Big Creek (1)	74	71			74	72		72	78 est.
Ten Cent (1)		64	72	65					
Lick (2)								47-53 (3)	
Squaw (2)								51-61 (3)	

Sources: (1) USFS Data Tables
(2) HydroProcesses Reports
(3) One-time spot readings, not 7-day averages.

3.2.2 Alternative 1 Environmental Consequences

Water quality would continue to be affected by natural events such as weather, wildlife, and forest growth. Past actions and on-going projects, as discussed under Existing Conditions, and foreseeable future projects (e.g. firewood cutting, road maintenance, fire suppression, placer mining, and recreation) would also affect water quality. No new potential sources of sediment would be created under this alternative, and riparian shade vegetation would not be reduced. The current high potential for catastrophic wildfire would remain with associated serious impacts to the hydrologic functioning of the watershed, if such a fire occurs.

3.2.3 Alternative 2 Environmental Consequences

Analysis of potential effects was done at the subwatershed scale. Water quality factors selected for analysis included sediment load and stream temperatures, because these are thought to reflect watershed condition and functioning, and they represent parameters most likely to be affected by the proposed action. In this analysis, potential sedimentation impacts were assessed by considering the extent, duration, and magnitude of soil disturbance and soil transport. Impacts to stream shade cast by riparian vegetation were used to determine the effects of activities on stream temperature.

Hydrology

As discussed under Existing Condition, the percentage of stands younger than 30 years and the amount of area in a roaded condition can be used as guidelines to assess hydrologic risk. Alternative 2 would not increase the percent of stands younger than 30 years, because fuel pre-treatment would leave a fully stocked stand and fire would be managed to achieve low burn intensities, which would maintain existing forest cover. While fire line functions somewhat like roads hydrologically, fire line construction would only affect 0.02 percent of the analysis area. Fire lines would also be narrower than roads (1-3 feet of exposed mineral soil as compared to 12 or more feet for roads). Mitigation Measure 5 would divert water flow off the fire line and Mitigation Measure 6 would return the fire line to a vegetated condition. Therefore, there would be little if any

cumulative impact on annual water yield, since the area disturbed would not approach the 8 percent threshold at which changes in water yield can be measured.

In the long-term, the proposed action could prevent catastrophic negative impacts to watershed hydrology by preventing catastrophic wildfires that could otherwise seriously damage the hydrologic functioning of the watershed.

Sediment Production

Pretreatment of fuels would not be expected to affect soils or increase sedimentation or erosion. Debris created during fuel pre-treatment would be burned as soon as possible to reduce the risk of large-scale soil exposure in future wildfires.

Underburning would occur primarily at low intensities, although moderate intensities could be reached where activity fuels are concentrated (e.g. jackpot burns). Mitigation measure 2 requires that burn prescriptions be designed to imitate low intensity wildfire effects on soil exposure, and ignition will occur outside Riparian Habitat Conservation Areas unless necessary to control fire intensity. In areas where burn intensities are low, most of the soil, duff, and organic matter would remain to help stabilize underlying mineral soils. Where burn intensities are higher, more soil, duff, and organic matter would be burned, and up to 10 percent of underlying mineral soils could be exposed. The resulting reduction in soil cover would increase the potential for soil erosion and off-site movement of sediment, although the extent of reduced soil cover and magnitude of sediment mobilization would be relatively small. Most broad leaf vegetation would not be killed and would vigorously re-sprout, quickly re-establishing soil cover. Mitigation measure 11 would restore soil cover more quickly by requiring large areas of exposed soil that result from piled slash to be seeded.

Construction of temporary fire line would also expose some mineral soil to the elements increasing the potential for sediment transport. However, construction of temporary fire line would expose approximately 5.2 acres of mineral soil. Mitigation measures 3, 5, and 6 and Best Management Practices F1-F6 (Appendix C) would ensure that fire line construction has little, if any, impact upon sedimentation. Therefore, there would be no cumulative increase in sedimentation.

Assuming disturbed soil would naturally revegetate and stabilize within four years, the short-term effects on soil stability associated with prescribed burning and fire line construction would offset the risk of serious long-term soil impacts associated with catastrophic wildfire. Since there would be no tractor fire line constructed and little or no ignition within Riparian Habitat Conservation Areas, most soils mobilized on upland sites would be captured by ground vegetation before entering local streams. Therefore, Alternative 2 would have minimal, if any, measurable impact (individually or cumulatively) on sedimentation within the analysis area.

Stream Temperature

Past timber harvest, road construction, and wildfire have produced openings in the vegetative canopy, which has decreased shade. While the proposed thinning and prescribed fire would further open the forest canopy, there would be little or no effect on existing stream temperatures because thinning would not occur within Riparian Habitat Conservation Areas. Stream temperatures would increase if substantial areas of riparian vegetation burned; however, given the conditions required

for a controlled burn, this scenario is very unlikely. Mitigation measures 1 and 2 (Section 2.3.2) are designed to protect riparian vegetation.

Alternative 2 would have minimal, if any, measurable impact on stream temperatures within the analysis area. Mitigation measures 1, 2, and 3 (Section 2.3.2) would likely protect stream shade and thus prevent a cumulative increase in stream temperatures.

Contaminants
Whenever mechanized equipment is used, there is a possibility of introducing fuel, lubricant, or other chemical contaminants into the environment, including streams. The District has a hazardous spill response system in place that would deal with such an event, and contractors and operators would be required to follow their own hazardous response plans. It is unlikely that chemical contamination of the stream system would occur because the spill response system is in place.

3.3 FISH POPULATIONS AND HABITAT

3.3.1 Existing Condition

Fisheries Habitat and Water Quality
Forest Service teams have conducted stream surveys within the analysis area since 1982. All streams surveyed were found to be fish bearing. Results of the surveys suggest that the watersheds contain reaches (portions of streams) and entire streams that do not meet established criteria associated with healthy[7] streams. For example, the North Fork John Day River, Granite, and Ten Cent creeks exceed Oregon State water quality standards for maximum seven-day average stream temperature (Table 5 on page 23). Riparian areas adjacent to Ten Cent Creek and Granite Creek have been determined to be as functioning at risk[8] with some reaches functioning at unacceptable risk as a result of historic mining activities and catastrophic fires (Table 6).

[7] 'Healthy' refers to a stream's ability to support fishes native to the stream and region.

[8] McKinney et al., 1996, developed a method of characterizing riparian areas using the following definitions:

> Proper Functioning: Riparian areas are functioning properly when adequate vegetation, landforms or large woody debris are present to dissipate stream energy, thereby reducing erosion. These elements also help to preserve water quality by filtering sediments and capturing bed load. They aid in flood plain development and maintenance, improve flood-water retention and ground water recharge, and develop and maintain diverse channel characteristics that provide the habitat, shelter, water depth, water flow and shade (temperature) for fishes and other aquatic life. Proper functioning riparian zones in the project area, for the most part, are those areas that were not historically mined or heavily roaded and do not have a recent history of catastrophic fire.
>
> Functioning at Risk: This includes riparian zones that are in functional condition, but existing geologic, hydrologic and/or biological components make them susceptible to further degradation. Riparian zones functioning at risk tend to be found in the smaller tributaries that have been subjected to limited mining, road building and catastrophic fires.
>
> Functioning at Unacceptable Risk: Riparian zones are not providing adequate vegetation, landforms or large woody debris to dissipate stream energy during periods of high flows. Lack of function includes inability to recharge ground water or support a high level of biodiversity. These areas are also characterized by certain physical and biological attributes, such as minimal flood plain, stream channelization, and low species diversity.

Table 6. Current status of streams in the analysis area.

Stream	Riparian Zone Health[1]	Stream Functionality[2]	Stream Temperature[3] Meets standards	Sediment Load[4] Meets standards
North Fork John Day	Functioning at Risk	Functioning at Risk	No	Yes
Granite	Functioning at Risk	Functioning at Risk	No	NI[5]
Ten Cent	Functioning at Risk	Functioning at Risk	No	NI
Indian	NI	NI	NI	NI
Lick	NI	NI	NI	Yes
Buck	NI	NI	NI	NI
Squaw	NI	NI	NI	Yes

1. Based on level of historic habitat disruption.
2. Meets or exceeds PACFISH criteria for pools/mile (for streams less than 5 feet wide, classification is based on a site examination by the fisheries specialist; 147.8/channel width=standard pools/mile).
3. Yes = Meets Oregon Department of Environmental Conservation 7-day summer stream temperatures; No = Does not meet criteria.
4. Yes = Meets or exceeds PACFISH criteria for suspended sediments using sediment embeddedness as a proxy (embeddedness <35%); No = Does not meet criteria.
5. NI = No Information.

Proposed, Endangered, Threatened Species and Species of Concern

Important fish species occurring in the North Fork John Day River and Granite Creek watersheds include spring run chinook salmon (*Oncorhynchus tshawytsha*), Middle Columbia River steelhead (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus*), interior redband trout (*Oncorhynchus mykiss gairdneri)*, and westslope cutthroat trout (*Oncorhynchus clarkii lewisi*). Other fishes occurring in the watershed include torrent sculpin (*Cottus rhythmus*), margined sculpin (*Cottus marginatus*), dace (*Rhinichthys sp.)* and mountain whitefish (*Prosopium williansoni*). The US Fish and Wildlife Service listed Middle Columbia River steelhead and bull trout (Columbia River population) as Threatened Species and identified spring run chinook salmon, interior redband trout, westslope cutthroat trout, and the California floater (*Anodonta californiensis*--a fresh water mussel) as Species of Concern. The Forest Service has listed chinook salmon, margined sculpin, westslope cutthroat trout, and redband trout as regionally Sensitive.

Oregon Department of Fish and Wildlife conducts annual chinook spawning surveys on streams in the analysis area. These data, along with historic annotations and habitat information were used to determine species occurrence. Definitive data is not available for all species in all stream systems.

Historically, salmon and steelhead were abundant in the analysis area. The John Day River is the last major stream in the Columbia River system to have free runs of chinook salmon and steelhead trout, due to the lack of dams on the river itself. Anadromous fish have only to migrate past three hydroelectric dams on the Columbia River to reach spawning grounds within the analysis area. In spite of this, numbers of both chinook and steelhead are greatly reduced from historic levels.

Steelhead numbers have been declining at a rate of about 15 percent a year since 1985 (Federal Register 1996).

Redband trout are known to spawn and rear in the analysis area, but numbers have been reduced from historic levels. They currently exist within the analysis area as small, isolated populations. Detailed information on population status is not available due to lack of current survey data.

Bull trout were once widespread in the John Day River system, but now are restricted to about 25 percent of their former range (Buchanan and Gregory, 1997). They occur primarily in the higher elevation and upper headwater streams. Bull trout have been reported from the headwaters of the North Fork John Day River, and Granite and Ten Cent Creeks in what appears to be less than optimum habitat. Water temperature is one of the most important factors in limiting bull trout distribution.

Westslope cutthroat trout (distinct mid-Columbia Basin populations) occur in the John Day River (Behnke, 1992). Preferred westslope cutthroat trout habitat are those streams with medium (2-75 mm) sized gravel with little fine sediment, little embedded substrate, moderate stream flow (0.1 to 0.3 m/s), and numerous small pools. In the analysis area, streams with fully functional riparian zones meet these criteria.

The California floater has been reported in the Blue Mountains of Washington and Oregon; however, little is known about its life history and distribution. No surveys of the analysis area have been conducted for this species. For the purposes of this evaluation, it is assumed that its habitat requirements are similar to other freshwater mussels (*Margaritifera*) found in the region. Freshwater mussels are usually found in cold, well-oxygenated waters with small to large gravel substrate. They prefer areas with stable bottoms free of silt. Water velocity appears to be an important habitat variable. Mussels were found in streams with an average gradient of 1.4 percent but were absent from streams with an average gradient of 2.4 percent (or fully functional mid-slope riparian zones) (Altnoder, 1926). Because these portions of Ten Cent Creek and Granite Creek are functionally at risk or functioning at unacceptable risk, the mussel is expected to be absent from the project area or present only in very low numbers.

The margined sculpin is found in the Blue Mountains of Washington and Oregon (Tucannon, Walla Walla, and Umatilla Rivers); however, its historic distribution is unknown. According to McPhail and Lindsey (1986), the margined sculpin is the only fresh water fish species whose distribution is restricted to the Middle Columbia River drainage. Given the habitat requirements of this species, it is expected to be associated with fully functional riparian zones. These conditions tend to predominate in the upper reaches of the streams and therefore, the sculpin is likely to be absent or in very low numbers in the reaches with functioning at risk and functioning at unacceptable risk riparian zones, (i.e. the lower reaches of Ten Cent and Granite Creeks).

3.3.2 Alternative 1 Environmental Consequences

Fisheries Habitat and Water Quality

This alternative does not propose an action, therefore, direct risk from management-ignited, prescribed underburning would not exist. Risk for future catastrophic fire would remain, potentially increasing over time. Potential effects associated with a catastrophic fire include direct fish kills,

removal of streamside vegetation resulting in increased stream water temperatures (from increased solar radiation), loss of hiding cover for fish, loss of food sources for aquatic organisms, increased erosion and sedimentation, and increased runoff and peak flows due to loss of soil cover and cohesion. Therefore, the effect of this alternative in the event of a major wildfire would likely be reduced riparian zone health and stream functionality.

Proposed, Endangered, Threatened Species and Species of Concern
Under this alternative, there would be no short-term adverse effects to riparian ecosystem processes and functions, channel conditions, or fish habitat. In the long-term, a catastrophic fire could adversely affect aquatic habitats through loss of riparian cover and increased sedimentation and water temperatures. Fish habitat suitability would be reduced and efforts to rebuild depleted populations of threatened or sensitive fish and other species of concern would be impeded.

3.3.3 Alternative 2 Environmental Consequences

Fish Habitat and Water Quality
Riparian zone health is measured by changes in species diversity and composition, while stream functionality is measured by changes in habitat complexity and quality (large instream wood, pool frequency and quality, quality of the streambed for spawning). Alternative 2 would protect both factors in several ways. Pre-treatment of ladder fuels would not occur within Riparian Habitat Conservation Areas (Mitigation Measure 1), so vegetation and future large instream wood would not be reduced. Mitigation Measure 2 would protect existing vegetation and large instream wood by requiring prescribed fire to imitate low intensity wildfire, with no planned ignition within the Riparian Habitat Conservation Areas and no more than 10 percent mineral soil exposure. Under a low intensity fire, estimates of tree mortality within the riparian area would be less than 5 percent. Tree mortality would not be enough to measurably alter stream temperatures and it could increase future large instream wood. Underburning would also mobilize nutrients to the soils, resulting in a short-term increase in plant productivity. In addition, species composition within the riparian zones would change favoring more fire-tolerant, shade-intolerant species.

Fish habitat (pools or spawning gravels) would not be measurably altered because Alternative 2 is designed to decrease the potential for mobilization of fine soils and associated contribution of sediment to streams. This would be accomplished by placing limitations on fire line construction within riparian areas, building waterbars across fire line, and seeding and mulching fire lines and large areas of exposed soil (Mitigation Measures 3, 6, 8, and 10). Therefore, proposed activities would result in only a slight increase in erosion and related sediment delivery at isolated locations. Effects on fish would further vary with proximity to habitat and severity of the underburn. When considered with past, ongoing, and foreseeable future activities, the cumulative effects of this alternative on fish habitat would be negligible.

Proposed, Endangered, Threatened Species and Species of Concern
This alternative has been designed to minimize impacts to fish and aquatic habitats. Through implementation of Mitigation Measures 1 through 6, and careful application of fire through the Prescribed Fire Burn Plan, this project would avoid further degrading aquatic habitats, and consequently have minimal impacts to fish and other aquatic species. Endangered Species Act determinations for steelhead and bull trout found that this alternative **may affect, but is not likely to adversely affect** these threatened species. In addition, the alternative **may impact** sensitive

redband trout and chinook salmon, **but will not likely contribute to a trend towards federal listing or cause a loss of viability to the populations or species**. In the long term, improved aquatic habitat is expected to help rebuild salmon and trout stocks within the analysis area. Other aquatic species, including cutthroat trout and margined sculpin, are unlikely to be adversely affected by the project and in the long-term, populations would likely benefit from improved aquatic habitat.

Many of the existing effects on species listed above (e.g. poor road conditions and/or locations) would continue. Activities such as mining, hunting, and mine tailings restoration would also continue. This project would not contribute in any measurable amount to the cumulative effects of these other activities.

3.4 FIRE AND FUELS

3.4.1 Existing Condition

Current stand conditions and their associated fuel complexes are the result of a number of influences including historic fire activity, fire suppression activities within the past 100 years, timber harvest, regeneration activities following harvest, and livestock grazing.

Fire Regime

The three dominant fire regimes (composed of fire frequency, vegetation types, etc.) found within the analysis area are described below and shown in Figure 1.

Dry Forest (Fire Regime I)

Low intensity-short duration return interval fires dominate dry forests. Fire sustains early seral species, such as ponderosa pine, and thins a large proportion of the seedlings and saplings that become established between fires. The result is a relatively open, single storied stand with low levels of accumulated fuels.

Moist Forests (Fire Regime III)

Fire regimes are complex in these forests, and are often referred to as a mixed fire regime, indicating that fires often burn with a combination of low to moderate intensity surface fire, and patches of high intensity fire. The patches of high intensity, stand-replacing fire occur when changes in surface fuels, stand density, and/or topography come together to increase fire intensity. Because of the variation in these factors, patch size resulting from this type of fire regime is likely to be highly variable.

Cold Forest (Fire Regime V)

The cold forest fire regime is characterized as high intensity-low frequency. Tree species in these forests show little resistance to fire, but in the case of lodgepole pine can quickly reclaim a site after fire. The late seral species of these forests, such as subalpine fire and Engelmann spruce, are very susceptible to crowning and/or torching, which produces fires that spread rapidly via spotting or crowning runs.

The majority of the proposed treatment area occurs in Fire Regime I with some Fire Regime III present (primarily cold pockets dominated by lodgepole pine). This corresponds to the warm-dry species types historically found on southern exposures.

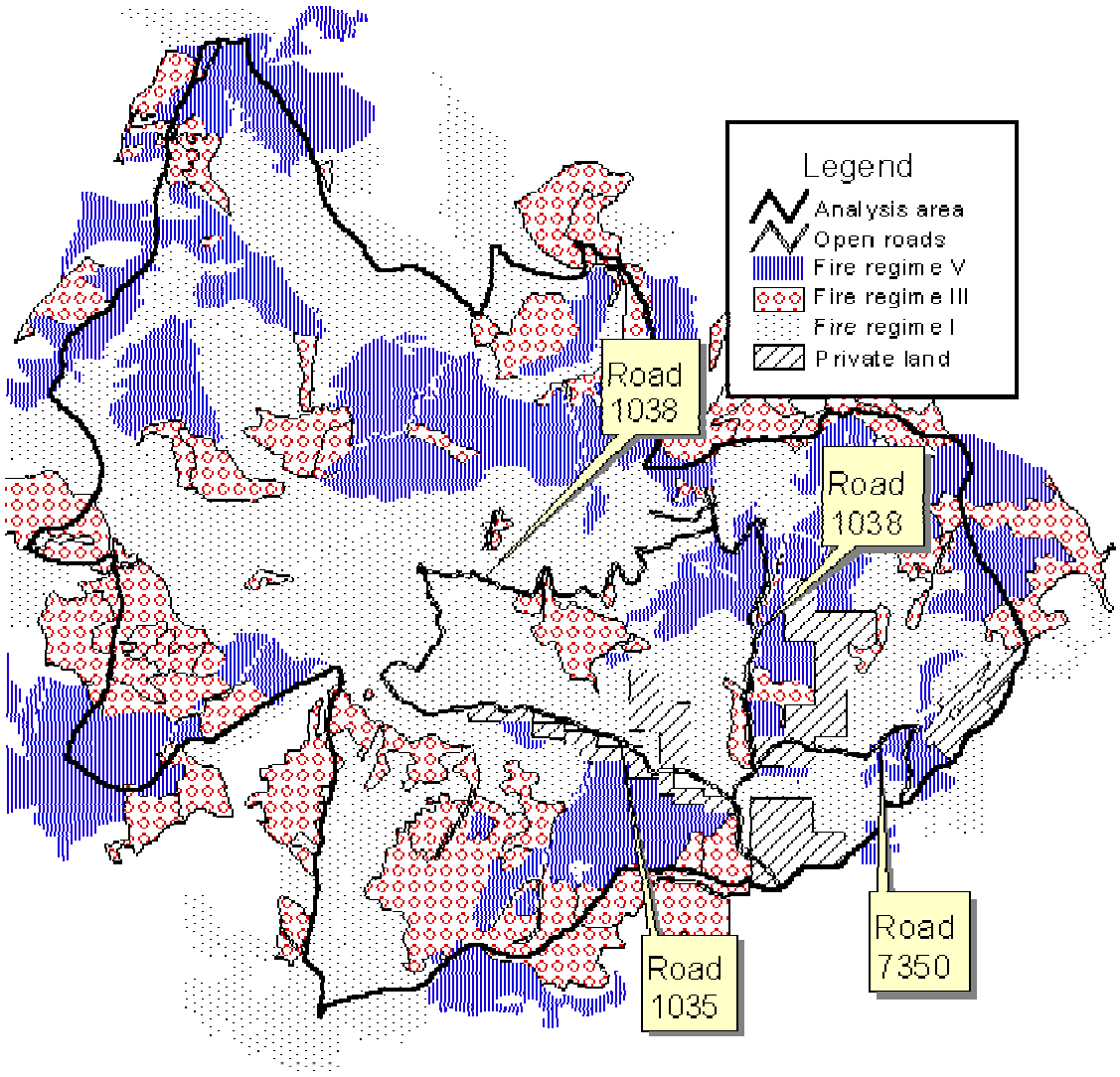


Figure 1. Fire regimes within the analysis area.

Condition Class

Condition Class refers to the current stand structure (including stocking level, species composition, size, and fuel loading) compared to what would historically be expected on the site. Areas in Condition Class 1 are within their historic range of variability. Areas in Condition Class 2 are beginning to trend away from their historic norm, primarily through increased stocking levels, in-growth of mid and late seral species, and increased fuel loading. Areas in Condition Class 3 have moved further away from what would be expected historically.

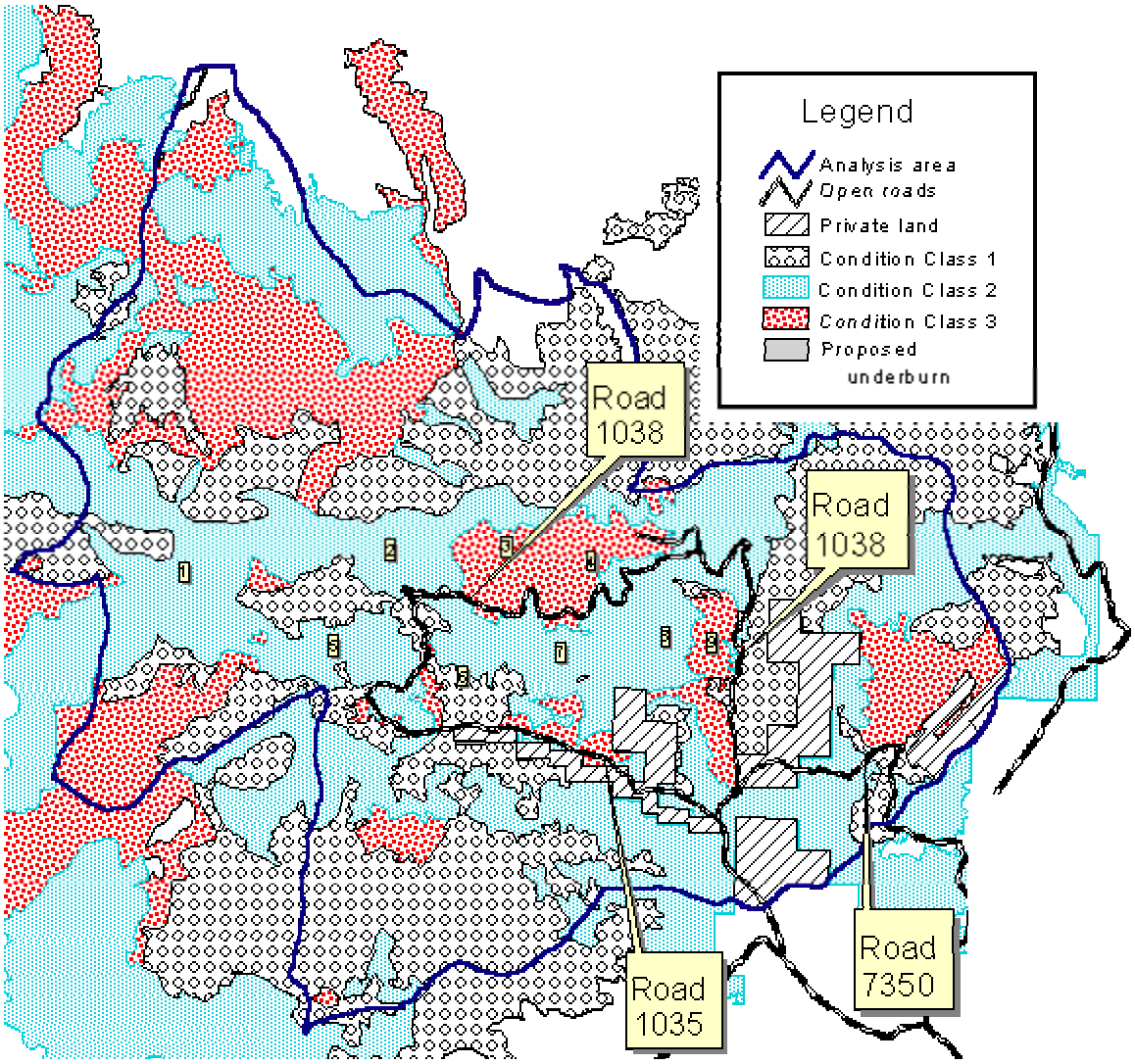


Figure 2. Fuel Condition Classes within the analysis area.

While the analysis area contains a relatively equal mix of Condition classes 1, 2 and 3, the majority of the treatment area is composed of stands in Condition classes 2 and 3 (Figure 2). This, combined with the fact that the majority of the treatment area would have historically been in a low intensity, high frequency burn cycle (Fire Regime I), illustrates the result of changes due to fire exclusion and harvest as well as the potential for future damaging and/or catastrophic fire events. It also indicates that if conditions can be reversed, future stand and corresponding fuel conditions can be managed through a program of periodic prescribed fire.

Fuel Types and Quantities

The Fire Behavior Prediction System, which utilizes the Northern Forest Fire Laboratory (NFFL) fuel models, is used in determining fire spread and risk. There are four categories of fuels used: grass, shrub, timber, and slash. The analysis area contains a variety of fuel models, which are described below.

NFFL Fuel Model 1

Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or nearly cured. These surface fires move rapidly through the cured grass and associated material. Very little shrub or timber is present, generally less than one-third of the area. This fuel type best represents grasslands and savanna. Annual and perennial grasses are included in this model.

NFFL Fuel Model 2

Fire spread is primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead-down stemwood from the open shrub or timber overstory, contribute to the fire intensity. Open shrub lands and pine stands that cover about one-third of the area may generally fit this model. Such stands may include clumps of fuels that generate higher intensities and may produce firebrands. This fuel model is in the grass category.

NFFL Fuel Model 5

Fire is generally carried in the surface fuels that are made up of litter cast by the shrubs and the grasses or forbs in the understory. The fires are generally not very intense because surface fuel loads are light, the shrubs are young with little dead material, and foliage contains little volatile material. Usually shrubs are short and almost totally cover the area. Young, green stands with no dead trees would qualify: vine maple, alder, even manzanita and ceonothus.

NFFL Fuel Model 8

Slow-burning ground fires with low flame lengths are generally the case, although the fire may encounter an occasional 'jackpot' or heavy concentration that can flare up. Only under severe weather conditions involving high temperatures, low humidities, and high winds do the fuels pose fire hazards. Closed canopy stands of short-needle conifers or hardwoods that have leafed out support fire in the compact litter layer. This layer is mainly needles, leaves, and occasionally twigs because little undergrowth is present in the stand. Representative

conifer types are white pine, and lodgepole pine, spruce, fir, and larch. This fuel model is in the timber group.

NFFL Fuel Model 9

Fires run through the surface litter faster than Model 8 and have longer flame height. Both long-needle conifer stands and hardwood stands are typical. Closed stands of long-needled pine (like ponderosa pine) are grouped in this model. Concentrations of dead and down woody material will contribute to possible torching out of trees, spotting, and crowning. Fire spread is mainly within the surface litter and the understories of these stands.

NFFL Fuel Model 10

The fires burn in surface and ground fuels with greater fire intensity than other timber litter models. Dead-down fuels include greater quantities of 3-inch (7.6 cm) or larger limbwood resulting from overmaturity or natural events that create a large load of dead material on the forest floor. Crowning, spotting, and torching lead to potential fire control difficulties. Any forest type may be considered if heavy down material is present; examples are insect or disease ridden stands, wind thrown stands, over mature situations with deadfall, and aged light thinning or partial-cut slash. This fuel model is in the timber category.

Fuel models for the analysis area have been developed both from GIS-generated maps and from field reconnaissance. Analysis of satellite imagery predicted much of the treatment area as a Fuel Model 8, but subsequent field review indicated it is better modeled as a Fuel Model 9 with a heavy woody component or a Fuel Model 10. Table 7 shows unit-specific fuel models and fuel loading projections for the project alternatives.

Fire behavior predictions were made utilizing the BEHAVE System (Intermountain Fire Sciences Lab, 1998), a series of interactive fire behavior computer programs for estimating wildland fire potential under various fuel, weather, and topographic situations. Fuel models were based on the thirteen standard fuel models used in the BEHAVE system, which were developed by the Northern Forest Fire Laboratory (NFFL) and are nationally recognized. Fire behavior predictions were run for fuel models 1, 2, 5, 8, 9, and 10 using identical weather, inputs, slope values, and fuel moistures. The weather inputs used represent conditions usually seen in mid to late August. Unfortunately, this program does not include the ability to determine vertical fire movement and so did not provide an estimation of the potential for crown fire development and spread (a major concern, particularly in Fire Regime III).

Table 7. Fuel models and fuel loading projections by unit.

Unit	Alternative 1		Alternative 2			
	Current Fuel Loading (tons/acre)	Current Fuel Model	Fuel Treatment	Projected Fuel Loading after Thinning (tons/acre)	Projected Fuel Loading after Burning (tons/acre)	Projected Post-project Fuel Model
1	10	FM 2/9	Underburn	10	3	FM 2/9
2	16	FM9/10	Underburn/Jackpot	20.5	5	FM 9
3	16	FM 10	Underburn/Jackpot	20.5	5	FM 9
4	20	FM 10	Underburn/Jackpot	20	7	FM 9
5	10	FM 2/9	Underburn	14.5	6	FM 2/9
6	10	FM 2/9	Underburn	14.5	6	FM 2/9
7	16	FM 9/10	Underburn/Jackpot	20.5	5	FM 9
8	20	FM 10	Underburn/Jackpot	20	7	FM 9
9	20	FM 10	Underburn/Jackpot	20	7	FM 9

3.4.2 Alternative 1 Environmental Consequences

Under this alternative, no areas would be treated for fuel reduction or stand structure modification. Those areas in Fire Regime I that are predominately open ponderosa pine would accumulate fuels and experience an increase in understory stocking of both ponderosa pine and other, less fire-resistant species. While currently at a low risk for a catastrophic fire, over time these stands would develop fuel profiles that would increase the potential for high intensity, difficult to control fires.

In those areas of Fire Regime I where the understories have already seen in-growth of seedlings and saplings and/or understory fuels are above historic norms (Condition classes 2 and 3), the stands would continue to be at risk for moderate to high intensity midsummer wildfires. Aggressive suppression action utilizing control strategies would be the primary fire suppression response, limiting the ability to manage stand structure and fuels through fire suppression actions.

Approximately 70 percent of the proposed units have fuel loading and stand structure features that would support high intensity fire exhibiting high flame lengths, fast rates of spread, and large spread distance. High fire intensities result in increased suppression costs and increased safety risks to firefighters and the public.

The majority of the fires occurring within the North Fork John Day Wilderness would continue to be managed as wildfires due to the risk of fire movement up-canyon to the east toward general forest, private property, and the city of Granite.

3.4.3 Alternative 2 Environmental Consequences

Under this alternative, 1,500 acres of fuel would be pre-treated to reduce ladder fuels and 4,637 acres of fuels would be reduced through a combination of underburning and jackpot burning[9]. The result would be to move the majority of treated stands from a Condition Class 2 or 3 back to Condition Class 1 where low intensity fires could be expected.

Pre-treatment of ladder fuels would reduce understory stocking, ladder fuels, and shading of surface fuels in order to make the introduction of low intensity underburns feasible. If left untreated, slash would increase short-term fire risk for a period of three to five years. However, slash created by pre-treatment would be underburned as soon after its creation as conditions allow, which would mitigate this risk and provide large, continuous areas of treated fuels across the project area.

In stands at risk for high intensity fires, the proposed treatments would result in fuel conditions that would burn with light to moderate intensity (flame lengths less than 4 feet) over a majority of the area. Because fire burns in a mosaic, approximately 30 percent of the treated area would still be at risk of catastrophic fire; however, fuels would be less contiguous, further reducing risk of large high intensity fires. This change would result from converting fuel models 9/10 and 10 with 16 to 20 tons of fuel per acre to fuel model 9 with 5 to 7 tons per acre (Table 7).

A reduction of the potential for high fire intensity would have a corresponding effect on expected suppression cost and firefighter and public safety. While treatment would not eliminate all risk to fire fighters and the public, certain factors of risk would be reduced. Three factors in particular would be affected: flame length/fireline intensity would be much less than with high intensity fires, rates of spread would be slower, and spread distance would be less. As a result, the degree of risk and amount of cost would be reduced.

In addition, underburning approximately 641 acres of the North Fork John Day Wilderness would reduce the potential that future wildfires would escape the wilderness.

Approximately 1,059,422 pounds of PM 10 particulates[10] (898,788 lbs of PM 2.5) would be created through the burning of pre-treatment slash and natural fuels. Due to the remote nature of the project area, distance to protected and sensitive smoke management areas, and relative small acreage treated, smoke emissions would have little to no effect on public health or use of National Forest or private lands within the analysis area. Following treatment, future wildfires would be expected to burn at a much reduced intensity, primarily as surface fires in the remaining needle cast and grass fuels, with emissions in the range of 130 to 155 pounds per acre (PM 10). Figure 5, on page 53 illustrates the expected differences in emissions between a summer wildfire prior to treatment, emissions from underburning, and a summer wildfire following underburning. Of note is the projection that combined underburning and a post-burn wildfire would have lower combined emissions than would a pre-treatment wildfire, primarily due to lower fire intensities and less consumption of canopy fuels.

[9] Underburning involves spreading fire (by hand or aerial application) throughout areas where fuels are light and scattered, producing a low intensity fire. Jackpot burning involves applying fire by hand to pockets of heavily concentrated fuels, resulting in a higher intensity fire. Intensity is somewhat controlled through ignition patterns and timing based on environmental conditions.

[10] PM 10 is a measurement of particulate matter (smoke) that is 10 micrometers or less in size; PM 2.5 is 2.5 micrometers or less in size.

Overall, this combination of treatments would reduce fuel loading, reduce the risk of high intensity fires, and provide a fuels buffer adjacent to private lands. Treatments would also improve fuel conditions within the North Fork John Day Wilderness such that future fires in the wilderness could be managed to maintain wilderness values without posing undue risk to private lands outside the wilderness. These activities would provide a starting point for a larger scale reintroduction of prescribed fire into the landscape.

Alternative 2 would lead to a short-term increase in cumulative smoke emissions during the fall and spring months, but emissions would be kept below State standards. Following treatment, wildfire smoke emissions during summer months would decrease. From a fire risk standpoint, the treatment area was designed to integrate with areas of past harvest and fire to create a band of light fuels extending from west of Dale to the city of Granite, potentially reducing future large fire spread across the North Fork John Day River.

3.5 FOREST VEGETATION

3.5.1 Existing Condition

Vegetation in the project area is characterized as mixed ponderosa pine and Douglas-fir forest to subalpine fir and Engelmann spruce stands. Specific stand types and conditions vary across units, but most stands show many of the same characteristics. Most obvious are higher levels of downed wood and litter (needles, leaves, etc.), and regeneration of shade tolerant late-seral species (grand fir, Douglas-fir, and lodgepole pine) in what were historically ponderosa pine-dominated stands. These conditions are a result of many years of fire suppression in stands that evolved with and adapted to frequent, low-intensity natural fires (USDA, 1992). Less obvious is the alteration of the vegetative mosaic and stand structures in the landscape, the change in diversity for these stands from historical conditions and the alteration of nutrient-cycling processes (USDA, 1991).

Stand structures in the warm, dry plant associations have changed from historical conditions of open, well-spaced large trees with sparse regeneration (essentially two layers of trees), to current conditions of stands with semi-closed or closed canopies of smaller trees with occasional large trees and abundant regeneration in the understories (multi-layered). Structural diversity across the landscape has decreased somewhat, with the development of multi-layered stands covering much more of the area than they did historically. The mosaic (arrangement on the landscape) of stands and structures has changed over the years with fire suppression and other management practices; the 'range' of open, park-like pine stands has been reduced (Hessburg et al., 1999). This shift has changed conditions not only for vegetative species, but also for other species that rely on the open stands of pine.

Throughout the District, insects and disease have been more prevalent in overstocked stands due to associated stress. The spruce budworm epidemic in the late 1980's/early 90's and resulting damage to stands is an example of what can occur from disruption of natural patterns. The stands within the project area were not as heavily affected by the budworm, and remain fairly healthy in comparison to other parts of the District. Within the analysis area, a variety of insect and disease damage is currently evident as individual, weak trees succumb to infestation or attack; however, nothing appears to be exceeding background levels. At this time, overstocking appears to be the most

noteworthy obstacle for trees and stands in the area to overcome. If this condition continues, it will weaken trees and create opportunities for insects or disease to increase above present levels and have a greater impact. Many of the large, old ponderosa pine are currently at risk of attack, primarily from bark beetles; their large root systems require even greater growing space to maintain tree health. Increased shade cover and lack of ground exposure from fire has reduced the amount of ponderosa pine and western larch regeneration in some areas, and encouraged regeneration of fir and lodgepole pine.

Nutrient cycling processes that occurred in the pine stands when fire was a frequent visitor have been altered with fire suppression. Fires and their effects occur infrequently, changing the dynamics between nutrient cycling processes and the species that evolved along with them. When a fire does burn through the area now, nutrient cycling does not function in the same way due to the fuel build-up that has occurred. More fuel is available (increased needle mat, woody debris, etc.) so fires burn hotter in comparison to historical conditions, volatilizing nutrients into the air rather than allowing them to cycle into the soil.

Snowbrush ceanothus (*Ceanothus velutinus*) is present in the area, and is a noted competitor with conifer seedlings. This shrub is a nitrogen-fixing plant and may aid in making available any nitrogen lost from the site in the combustion process of a fire (Johnson, 1998 and Agee, 1993). Ceanothus can sprout prolifically following a fire disturbance, if seeds retained in the litter and duff layers are sufficiently scarified. Currently, the snowbrush in the area does not appear to have hindered tree regeneration significantly, as evidenced by tree saplings growing up through the brush. Eventually, shade from the overstory canopy will cause the snowbrush to die out. Mallow ninebark (*Physocarpus malvaceus*) is also present, primarily occurring in proposed Unit 1. This shrub can be a competitor to regeneration following fire, where it can increase in vigor if the stand is opened up.

Unit 4 and portions of other units are in cool, grand fir plant associations, consisting of grand fir, western larch, lodgepole pine, subalpine fir, and Engelmann spruce; these associations usually occur on north- or east-facing slopes which receive less sun exposure and are generally more moist. Regeneration in these stands is primarily grand fir and lodgepole pine. These types of stands typically experienced infrequent stand-replacement fires that killed much of the stand; they would then regenerate with early seral species (western larch, lodgepole pine, and ponderosa pine). Late seral species would come in underneath the new canopy and eventually become the primary stand component.

3.5.2 Alternative 1 Environmental Consequences

Under the no action alternative, no prescribed burning would be initiated. Within the landscape of the Buck Creek analysis area, one that has evolved primarily with frequent, low-intensity natural fires, inaction (no re-introduction of fire coupled with continued fire suppression) would have the following consequences:

- Tree species diversity and stand structure would continue to change from open, park-like two-layered stands favoring ponderosa pine and western larch, to multi-layered closed-canopy fir stands. As these unnatural conditions are perpetuated, stands would become increasingly overstocked and more vulnerable to wide-scale insect and disease infestation.

- Nutrient cycling processes would continue to be altered by the interrupted fire cycle, having potential long-ranging effects on the species that evolved with the historical fire regime/nutrient cycling processes.

- The risk of losing large, old remnant ponderosa pine would continue to increase, as stands become overstocked and susceptible to insect damage (primarily bark beetles). These trees would eventually disappear from the landscape, as would the structure and diversity they currently provide. The risk of catastrophic fire would increase through time as fuels build up, and would become another factor increasing the risk of losing the remaining large ponderosa pine.

- The risk of losing riparian vegetation to catastrophic fire would remain high.

3.5.3 Alternative 2 Environmental Consequences

Prescribed burning for fuel reduction would aid in re-establishing fire's historical role in influencing stand conditions through periodic low-intensity underburns, and would help restore dry forests to a level that approximates their historical abundance (USDA, 1997b). With re-introduction of fire, stands would begin to resemble historical patterns and compositions, improving overall forest health in the area:

- Stocking control would be provided, allowing more growing space for early seral species.

- Regeneration of early seral species would be encouraged by providing favorable conditions for seedling establishment and survival.

- The amount of late seral species within understories would be reduced, which would allow species compositions and stand structures to move closer to historical conditions.

- Nutrient cycling processes would return to more historical conditions, i.e. releasing nutrients held in litter and duff build-up from lack of fire (USDA, 1997b).

Given existing conditions, it could take several cycles of prescribed underburning to return these landscapes to an approximation of their historical condition. Some tree loss would occur, though this would not have an impact on the landscape as a whole.

In the cool grand fir plant associations, fire's historical role was to influence stand compositions by causing periodic stand replacement in large patches. Fire created a mosaic of stand compositions across the landscape, ranging from early seral lodgepole pine and western larch to old growth grand fir. The cool grand fir stands in the Buck Creek project area are in a fairly healthy condition, with a diversity of tree species in both the overstories and understories. Re-introducing fire in limited amounts would result in tree mortality and some thinning of stands. This project would not create the large stand replacement that occurred historically in these types of stands, but individual and small patches of tree mortality would give early seral species an opportunity to become established. An increase in species and structural diversity would occur.

Depending on the timing of the burning and fire intensity, snowbrush ceanothus (*Ceanothus velutinus*) could sprout prolifically following the burn. Competition with snowbrush could

potentially reduce establishment or growth of individual or small groups of conifers. However, in areas where ceanothus currently exists, conifer species are growing up through the shrubs. All stands proposed for burning are currently adequately stocked with trees and burning should not reduce stocking to the point that competition with snowbrush would become problematic within the stand. Ceanothus is a nitrogen-fixing plant, taking nitrogen from the air (unavailable to most plants) and converting it into a form useful to other plants (Walstad et al., 1990). This would benefit areas where nitrogen, a vital nutrient, may be in short supply.

Ninebark (*Physocarpus malvaceus*), also present in minor amounts within the project area, is another shrub species that responds well to fire and can be competitive with conifer regeneration. As with ceanothus, existing adequate tree stocking and limited amounts of ninebark should limit competition.

Tree injuries from burning could range from bole scorch or heat damage to roots near the soil surface, to consumption of the crown. Any type of injury could predispose some trees to insect and disease infestation or mortality, by reducing their resistance. These effects would be isolated and short-lived. Greater and more widespread impact from insects and disease would likely occur under the "no action" alternative, where conditions would keep the level of susceptibility high for entire stands. Prescribed burning would reduce susceptibility to infestation in the long-term, by reducing stocking levels and re-adjusting species mixes to resemble historical, fire-adapted compositions. Fire has an immediate effect on insects by killing them directly, but appears to have no direct effects on root diseases at this time (Walstad et al., 1990)

Fuels pre-treatment would occur primarily in mixed conifer stands on the drier sites, where the understories are crowded mixed species and the overstories are sparse, with occasional large, old ponderosa pine, western larch, and Douglas-fir. Pre-treatment would allow greater chance of survival for some trees by reducing risk of fire-caused mortality and by reducing competition from other trees. Reducing ladder fuels by falling saplings and small trees would essentially act as a light thinning. Large, overstory and healthy understory ponderosa pine, western larch, and Douglas-fir would most often be selected for "protection" due to the abundance of lodgepole pine and fir saplings in these stands (these species tend to be the crowded trees creating the ladder fuels). This activity would have the effect of promoting survival of those species historically found on these sites under a more natural fire regime, allowing them to provide seed sources into the future.

Historically, riparian areas within ponderosa pine and warm grand fir stands most likely burned with somewhat less frequency than the rest of the stand, but nevertheless were accustomed to frequent underburning. With years of fire suppression, fuels have built up in these riparian areas just as in the rest of the stands, leaving them at risk of catastrophic wildfire; lack of fire has changed historical species composition and diversity by allowing fire-intolerant tree species to invade and promoting heavy cover from competing grasses. Re-introducing fire into these riparian areas would begin to bring them back to more historical conditions, by promoting shade-intolerant species and increasing species diversity through some reduction of competing grasses (allowing other species of grasses, forbs and shrubs a chance to regenerate). With the re-introduction of low-intensity underburning, some loss of the fire-intolerant tree species (true firs, lodgepole pine, Engelmann spruce) and grass cover would occur.

Riparian areas associated with cool grand fir stands burned with the same stand-replacing fires that the uplands experienced, however fuels were not as heavy as today, leaving the wetter riparian areas to burn in more of a mosaic pattern with some openings and some areas unaffected by fire. Today, fire suppression has created an unnatural fuel build-up here as well, and controlled re-introduction of low-intensity fire in these areas would reduce the fuels that are currently leaving these cool grand fir riparian areas at high risk for catastrophic and complete mortality from wildfire. Loss of tree and shrub cover from a catastrophic fire translates to loss of shading and loss of root systems for streambank stability. As stated earlier, re-introduction of fire into these areas could result in some isolated tree mortality.

The proposed burning would have little cumulative loss of forest cover when coupled with past harvest and wildfire. The burning prescription, as designed, should result in little to no tree loss, and only in isolated areas (as opposed to the widespread mortality expected if wildfire were to occur).

3.6 NOXIOUS WEEDS

3.6.1 Existing Conditions

Noxious weeds are undesirable plant species that the Forest Service has designated for control or management. Typically, they are invasive, aggressive, and/or harmful, non-native plant species. Several noxious weed species have been identified within the Buck Creek analysis area. They include: diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea maculosa*), hound's tongue (*Cynoglossum officinale*), whitetop (*Cardaria draba*), yellow toadflax (*Linaria vulgaris*), leafy spurge (*Euphorbia esula*), St. Johnswort (*Hypericum perforatum*), Canada thistle (*Circium arvense*), and bull thistle (*Circium vulgare*).

There are eight diffuse knapweed sites, one spotted knapweed site, two hound's tongue sites, and one yellow toadflax site within the proposed treatment units. All sites occur along the southern edge of the project boundary on access routes to the proposed treatment units, mostly along Forest Road 1035. Canada thistle, bull thistle, and St. Johnswort are widespread within the proposed treatment units and are so extensive forest-wide that they are not generally inventoried. St. Johnswort and bull thistle are less invasive and/or persistent than other, higher priority weeds and are generally crowded out as desirable vegetation recovers a disturbed site.

Three spotted knapweed sites, four diffuse knapweed sites, one hound's tongue site, and one Dalmatian toadflax site are within one quarter mile to three miles of the project area, again mostly on access roads. Established populations of leafy spurge are upstream in Beaver Creek Meadows, and several acres of whitetop are currently being treated by Grant County inside the city of Granite. These extremely invasive and persistent perennials are of great concern in the Granite area.

3.6.2 Alternative 1 Environmental Consequences

Introduction of noxious weeds by project vehicles and equipment would not occur. Only natural mechanisms (wind, water, wildlife, wildfire), ongoing projects, and public activity (e.g. recreation, firewood cutting) would disturb soil, providing sites for the introduction or spread of noxious weeds. In the event of catastrophic fire, however, suppression action would create soil disturbance

and vehicle/equipment traffic at a level that could far exceed other management activities. In this event, the likelihood of weed spread would be much greater.

3.6.3 Alternative 2 Environmental Consequences

While Alternative 2 would result in more soil disturbance and a higher risk of spreading noxious weeds in the short-term than Alternative 1, the noxious weed prevention strategies and Mitigation Measures 6, 10, 11, and 12 (Section 2.3.2) would reduce the risk of spread and introduction, particularly via vehicles and equipment. Additional weed surveys and treatment of known sites would be conducted in the project area before implementing the proposed action. Monitoring would be conducted for five years post-project. Detection and subsequent treatment of new sites would occur within the project area within the context of the Umatilla National Forest Environmental Assessment for the Management of Noxious Weeds (USDA, 1995). Long-term potential for noxious weed spread associated with wildfire would be reduced because the amount of soil exposure associated with a controlled burn would be much less and fewer vehicles would be needed for controlling the fire.

3.7 WILDERNESS AND INVENTORIED ROADLESS AREAS

3.7.1 Existing Conditions

There are 122,296 acres within the North Fork John Day Wilderness. Forest Plan standards and guidelines for the wilderness state, "*conditions will be improved in situations where natural processes are not operating freely*" and "*natural ecological processes of plant succession will be encouraged to occur, including ecological systems dependent on the natural role of fire.*" They further state, "*prescribed fire may be used as a tool to manage in accordance with management plans for each wilderness."* There are no inventoried roadless areas within the analysis area.

There are four wilderness trails within the area proposed for treatment: 4.25 miles of the North Fork John Day River Trail (#3022), .25 miles of the Silver Butte Trail (#3025), .125 miles of the Lake Creek Trail (#3018), and the entire length (3.4 miles) of the Granite Creek Trail (#3016). The Granite Creek trailhead is the only trailhead within the project area, and is one of the main access points for the North Fork John Day Wilderness. Structures located within the wilderness and project area include two trail bridges on Granite Creek and various informational signs. Most of the wilderness within the project area is classified as semi-primitive (using the Wilderness Resource Spectrum), with a small portion to the north designated as primitive (Forest Plan, 1990).

While wilderness trail use is heaviest during the fall big game hunting seasons, there has been an increase in summer use by recreationists. Some of the activities include camping, hiking, horseback riding, huckleberry picking, sightseeing, fishing, and viewing remnants of the area's rich mining history. There are approximately six high-use traditional campsites located along the wilderness trails. Although visitors are increasing every year, the North Fork John Day Wilderness gets relatively low use in comparison to other wilderness areas nearby, including the Eagle Cap Wilderness on the Wallowa-Whitman National Forest and the Wenaha-Tucannon Wilderness on the north half of the Umatilla National Forest.

Trail locations are primarily in canyon bottoms, which limit views into the project area. For instance, the popular Granite Creek Trail follows along the creek bottom and the southern edge of a scenic sheer face that prohibits views to the north. The wilderness portion of the project area is similar to other parts of the wilderness (excluding recent fire areas), with no features that would be considered "unique". Some evidence of historical mining activity remains, which is common to this portion of the District.

3.7.2 Alternative 1 Environmental Consequences

Under this alternative, continued fire suppression would perpetuate the cycle of increasing fuel loads and large, catastrophic fires creating an unnatural "homogenous" landscape. Visual impacts of large, catastrophic fires are more severe and widespread than those created by smaller fires that burn with varied intensity and pattern. From a wilderness user's perspective, the larger scale of catastrophic fires would compromise the solitude and visual integrity expected from a wilderness experience. Potential effects would be:

- Large areas of blackened landscape lasting for years, with dead or non-existent vegetation occurring over much larger acreages (thousands versus hundreds), often covering whole drainages.

- Large areas of dense, downed wood as snags fall.

- Delayed recovery of forest vegetation due to destruction of seed sources across the landscape, slowing the regeneration process. Associated with this would be a loss of diversity within the forest. Varied tree species add visual interest, and some stands within the project area would likely regenerate exclusively to lodgepole pine when intensely burned.

- Temporary or permanent trail closures resulting from erosion or slides from severely denuded areas.

- Lack of tree cover for shade, extending over large areas.

- Greater impacts on wilderness solitude and naturalness due to suppression efforts: fire line construction is more extensive and intense on larger fires, with more crews, aircraft, and power equipment used; fire retardant can be visible on the landscape for several years; and trail closures are usually more extensive and longer term.

- Large amounts of smoke within the wilderness, lasting for longer periods.

- Threat to public safety.

In the absence of any human-caused or lightning fires, this alternative would not have any effect on the wilderness in the short-term. However, given the fire history and number of ignitions received in the project area in 2001, a large catastrophic fire would likely occur in the future, with most of the effects listed above experienced.

3.7.3 Alternative 2 Environmental Consequences

Under Alternative 2, prescribed burning would occur on 641 acres within the North Fork John Day Wilderness, but no pre-treatment of fuels would take place. Prescribed burning is allowed in the Forest Plan Standards and Guidelines for Wilderness, which state, "…prescribed fire may be used as a tool to manage in accordance with management plans for each wilderness." The North Fork John Day Wilderness Fire Management Action Plan satisfies this requirement.

The primary effects of this alternative would be associated with impacts on solitude due to the burn operations, and all would be relatively short term (ten years or less). The number of individuals that a wilderness user encounters would increase. Encounters could include a crew building fire line, crews working the burn operation, crews performing post-burn fire line rehabilitation, or fire personnel monitoring the burn after completion. Intrusion of noise would increase from the use of chainsaws to buck up logs or fall snags from fire lines, portable water pumps for fire control, and helicopter operations during ignition or in the event of an escaped burn. A minimum requirement analysis was conducted to limit the use of machines and other deviations from wilderness values. Spring burning would occur during a low use period, although if the burn were conducted in the fall, hunters would be affected. In comparison, wildfires usually occur in the late summer/fall period when recreation use is high.

During ignition and over time as large concentrations of fuel burn out, smoke could limit visibility and cause wilderness users some physical discomfort. This would be limited in duration and is part of the natural fire process to be expected within a wilderness. The Blue Mountains were named for the "blue" aspect they gave when viewed from a distance, which was created by the frequent fires that historically burned throughout the summer seasons. Smoke created from this burn would be much less and of shorter duration than that experienced from recent large wildfires. Since a fully stocked stand would remain after treatments are complete, there would be no change in visual condition as viewed from the wilderness**.**

Trails could also be temporarily closed during ignition operations for user safety, limiting access to the wilderness. The necessity of trail closures for the burn operation would be determined when actual logistics of the burn operation are established; closures would not last long and, in fact, may not be necessary at all. In the long-term, treating this area of the wilderness would reduce risk of wildfire; thereby potentially reducing the risk of future extended trail closures. Also, there would be less deadfall to impede travel, because the amount of tree mortality would be less with prescribed fire (due to reduced fire intensity).

Visually, the prescribed burn would have relatively minimal short-term effects. This is due to the location of actual ignition (as opposed to the burn unit boundary), which would primarily occur in the more open ponderosa pine stands along the southern slope of the portion of wilderness to be treated. Not only would most of this area be visually blocked from the trails by topography, but the actual burn would also be low intensity, minimizing the effects visible to those walking through it. Immediately following the burn, blackened ground and some burned vegetation would be visible. Fire lines would be rehabilitated as necessary to blend with the surrounding landscape. Ash would be dispersed during the winter and spring following the burn and vegetation would resprout, so the appearance of the burn to the casual observer would be similar to or less than that of a natural fire within the wilderness.

Project design and mitigations would keep impacts to a minimum. For instance, existing trails would be utilized for fire line where possible to allow a more natural appearance. Minimum Impact Suppression Tactics (MIST) would be used for handline location, construction, and rehabilitation. The effects of prescribed fire would not be any more and would likely be much less than that generated from a natural fire in the wilderness due to higher fuel moisture levels, lower fire intensity, and other conditions required to remain within the fire prescription.

3.8 RECREATION

3.8.1 Existing Conditions

Outside of the wilderness boundary, there are some opportunities for recreation as well. There are no developed campgrounds, but numerous dispersed camps (30 - 40 sites) are located along open roads and Granite Creek. This is a very popular area for deer and elk hunters, receiving a lot of dispersed camping use during the fall season. While there are no designated OHV (Off-Highway Vehicle) trails in the area, all roads within the planning area are open to OHV travel (2001 Interim Program for ATV/OHV Strategy on the Umatilla National Forest). Additionally, Forest roads 1035-060, 1035-080, 1038-060, 7350-050, 7350-052, and 7350-070 are open seasonally to OHV use but closed to other motorized travel. There are no groomed snowmobile trails in the analysis area, but some snowmobile activity does occur during the winter months when there is adequate snow coverage. Other popular recreational pursuits in the area include mushrooming, firewood gathering and sight seeing.

3.8.2 Alternative 1 Environmental Consequences

The No Action Alternative would not likely alter existing recreation use patterns or facilities in the immediate future. However, the chance of a catastrophic fire would continue to increase. If this occurs, potential effects for the recreation setting and users would be loss of traditional dispersed campsites, large amounts of smoke, lack of tree cover for shade and wind protection, decreased opportunities for sightseeing and other recreation activities, and threat to public safety due to increased number of snags in the project area. Subsequently, recreation activities, such as hunting, hiking, camping, and sight-seeing, would decline due to the unfavorable and, at times, unsafe setting that would exist in the likely event of a catastrophic fire.

3.8.3 Alternative 2 Environmental Consequences

Proposed management activities could temporarily reduce the availability of recreation opportunities such as dispersed camping, OHV trail use, fishing, and access to traditional hunting areas, especially in the fall due to trail closures and smoke. However, these impacts would be short-term and outweighed by the longer-range benefits to the recreational opportunity, such as improved forage for big game animals, reduced wildfire hazard, and improved visual quality.

3.9 WILDLIFE

3.9.1 Existing Conditions

Old-growth Habitat

The amount of late and old structure forest is far below the estimated historic condition in the Granite Watershed (USDA, 1997a). One Dedicated Old Growth stand (Management Area C1) is located at the southern tip of the analysis area, but not within the project boundary. No inventoried old growth is found within the project boundary, but some is mapped within the analysis area.

Management Indicator Species

The following Management Indicator Species were identified by the Forest Plan to represent the welfare of a larger group of wildlife species presumed to share the same habitat requirements:

Rocky Mountain Elk

Elk are common within the analysis area. Numbers are near the desired population level, or 'management objective', set by Oregon Department of Fish and Wildlife. Big game security can be measured by evaluating the density of open roads and the availability of hiding cover. Current open road densities are quite low within the analysis area due to the large percentage of wilderness. Open road densities excluding the wilderness acres are also within the desired condition of an average of 2 miles per square mile Forest-wide (USDA, 1990). Hiding cover is relatively plentiful throughout the area due to dense understories and rolling topography.

Pileated Woodpecker

Reproductive habitat for this species is limited to a few scattered old growth areas and some smaller stands of mature mixed conifer. Pileated woodpeckers have been observed in the area.

Three-toed Woodpecker

This species nests in mixed conifer stands dominated by mature and old lodgepole pine. This habitat type is very limited in the analysis area, and no three-toed woodpecker observations have been recorded in this area.

Other Primary Cavity Excavators

These represent a vast array of vertebrate species that depend upon dead standing trees and down logs for reproduction and/or food gathering. Dead standing tree and down wood densities vary in the analysis area. Wilderness areas and stands affected by insect or disease have relatively high snag densities. Private land and areas that have been harvested in the past have fewer large snags and down logs.

American Marten

This species is also found in mature forests. Habitat is represented by the C1 management areas and scattered riparian corridors within mature forested stands. Marten are likely present in the analysis area, but not in substantial numbers.

Threatened, Endangered, and Sensitive Wildlife Species
The following Threatened, Endangered, Proposed, and Sensitive wildlife species have the potential to occur in or adjacent to the analysis area:

Gray Wolf (Endangered)
This species could occur in the area, although use within the analysis area has not been documented. A radio-collared gray wolf dispersed to the Blue Mountains from Idaho in March 1999, and was captured on the District (15 miles west of the project area) for relocation to Idaho. Another wolf was killed in October 2000 north of Ukiah. Other wolves have been reported in the Blue Mountain region. The Blue Mountains offer relatively high prey densities, large tracts of publicly owned land, and low human populations.

Northern Bald Eagle (Threatened)
Bald eagles are occasionally seen in the Granite and Clear Creek areas, but are not resident. Winter use has not been documented within the analysis area, but it does occur in outlying, lower elevation areas. Winter bald eagle use of the uplands would be limited to periods when snow depths are low or non-existent, usually early fall. They primarily feed on big game carcasses and spawning chinook salmon.

Canada Lynx (Threatened)
The Blue Mountains are considered to be on the fringe of the range of Canada lynx. Lynx are known to have occurred in the area historically, and several recent but unconfirmed sightings have been reported in the Blue Mountains. Surveys have been ongoing and to date no lynx have been detected. The majority of potential lynx habitat is found at higher elevations (>5000') in cool, moist habitat types.

The analysis area falls within two Lynx Analysis Units: subwatersheds 93A and 93B are included in the Granite Lynx Analysis Unit, and Subwatershed 94A is within the Meadow Creek Lynx Analysis Unit. Existing lynx habitat conditions in these Lynx Analysis Units are displayed below (Table 8). About 94 percent of the potential lynx habitat in the Granite Lynx Analysis Unit is considered currently suitable for foraging and denning, while approximately 51 percent is suitable in the Meadow Creek Lynx Analysis Unit (largely due to loss of habitat in the Tower Fire).

Table 8. Current condition of Lynx Analysis Units (LAU) in the Buck Creek Underburn analysis area.

LAU	Potential	Denning	Foraging	Unsuitable[11]	% Suitable	% Unsuitable[12]
Granite	24,932	11,379	12,010	1,543	94	6
Meadow Creek	59,431	32,87	27,034	29,110	51	49

[11] Lynx potential habitat in currently unsuitable condition.
[12] If more than 30% of potential habitat is currently unsuitable, the Lynx Conservation Assessment Strategy requires that no further reduction of suitable habitat shall occur as a result of vegetation management activities.

California Wolverine (Sensitive)
Habitat is present for foraging California wolverine. California wolverines have not been detected on the District, despite extensive surveys conducted in the last decade. However, there have been unconfirmed reports of wolverine within the Granite Watershed.

Peregrine Falcon (Sensitive)
This species is not known to occur within the analysis area, although individuals have been observed foraging in other parts of the District during the non-breeding season. Potential nesting habitat on the District has been surveyed for many years (1991–2001) and no peregrine nests have been found.

Columbia Spotted Frog (Sensitive)
Spotted frogs have not been observed within the analysis area, however, no formal surveys have been completed. Suitable habitat for spotted frogs occurs along creeks, wet meadows, and springs.

Neotropical Migratory Birds
Neotropical migrants account for nearly half of the avian species diversity in the watershed, and occupy a wide variety of habitats. Most birds in eastern Oregon ponderosa pine forests are 'foliage-gleaners', which forage primarily by gathering insects or fruit from vegetation rather than from the ground (Sallabanks et al., 2001). Three habitat types are considered "priority" in the *Conservation Strategy for Landbirds* (Altman, 2000): dry forest; late-successional, mesic, mixed conifer; and riparian woodland and shrub. Many neotropical migrant species favor open stands of old ponderosa pine. This habitat (dry forest) has declined as these stands have grown in with more shade-tolerant species. There are limited amounts of dry forest (<500 acres) and a few patches of late-successional, mesic, mixed conifer forest outside of proposed units. Riparian woodland and shrub habitat occurs throughout the analysis area and ranges from poor condition (due to mining, roads, and other activities), to good condition within the wilderness and some other areas.

Ground and Shrub Nesting Birds
Approximately 40 bird species that nest on the ground or in shrubs are known to occur on the Umatilla National Forest. There are no data available on the density of nesting birds and the total bird species composition of the project area.

3.9.2 Alternative 1 Environmental Consequences

Old Growth Habitat
Under this alternative, fuels reduction treatments would not occur, so the possibility of stand-replacing wildfires and related loss of old growth habitat would remain, becoming greater as fuels accumulate. Forest health would continue to be at risk, reducing the quality and availability of old growth habitat components. No reduction in fir encroachment or thinning of overstocked ponderosa pine stands would occur, so the development of future old growth could be delayed.

Management Indicator Species
Although elk hiding cover would be maintained in the short-term, forest health would continue to be at risk, potentially reducing the quality and availability of the other habitat components in the future. Fir encroachment and overstocking in ponderosa pine stands could delay development of

mature forest, thus delaying development of habitat for marten, pileated woodpecker, and other primary cavity excavators dependant on large snags and down wood.

Threatened, Endangered, and Sensitive Wildlife Species
This alternative would have **no effect** on gray wolf, bald eagle, or Canada lynx, and **no impact** on peregrine falcon, or spotted frog. Stand replacing wildfires would likely occur in the future, becoming more probable as fuels accumulate. Forest health would continue to be at risk, reducing the quality and availability of habitat components for California wolverine.

Neotropical Migratory Birds
Fir encroachment and dense understories would delay development of mature dry forest (a single-layered canopy of large trees with an open, park-like understory dominated by herbaceous cover, scattered shrub cover, and pine regeneration). Area neotropical migratory species that are associated with this habitat would remain stable or decline until more of this type of habitat develops.

No change in late-successional, mesic, mixed conifer forest or riparian woodland and shrub habitat would occur, so neotropical migrants associated with these habitats should not be affected.

Ground-nesting Birds
No change in ground and shrub avian nesting habitat would be expected, therefore there would be no direct effects on species dependant on this habitat. The possibility of future stand-replacing wildfires would remain; such wildfire could reduce nesting habitat for these species on a large scale.

3.9.3 Alternative 2 Environmental Consequences

Old Growth Habitat
Stands that do not currently provide old growth habitat would be underburned, promoting the development of future old growth and benefiting old growth dependent species in the long-run. The risk of potential stand-replacing fire would be greatly reduced. Underburning would reduce the current fuel levels, as well as kill fir encroachment and thin overstocked ponderosa pine stands. Plant species that are dependent on or associated with fire would become more vigorous, improving overall stand health and benefiting wildlife that depend on naturally occurring ponderosa pine habitat.

Management Indicator Species
Pre-treatment of fuels and underburning would reduce hiding cover for elk within much of the project area, however, the relatively low open road densities would help to compensate for this effect on big game security. Experience has shown that a successful underburn may only cover a maximum of 60 percent of the target area, resulting in a mosaic of burned and unburned vegetation on a local scale, as well as a landscape scale. Elk would likely move to unburned cover during underburning and other disturbing activities such as fuel pre-treatments (due to chainsaws and human presence). One to four burn entries would be required to achieve the desired fuels reduction over a 10-year period. Pre-treatment of fuels prior to burning would allow more control over the effects of the fire. Pre-treatment would focus on areas where small trees would be cut in order to reduce ladder fuels and protect larger trees from scorch. Large patches of unburned cover would be

available for big game escape during and after project activities. The adjacent wilderness would also provide a large area for big game to move into during hunting seasons, if needed. An increase in forage quality and availability would provide long-term benefits to elk. An increase of more nutritive vegetation usually occurs in response to underburns (Nelson and Leege, 1982). Many palatable grass, forb, and shrub species would increase in quantity and quality. Ungulates would spread out and utilize uplands rather than concentrate in riparian areas.

Most snags and logs would not be impacted by the proposed project. Snags and logs in stages of late decay could be partially consumed depending on their moisture content. The mitigation restricting ignition near these habitat components would also help reduce this effect. In addition, the loss of a few snags and logs should not affect local wildlife populations since most areas contain much more than the minimum requirements for these components. Riparian areas would not be ignited except to control fire intensity or soil exposure, but fires would back down into riparian areas, resulting in a lighter intensity burn in those habitats. This could protect the habitat complexity and canopy cover often associated with riparian areas, yet also promote growth of larger trees. Habitat for marten would likely benefit from this strategy.

This project in conjunction with past, ongoing, and future foreseeable activities such as mining, hunting, and riparian habitat improvement would not affect Rocky Mountain elk populations or reduce the amount or quality of big game habitat. The proposed activities would also not negatively affect marten and cavity dependent species. Underburning would remove some snag and down tree habitat, but underburning would also create these features. The wilderness would provide a large undisturbed area adjacent to the project area, which would help offset disturbances to wildlife within the project area.

Threatened, Endangered, and Sensitive Wildlife Species

Gray Wolf

The proposed activities would have **no effect** on individuals or the quality or quantity of habitat. Wolves are not known to be in the area, and no denning or rendezvous sites are known. Cumulatively the proposed activities, in combination with other ongoing projects and future foreseeable projects, would not affect wolves or their habitat because of the limited duration and intensity of activities, the small percentage of area affected, and the current lack of sightings in this area.

Bald Eagle

Since bald eagles seldom use the area and fire is a naturally occurring disturbance, no direct effects are expected. Pre-treatment of fuels would not affect habitat components for bald eagle. Large pine and fir trees near waterways would not likely be consumed by the underburning, and mortality of these trees would still provide eagles with roosts. Bald eagle prey resources such as fish and small mammals would not be impacted. Cumulatively the proposed activities, in combination with past, ongoing, and future foreseeable projects, would not affect bald eagles or their habitat because of the limited duration and intensity of activities, and the small percentage of eagle habitat affected. Therefore, this alternative would have **no effect** on bald eagles or their habitat.

Canada Lynx

In the Granite Lynx Analysis Unit, pre-treatment of fuels would not occur in lynx habitat. Underburning would mimic low-intensity wildfire, although a spring underburn might not spread well within cool moist habitat types that comprise lynx habitat. Some existing snowshoe hare foraging habitat could burn, but the patchiness of underburning would not likely reduce the suitability of lynx habitat within the analysis area. Even if all lynx habitat within the proposed treatment units burned completely, the reduction in suitable lynx habitat would be only 385 acres, changing the percent suitable from 94 percent to 93 percent in the Granite Lynx Analysis Unit. Any burned lynx habitat would be enhanced in the long-term, since lodgepole pine would be expected to re-establish and provide quality snowshoe hare foraging habitat into the future.

In the Meadow Creek Lynx Analysis Unit, no underburn units are proposed within lynx habitat, so all patches of regenerating conifer and aspen in potential lynx habitat would be maintained. However, lynx habitat could be affected if the fire became uncontained on the northern boundary of the analysis area.

This alternative would be consistent with the *Lynx Conservation Assessment and Strategy* (USDA et. al. 2000) and the Umatilla Programmatic Biological Assessment for Lynx (USDA 2001). The proposed activities **may affect, but are not likely to adversely affect** the Canada lynx or its habitat. Since lynx are not known to be in the area, and suitable habitat is plentiful within the analysis area, no direct, indirect, or cumulative effects are expected.

California Wolverine

The proposed activities would reduce tree densities, but canopy cover and forest structure would be maintained, providing suitable habitat for travel and foraging of wolverine. The risk of potential stand replacing fire would be greatly reduced. Proposed activities would contribute to the overall health of forest stands and be beneficial to wolverine prey species. The proposed activities, in combination with past, ongoing, and future foreseeable projects, would have **not impact** on wolverine because of the limited duration and intensity of activities, and the small percentage of area affected.

Peregrine Falcon

Due to the limited duration and intensity of activities and the small percentage of area affected would have **no impact** on peregrine falcons. Peregrine falcons could pass through the project area, but are not resident, so they should not be cumulatively impacted by the proposed activities.

Columbia Spotted Frog

Proposed activities would maintain potential spotted frog habitat in the area. Based on observations of past underburns and mitigation proposed for Riparian Habitat Conservation Areas, prescribed burning should maintain the quality of riparian habitat. Spotted frogs primarily remain in the water and would be protected from direct effects of fire. These frogs prefer warm, slow flowing or freestanding water, and so would not be affected by a loss of riparian shade. The proposed activities, in combination with past, ongoing, and future

foreseeable projects, would have **no impact** on spotted frogs because of the limited duration and intensity of activities, and the small percentage of area affected.

Neotropical Migratory Birds
Proposed underburning would promote the development of mature dry forest, benefiting neotropical migratory species favoring this habitat type.

No change in late successional, mesic, mixed conifer habitat is anticipated since no management activities are proposed within this habitat type.

Riparian areas would typically not be ignited, however, prescribed fire would burn into them, resulting in a primarily low intensity burn within riparian zones. This could protect the habitat complexity and canopy cover associated with riparian areas, yet also promote tree growth and reduce the potential for stand-replacing fire.

Ground-nesting birds
Pre-treatment of fuels would target young fir trees and generally would not affect hardwood shrubs and most ground cover. Since some resident birds nest in April, underburning in the spring could temporarily displace ground and shrub nesting birds. Lingering smoke could also cause nest abandonment or suffocation of young birds unable to fly out of the smoke. Some nests would likely burn, but it is highly possible that those birds would re-nest in the same season (R.Sallabanks, personal communication). Most migratory birds do not nest until May or June, after opportunities for spring burning, but spring underburning could reduce nest structure availability. In addition, a reduction in ground cover could result in an increase in predation. A spring underburn usually covers a maximum of 60 percent of the target area, resulting in a mosaic on a local scale, as well as a landscape scale. This would reduce the amount of habitat and individuals impacted by the proposed projects. Past monitoring of bird communities in burned and unburned areas on the Umatilla National Forest showed little response to spring burns (Turner and Sallabanks, 2000).

Cumulative effects would be minimal because no other projects occurring in the analysis area would remove ground or shrub nest structure. The proposed treatments would not incrementally increase impacts to ground and shrub nesting bird populations when added to past, ongoing, and foreseeable future activities due to the limited duration and intensity of proposed treatments and the small percentage of area affected.

3.10 COMPLIANCE WITH OTHER LAWS, REGULATIONS, & POLICIES

3.10.1 Endangered Species Act

Threatened and endangered fish and wildlife species were discussed under Section 3.3, Fish Populations and Habitat, and Section 3.9, Wildlife. Surveys and Biological Evaluation of the potential project impacts to threatened or endangered fish and wildlife species were conducted by professional biologists. The Biological Evaluations contain determinations that there would be **no effect** on gray wolf or bald eagle. Activities proposed under Alternative 2 **may affect, but would not likely adversely affect** lynx, steelhead trout, and bull trout. Consultation with the U.S. Fish and Wildlife Service and National Marine Fisheries Service regarding steelhead trout, and bull trout

will occur before making a decision on this environmental assessment. The U.S. Fish and Wildlife Service have concurred with the determination for lynx in their letter to Jeff Blackwood in February 2001.

The project area was also surveyed for sensitive and federally listed plants in 1993, 1995, and 1997. The Biological Evaluation for Plants determined that the preferred alternative should **no effect** on *Silene spaldingii*, which is proposed for federal listing under the Endangered Species Act.

3.10.2 National Historic Preservation Act

Informal consultation with the Confederated Tribes of the Umatilla Indian Reservation did not reveal any tribal concerns. A review of cultural and heritage resources was conducted for the project area. Through surveys conducted in 1991, 1993, and 1997, one prehistoric and nine historic sites have been identified in the project area. Through project design, all of these sites would be protected from any ground-disturbing activities associated with the Buck Creek Underburn. Those sites that contain wooden structures or features that could be affected by the fire would be protected with mitigation methods that do not disturb the soil. If implemented as proposed, this project will have no effect on any historic property considered eligible or potentially eligible to the National Register of Historic Places.

3.10.3 Clean Air Act

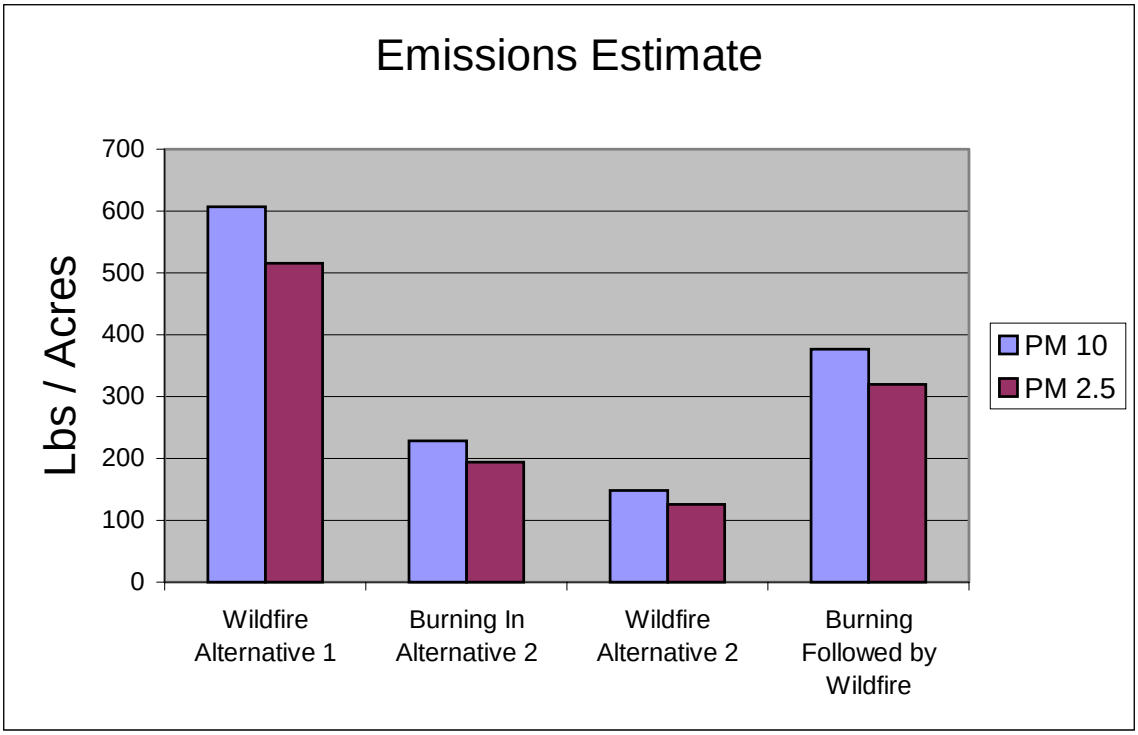
Compliance with the Clean Air Act includes providing an assessment of the need to use prescribed burning. Other methods of treating fuels were considered during the development of alternatives including grapple piling, slash busting, and chipping. Because of the impacts of mechanical treatments on soils, fisheries, and wilderness issues, mechanical treatment proposed under Alternative 2 would be limited through most of the analysis area, using only chainsaws to reduce ladder fuels. As a result, low intensity prescribed burning on a short return interval, as described under Alternative 2, would be the best means to maintain the fuels over a long period.

Approximately 1,059,422 lbs of PM10 particulates (898,788 lbs of PM2.5) would be created under Alternative 2 through the burning of activity and natural fuels. The effect of the prescribed burning would be short-term and have little impact on surrounding communities and Class I Wilderness areas, due to the location of the project area. The closest 'Special Protection Zone' would be La Grande, Oregon, with a distance of approximately 48 air miles from the project area. Impacts from smoke would be restricted to individual dwellings within the immediate area (Granite and dispersed camp sites in the project area) for short periods. Baker City is a 'sensitive' area and is about 30 air miles away. The project area is more than 40 air miles from the nearest Class I Wilderness area and is located in portions of a Class II Wilderness area.

Due to the remote nature of the project area, distance to protected and sensitive areas, and relatively small acreage treated, smoke emissions would have little to no effect on public health or use of National Forest or private lands within the analysis area. Following treatment, future wildfires are expected to burn at a much reduced intensity, primarily as surface fires in the remaining cast off tree needles and grass fuels, with emissions on the range of 130 to 155 lbs per acre (PM10). Table 9 illustrates the expected differences in emissions between a summer wildfire prior to treatment, emissions from underburning, and a summer wildfire following underburning. Of note is the projection that combined underburning and a post-burn wildfire would have lower combined

emissions than would a pre-treatment wildfire, primarily due to lower fire intensities and less consumption of canopy fuels.

Figure 3. Comparison of anticipated smoke emissions between alternatives.



Any prescribed burning operations within the project area would be consistent with the State of Oregon's Smoke Management Implementation Plan, and would be implemented within guidelines of the Smoke Management Program. Smoke emissions would be managed to minimize the amount of smoke that is generated through any planned treatments. Burning would take place under conditions favorable to effective mixing and dispersion of smoke.

In conclusion, this project would comply with the requirements of 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.

3.10.4 Clean Water Act

The Clean Water Act of 1977 was enacted to facilitate the restoration and maintenance of the chemical, biological, and physical integrity of the waters of the United States. The Act was amended in 1987 to protect national waters from pollution from point and non-point sources. As part of the implementation of this Act, the State of Oregon maintains an inventory of water quality limited streams, which is based upon standards developed by the Oregon Department of Environmental Quality. Determination of a Total Maximum Daily Load standard for the North Fork John Day Subbasin, which encompasses the Buck Creek analysis area, is anticipated by 2003.

Table 9 lists the beneficial uses of water in the analysis area and lists the water quality criteria used as standards for assessing water quality for the North Fork John Day River subbasin.

Table 9. Beneficial uses and water quality criteria for the North Fork John Day subbasin

Beneficial Use	Associated Water Quality Criteria
Public Domestic Water Supply	Turbidity, Chlorophyll a
Private Domestic Water Supply	Turbidity, Chlorophyll a
Industrial Water Supply	Turbidity, Chlorophyll a
Irrigation	None
Livestock Watering	None
Anadromous Fish Passage	Biological Criteria, Dissolved Oxygen, Flow Modification, Habitat Modification, pH, Sedimentation, Temperature, Total Dissolved Gas, Toxics, Turbidity
Salmonid Fish Rearing	Dissolved Oxygen, Flow Modification, Habitat Modification, Sedimentation, Temperature
Salmonid Fish Spawning	Same as Salmonid Fish Rearing
Resident Fish and Aquatic Life	Same as Anadromous Fish Passage
Wildlife and Hunting	None
Fishing	Aquatic Weeds or Algae, Chlorophyll a, Nutrients
Boating	None
Water Contact Recreation	Aquatic Weeds or Algae, Bacteria, Nutrients, pH
Aesthetic Quality	Aquatic Weeds or Algae, Chlorophyll a, Nutrients, Turbidity

Activities such as road building, timber harvest, mining, and fires can create non-point sources of pollution. Spills of fuels used in machinery can create point sources of pollution. Observing relevant Best Management Practices (Appendix C) can serve to prevent or minimize both types of pollution, as can effective restoration and enhancement of watershed and riparian areas, and improved monitoring for the detection of water quality parameters of concern. Observing Best Management Practices would serve, at a minimum, to maintain current water quality in analysis area streams.

Lower Granite Creek is cited on the State of Oregon's 1998 303(d) list as water quality limited. Limiting criteria include sedimentation, temperature, and habitat modification (USDA, 1999). Neither Ten Cent Creek nor the portion of the North Fork John Day River within the analysis area is cited in the listing for hydrologic parameters.

Alternative 2 would have little or no effect on existing stream temperatures because pre-treatment of fuels would not occur within Riparian Habitat Conservation Areas. However, stream temperatures would increase if substantial areas of riparian vegetation burned. Prescribed burning under controlled conditions is unlikely to kill enough vegetation to cause a measurable rise in stream temperature, or to cause substantial habitat modification. Mitigation measures 1-3 are designed to protect riparian vegetation. The project poses some potential for soil erosion and off-site movement of sediment, but these would be kept to a minimum through protection of Riparian Habitat Conservation Areas and implementation of Best Management Practices and mitigation measures 1, 2, 3, 5, 6, and 10. Sedimentation is not expected to be enough to measurably alter stream functionality.

By observing the Best Management Practices and mitigations described in this document, Alternative 2 would protect beneficial water uses in this area and maintain water quality in associated streams in compliance with the Clean Water Act.

3.10.5 National Forest Management Act

Under Alternative 2, proposed pre-treatment of fuels and underburning would reduce the chances of catastrophic wildfire and return the forest to a more natural fire regime with frequent, low-intensity fires. The prescribed burning of natural and activity fuels would reduce long-lasting hazards from wildfire, while air quality would be maintained at a level that would meet or exceed applicable Federal, State, and local standards. All proposed activities would provide sufficient habitat to maintain viable populations of fish and wildlife and critical habitat for threatened or endangered species would be protected. Proposed activities would accelerate development of forest habitats that are currently deficient within the analysis area, enhancing the diversity of plant and animal communities in the long-term. See discussions under the applicable resource sections above for further support that proposed activities would comply with the seven requirements associated with vegetative manipulation (36 CFR 219.27(b)), riparian areas (36 CFR 219.27(e)), and soil and water (36 CFR 219.27(f)).

3.10.6 Executive Orders 11988 and 11990: Floodplains and Wetlands

Executive Order #11988 provides for the protection of flood plains, while Executive Order #11990 provides for the protection of wetlands. Alternative 2 would be consistent with these orders because activities would avoid these areas.

3.10.7 Executive Order 12898: Environmental Justice

Executive Order 12898 requires that federal agencies adopt strategies to address environmental justice concerns within the context of agency operations. With implementation of Alternative 2, there would be no disproportionately high and adverse human health or environmental effects on minority or low-income populations. The actions would occur in a remote area and nearby communities would mainly be affected by economic impacts as related to contractors implementing fuel pre-treatments. Racial and cultural minority groups could also be prevalent in the work forces that implement prescribed fire or fuel pre-treatment activities. Contracts contain clauses that address worker safety and equal employment opportunities. Therefore, the proposed activities should not conflict with environmental justice goals.

3.10.8 Energy Requirements and Conservation Potential

Some form of energy would be necessary to supply mechanized equipment for prescribed fire and pre-treatment of fuels. Pre-treatment of fuels would involve small machines (chainsaws), while prescribed fire would have high fuel requirements associated with helicopter operations.

3.10.9 Prime Farmland, Forestland, and Rangeland

No prime farmland, rangeland, or forestland occurs within the analysis area.

3.10.10 Wild and Scenic Rivers Act

The North Fork John Day River was designated a National Wild and Scenic River in 1988, and the segment of the river within the analysis area is designated 'Wild'. This designation carries much the same management emphasis as the surrounding wilderness. The North Fork of the John Day Wild and Scenic River Management Plan, completed in June 1993, allows for the use of prescribed fire as a tool to meet vegetation management needs. Prescribed burning would occur within the Wild and Scenic River corridor, and would comply with standards and guidelines in the Forest Plan and Wild and Scenic River Management Plan. The nearest fuel pretreatment units would be over a mile away. Therefore, this project would comply with the Wild and Scenic Rivers Act.

3.10.11 Forest Plan Consistency

That portion of the analysis area that is not designated as wilderness or Wild and Scenic River (i.e. the majority of the project area) is managed under the Forest Plan as C7 Special Fish Management Area. Standards and guidelines for C7 management areas relevant to this project are as follows:

- Within 250 feet of all streams and wet areas associated with streams, limit the mineral soil exposed by ground-disturbing activities to 10 percent of the project area.

- Within the riparian constraints of 10 percent exposed mineral soils and 80 percent stream surface shading, prescribed burning may be utilized in riparian areas as long as consistent with strategy goals. Within fish and water goals, prescribed fire may be used on the remainder of the management area in order to meet resource objectives.

- Fuels should not exceed an average of 9 tons per acre in the 0 to 3-inch size class.

- Where natural conditions permit, streamside vegetation along the entire length of perennial streams will be managed to maintain an average shading of 80 percent of the entire stream surface shaded. Where existing shading is already below this level, retain all vegetation contributing to stream-surface shading.

Design and mitigation consistent with all of the above guidelines are discussed in Section 2.

Activities proposed within Riparian Habitat Conservation Areas are expected to comply with PACFISH criteria. This includes no pre-treatment of fuels within Riparian Habitat Conservation Areas and limiting the exposure of mineral soil to no more than 10 percent. As a result, activities proposed under either alternative would be consistent with the Forest Plan.

3.10.12 Consumers, Minority Groups, and Women

Some of the activities associated with Alternative 2 could be contracted. Contracts would be governed by federal contract regulations, which prohibit discrimination based on race, color, sex, religion, etc. While proposed activities could create some jobs, no quantitative output, lack of output, or timing of output associated with these projects would affect the civil rights, privileges, or status quo of consumers, minority groups, or women.

3.10.13 Unavoidable Adverse Effects

Implementation of either alternative would result in some minor adverse environmental effects. The severity of the effects would be minimized by adhering to direction in the management prescriptions and Standards and Guidelines in Chapter IV of the Forest Plan and additional mitigation proposed in Section 2 of this document. These adverse environmental effects are discussed at length under each resource section.

3.10.14 Short-term Use and Long-term Productivity

Short-term uses are generally those that determine the present quality of life for the public. In the Pacific Northwest, these uses typically include: timber harvest, livestock grazing, recreation, transportation, utility corridors, and wildlife habitat. Long-term productivity refers to the land's capability to support sound ecosystems producing a continuous supply of resources and values for future generations.

Alternative 1 Environmental Consequences

There would be no change in short-term uses within the analysis area, although there would be a risk of reducing long-term productivity in the event of a catastrophic fire or insect infestation.

Alternative 2 Environmental Consequences

Considerable research suggests that nitrogen reserves, organic residues, and soil physical properties are critical elements of the ecosystem that must be carefully managed to ensure long-term productivity (Little and Klock, 1985; Sachs and Sollens, 1986; Harvey et. al., 1987; Powers and Weatherspoon, 1984; and Amaranthus and Perry, 1987 as cited in the Tower Fire Recovery Project EIS [USDA, 1997b]). Pre-treatment of fuels, as designed and mitigated, would have little effect on long-term productivity, while underburning would benefit productivity by cycling nutrients bound in fine fuels into the soil (the fire would burn cooler, so fewer nutrients would be volatilized).

Large fuel accumulations have developed due to fire exclusion and could result in unacceptable impacts on air quality under catastrophic fire conditions, as witnessed during the large fires of 1996. Pre-treatment of fuels and prescribed fire could be used both effectively and efficiently to reduce fuel loadings and otherwise manipulate the various fuel complexes within the analysis area. This would greatly reduce the consequences of a wildfire within and adjacent to the manipulated fuel complexes. Proposed activities would also enhance the long-term productivity of wildlife habitat, increase stream flows, provide more visual diversity, and provide the disturbance necessary for the perpetuation of important plant species. The temporary impacts of smoke from prescribed fire under Alternative 2 would have minor effects on the short-term use of Forest resources such as recreation sites, visual resources, and wilderness. The use of prescribed fire to reduce the flammability within treatment units would affect long-term forest productivity by reducing the risks and consequences of a major wildfire. The long-term benefits of prescribed burning natural fuels more than outweigh the short-term impact to air quality.

SECTION 4
AGENCIES AND PERSONS CONSULTED

The interdisciplinary team was made up of Forest Service resource specialists as well as private consultants from Boateng & Associates, Inc. (an environmental consulting firm). Names and affiliations are listed below.

Forest Service Interdisciplinary Team Members:

Randy Fitzgerald	Team Leader
Rick Guglielmi	Wilderness and Recreation Specialist
Noel Livingston	Fire and Fuels Specialist
Holly Harris	Wildlife Biologist
Lea Baxter	Silviculturist
Janel Lacey	NEPA Specialist

Boateng & Associates, Inc. Interdisciplinary Team Members:

Lori Anderson	Writer and NEPA Specialist
Bill Rodgers	Hydrologist
Bob Meyer	Fisheries Biologist

Scoping letters were sent to the mail list of interested public maintained at the Umatilla National Forest Supervisor's Office. This included the Confederated Tribes of the Warm Springs Reservation of Oregon, the Confederated Tribes of the Umatilla Indian Reservation, and Oregon Department of Fish and Wildlife.

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