United States
Department of
Agriculture

Forest
Service

November 2004

Environmental Assessment

Gibbonsville Wildland/Urban Interface Fuels Reduction Project

North Fork Ranger District, Salmon-Challis National Forest
Lemhi County, Idaho

For Information Contact: Terry Hershey
North Fork Ranger District
(208) 865-2700

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Chapter 1

Purpose and Need

Chapter 1
Purpose and Need

Introduction

This Environmental Assessment (EA) discloses the direct, indirect and cumulative environmental impacts of the proposal to reduce hazardous fuel conditions around the community of Gibbonsville and other North Fork drainage communities.

This chapter outlines the Proposed Action, Purpose and Need, and Decision Framework for this action. This chapter describes how the proposal implements the Salmon National Forest Land and Resource Management Plan (Forest Plan; [USDA Forest Service, 1988]) and other laws and regulations, and also describes the environmental issues derived from public involvement and other scoping activities, including cumulative effects issues.

Description of the Area

The project area includes approximately 20,650 acres in the area surrounding the community of Gibbonsville (T26N, R21E, Section 25, Boise Meridian) on the North Fork Ranger District of the Salmon-Challis National Forest, Lemhi County, Idaho (Map 1 page 1-3). The project area is within the North Fork Salmon River watershed, approximately 10 miles upstream from the North Fork Salmon River and Salmon River confluence, and 25 miles north of Salmon, Idaho.

The project area was chosen based on logical watershed and administrative boundaries, considering previous watershed assessments and the potential for large wildfires that could impact private land and important Forest resources. The project area is bordered by the continental divide to the east, the West Big Hole Roadless Area to the southeast, the northern portion of the Hughes Creek watershed to the southwest and west, Forest Service Road 60449 to the northeast, the Anderson Mountain Roadless Area to the north, and the West Fork of Nez Perce Creek drainage to the northeast (Map 2, page 1-4).

Proposed Action

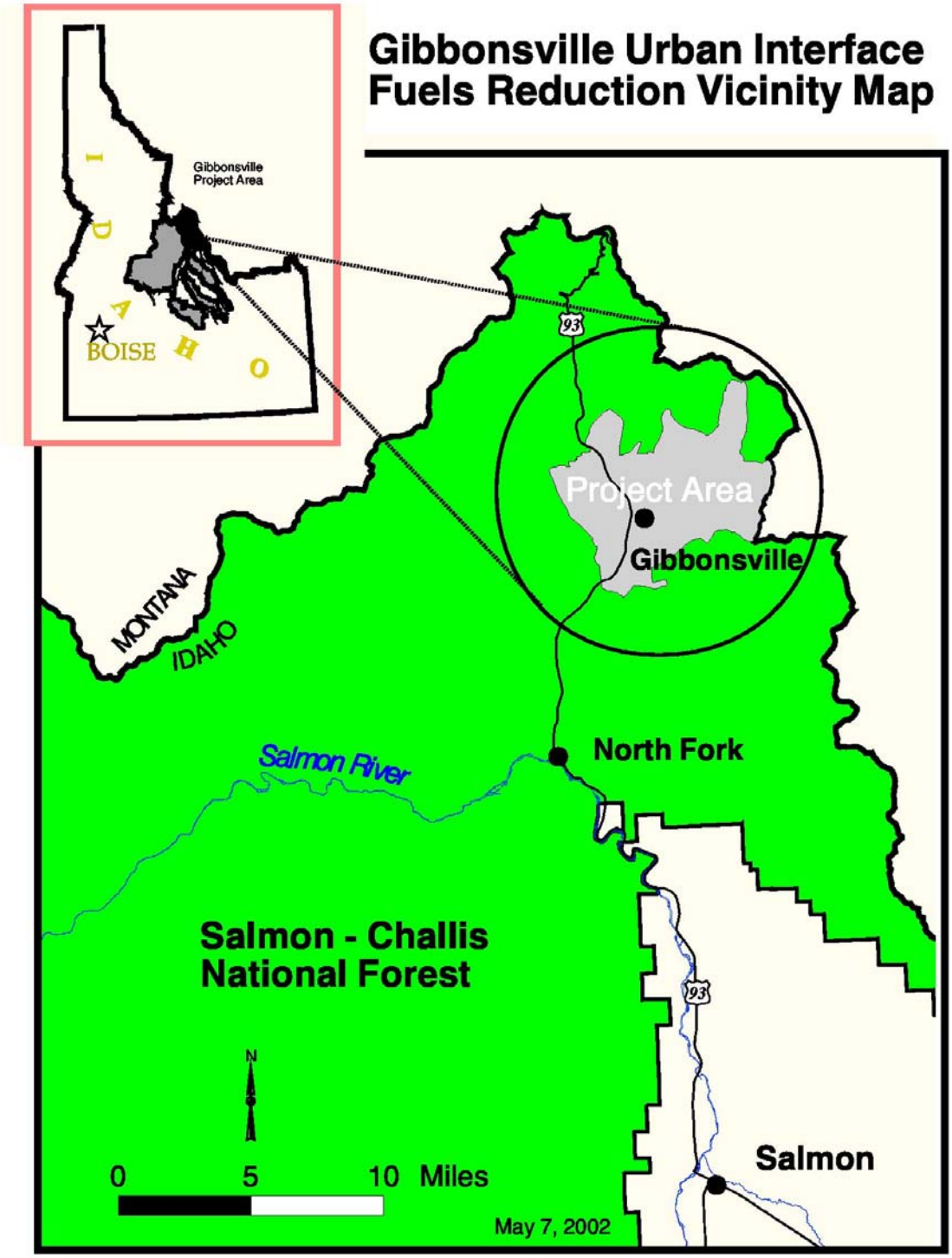
The Forest proposes to reduce the risk of high severity wildfires and improve forest health by using prescribed fire and thinning of timber stands within the project area. Specifically, this project proposes to:

- Use low intensity prescribed fire to underburn dry forest types such as ponderosa pine and Douglas-fir stands.
- Use low intensity prescribed fire to reduce unnaturally high accumulations of logs and ladder fuels.
- Thin timber stands by cutting and removing trees, followed by underburning, broadcast burning and burning concentrations of slash.

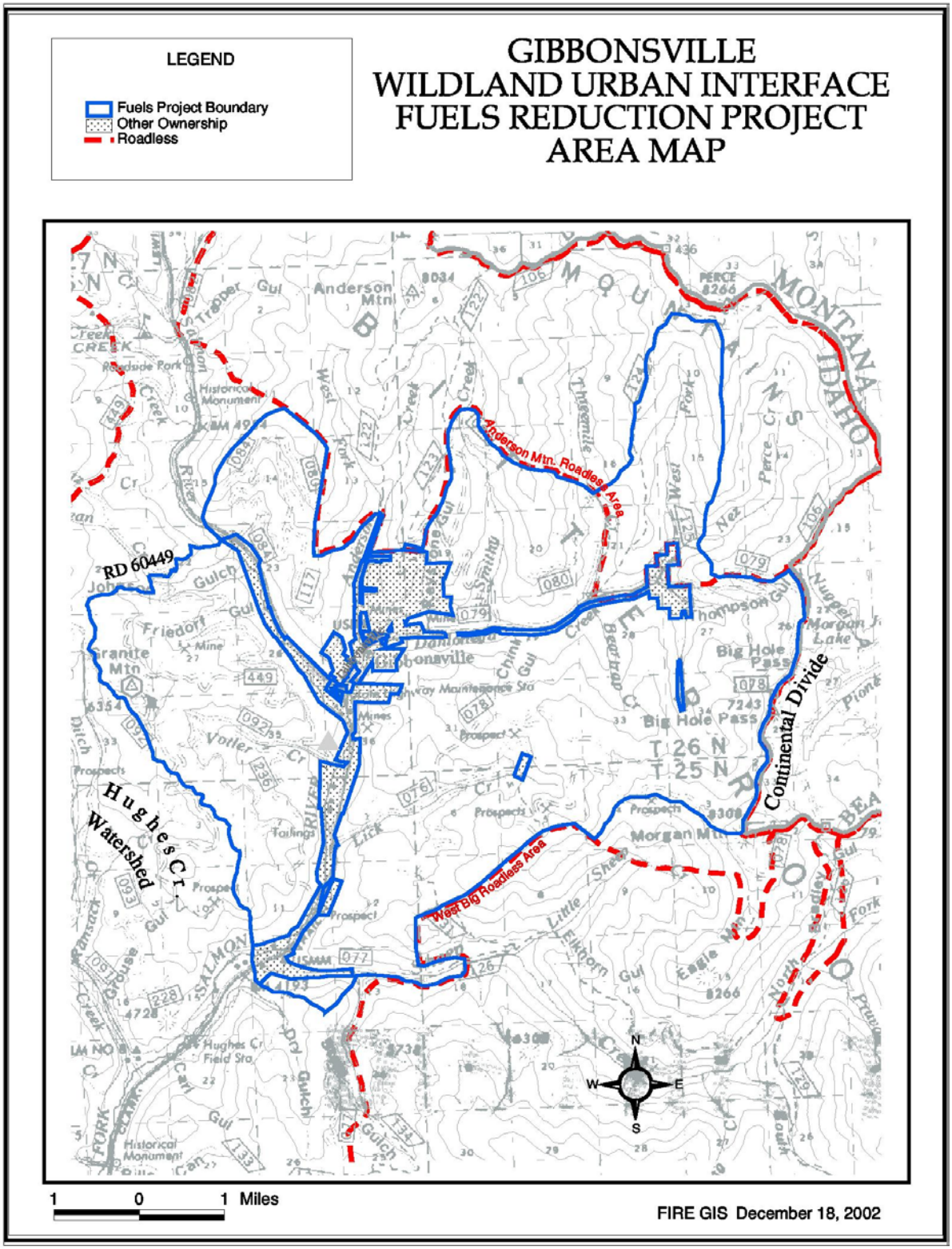
Background

Over the last decade, the Forest has conducted three resource assessments in the Upper North Fork watershed (USDA Forest Service, 1995; USDA Forest Service, 1998; Hoyt, 2000). Each of these assessments covered the Gibbonsville and Dahlonega Creek areas and highlighted the increasing risk of severe fire in the wildland-urban interface.

Map 1. ***Vicinity Map***



Map 2. ***Project Area***



Steep slopes, heavy duff, and ladder fuels characterize the area (Figure 1). Many private residences are scattered throughout the drainage. Homes are typically located in valley bottoms surrounded by steep slopes with high concentrations of heavy fuels. This combination raises the potential for crown fires and high intensity surface fires. Access to the private property is largely via narrow, dead-end roads. The combination of a limited road system, high fuel loads, and steep slopes means that much of the private property lacks "defensible space" where firefighting personnel could work safely and provide protection under wildfire conditions.

Figure 1. *Existing Condition, 2000- Photo of forest litter and ladder fuels, typical on the Salmon-Challis Forest.*

Most of the forest types in the Gibbonsville project area experienced frequent historical fires, every 25 years or less (Crane and Fisher, 1986). These low to moderate severity fires maintained relatively open forests of ponderosa pine and Douglas-fir in a variety of ages (Figure 2) and sizes, while keeping surface fuel accumulations low (Agee, 1993). Severe crown fires were uncommon and most fires left most forest overstory trees alive. However, the majority of the upper North Fork drainage has not burned in the past century. The Forest's fire records show that from 1919 to 1996, only 10 percent of the Gibbonsville project area burned (project files, Forest Health). The percentage of area burned would have been higher if these fires had been allowed to burn under natural fire cycles.

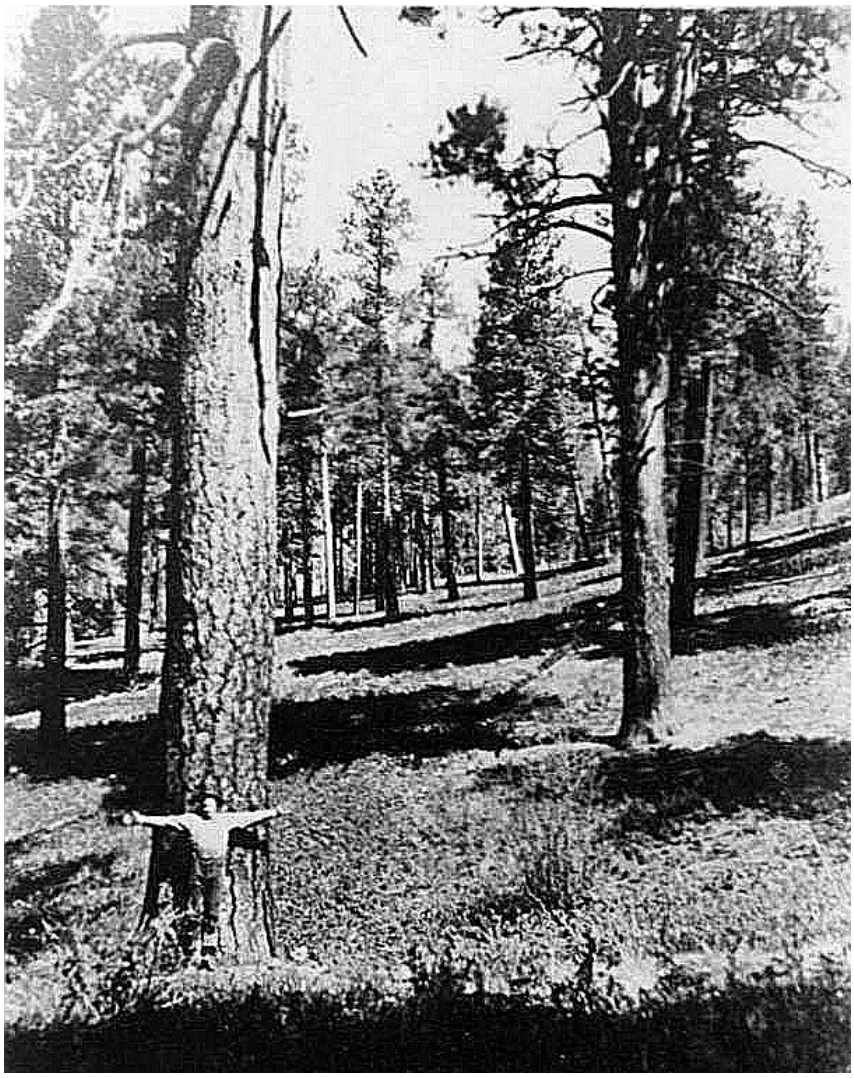


Figure 2. *Desired Condition, 1913- Large overmature trees on a bar in Humbug Gulch. Typical yellow pine country." H. Work, 1913.*

Current forest conditions in the project area are similar to those that existed on the Salmon-Challis Forest and on the Bitterroot Forest prior to the wildfires of 2000. In 2000, wildland fires burned over 400,000 acres on the Salmon-Challis Forest and destroyed one home and five other structures in the wildland/urban interface. On the adjacent Bitterroot Forest, similar acreages burned and 70 homes were lost.

The probability of high severity wildfires was classified for the Interior Columbia River Basin, and ranked as low, moderate or high (Hann and others). Putting these rankings in context, the large high severity fires of the Bitterroot Valley in year 2000 occurred in areas dominated by moderate rankings. The Clear Creek Fire Complex on the Salmon-Challis Forest occurred in areas with a mix of both high and moderate rankings.

This mixture of high and moderate rankings dominates the Salmon-Challis National Forest. This mosaic of high/moderate fire probability rankings, coupled with the continuous nature of forest multistory fuels, creates a dangerous situation in the Gibbonsville area.

The North Fork drainage (which includes Gibbonsville) contains drainages with both moderate and high "Probability of an Uncharacteristic Wildfire Event Occurrence" (Hann and others, 2001). The Gibbonsville area is ranked as moderate probability for severe wildfires, but is bordered on the southwest by areas ranked as high. The location of these high ranked areas in relation to Gibbonsville is important, because forest fuel types that are affected by the hot, dry weather conditions of fire season surround Gibbonsville.

The continuous nature of the forest fuels and the topography of the entire North Fork drainage predispose the Gibbonsville area to increased risk of high severity wildfire events. The data used to create the probability rankings for the Gibbonsville area was gathered prior to 2000. The Clear Creek Fire Complex and the Bitterroot Valley fires both demonstrated that drainages with only moderate probabilities are capable of supporting high severity wildfire events.

Fire movements on the Salmon-Challis National Forest are often associated with winds from the southwest, which push fires in an east or northeast direction. The Gibbonsville community is located in the canyon of the North Fork of the Salmon River, a tributary of the main Salmon River. Lightning storms and associated strong winds often move up the Salmon River canyon from the west, then proceed up the North Fork. Weather patterns, high fuel loads, topography, prevailing winds, and ignition probabilities all put Gibbonsville in the path of potential fires.

The residents of Gibbonsville are concerned that they are at risk from fires similar to those of 2000, and support this project.

Purpose and Need for This Action

The purpose of this proposal is to reduce hazardous fuels in the project area, improve forest health, and protect natural resources and private property from high severity wildfire.

Fire suppression has excluded large fires from the North Fork watershed, but it has also greatly reduced the low to moderate intensity fires that historically kept the forest in a more fire resistant condition. As a result of fire exclusion, fuel accumulations have substantially increased (Hoyt, 2000). A dense, multi-layered understory of trees on both private and federal lands now creates a fuel ladder that enables fire to move quickly from the ground to the treetops. Fire exclusion has also led to the accumulation of dead

and down woody material (Hoyt, 2000). This accumulation of biomass sets the stage for potentially large, intense and severe stand replacement fires.

Current fuel loadings and limited access, including only two routes out of Gibbonsville, limit the options available for wildfire suppression and increase risks to the safety of firefighters and wildland-urban interface communities. Suppression of a large fire and defense of structures and property in this area is probably beyond the capabilities of firefighting resources (Schuckert, 2002).

The following specific needs have been identified:

- Reduce the risk to wildland firefighters involved in suppression activities.
- Modify vegetation conditions to improve the ability of firefighters to safely manage future wildfires.
- Increase the probability of successfully defending life and property within the wildland-urban interface.
- Reduce the risk of high severity wildland fires, especially in the wildland-urban interface areas.
- Decrease the probability that a wildland fire would develop into a crown fire.
- Reduce the risk of catastrophic fires in the remaining large ponderosa pine stands.

Desired Future Conditions

The desired future condition for the project area is based on Forest Plan direction, opportunities identified in the Lost Trail Pass-Gibbonsville Integrated Resource Analysis (USDA Forest Service, 1995), the North Fork Headwaters Watershed Analysis (USDA Forest Service, 1998), the Gibbonsville Fuels Assessment and Treatment Plan (Hoyt, 2000) and direction from the National Fire Plan (USDA Forest Service, 2000). Desired future conditions regarding fuels have been established for both the wildland-urban interface and general forested area of the project area:

Wildland Urban Interface

- Fuel levels will be reduced to provide an increased likelihood of safe and efficient fire protection, firefighter safety and public safety by reducing flame lengths to 4 feet or less (Hoyt, 2000).
- Fuel levels will allow the successful application of low intensity prescribed fire. Ground fuels will be comparable to fuel model 2 (grasses) and fuel model 8 (timber) (Anderson, 1982). Live fuel profiles will be comparable to forest structural stages of old forest single story and stem exclusion open canopy (Hessberg, 1999).

General Forested Area

- Open stands of large diameter ponderosa pine and Douglas-fir will be characterized by low levels of ground fuels (Brown, 2000).
  Generally, ladder fuels in the dry forest types will be maintained at levels that result in low risk of crown fire spread when fire danger ratings are very high.
- The trend toward large-scale high intensity wildfires will be reduced. Wildfires will have a high probability of remaining on the ground and being of low to moderate intensity.
- Most of the areas where Ponderosa pine and Douglas-fir grow will have down woody fuels consisting of scattered larger diameter logs, low amounts of dead and down fuels in the one to six inch category, and less than two inches of bark flake/duff accumulations at the base of large diameter ponderosa pine trees.

Relationship to the Forest Plan

This Environmental Assessment tiers to the Forest Plan. The Forest Plan provides four levels of forest management direction, each with guidance applicable to the proposed action:

Forest management goals describe how the Forest will be administered to assure long-term protection and utilization of resources. The proposed action would fulfill Forest Plan goals to use prescribed fire to treat hazardous fuel conditions (Forest Plan, page IV-3). It also meets the goal of improving the growth, health and vigor of timber stands through silviculture treatments (Forest Plan, page IV-2).

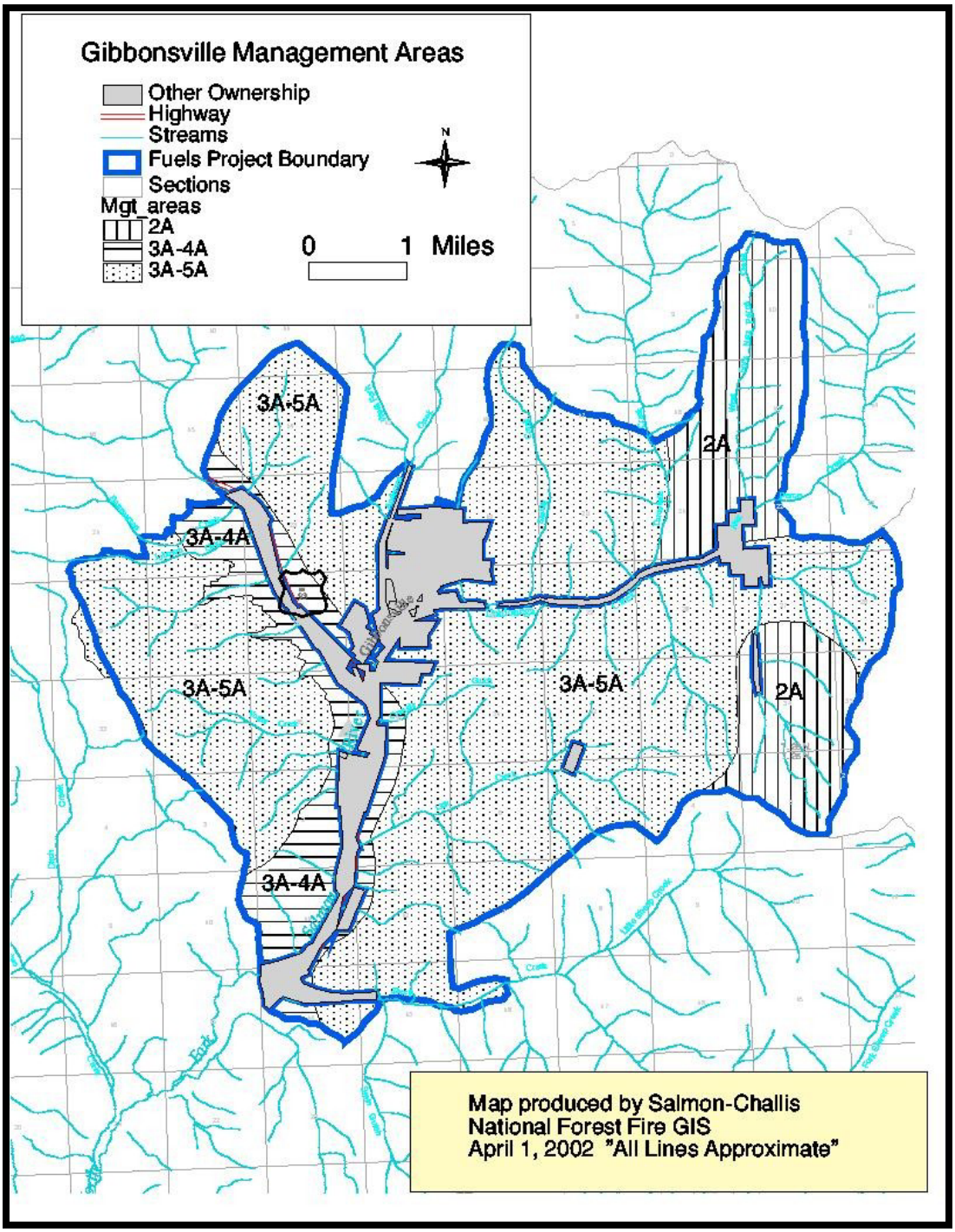
Forest-wide direction statements specify the actions, measures or treatments to be done when implementing management activities. Forest Plan Forest-wide direction is to maintain adequate structural diversity of vegetation (USDA Forest Service, 1988) for an area. There are three management areas (MA) within the project area (Map 3, page 1-10):

- MA 2A: Emphasis is on dispersed recreation. Semi-primitive, motorized recreation is featured. Minerals and energy activities, grazing and vegetative manipulation are allowed. Plan no timber harvest unless the timber is damaged by catastrophe.

- MA 3A-4A: Emphasis is on meeting anadromous fish habitat needs and providing big game habitat on key winter range. Vegetation manipulation is allowed for enhancement of habitats. Manage forest cover types to provide healthy stands.

- MA 3A-5A: Emphasis is on aquatic habitat management for anadromous fish species and long-term timber production through investments in regeneration and thinning. Manage forest cover types to provide healthy stands.

Map 3. ***Management Areas***



Relationship to the National Fire Plan

In response to the 2000 wildfires and by Presidential request, the Forest Service developed operating principles in what has become known as the *National Fire Plan* (USDA Forest Service, 2000). The *National Fire Plan* provides direction to reduce future fire risk by treating fuels. Specific *National Fire Plan* goals and objectives relevant to this project include:

- Reduce the threat to life and property from catastrophic fire
- Assign the highest priority for hazardous fuels reduction to communities at risk
- Restore natural ecological systems to minimize uncharacteristically intense fires
- Reduce the number of small fires that can become large

The community of Gibbonsville has been identified as an "at risk" interface community in response to the *National Fire Plan*.

Decision Framework

Using this environmental analysis, the North Fork District Ranger will decide the following in accordance with Forest Plan goals, objectives and desired future conditions:

- Which, if any, fuels reduction management actions should be implemented?
- What mitigation and/or monitoring, if any, will be included in the decision?

Scoping and Public Involvement

Numerous methods were used to involve the public and agencies in the analysis:

- Public meetings were held in Gibbonsville on May 24, 2001 and December 3, 2001 and in Salmon on December 4, 2001.

- The project proposal was presented and discussed at the Lemhi County Commissioners meeting on August 27, 2001 and at the North Fork Volunteer Fire Department on December 3, 2001.

- A scoping letter dated October 29, 2001 was mailed to approximately 300 individuals, organizations and federal, State and local agencies, describing the proposed project and alternatives and requesting input on issues.

- A newspaper article describing the proposal and seeking public comment was published in the Salmon *Recorder Herald* on November 1, 2001.

- Appropriate government agencies were contacted, including U.S. Fish and Wildlife Service, National Marine Fisheries Service, the Idaho Department of Fish and Game, the Shoshone-Bannock Tribes and federal legislative offices. Field trips with representatives of the National Marine Fisheries Service were conducted in September and October 2001. A field trip with representatives of the Lemhi County Commissioners, the North Fork Fire Department, and the High Country Resource Conservation and Development Council was conducted in November 2001. Field trips with the U.S. and Wildlife Service were conducted in June 2002.

- In February 2002, a follow-up letter was sent to 33 individuals and five organizations who had previously commented. The letter was also sent to four adjacent large-acreage landowners; one who had previously commented and others who had not commented but could be affected by the project.

- Updated maps were provided to the National Marine Fisheries Service and the U.S. Fish and Wildlife Service in February 2002 and again in March 2002.

- The proposal was described in the Salmon-Challis National Forest quarterly *Schedule of Proposed Actions,* which is mailed to approximately 125 individuals and organizations on the Forest Plan mailing list. The proposal was also posted on the Internet.

- In June 2002, a follow-up letter was sent to the public describing the difference between alternatives and informing them that a roads analysis was being conducted.

During the scoping period, 22 letters were received as well as 45 comments collected during the public meetings. Copies of the letters and responses are located in the project analysis file at the North Fork Ranger District.

Issues

An issue is a point of discussion, debate or dispute (about environmental effects) regarding the proposed action. Issues for the Gibbonsville Wildland/Urban Interface Fuels Reduction Project were identified through public and internal scoping. The Forest Service interdisciplinary team identified important issues and determined the extent of analysis using the comments received from the public and other agencies. Similar issues were combined where appropriate. Issues were categorized into Key issues and Analysis issues. Key issues are used to formulate alternatives and prescribe mitigation

measures. Key issues along with analysis issues were used to analyze environmental effects. This section summarizes these Key and Analysis issues, along with the indicators used to evaluate alternatives in this EA.

Key Issues

Key issues are used to develop alternatives, specific management actions, and activities of the action alternatives.

Key Issue: Large High-Severity Wildfire and Urban Interface

The proposed action or alternatives may reduce hazardous fuels and the potential for severe high-intensity wildfires. Proposed treatments may improve firefighter and public safety and reduce the risks of high-severity wildfire to private property and important resource values.

Indicators:

- Acres of down woody fuel loading reduced to four to 15 tons per acre throughout the project area
- Acres of down woody fuel loading reduced to one to four tons per acre next to private lands
- Acres of ladder fuels treated throughout the project area
- Fire behavior following treatments

Key Issue: Forest Health

The proposed action or alternatives could result in changes in the dry vegetation types and in large diameter ponderosa pine and Douglas-fir trees. Changes include greater resistance of these large diameter trees to being killed by low to moderate severity fires in high fire danger conditions; decrease in risk of large high-severity fires; decrease in risk of insect and disease epidemics, and increase in native plant diversity and vigor of dry forest types.

Indicators:

- Acres treated in the overstory to reduce the risk of crown fire spread
- Acres treated in the understory to reduce surface fuels and ladder fuels
- Acres treated to reduce high levels of duff/bark flakes at the base of large diameter high-risk ponderosa pine and Douglas-fir trees
- Acres treated to reduce insect and disease potential

Key Issue: Water Quality
The proposed action or alternatives could increase stream sedimentation and adversely affect water quality and watershed function in the Anderson Creek, Dahlonega Creek and Crone Gulch watersheds.
Indicators:

- Relative Sediment Yield Prediction
- Road Density

Analysis Issues
Analysis issues are used to compare alternatives and are addressed in the effects analysis.

Analysis Issue: Soil Productivity
The proposed action or alternatives could result in detrimental soil disturbance, creating erosion and affecting long-term soil productivity.
Indicators:

- Percentage of detrimental soil disturbance
- Amount of soil resource commitment (roads, landings, trails, etc.)

Analysis Issue: Forest Products
The proposed action or alternatives may affect the availability and value of forest products, including firewood, posts, poles, house logs and small diameter saw timber. The alternatives may affect local economies.
Indicators:

- Project Present Net Value (PNV) of activities
- Volume and value of forest products available (ccf)

Analysis Issue: Air Quality
Prescribed burning and wildfires produce smoke, which could affect air quality and impact smoke sensitive areas.
Indicators:

- Amount of particulate matter produced by prescribed burning (based on FOFEM modeling)
- Impacts to smoke sensitive areas

Analysis Issue: Visual Quality
The proposed action or alternatives could affect Forest scenic quality by changing the predominant form, color, line or texture in a given viewing area. The Salmon River Scenic Byway could also be affected.
Indicator:

- Change in visual quality objectives (VQO)

Analysis Issue: Inventoried Roadless Area
The proposed action and alternatives may affect the Roadless characteristics of the Anderson Mountain Roadless Area.
Indicators:

- Change in Roadless Area characteristics

Analysis Issue: Noxious Weeds
The proposed action or alternatives could increase the spread of established noxious weed populations and promote the introduction of new, exotic invaders.
Indicators:

- Acres infested by noxious weeds

Analysis Issue: Fish, Wildlife and Plants
The proposed action or alternatives could affect important plant, wildlife and fish species and/or their habitats, including management indicator species, sensitive species or listed threatened, endangered or proposed species.
Indicators:

- Predicted effects on management indicator species, sensitive species, listed species and/or their habitats
- Compatibility with the Lynx Conservation and Assessment Strategy
- Changes in terrestrial vertebrate source habitat

Analysis Issue: Designated Old Growth
The proposed action or alternatives could affect designated old growth characteristics.
Indicators:

- Acres of designated old growth affected

Analysis Issue: Big Game Winter Range
The proposed action or alternatives could affect big game winter range.
Indicators:

- Predicted changes in winter range cover/forage ratios
- Open road densities (miles per square mile) in big game winter range

Cumulative Effects Issues

Cumulative effects consist of the direct and indirect effects resulting from the incremental impact of the proposed action or alternatives, when added to other past, present and reasonably foreseeable future actions, regardless of who carries out the action (40 CFR 1508.7). All of the environmental issues carried forward for analysis in this EA have the potential for cumulative effects. Detailed discussion of cumulative effects is found in Appendix D.

Guidance implementing NEPA requires that federal agencies identify the temporal and geographic boundaries within which they will evaluate potential cumulative effects of an alternative, and the specific past, present and reasonably foreseeable future projects that will be analyzed (40 CFR 1508.25). In 1997, the Council on Environmental Quality published additional guidance on cumulative effects assessment, which provides the basis for discussion in this EA (Council on Environmental Quality, 1997).

For the purposes of this EA, the general temporal boundaries of analysis are from 1970 to 2010 for most indicators, except for Large High Severity Wildfire and Forest Health. This 40-year period encompasses a range within which data is reasonably available and forecasts are reasonably foreseeable. For the Large High Severity Wildfire and Forest Health analysis, the temporal boundary used was from 1850 to 2010. Certain effects for the indicators may vary with time, as noted in Chapter 3, but any quantification is speculative and therefore outside the scope of analysis for this document. The geographic boundaries of analysis vary depending on the specific resource and potential effects; therefore, they correspond to the analysis areas described in Chapter 3 for each resource issue. Specific projects with the potential to affect the same resources potentially affected by the proposed action or alternatives, and which were therefore analyzed for cumulative effects are shown below and described Appendix D.

Table 1: ***Past, Present, and Reasonably Foreseeable Actions Analyzed***

Cumulative Action	Past	Present	Future
Proposed Action and action alternatives			**X**
Fires, both wildfire and management ignited	**X**	**X**	**X**
Timber Sales	**X**		
Mining Operations	**X**	**X**	**X**
Livestock Grazing	**X**		
Personal use and commercial firewood harvesting	**X**	**X**	**X**
Motorized recreation, both summer and winter		**X**	**X**
Noxious weed treatments		**X**	**X**
Private land development	**X**	**X**	**X**
Lewis & Clark celebration			**X**
Granite Peak Lookout Restoration			**X**
Hunting	**X**	**X**	**X**
Harvey Mill Site Highway Enhancement Project			**X**
Special use permits	**X**	**X**	**X**

Topics Not Specifically Analyzed In This EA

Some of the concerns or topics listed below were raised by the public during the scoping process. Others are required to be addressed by other laws or regulations but are not analyzed in detail in this EA. These topics are outside the scope of the analysis for the reasons shown, or are controlled by law or regulation, or are addressed in reports or other NEPA documents, which are in the project file. None of these topics drive specific alternatives and none have been determined to be significant under 40 CFR 1501.7.

Heritage
Completed cultural resource surveys can be found in the project file on the North Fork Ranger District. Ongoing surveys will be completed in accordance with the Memorandum of Agreement with the State Historic Preservation Office (SHPO).

Wild and Scenic Rivers
There are no existing, proposed or eligible wild and scenic rivers within the project area.

Recreation
Recreational uses are primarily related to driving for pleasure, hiking, and hunting. The use of low intensity prescribed fire to underburn timber stands and/or thinning of timber stands generally will not affect recreational use or experience. The natural appearing, forested setting will be maintained. Patterns of recreation use and types of recreation use would remain unchanged from the current condition.

Aspen and Other Deciduous Stands
Forest Plan riparian standard and guidelines will protect existing stands of aspen and other deciduous species. Expansion and rejuvenation of deciduous stands is outside the scope of the project.

Other Treatment Areas

- **Moose Creek Estates**
  Areas around the Moose Creek Estates were considered for fuel reduction treatment but were eliminated from further consideration due to light fuel loads, low risk of catastrophic fires, lack of anchor points for effective fireline construction, and a location directly adjacent to the Mt. Anderson Roadless Area. Analysis can be found in the project file on the North Fork Ranger District.

- **Humbug Creek Drainage**
  The Humbug Creek Drainage is outside the project area boundary. The boundary was not expanded because treatment within Humbug Creek Drainage is not necessary to protect the wildland-urban interface.

Chapter 2

Alternatives

Chapter 2
Alternatives

Introduction

This chapter describes and compares the alternatives considered for the Gibbonsville Wildland/Urban Interface Fuels Reduction project. It includes a description and map of each alternative considered. It also presents the alternatives in comparative form, defining differences between each alternative including environmental effects.

Alternative Development Process

Before developing alternatives, the project area was reviewed to classify the risk of fire severity and wildfire effects. Characteristics such as forest structural stage and fuel models were mapped. Forest structural stage (Hessberg, 1999,) describes changes in forest conditions related to size and distribution of trees. Changes to multi-storied or layered forest types contribute to increased risk of large high severity fires, while single story or open forest stands generally do not have the fuels available for large high severity fires and thus are more resistant to fire. Fuel modeling (Albini, 1976; Anderson 1982; Rothermel 1983) provides information on predicted fire behavior. Fuel modeling is based on vegetation conditions and considers fuel moistures, slope and wind to provide a basis to predict fire spread and fire intensity.

Risk was characterized for the dry forest type and was related to the amount of lethal damage to the dominant vegetation, generally trees. A rule set for wildfire risk was developed, using references and local fire experts that considered fuel models and forest structural stage to rate the risk for fire effects. Table 2-1 provides a summary of how fire risk was classified. Additional information on forest structural stage and fuel models is provided in Chapter 3.

Table 2-1. ***Wildfire Effects Risk Rating***

Risk for negative wildfire effects and forest health	Structural Stage	Fuel Model	Description
High	Old forest multistory (late successional forested stands with diverse horizontal and vertical distribution of tree sizes resulting from frequent non-lethal underburning or other management)	Any	Ladder and crown fuels yield high risk for crown fire and crown fire spread.
High	Young forest multistory (stands resulting from frequent harvest or lethal disturbance to the overstory); Understory reinitiation (Second generation of trees established under mortality-induced openings of the older overstory)	2 (grass) *5 (brush) *9 (timber)	Ground fuels combined with ladder fuels could result in lethal tree trunk damage as well as sustained torching.
High	Any	10 (timber) 12 (timber) 13 (timber)	Heavy ground fuels can result in lethal tree trunk damage without transitioning to a crown fire
Moderate	Any combination of single story and fuel model that are not high or low	---	Any combination of single story and fuel model that are not high or low
Low	Old forest single story (late successional where understory trees are generally absent)	2 (grass) 5 (brush) 8 and 9 (timber)	
Low	Young forest multistory; Understory reinitiation	8 (timber)	
Low	Stem exclusion closed canopy (mid-successional stands where occurrence of new trees is excluded; the forest canopy is closed and tree crowns are abrading)	2 (grass) 8 (timber)	

* Fuel models 5 and 9 are not normally considered high risk except when referring to forest structures of Young Forest Multilayer Stands and Understory Reinitiation.

The rating of wildfire effects risk was used in conjunction with key issues to help delineate alternative treatments. The ID team also used information from public and agency comments and field-related resource information to formulate alternatives around key issues. In addition, each action alternative was designed to meet the purpose and need for the desired condition defined in Chapter 1.

Alternatives Considered in Detail

Alternative A

Alternative A is the no-action alternative. This alternative is required and serves as a baseline to measure effects if no management changes are implemented. The no-action alternative represents the status quo for the area. This alternative will not complete any fuels reduction work within the Gibbonsville project area; there will be no thinning or prescribed burning of forest fuels at this time. This alternative takes no steps to change or alter the progression of forest conditions. There will be no change in current management direction or in the level of ongoing management activities in the project area. Work previously planned within the project area will still occur.

Alternative B

This alternative was developed as the Proposed Action to apply a combination of thinning and burning treatments over the next five to seven years to reduce the risk of catastrophic wildfire. Fuel accumulations will be reduced on approximately 5,690 acres of National Forest System (NFS) lands by thinning trees with ground-based mechanized equipment, followed by burning. This alternative will reduce interlocking tree crowns and ladder fuels, lessening the risk of fast moving crown fires. Thinning will also move stands toward the desired conditions outlined in Chapter 1.

Maps in Appendix B (pages B-1 through B-30) display the location of proposed thinning and burning units. Equipment used during the thinning and cutting operations will include feller/bunchers or chainsaws. Trees and slash will be transported using a forwarder or skyline/cable system. Residual slash will be cut, piled and burned, either in hand piles, tractor piles or broadcast. Specific burning treatments were designed based on slope and fuel loadings related to fire behavior and the potential lethal damage to remaining trees. Thinning will occur between April and October and burning will occur in the spring and fall when prescriptive conditions are met.

Sixteen specific silviculture prescriptions are proposed in this alternative. Appendix B provides a detailed listing for each individual unit in the project area. A summary is also provided in Table 2-2 on page 2-7. The following descriptions detail how thinning and burning applications will differ over the project area:

- Approximately 2,683 acres will be thinned from below to provide sufficient crown space to reduce the risk of high severity wildfire, enhance stand vigor and resistance to insect and disease, and prolong the life of existing ponderosa pines and other large trees by reducing competition. The smaller submerchantable trees will be thinned to an 18 foot spacing. Areas with commercial size trees will be thinned to a stand density index (SDI) of 80. SDI is a measure of stand density expressed as the number of trees per acre as if the average stand diameter were 10 inches (McCarter, 1986). Using an SDI 80 will gradually increase the spacing between trees (of seven to 30 inches in diameter) from 18

to 56 feet. Trees removed will generally be less than 12 inches in diameter at breast height (dbh). No large (greater than 20 inches) ponderosa pine or large snags will be cut except for safety reasons. The wood product from the thinning will be sold commercially. Thinning slash will be piled and burned after curing, while some areas will be underburned to leave between four and 15 tons per acre.

- To reduce ladder fuels, seedlings and saplings less than eight inches dbh will be cut with chainsaws to reduce stocking levels. Spacing will be a minimum of 18 feet. Some limbing of trees and cutting of brush will also occur to reduce ladder fuels. Cut small trees will be left on the ground and broadcast burned or hand piled and burned. Approximately 2,062 acres will be treated to remove ladder fuels to reduce the risk of a ground fire moving up into the tree crowns, reduce flame lengths, and reduce slash to between one and four tons per acre directly adjacent to private land.

- Another 908 acres of ponderosa pine plantations and naturally regenerated ponderosa pine and Douglas-fir stands established after previous harvests will be thinned to a spacing of approximately 18 feet. Some areas will either be piled or broadcast burned to remove residual slash.

- Approximately 38 acres of dwarf mistletoe-infested Douglas-fir above Gibbonsville will be felled to improve forest health and reduce the risk of severe wildfire. Scattered ponderosa pines will be left as seed trees. Accessible areas will be made available for gathering wood products and fuel wood. Inaccessible areas will be broadcast burned or piled and burned. The area will be planted with ponderosa pine to a ten-foot or greater spacing after treatment.

- Green firewood sales will be available to the public for personal use on approximately 75 acres. Standing live trees, generally less than 12 inches dbh, will be available for cutting. No changes in the current firewood program in the remainder of the project area are planned.

- Approximately 15 miles of unclassified road will be decommissioned (Appendix C). Decommissioning is achieved by several methods such as obliteration, ripping and seeding, removing drainage structures (such as culverts, relief ditches, outsloping road), stabilizing cut and fill slopes, obstructing road entrances by installation of berms, or recontouring. Appendix C provides details on the roads analysis.

- Treatments next to streams in Riparian Habitat Conservation Areas (RHCAs) and filter strips will be limited to ladder fuel reduction, hand piling and burning of slash piles, and broadcast burning. No treatment will occur within the riparian areas.

Approximately 16,896 acres will remain untreated due to a relatively low risk of severe wildfire effects and the differing fire ecology of mixed conifer vegetative sites. Other

areas were eliminated from treatment to protect fish and wildlife habitat, due to regulations governing inventoried roadless areas, or because a combination of access, location, and steepness made treatment infeasible.

Alternative C

This alternative was developed in response to the issue of water quality as affected by increased stream sedimentation. It was designed to treat areas with high and moderate erosion hazard that also have a high risk of severe wildfire impacts to soil and water resources. The risk of severe wildfire impacts was based on fire behavior fuel model classification (Anderson, 1982) and vegetation structural stage (Hessberg, 1999) as explained previously.

Fuel accumulations will be reduced on approximately 4,016 acres of NFS lands by means of thinning by ground-based mechanized equipment and burning by hand. Maps in Appendix B display the location of proposed thinning and burning. Areas will be treated using hand felling and tractor and skyline logging systems. Timing of operations is similar to that described in Alternative B.

This alternative emphasizes reducing the risk of high intensity wildfires in watersheds with soils having moderate to high inherent erosion hazard ratings. Implementation of this alternative will minimize the risk of crown fires, reduce rate of fire spread, and thus minimize soil damage and erosion potential. This alternative will help protect private homes and forest resources. Proposed treatment areas have a combination of moderate to high soil erosion hazard, heavy fuel build-up, and stands with a multi-layer canopy.

The silviculture prescriptions proposed in Alternative C are detailed in Appendix B. A summary is also provided in Table 2-2. The specifics of the treatment methods are similar to those described in Alternative B:

- Approximately 4,016 acres will be treated; 1,574 acres will be harvested using tractor and skyline yarding systems. After treatment, slash will be hand piled and burned on 1,947 acres, machine piled and burned on 447 acres and broadcast burned on 1,590 acres.

- Approximately 1,986 acres will be treated for ladder fuels. Treatment will be similar to those as described in Alternative B.

- Approximately 38 acres of dwarf mistletoe-infested Douglas-fir above Gibbonsville will be felled to improve forest health and reduce the risk of severe wildfire. Scattered ponderosa pines will be left as seed trees. Accessible areas will be made available for gathering wood products and fuel wood. Inaccessible areas will be broadcast burned or piled and burned. The area will be planted with ponderosa pine at a ten-foot or greater spacing after treatment.

- Green firewood sales will be available to the public for personal use on five acres.

- Approximately nine miles of existing unclassified roads used for temporary access during treatment will be decommissioned once the project is completed (Appendix C).

- Treatments next to streams in RHCAs will include ladder fuel reduction, hand piling and burning of slash piles, and broadcast burning. Only backing fires will be allowed in filter strips next to streams. No treatment will occur within the riparian areas.

No treatment will occur on approximately 18,571 acres where the risk rating comparing severe wildfire effects to erosion hazard rating was low.

Alternative D

This alternative was developed specifically in response to the issue of wildfire risk in the wildland-urban interface, while emphasizing management of lynx and designated old growth habitat. Proposed treatment units were designed to protect private property while enhancing or maintaining lynx and designated old growth habitat in case of wildfires. Implementation of this alternative will reduce the risk of damage to life and property, the rate of fire spread, minimize the risk of crown fires, and reduce impacts to lynx and designated old growth habitat.

This alternative will treat approximately 2,499 acres of NFS lands to reduce the risk of high severity wildfire. The silvicultural prescriptions proposed in Alternative D are detailed in Appendix B for each individual unit in the project area and summarized in Table 2-2. Maps in the appendix display the areas proposed for thinning, ladder fuel removal, shaded fuel breaks and burning. Units will be treated using hand felling, tractor and skyline logging systems; the specific methods are similar to those described in Alternative B:

- Approximately 946 acres will be hand felled and harvested using skyline and tractor logging systems.

- Ladder fuel reduction will occur on approximately 1,452 acres of National Forest lands.

- Slash disposal will on occur on all the treated acres. Some units will have multiple treatments to help reduce ladder fuels prior to prescribed burning. Hand piling and burning will occur on approximately 1,040 acres, machine piling and burning on 105 acres and broadcast underburning on 1,676 acres.

- Green firewood sales will occur on approximately 70 acres.

- Approximately 6 miles of unclassified road will be decommissioned (Appendix C).

- Treatments next to streams in RHCAs and filter strips will include ladder fuel reduction, hand piling and burning of slash piles, and broadcast burning. No treatment will occur within the riparian areas.

No treatment will occur on approximately 20,088 acres because the risk of severe wildfire effects is relatively low or because a combination of access, topography, land ownership and/or fuel types preclude the safe reintroduction of fire.

Table 2-2. ***Summary of Treatments Proposed by Alternative***

	Alt A	Alt B	Alt C	Alt D
Total Acres Treated	0 acres	5,690 acres	4,016 acres	2,499 acres
Thinned to a minimum 18 foot spacing and SDI 80	0 acres	2,683 acres	1,574 acres	946 acres
Ladder fuel reduction	0 acres	2,062 acres	1,986 acres	1,452 acres
Thinned to 18 foot spacing	0 acres	908 acres	418 acres	101 acres
Treat Mistletoe Infestation	0 acres	38 acres	38 acres	0 acres
Green Firewood Sales	0 acres	75 acres	5 acres	70 acres
Hand piled and burned	0 acres	2,505 acres	1,947 acres	1,040 acres
Machine piled and burned	0 acres	805 acres	447 acres	105 acres
*Broadcast burned	0 acres	2,504 acres	1,590 acres	1,676 acres
Road Decommission	0 miles	14.8 miles	8.8 miles	6 miles

** Many of the same acres have multiple burn prescriptions (i.e., broadcast burned after the hand piles are burned).*

Features Common to All Action Alternatives

All applicable Forest-wide and management area standards and guidelines have been incorporated in the action alternatives. Best Management Practices have also been included. Additional direction from Regional guides, Forest Service manuals and

handbooks, and ID Team specialist reports were also considered in designing the action alternatives. The following specific items listed by resource area are common to all action alternatives:

Hydrology

- ✓ No windrowing of slash will occur.
- ✓ No slash piling in draws adjacent (25 feet) to streams or within riparian areas.

Soils

- ✓ Stabilize skyline corridors and skid trails by providing drainage and seeding, as needed.
- ✓ Skid trails and skyline corridors may need water dispersion structures (waterbars or slash) installed to reduce soil erosion if the existing vegetative cover is removed. These structures will be installed following completion of a unit or in the fall before the ground freezes if the unit is not completed before winter. Waterbar spacing requirements in the Forest Plan will be followed.
- ✓ Skid trails will be seeded in the fall (after September 15th) the year the unit is completed.
- ✓ Soil productivity will be maintained in each harvest unit by retaining four to 10 tons/acre of slash, including large woody debris greater than three inches in diameter, as microbial host material and smaller woody debris for nutrient reservoirs.
- ✓ Prohibit equipment operations and log hauling during extremely wet or extremely dry periods when unacceptable soil damage will result, including compaction, puddling, or soil erosion.
- ✓ Compacted skid trails and landings will be scarified and reclaimed.
- ✓ Limit machine slash piles in harvest units to 30 feet by 30 feet in size. Piles may be larger at landing sites.
- ✓ Hydrophobic soils (soils that repel water) will be scarified and reclaimed.
- ✓ Minimize top soil in slash piles.

Fuels

- ✓ Fire ignitions will not occur within riparian areas. However, fires may be allowed to back into riparian areas.

Air Quality

- ✓ Extended meteorological and spot weather forecast on mixing height, atmospheric stability and wind speed are required prior to burning to ensure federal and state ambient air quality standards are met.
- ✓ “No burning” restrictions will be enforced if predictions indicate standards will be exceeded.
- ✓ The appropriate mop-up category will be designated in the prescribed burn plan to ensure actions taken reduce impacts of residual smoke on visibility and health.

Visuals

- ✓ Apply the following special treatments within 300 feet of the shoulder of Highway 93 where practical and feasible:
  - Flush cut stumps
  - No piling or scarification
  - Vary thinning spacing
  - Low intensity broadcast burn.

Weeds

- ✓ Treat all new noxious weed infestations associated with implementation of the decision.
- ✓ Delay weed spraying on seeded or reseeded areas until the vegetation has had one full growing season.
- ✓ If less than 40 percent vegetation cover, including plant basal area and litter, exists two years after noxious weed treatment, seeding of native plant species is required.

Fisheries

- ✓ Screen pump suction hoses with a 3/32 inch or smaller mesh size screen with the water velocity at the screen not exceeding 0.4 feet per second.
- ✓ Store any fuel outside of RHCAs. During refueling, ensure that no fuel enters a water source or is spilled within the riparian area.
- ✓ Provide containment for any operation using a pump connected to a five-gallon gas container, to prevent any fuel spill or leakage from entering the stream channel or riparian area.
- ✓ The prescribed burn plan will follow mitigation measures stated in the *Programmatic Biological Assessment for Fire Suppression and Prescribed Natural Fire Activities in the Upper Salmon River Sub-basin* (USDA Forest Service, 2002).
- ✓ Coordinate the burn plan activities with the Idaho Department of Fish and Game and other interested agencies and publics.
- ✓ No ground disturbing machinery will be used within RHCAs.
- ✓ If the prescribed fire removes any stream shade, which may affect stream temperatures, a long term monitoring plan will be developed with the Level 1 Team to assess those impacts.

Wildlife

- ✓ Management of active gray wolf den sites, if discovered within the project area during the active project period, will be coordinated with the Nez Perce Tribe and the Fish and Wildlife Service. Protection measures will be developed on a case-by-case basis and *may* include restriction of activities within a one-mile radius around active den sites on federal land between April 15 and June 30.

- ✓ Active raptor nests will be protected with ½ mile radius “no disturbance zone” around the nest site during proposed harvest and prescribed fire activities.

Buffers will be designed on a case-by-case basis and follow species specific recommendations for bald eagle, northern goshawk, great gray owl, boreal owl and flammulated owl.

- ✓ Snags will be identified and marked for retention except where there is a safety concern or fire risk. Snags in prescribed fire units will be allowed to remain standing if damaged by fire. No salvage of fire-killed trees will occur except for public fuelwood.

- ✓ Live trees with existing decay or damage features, including but not limited to fungi, soft wood decay, or broken tops, will be marked and retained in proposed treatment units unless they pose a safety concern or fire risk.

- ✓ No special habitat features required for the maintenance of old growth will be modified, including snags, large diameter live trees and large woody debris suitable as wildlife habitat.

- ✓ Existing road closures will be reinforced to improve elk security within migration routes.

- ✓ Hiding cover for elk and deer will be provided along the edges of collector and arterial roads, streams and rivers. Hiding cover screens will be developed where feasible considering variation in topography and existing vegetation.

- ✓ Machine-created piles of vegetation debris, including branches of varying size and undesirable portions of trees, will retain a minimum of two pieces of larger-sized material per acre for woody debris habitat. Individual pieces will be at least 16 inches in diameter at the larger end, and a minimum of 50 feet in length where feasible.

- ✓ Burn prescriptions will be prepared to assure that no lethal fire occurs in mountain mahogany stands.

Cultural Resources

- ✓ Appropriate protection methods for eligible cultural resource sites will be coordinated through the Forest Archeologist. Methods will be decided on a site specific basis and may include coordinating location of burn piles; removing duff and ladder fuels; using direct, wet or black line; installing wrap, gel or foam; and using pumps and sprinklers.

- ✓ The Forest Archeologist will be informed if any sites are discovered during implementation. Discovery steps outlined in the project file will be followed.

Monitoring

Monitoring will be conducted if one of the action alternatives is implemented. Monitoring will verify that the project is implemented as designed and is effective and efficient in

meeting project and Forest Plan objectives. Monitoring is also conducted to ensure that implementation is consistent with established standards and guidelines as well as the design features and mitigations.

- ✓ Air quality will be monitored for concentrations of particulate matter. If air quality exceeds standards, burning will be curtailed.

All alternatives will comply with specific monitoring requirements identified in the Forest Plan. The Forest Plan identified nine applicable monitoring items, which this project will monitor:

- ✓ Status of old growth retention stands (page V-5)
- ✓ Anadromous and resident fish habitat quantity and quality (page V-6)
- ✓ Classification of suitable and unsuitable timber lands (page V-8)
- ✓ Compare soil erosion for various forest practices (page V-9)
- ✓ Ground disturbing activities with potential to alter soil productivity (page V-9)
- ✓ Changes in water quality due to land management activities (page V-10)
- ✓ Flow increases due to timber harvest (page V-10)
- ✓ Monitor whether Idaho State Air Quality guidelines and standards are being met (page V-12)
- ✓ Compliance with Visual Quality Objectives (page V-18)

Alternatives Considered but Eliminated from Detailed Study

Several alternatives were considered during the planning process, but not analyzed in detail. These are described briefly below, along with the reasons for not considering them further.

Restoration Only Alternative

An alternative that restores or improves fish and wildlife habitat, emphasizing natural disturbance processes, was considered but dropped from further consideration. Eliminating or restricting road use through closures, stabilization or obliteration will improve big game security habitat and reduce sedimentation to streams, but does not address the need to reduce hazardous fuels or protect private property. The purpose and need of the project is to reduce hazardous fuels, improve forest health, and protect natural resources and private property at risk from uncharacteristic wildfire. Emphasizing natural disturbance processes is similar to the “no action” alternative below.

Prescribed Fire Only Alternative

An alternative that uses only prescribed fire and does not include harvesting with mechanical equipment is outside the scope of the proposed action. The proposed action is to reduce the risk of uncharacteristic wildfire and improve forest health through the use of prescribed fire and thinning of timber stands within areas of the North Fork Salmon River watershed.

Urban Interface Only Alternative
An alternative that treats only vegetation directly adjacent to private land and structures was eliminated from further consideration as it did not meet the purpose and need. Specific needs identified in the purpose and need include decreasing the probability that a wildland fire will develop into or be sustained as a crown fire; reducing the risk of uncharacteristic wildfire in areas of remaining large ponderosa pine stands; and modifying vegetative conditions to improve the ability of firefighters to manage future wildfires in a safe manner.

Moose Creek Estates Alternative
An alternative was considered that included Moose Creek Estates, but was eliminated from further consideration due to the differing site conditions. It is unlikely a prescribed fire could be carried on the ground due to the moist soil conditions and lack of heavy fuel loads. Removing standing dead trees would be difficult because of the roadless area directly adjacent to Moose Creek, the steepness of the slopes and the high soil moisture content.

Comparison of Alternatives

Comparison by Issue

Although Chapter 3 presents a detailed discussion of the environmental effects of the alternatives, Chapter 2 concludes with a summary of the effects of the alternatives. Each alternative is evaluated for its effects on the issue indicators and is summarized in Table 2-3 on page 2-13.

Table 2-3. *Environmental Effects of Alternatives*

Issue and Indicators	Alternative A	Alternative B	Alternative C	Alternative D
<u>High Severity Wildfire and Urban Interface</u>				
Percent of down woody fuel reduced to 4-15 tons/ac.	None	17%	12%	7%
Acres of down woody fuel reduced to 1-4 tons/ac.	None	5%	4%	3%
Acres of ladder fuel reduced	0	5,690	4,150	2,499
Reduction in fire behavior following treatment	None	High	Moderate	Low
<u>Forest Health</u>				
Acres treated in the overstory to reduce the risk of crown fire spread	None	5,436	3,778	2,466
Acres treated in the understory to reduce surface feuls and ladder fuels.	None	5,436	3,778	2,466
Acres treated to reduce duff/bark flakes at base of large diameter high risk ponderosa pin and Douglas-fir trees	None	2,540	1,590	1,676

Table 2-3 cont. ***Environmental Effects of Alternatives***

Issue and Indicators	Alternative A	Alternative B	Alternative C	Alternative D
<u>Forest Health cont.</u>				
Acres treated to reduce insect and disease potential	None	5,690	4,016	2,499
<u>Water Quality</u>				
Relative Sediment Yield Prediction	High (57%)	Moderate (10%)	Low (4%)	Moderate (10%)
Road Density per watershed (mi./sq.mi)				
Anderson	1.28	1.28	1.28	1.28
Dahlonega	1.42	1.42	1.39	1.39
Lick	6.02	5.65	4.48	5.09
N. Gibbonsville	4.18	4.14	4.04	4.11
Sheep	0.05	0.49	0.49	0.49
<u>Soil Productivity</u>				
Percent of soil detrimental disturbance	Existing Condition 4.34% Severe Fire, 29%	Low, 6.30%	Low, 5.51%	Low, 4.90%
Amount of soil resource commitment	Low 1.58%	Low, 1.4%	Low, 1.5%	Low, 1.5%
<u>Forest Products</u>				
Project Present Net Value of activities	0	$ 3,413,950	$ 2,437,580-	$ 1,578,450
Volume (ccf) and value of forest products	0	15,007 $ 1,619,290	9,191 $ 937,120	4,639 $ 452,929

Table 2-3 cont. ***Environmental Effects of Alternatives***

Issue and Indicators	Alternative A	Alternative B	Alternative C	Alternative D
<u>Air Quality</u>				
Amount of particulate matter produced by prescribed burns	No change	Low to moderate	Low to moderate	Low to moderate
Impacts to smoke sensitive areas	Low	Gibbonsville- Mod. Salmon- Low Bitterroot- Low	Gibbonsville- Mod. Salmon- Low Bitterroot- Low	Gibbonsville- Mod. Salmon- Low Bitterroot- Low
<u>Visual Quality</u>				
Changes in visual quality objectives	No change	No change	No change	No change
<u>Inventoried Roadless Areas</u>				
Change in roadless area characteristics	No change	No change	No change	No change
<u>Noxious Weeds</u>				
Acres infested by noxious weeds	7,011	2,784	1,649	1,122

Table 2-3 cont. ***Environmental Effects of Alternatives***

Issue and Indicators	Alternative A	Alternative B	Alternative C	Alternative D
<u>Fisheries</u>				
Predicted effects on management indicator species, sensitive species, listed species and/or their habitats	No Change	May Impact but will not contribute to population or habitat declines.	May Impact but will not contribute to population or habitat declines.	May Impact but will not contribute to population or habitat declines.
<u>Wildlife</u>				
Predicted effects on management indicator species, sensitive species, listed species and/or their habitats	No change	Lynx – adverse effect Gray wolf –not likely to adversely affect Bald eagle –not likely to adversely affect R4 sensitive species – insignificant and discountable	Lynx – adverse effect Gray wolf –not likely to adversely affect Bald eagle –not likely to adversely affect R4 sensitive species – insignificant and discountable	Lynx – not likely to adversely affect Gray wolf –not likely to adversely affect Bald eagle –not likely to adversely affect R4 sensitive species – insignificant and discountable
Compatibility with the Lynx Conservation and Assessment Strategy	No change	Not compatible	Not compatible	Compatible
Terrestrial vertebrate source habitat	Early seral closed 5% Early seral open 5% Mid seral closed 30% Mid seral open 7% Late Multi 42% Late Single 4%	Early seral closed 1% Early seral open 9% Mid Seral closed 20% Mid seral open 17% Late Multi 31% Late Single 14%	Early seral closed 3% Early seral open 7% Mid seral closed 22% Mid seral open 15% Late Multi 31% Late Single 14%	Early seral closed 3% Early seral open 7% Mid seral closed 26% Mid seral open 11% Late Multi 36% Late Single 9%

Table 2-3 cont. ***Environmental Effects of Alternatives***

Issue and Indicators	Alternative A	Alternative B	Alternative C	Alternative D
<u>Designated Old Growth</u>				
Acres of designated old growth affected	1,486 acres	Enhance 133 acres Decrease 156 acres	Enhance 131 acres Decrease 252 acres	Enhance 149 acres Decrease 56 acres
<u>Big Game Winter Range</u>				
Predicted changes in winter range cover/forage ratios	No change	Below 80% capability	Below 80% capability	Below 80% capability
Open road densities in big game winter range	No change	No net decrease in open roads	No net decrease in open roads	No net decrease in open roads

Chapter 3

Existing Environment
and
Potential Effects

Chapter 3
Existing Environment and Potential Effects

Introduction

This chapter presents the scientific and analytical basis for comparing alternatives. It provides information concerning the existing environment of the Gibbonsville Wildland-Urban Interface Fuels Reduction project area. Following each resource description is a discussion of the potential effects (environmental consequences) of implementing each alternative. The direct, indirect and cumulative effects are discussed. Where possible, effects are quantified and qualified. The means by which potential adverse effects will be reduced or mitigated are described. Detailed cumulative effects analysis of past, present and future projects is discussed in Appendix D.

The discussions of the existing environment and potential effects utilize information included in the Forest Plan, watershed analysis, project-specific resource reports and related information, and other sources as indicated. Such information may be summarized and referenced to minimize duplication. The planning record for the Gibbonsville Wildland-Urban Interface Fuels Reduction Project includes all project-specific information, resource reports and results of field investigations, and is available at the North Fork Ranger Station.

Large High Severity Wildfire and Urban Interface

Affected Environment

The analysis areas for fire behavior and fuel characteristics are the treatment units. Land managers can affect fire behavior by manipulating fuels, thereby reducing the chances of crown fires. Compared to surface fires, crown fires produce more smoke, cause more resource loss, remove more nutrients and increase threats to life and property (Scott 1998).

Many elements play a role in fire behavior, but the primary factors are fuels, weather and topography (Rothermel 1983; Scott and others 2001). The severity and intensity of a fire depends on many combinations of these factors. The only element that land managers can affect is fuel (Pollet and others 1999), to preemptively modify fire behavior by changing the fuel complex (Finney 2001).

Fuels are composed of vegetation, both live and dead (Anderson 1982). The amount of fuels and their type, size, distribution, and arrangement govern whether an ignition will result in a sustaining fire (Anderson 1982). Fuels are

described in this analysis in terms of down woody vegetation and ladder fuels because these parameters can be seen, measured and treated on the ground.

Tables in Appendix B show the vegetative and fuel composition of each treatment unit.

The purpose of a fuels project is to modify fire behavior, therefore flame length is the indicator used for fire behavior.

Down Woody Material

Down woody material consists of the dead twigs, branches, stems and boles of trees and brush, on or above the ground, in various forms of decay (Brown 1974; Graham and others 1994). Fine fuels (twigs, branches, grass and forbs) contribute to the spread and initial intensity of a fire. Large woody debris (greater than three inches in diameter) have little influence on the spread and intensity of the initiating fire; however, they can contribute to development of large fires and fire severity (Brown 2001). A fire can smolder in areas with accumulations of large woody debris and can be fanned by high winds into fast moving fires (Brown 2001). Fire spotting and potential for crown fire are greater where large amounts of woody debris have accumulated under a forest canopy (Brown 2001).

Resistance to control (the suppression force required to control a fire) is based on the amount of down woody material in the area. Steep slopes also mean a higher resistance to control. Slopes range from 25 to 55 percent within the project area. High and Extreme ratings for resistance to control occur under the following conditions (Brown 2001) as displayed in Table 3-1.

Table 3-1. ***Resistance of Down Woody Material to Control***

0 to 3 inches diameter	**3 to 10 inches diameter**	
	High	Extreme
5 tons per acre	25 tons per acre	40 tons per acre
10 tons per acre	15 tons per acre	25 tons per acre
15 tons per acre	5 tons per acres	15 tons per acre

Down woody material ranges from two to 41 tons per acre within the treatment units. Approximately six percent of the treatment area has a resistance to control rating of High to Extreme.

Ladder Fuel

Ladder fuel is any vertical vegetation, such as seedlings, saplings or shrubs, that connects the surface fire to the crown fuels or canopy of the overstory trees, potentially fueling a crown fire (Finney 1998). Crown fires are intense, fast

moving, destructive fires that burn within the tree canopy (Scott and others 2001). Certain conditions -- dry fuels, low humidity, high temperatures, heavy accumulations of dead and down litter, conifer seedlings and other ladder fuels, steep slopes, strong winds, unstable atmosphere and continuous forest conifer trees – favor crown fires over surface fires (Rothermel 1991). Concentrations of fuels, ladder fuels and forest canopy are the only conditions that land managers can change.

Crown fire ignition occurs when surface fire intensity increases under conditions favorable to crown fires. Flames climb ladder fuels into the tree crowns, igniting the needles (Rothermel 1991). The flames may involve one tree (torching) or a group of trees (crowning) depending on the overall tree crown density within the area. If tree crowns are not continuous, the flaming crowns will burn out and stop spreading. Flaming crowns may create firebrands or embers that fall to the ground or are carried ahead of the crown fire to start small ground fires called spot fires (Rothermel 1983). If this continues, a crown fire may be sustained for longer periods of time and over greater distances.

Crown fires are generally rare, but their impact can be severe (Rothermel 1991). They are more difficult to control than surface fires, their rate of spread is several times faster, and spotting is frequent and can occur over long distances (Scott 2001). Spotting makes structures more difficult to defend and presents more risks to residential developments near forest stands (Scott 2001).

Ladder fuels are a component of all the proposed treatment units. They occur in clumps or singly throughout the treatment units and are composed primarily of Douglas-fir and ponderosa pine seedlings and saplings, and scattered shrubs.

Fuel Models

Because fuel models can be assessed on the ground, they are used to predict fire behavior in this analysis. Fuel models are tuned to the fine fuels that carry a fire, describe conditions at the head of the fire, and were developed for seasons of the year when fires burn well (Rothermel 1983). Anderson (1982) describes 13 models, six of which are represented within the proposed treatment areas of the Gibbonsville fuels reduction project area. Representation of each fuel model within the project area is shown in Table 3-2 followed by descriptions. Appendix E graphically displays fuel model distribution throughout the project area.

Table 3-2. ***Fuel Models Represented in Project Area***

FUEL MODELS	ACRES	PERCENT OF TREATMENT AREA
1	1,463	6
2	3,422	15
5	170	1
8	11,754	52
9	3,763	17
10	1,644	7

Fuel Model 1 falls within the grass group where very few shrubs or trees are present. Cured or nearly cured fine herbaceous fuels govern fire spread. Fires move rapidly through cured grass and associated material (Anderson 1982).

Fuel Model 2 falls within the grass group and can also be represented by open ponderosa pine stands. Fire spreads primarily through fine herbaceous fuels, either curing or dead. These are surface fires where herbaceous material, litter, and dead-down stemwood from the open shrub or timber overstory contribute to fire intensity. Expected rates of spread and fireline intensities are moderate to high (Anderson 1982).

Fuel Model 5 falls within the brush group. In this model, fire is generally carried in surface fuels made up of litter cast by shrubs and their grass or forb understory. Fires are generally not very intense because the surface fuel loads are light, the shrubs are young with little dead material, and live vegetation does not burn well. Shrubs are generally not tall, but have nearly total coverage of the area (Anderson 1982).

Fuel Model 8 falls within the timber group and can be represented by Douglas-fir stands. This model has slow burning ground fires and short flame lengths, with occasional heavy fuel concentrations creating longer flame lengths. 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 support fire in the compact litter layer. This layer is mainly needles and some twigs, since little undergrowth is present in the stand (Anderson 1982).

Fuel Model 9 falls within the timber group and is typical of closed canopy ponderosa pine stands. Fires run through the surface litter faster than Fuel Model 8 and have longer flame lengths. Concentrations of dead and down woody material contribute to possible torching out of trees, spotting, and crowning (Anderson 1982).

Fuel Model 10 falls within the timber group and is represented by any forest type where large quantities of down wood are present. The fires in this fuel model burn in surface and ground fuels with greater intensity than in Fuel Models 8 and 9. Dead and down fuels include greater quantities of three-inch diameter or larger pieces. Crowning out, spotting, and torching of individual trees is more frequent in this fuel model, leading to potential fire suppression difficulties (Anderson 1982).

Flame Length

One purpose of this project is to provide safe firefighting conditions within the Gibbonsville Project area. The flame length of a potential fire will be used to measure fire fighting conditions. Direct suppression of a fire is usually made during its initial runs as it burns surface fuels. Flame length is used to interpret suppression efforts. Fires with a flame length less than four feet can usually be attacked at the head or flanks with hand tools (Rothermel 1983). Fires with flame lengths between four and eight feet are too intense for direct attack with hand tools; equipment such as bulldozers, pumper trucks and retardant planes can be effective (Rothermel 1983). Flame lengths between eight and eleven feet may present serious control problems. Torching of individual trees, crown fires and spot fires may occur (Rothermel 1983). Flame lengths greater than eleven feet may cause crown fires, spotting and major fire runs (Rothermel 1983). Steep slopes and wind can cause fires to burn more rapidly and with greater intensity; both of these factors tilt the flame over the unburned fuel and bring it to ignition sooner (Rothermel 1983). Indirect attack or no suppression effort may be the only possible tactics for the last two scenarios.

Environmental Consequences

Analysis Methods

Inventories of forested vegetation measured vegetation characteristics. Forest Vegetation Simulator (FVS), Fire Fuels Extension (FFE), FARSITE, Fuels Management Analysis (FMA), and BEHAVE are models used to predict forest vegetation structure and model fire behavior.

Fire behavior depends on many variables such as weather, slope, ignition area, and source. Flame length is used to determine what type of suppression effort can be deployed. FARSITE, a fire area simulator model (Finney 1998), and a Fire Behavior Analyst's predictions of fire behavior were used to model fire behavior within the analysis area. FARSITE includes many fire variables such as weather, fuels and topographic features. Fire behavior for all alternatives was predicted for two types of weather: a fairly "normal" August such as that of 2001, and an extreme weather year such as August 2000. These two weather years were used to model fuel conditions and flame length and to describe suppression ability and firefighter safety. A fire starting in the vicinity of Gibbonsville was used since lightning patterns in the area and human use makes it likely a fire will start there at some time.

Alternative A
Down Woody Material
Direct and Indirect Effects
With no treatment, down woody material will remain as stated in Affected Environment, and will continue to increase as the vegetation matures and dies. Needles, leaves, twigs, branches and dead trees will increase down woody fuel loads until a fire burns through the area. Units with more than 25 tons per acre (six percent of the area) will have a high resistance to control, and will be more likely to support crown fires.

When a fire burns through the project area, some or all of the woody material will burn. Most fuels less than three inches in diameter will be consumed in a ground fire. Depending on the weather, portions of fuels more than three inches in diameter will also be consumed. The amount and arrangement of down woody material helps feed the fire. Higher concentrations of large woody material increase the fire's intensity, which may be further exacerbated by other factors such as wind, moisture and slope. All of these factors create a more intense fire, with the possibility of spot fires and crown fires. The hotter the fire, the more fuels are consumed, leaving less on the ground.

Ladder Fuel
Direct and Indirect Effects
Ladder fuels will continue to be a component of all of the stands within the project area, either in clumps or singly. The death of mature trees creates openings in the canopy, allowing more shrubs and seedlings to become established and grow. Ladder fuels will persist in the understory and will increase the chances of a crown fire. If a crown fire occurs very little vegetation will remain.

Without thinning the smaller trees, continuous crown fuels will not be broken up, and stands will remain susceptible to crown fires. Crown fires kill most vegetation, including desirable features such as large diameter ponderosa pine and Douglas-fir.

Ponderosa pine and Douglas-fir saplings will not be thinned, leaving dense stands that will grow into mature stands with continuous crowns. Within 30 years, these stands will be very susceptible to crown fires.

Douglas-firs heavily infested with dwarf mistletoe will not be removed from cutting unit 56, leaving a stand ripe for catastrophic fire. In this unit, branches are heavily laden with needles and concentrations of pitch, and extend nearly to the ground, providing a ladder into the crowns. Continuous crowns support high intensity fires which kill most vegetation.

Fuel Model
Fire Behavior Without Treatments
Direct and Indirect Effects
Depending on the fuel model, fire will spread by the main component in the understory. Fine fuels will increase as more needles, twigs and branches fall to the ground. These fine fuels will increase the intensity of a future fire. When a fire eventually burns through the surface fuels, they will be reduced or totally consumed, decreasing the amount of fuels available, until more fuels accumulate from the existing vegetation.

If a fire occurred within the project area, flame lengths could range from one to 10 feet. Direct attack by hand crews or mechanized equipment is possible where flame lengths are less than eight feet, as long as flames do not reach the crowns. Most surface fires are caught with direct attack without much loss of resources (Belknap 2002). Firefighters should be able to safely protect buildings if a surface fire threatened them. Predicted flame lengths at the head of the fire for each fuel model found in the project area are listed in Table 3-3.

Table 3-3. ***Flame Lengths by Fuel Model***

Fuel Model	Flame Length (Feet)
1	4
2	6
5	4
8	1
9	2.6
10	4.8

Hot, dry weather pretreats fuels, making them dry and flammable. On steep slopes with ladder fuels and continuous tree crowns, fires can burn as fast spreading, high intensity crown fires (Scott 1998). Then direct attack by hand crews or mechanized equipment is impossible, and methods such as indirect attack must be employed. No surface vegetation remains where fire burns with high intensity, and no live vegetation where crown fires burn. Concentrations of down woody material and ladder fuels carry fire from the surface into the crowns. Individual trees torch and a crown fire occurs wherever the overstory is continuous. Fire crews will be unable to fight the fire directly, and will rely on indirect suppression efforts, such as building a firebreak some distance in front of the fire until it drops out of the crowns and allows more direct attack. Structures can be protected by indirect methods such as foaming or sprinklers. The area may be unsafe for firefighters due to extreme fire behavior. This potential exists over thirty-two percent of the analysis area.

Alternative B, C, D
Effects for all action alternatives are similar, since the types of treatments are the same, only differing in where the treatments are applied on the landscape.

Down Woody Material
Direct and Indirect Effects
Thinning and ladder fuel treatments will increase down woody material until slash treatments (broadcast or pile burning) are applied. Broadcast burning will decrease all down woody material to one to 15 tons/acre in a mosaic pattern across the treatment units. Piling and burning the slash will decrease the larger (greater than three inches) down woody materials in patches or pockets, leaving smaller needles, twigs and branches scattered across the unit. One to four tons per acre will be left in units adjacent to private land, and four to 15 tons/acre in all other units. Table 3-4 shows the range of down woody materials remaining after treatment, by alternative.

Table 3-4. ***Percent of Down Woody Material Remaining***

Tons/acre Remaining	Alternative B	Alternative C	Alternative D
1-4	5%	4%	3%
4-15	17%	12%	7%

Reducing fuel loads to one to 15 tons/acre will lessen resistance to control, allowing direct suppression of fires and reducing the risk of spot or crown fires.

Ladder Fuel
Direct and Indirect Effects
Ladder fuel treatments will create an 18 by 18 foot spacing, breaking up the continuity of the ladder fuels and leaving one to fifteen tons per acre of down woody material scattered on the ground. Before slash treatment, the risk of high intensity fire fueled by the large slash accumulations will be high. Broadcast burning will decrease all down woody material in a mosaic pattern across the treatment units. Piling and burning the slash will mainly decrease the larger down woody materials in patches or pockets, leaving the smaller needles, twigs and branches scattered across the unit. Table 3-5 shows the number of acres of ladder fuel treatment by action alternative.

Table 3-5. ***Acres of Ladder Fuel Treatments by Alternative***

	Alternative B	Alternative C	Alternative D
Acres of ladder fuel treatments	5,690	4,150	2,499

Within 10 to 20 years, new seedlings and saplings will become established in the understory of mature stands, creating a ladder fuel condition similar to today's. Future maintenance treatments will be needed to remove these ladder fuels.

Ladder fuel treatments without slash treatment will occur on 266 acres in Alternative B and 222 acres in Alternative C. These units will have a greater down woody fuel loading for three to five years, until snow compacts the limbs and the needles fall off the downed material. Until the slash breaks down, surface fires could be very intense. Precommercial thinning of these units will reduce susceptibility to crown fire.

Thinning trees greater than eight inches in diameter will lower crown density in the treatment units, providing less fuel and crown continuity that could support a crown fire. Merchantable boles will be removed, leaving tops, branches, limbs and needles to increase the down woody material, especially fine fuels. Following broadcast burning or pile burning, the logging slash will equal one to fifteen tons per acre. Slash treatment will decrease down woody material and fine fuels. The combination of ladder and crown fuel reduction will greatly decrease the likelihood of crown fires. Individual trees may torch, but there will not be enough fuel to sustain a crown fire. Eventually (10 to 20 years), the crowns will grow together and additional thinnings will be needed to maintain a discontinuous crown layer.

In Alternative B and C, 38 acres of Douglas-fir heavily infested with dwarf mistletoe will be treated. Fine fuels and remaining down woody material will be reduced to four to 15 tons per acre following slash treatments by broadcast burning. Ponderosa pine is more "fire resistant" than Douglas-fir because its branches self-prune as the tree grows, reducing ladder fuels. The roots grow deeper into the soil, making them less susceptible to fire damage (Graham and others, 1999). Conversely, Douglas-fir infested with dwarf mistletoe has heavy concentrations of flammable needles close to the ground. Under moister conditions, the roots tend to remain in the upper soil levels, making them more susceptible to damage from surface fires (Graham and others, 1999). This treatment will make the stand less susceptible to fire by removing fine surface fuels, highly flammable ladder fuels and promoting the growth of young ponderosa pine.

Fire Behavior With Treatments
Direct and Indirect Effects

Vegetative composition will change, favoring large ponderosa pine over Douglas-fir in most of the stands.

After thinning and ladder fuel reduction but prior to slash treatment, a continuous fuel bed will remain, composed of all the down woody material remaining from the treatments. This will briefly change the fuel models to 11 or 12 (Graham et

al. 1999). Flame lengths associated with these fuel models are 3.5 feet and eight feet, respectively.

Fairly active fires in the slash and herbaceous material characterize fuel model 11. The fuel load is rather light, limiting fire potential. Conversely, rapidly spreading fires with high intensities, capable of generating firebrands, can occur with fuel model 12 (Anderson 1982).

The combination of all proposed treatments will make forests more "fire safe" by creating a species composition, age structure, and fuel level such that crown fires are unlikely to begin or spread (Brown 2000). Surface fire intensity will be reduced by removal of fine fuels through broadcast burning. Reducing ladder fuels makes crown fires less sustainable. Stands with fewer trees have less continuous crowns and ladder fuels (Pollet et al. 1999). See Table 3-6.

Table 3-6. *Changes in Fire Behavior by Alternative*

Fire Behavior Within Analysis Area	Alternative B	Alternative C	Alternative D
Reduction in Crown Fire Potential	30%	21%	13%
Reduction in Surface Fire Potential and Resistance to Control	23%	16%	11%
Reduction in Future Crown Fire Potential	4%	2%	<1%
Direct Fire Attack	23%	16%	10%

Thinning reduces crown bulk density and thus the amount of crown available to burn, thus reducing the potential for a crown fire. It also removes the vegetation in the understory (crown base height) that carries the fire into the crowns (Scott 1998). Fuel loads are redistributed; decreasing fire intensities when surface fuels are treated by broadcast burning and pile burning (Graham et al. 1999, Scott 1998). Reducing the number of trees through thinning and ladder fuels treatments makes crown fires harder to initiate and sustain (Graham et al. 1999). Thinning from below maintains larger diameter trees, and allows the leave trees to increase in diameter and develop thicker bark, making them more fire resistant. Thinning will favor ponderosa pine over Douglas-fir, a more fire-susceptible species due to its low crowns.

Precommercial thinning in sapling-sized ponderosa pine and Douglas-fir will favor ponderosa pine over Douglas-fir and allow stands with lower crown bulk densities to develop, reducing the likelihood of crown fires (Graham et al. 1999). For approximately five years after thinning, potential fire behavior in thinned units

with no slash treatment will be very intense due to the amount of fine fuels on the surface (Pollet et al. 1999). The fuel model will change from 8 to 12 (with predicted flame lengths of eight feet). After five years, these fine fuels will have decomposed, decreasing the chance for high intensity surface fires.

If a fire occurs in the project area following treatments, fire intensity will be reduced due to reduction in fuels; flame lengths will range from one to 10 feet. Direct attack by hand crews or mechanized equipment will be possible if flame lengths are less than eight feet, because the removal of some fuels will keep the fire on the ground and give fire crews a better chance to stop it. Structures will be easier to defend and it will be safer for firefighters to be in the vicinity of treated areas (Omi et al. 2002).

Treating the surface fuels through broadcast burning or burning slash piles minimizes fire intensity (Graham et al. 1999, Scott 1998). Reduction in down woody concentrations reduces the time fires burn and lower the potential for killing roots and scorching trees. Most trees will survive the fire, maintaining a mature forested condition.

The seedtree regeneration method applied to unit 56 in alternatives B and C will reduce possible fire intensity within this unit. Dwarf mistletoe brooms are extremely flammable due to the high concentrations of sap, needles and branching pattern that extend close to the ground. This treatment will create an open stand with low crown bulk densities that will not support crown fires as long as the regeneration is not tall (Graham et al. 1999). The regeneration will need precommercial thinning approximately 15 years following treatment to prevent development of ladder fuels, which could increase the potential for crown fires (Graham et al 1999). The remaining 20 or so mature overstory trees per acre will be unable to sustain a crown fire with their greatly reduced crown fuels and fuel continuity.

Thinning and burning of slash indirectly limits fire size by facilitating suppression (Finney 2001). Reduction of ladder fuels facilitates control of fires because fire intensity is lowered, embers or firebrands are reduced, which leads to less spotting and in turn lowers the potential for crown fires (Finney 2001). An overall reduction in ladder fuels, down woody material and increased spacing between overstory crowns, reduces the likelihood of a sustained crown fire within the treatment areas. Resistance to control would be low to moderate, allowing firefighters to safely attack the fire.

Alternative B treats more acres in the project area than Alternatives A, C and D, providing a mosaic of fuels across the landscape; the vegetation continuity within the landscape is more broken. Alternative B provides more opportunities to suppress a fire (depending on where it started) than the other three alternatives. Alternative B treats more units adjacent to the urban interface than the other three alternatives, providing safer areas for firefighters within the interface.

Forest Health

Affected Environment

The analysis area for forest health is the same as the project area. The boundary for the project area is large enough to reflect ecological processes and includes a variety of ecosystems: riparian, meadows, low and mid-elevation forest. The boundary includes mostly the dry forest short fire-return interval ecosystem, which is the primary emphasis of the National Fire Plan.

The baseline used for forest health is the Historical Range of Variability (HRV) (Brown and others, 2000). HRV is the natural fluctuation of ecosystems over time. It refers to the range of conditions and processes likely to have occurred prior to settlement by Euro-Americans (about the mid-1800s). HRV serves as a reference point from which change can be measured, rather than a condition that ecosystem management tries to attain (USDA Forest Service 1996).

Forest health is a function of ecosystems and structure (forest over story and under story vegetation), fire severity, and insect and disease potential. Ecosystem processes addressed are fire frequency and severity, and insect and disease potential. The ecosystem structure considered is forest vegetation, both overstory and understory.

Forest Overstory

Forest structural stages characterize the changes in forest conditions related to size and distribution of trees. Two primary stages are Old Forest Single Story (OFSS) and Old Forest Multi-Story (OFMS) (USDA Forest Service 1996). OFSS is characterized by the presence of large overstory trees and a general absence of understory trees. OFMS is characterized by diverse horizontal and vertical distributions of tree sizes, with large trees present and significant in the overstory. Historically large diameter open OFSS stands were common in the dry forest type in Central Idaho. Photos of the project area in 1913 display these open forest conditions (Figure 3-1).

Figure 3-1. *Forest structural conditions of the dry forest Ponderosa pine type. The author's caption states: "A southerly slope in the pure yellow pine type. The trees average 36" D.B.H. The bunch grass is heavy and reproduction is very scarce. Humbug Gulch." (H. Work 1913).*

More current photos provide examples of OFMS stands within the Gibbonsville project area (Figure 3-2).

Figure 3-2. *Existing condition in the project area. Photo of OFMS structure in proposed treatment unit 107 of the Gibbonsville Project area (Salmon-Challis Forest, 2002).*

As these photos display, a substantial change in the number of small trees per acre has occurred. In the OFMS stands, large numbers of seedling, sapling and pole size trees often occur in patches or clumps. As fire exclusion continues, these clumps expand and occupy more of the area, resulting in a substantial increase in the average number of trees per acre.

In the project area, the OFMS currently occupies 40 percent of the dry forest type. This percentage of OFMS is twice the historical maximum. In the project area, the OFMS structure is three to four times greater than the OFSS. The conversion of OFSS to OFMS leads to an increased risk of large high severity wildfires such as the Clear Creek Complex on the Salmon-Challis National Forest and the fire complexes in the Bitterroot Valley in 2000.

In the historical landscapes, the OFMS structure was a component of the dry forest ecosystem, but generally its percentage of the dry forest type landscape did not exceed the OFSS. Where ponderosa pine was a major portion of the forest overstory, the OFMS represented a considerably smaller percentage of the dry forest landscape. In landscapes with both ponderosa pine and Douglas-fir, where Douglas-fir occupied the wetter sites, OFMS may have had the same proportions as the OFSS (Losensky, 1996). In the project area, many forest areas that were single storied forests in the late 1800s and even the early 1900s are now multi-storied forests.

Large high severity fires are more likely when a large proportion of the landscape is in multi-storied forest types. Such fires were not characteristic of these ecosystems when they were functioning and resistant to fire. When single story or open canopy forest structures made up a larger percentage of the dry forest landscape, the fuel base was not available to allow large high severity fires to consume large percentages of the landscapes. Mid-size ponderosa pine and large Douglas-fir are resistant to the heat generated from ground fires (Brown 2000). In open forest structures, these species are also highly resistant to crown fire spread and act as natural barriers against large crown fires.

Figures 3.3 to 3.7 provide a comparison of the estimated historical and current structural stages for the dry forest type in the project area. These figures show a dramatic increase in multi-storied forest structures at the cost of single story forest structures.

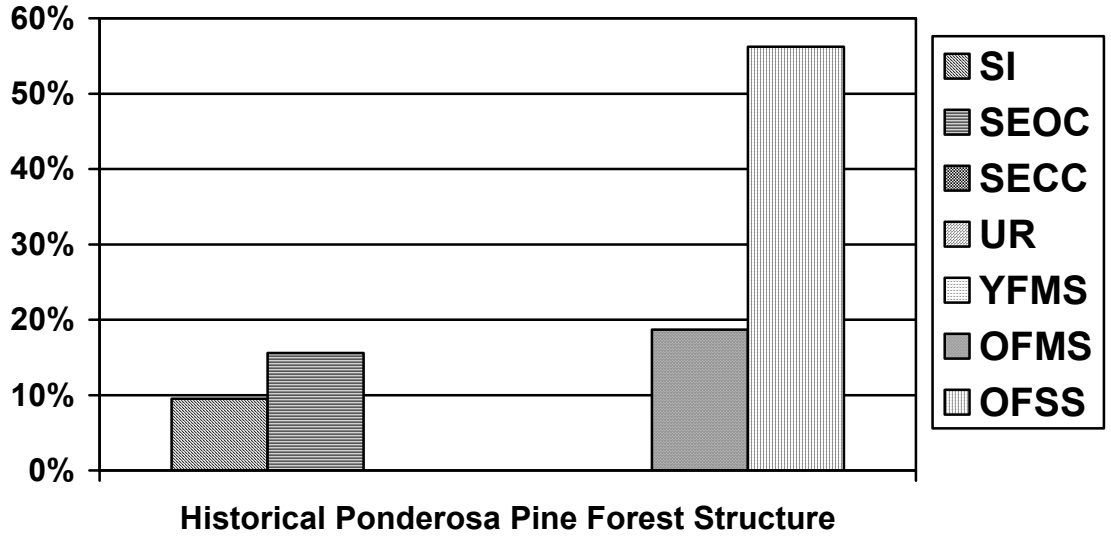


Figure 3-3: *Historical ponderosa pine cover type structural stages (J. Losensky, 1996).* Stand Initiation (SI), Stem exclusion open canopy (SEOC), Stem exclusion closed canopy (SECC), Understory reinitiation (UR), Young Forest multi-story (YFMS), Old Forest multi-story (OFMS), Old Forest single-story (OFSS).

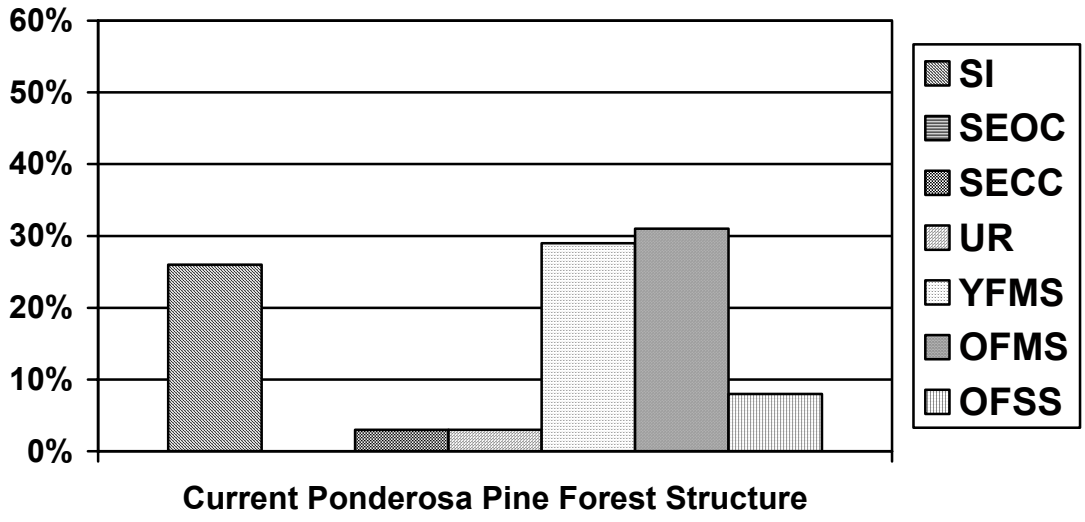


Figure 3-4: *Current ponderosa pine dry forest structural stages for the Gibbonsville area.* Stand Initiation (SI), Stem exclusion open canopy (SEOC), Stem exclusion closed canopy (SECC), Understory reinitiation (UR), Young Forest multi-story (YFMS), Old Forest multi-story (OFMS), Old Forest single-story (OFSS).

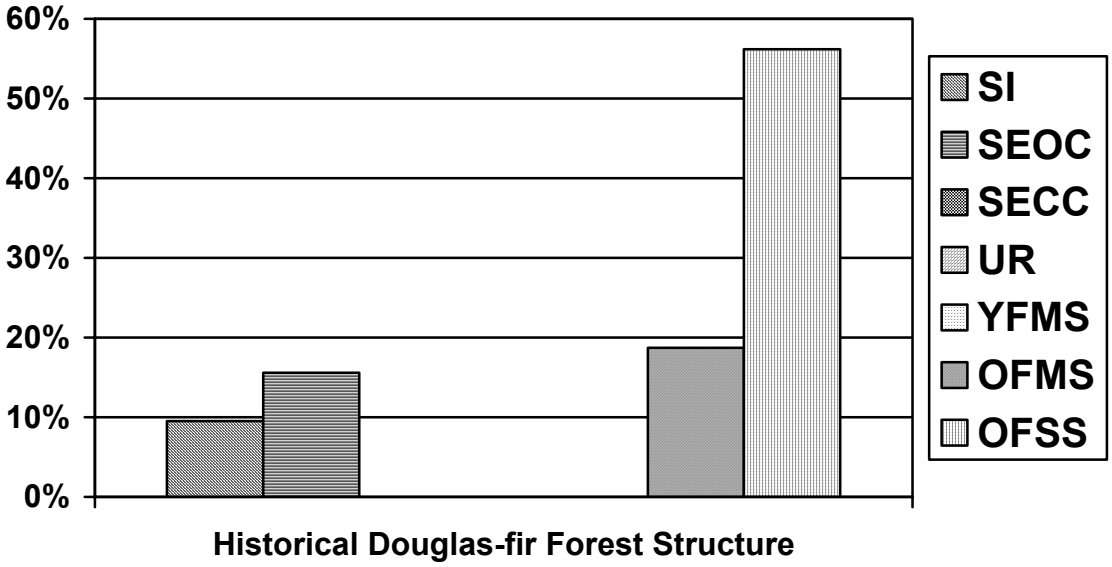


Figure 3-5: *Historical Douglas-fir cover type structural stages (J. Losensky, 1996).* Stand Initiation (SI), Stem exclusion open canopy (SEOC), Stem exclusion closed canopy (SECC), Understory reinitiation (UR), Young Forest multi-story (YFMS), Old Forest multi-story (OFMS), Old Forest single-story (OFSS).

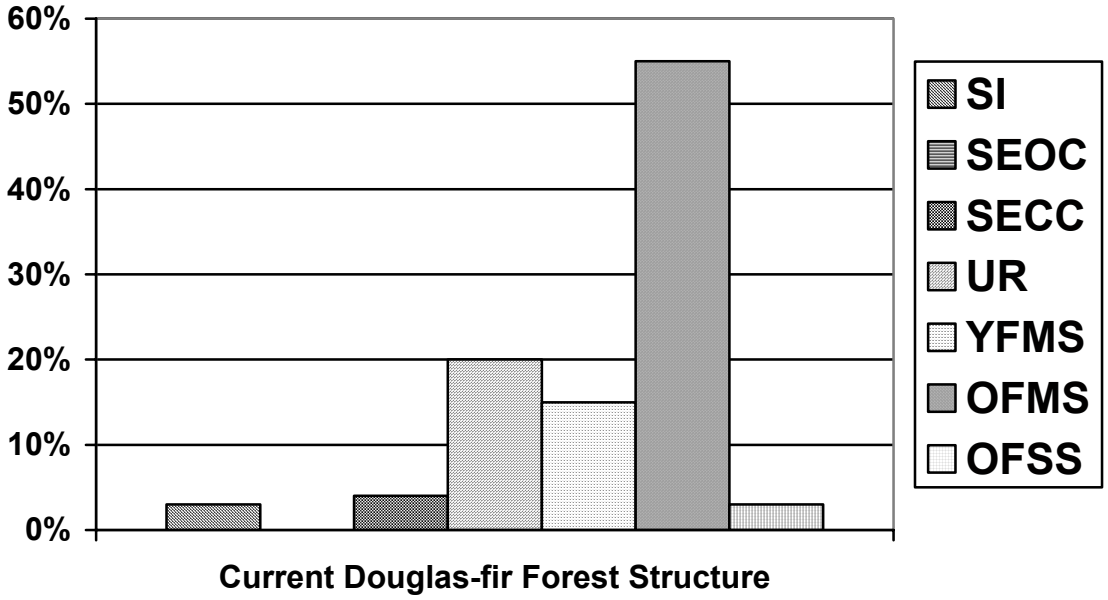


Figure 3-6: *Current Douglas-fir dry forest structural stages for the Gibbonsville area.* Stand Initiation (SI), Stem exclusion open canopy (SEOC), Stem exclusion closed canopy (SECC), Understory reinitiation (UR), Young Forest multi-story (YFMS), Old Forest multi-story (OFMS), Old Forest single-story (OFSS).

A fire frequency assessment was completed for the upper North Fork landscape, which takes in the drainages from Gibbonsville to Lost Trail Pass. Fire group 3 (Crane et. al 1986) represented 36 percent of the analysis area in the assessment. Fire group 3 is defined as warm, moist ponderosa pine habitat types and warm, dry Douglas-fir habitat types usually dominated by ponderosa pine. The actual acreage burned in fire group 3 over the past 75 years was 1,460 acres. This is only three percent of the area that would have burned during a natural burn cycle.

From 1919 to year 2000, approximately 175 fires were suppressed in the Gibbonsville area. Total estimated burned area was 544 acres in the 80-year period for the analysis area of 13,050 acres (Hoyt 2000). In other words, an average of seven acres per year have burned in the past 80 years. At this rate it will take approximately 1,800 years to burn over the 13,050-acre project area. This fire return interval rate is many times greater than the historical rates for the dry forest type, which ranged from three to 41 years.

Understory Plant Vigor and Plant Species Diversity

As a result of fire exclusion and other management activities, the forest understory in the dry forest type of the project area has lost plant diversity. In the historical dry forest frequent fire regime of the Gibbonsville area, grasses and

forbs were fire-adapted species and responded vigorously to the common low severity fires. These grasses and forbs provided rapid ground cover after a low severity fire, preventing soil erosion and providing an abundant food source for wildlife.

The loss of the open forest structural stages eliminated environmental conditions favoring grasses and forbs. The closing of the forest canopy, plus increased tree density, blocks direct sunlight from the forest floor. Loss of soil moisture from increased tree evapo-transpiration reduced the vigor and presence of the grass and forb species that once thrived on the open forest floor. In addition, lack of frequent low severity fires has altered the nutrient cycle, patterns of ash beds, and low duff levels that some plants need for seed germination and survival.

Duff and Bark Flake Accumulations

Tree resistance to damage from ground fires depends on many factors, two of which are tree bark thickness and the distance of the lowest live branches from the ground.

Tree bark thickness influences a tree's ability to withstand heat generated from ground fires. The thicker the bark, the more resistant the tree is to ground fires. Bark thickness is related to tree diameter: the larger the tree, the thicker the bark (Ryan 1990). Under natural fuel conditions for ponderosa pine, fire resistance is gained at one to ten inches in diameter. For Douglas-fir trees, fire resistance is gained at five to ten inches in diameter (Brown, 2000). The longer a ponderosa pine or Douglas-fir tree seedling is protected from fire and grows at a rapid rate, the faster it will develop bark thick enough to resist ground fires and become part of a fire resistant overstory.

When fires are frequent and fuel accumulations consist mostly of fine fuels, the lower live branches of Douglas-fir and ponderosa pines are pruned by ground fires (Brown, 2000). The heat generated by ground fires kills the lower live branches between 10 and 20 feet from the ground, depending on the heat of the fire. The heat is usually severe enough to kill the foliage on the lower branches, but not hot enough to combust the foliage and cause a crown fire. The lower branches are burned and fall off in a few years. Historical amounts of ground fuels such as grass and shrubs will produce flame lengths of four to six feet, depending on burning conditions (Anderson, 1982). This pruning of lower live limbs continually improves the tree's ability to resist future ground fires.

In the nineteenth and early twentieth centuries, fires in the ponderosa pine type were usually ground fires (Locke, 1911). Herman Work's thesis of the Salmon National Forest (1913) provides photos that make reference to a low severity fire that occurred in 1910 just south of Gibbonsville (Figure 3.7).

Figure 3-7. *"A mature stand of yellow pine on Humbug Gulch. The tree in the foreground is 54" D.B.H. The average tree is 38" D.B.H. A few dead saplings and charred stubs show some results of the 1910 fire." (Work, 1913)*

In recent years, fires occurring under extreme fire conditions in the dry forest type have been high severity fires. The Clear Creek Fire Complex in 2000 (25 miles southwest of the project area) burned large areas of the dry forest type with lethal and mixed lethal fire severity.

Insect and Disease Potential

The change in potential insect disturbances is directly correlated with the change in composition, structure and connectivity of forest host species. Changes in potential insect disturbance are strongly tied to the transitions involving the ratio of shade-intolerant (trees that grow well in the sun such ponderosa pine) to shade-tolerant species (trees that grow well in the shade, such as Douglas-fir). It is also tied to dominance of medium to large trees, increased crown cover, development of the understory and development of multiple crown layers (Quigley 1979).

In the project area, the risk of insect epidemics is increasing as the vegetative structure shifts, with resulting water/nutrient stress on trees. Major increases in

the OFMS acres are stressing mid to large diameter trees. This will continue as long as tree stocking levels remain high and the average stocking density continues to increase. As ponderosa pine declines as a major overstory tree species, the risk of insect epidemics will increase.

Environmental Consequences

Analysis Method

Assessment data was complied from the existing forest wide data layers, including: cover type, vegetation structural stage, potential vegetation type, fuel models, slope, aspect, and elevation. Field observations allowed resource specialists to confirm forest data layers and to gather additional information. Stand exam field plots, fuel transects field plots, habitat typing plots, and field reconnaissance contributed to the information to complete the assessment.

The forested portions of the project areas were delineated into fire groups (Crane and Fisher 1986), forest structural stage (Hessberg 1999, and USDA Forest Service 1996), and fuel models (Anderson 1982). Trees pre acre, vertical arrangement of trees, and canopy cover, habitat type group were used to classify forested areas into forest structural stages. Historical fire regimes were assigned based the fire group classes (Crane 1986) and on published literature linked to habitat type groups or historical forest types.

Three levels of scale were addressed in the assessment and included the Interior Columbia Basin, Central Idaho, and local Gibbonsville area/treatment area. Baseline and current conditions/trends were discussed at these three scales and allow the reviewer an opportunity to place the resource information into context regarding cumulative effects.

When scientific findings were not available for sites within a particular scale (Basin, Central Idaho, or project) the nearest location with published science findings was used when the site were appropriately matched (i.e., similar habitat types).

The Forest Health assessment discussion is divided into two basic components: ecosystem process, and ecosystem structure. Ecosystem process refers to the key disturbance processes of fire and insect activities that had substantial influence on the overstory vegetation. Fire is discussed in terms of its frequency to the landscape and the fire effects to the vegetation that result after the fire event. Fire is also addressed in terms of the type of tire event; crown fire, ground fire and the level of severity form the fire (high to low, or lethal to nonlethal).

Ecosystem structure is addressed regarding the dominant overstory tree species and size. Discussions keyed into the primary tree species, diameter, health or vigor, trees arrangement in the forest (forest structural stages), and woody fuel arrangement on the forest floor.

Current conditions and trends discussion was based on assessing the available information on existing of recent resource attributes, and then comparing those attributes or similar attributes to baseline or reference information. This process allows for a clear and documented discussion regarding trends of important resource attributes.

Alternative A
Direct and Indirect Effects
Forest Overstory
The No Action Alternative will not reduce ladder fuel conditions under a controlled situation, and unless a wildfire occurs, ladder fuels will increase.

Historically, the dry forest type was characterized by frequent nonlethal underburning fires for approximately 80% of the landscape (Hann et al 1997), and the open forest structure acted as a fuel break, restricting the size of crown fires in any given landscape.

The current high amount of ladder fuels (75% of the Gibbonsville area), as represented in the multi-story forest structures (UR, YFMS, and OFMS), will place the Gibbonsville project area at higher risk for large high severity wildfires during high fire danger situations. In the absence of sizeable disturbances, current stand development trends will continue. Stocking levels will increase while vigor and growth decline. Douglas-fir will replace ponderosa pine.

Understory Plant Vigor and Plant Species Diversity
In the No Action Alternative, the trend of high levels of competition for water, nutrients, and sunlight will continue on stands with dense tree canopy closures. Also, the amount of the dry forest type with high levels of dense forest canopy will increase. Forests with dense tree canopies will have low vigor ponderosa pine seedlings, and important grasses and forbs which were adapted to frequent low severity fire regimes will continue to decline.

Many of the plants that historically occupied these dry forest types were adapted to open forest conditions and frequent low severity fires, which prepared seedbeds, cycled nutrients, and stimulated sprouting plants.

Open forest conditions allowed more sunlight to reach the forest floor. Some understory plants and ponderosa pine seedlings need these conditions. When forests are open, ponderosa pine seedlings grow rapidly and out-compete Douglas-fir seedlings for nutrients, water, and light. Dry forests with large portions of the landscape in dense forest canopy are not conducive to rapid ponderosa pine growth. Small ponderosa pine trees under heavy competition for water/nutrients and sunlight are more susceptible to fire, insect, and competition mortality.

Open forest conditions have less living tree biomass per acre than the areas currently in OFMS, and UR, SECC. Areas with high levels of living tree biomass have more competition for water and nutrients, resulting in plant stress or death. Understory plants may have light and moisture requirements that cannot be met if tree stocking levels are high. Continuous high levels of competition generally result in low plant vigor. Low vigor plants are less able to produce seeds or vegetative reproductive starts than plants of good vigor. This could affect the plant community's ability to respond to wildfire and provide soil cover for stabilization.

Duff and Bark Flake Accumulation

The No Action Alternative will not reduce duff levels and, unless a wildfire occurs, will allow duff levels to increase. Forest duff burns in both ground and crown fire events. The amount of duff consumed by fire is in part related to the fire intensity and the moisture content of the duff. High and extreme fire danger situations are generally associated with drought conditions or periods of high winds, dry fuels, high temperatures, and low humidity. Due to high summer temperatures, low summer/fall relative humidity, and the natural drought patterns of the Gibbonsville area, high fire danger situations are not uncommon.

If duff layers are dry, fire will consume most of the existing duff. If the duff layer is thicker than under historical conditions, its combustion will generate more heat or longer duration of heat. This unnatural amount of heat will contribute to plant damage and may exceed the plants' fire resistance levels, resulting in serious damage or death. When duff levels are higher than natural in the dry forest ecosystems, ground fires will kill many more of the large overstory trees than under natural conditions.

Root systems, or the live tissue at the base or stem of the grass/shrub/tree, can be damaged or killed from the heat of surface fires. Plants with the ability to sprout after low severity fires may have sprouting plant tissue killed by high levels or extended periods of heat exposure generated from the burning of unnaturally thick duff layers.

Ninety-three percent of the Gibbonsville project area is a dry forest type historically dominated by frequent low severity fires. Duff and ladder fuels have accumulated with fire exclusion and plant vigor has been lost. This increases the risk of high severity fire, which in turn poses a risk to forest health.

Insect and Disease Potential

In the absence of sizeable disturbances, current stand development trends will continue. Stocking levels will increase while vigor and growth decline. Insect activity will increase and Douglas-fir will replace ponderosa pine. The current risk of uncharacteristic wildfire and resource damage will remain.

Alternatives B, C and D
Effects Common to Action Alternatives
Direct and Indirect Effects
Effects between the action alternatives are similar, with the differences being in acres treated. An acreage summary of treatments is provided in Table 3-7.

Table 3-7. *Summary of Effects of Action Alternatives to Forest Health*

Alternatives	Overstory		Understory	Duff and Bark Flake Accumulations	Insect and Disease Potential
	Acres Thinned to a Minimum of 18 foot Spacing and SDI 80	Acres Treated and Burned	Acres Thinned to a Minimum of 18 foot Spacing and Burned	Acres Broadcast Burned	Acres Treated
B	2,683	5,436	5,436	2,540	5,690
C	1,574	3,778	3,778	1,590	4,016
D	946	2,466	2,466	1,676	2,499

Forest Overstory
Both surface and canopy fuels play an important factor in the risk of high severity wildfires. By fuel treatment activity type, we can expect the following effects to crown torching and crown fire indicators in multistory stands (Scott 2001), Table 3-8.

Table 3-8. *Expected Results to Multistory Stands from Fuel Treatments.*

Fuel Treatment	Surface fuel load (SFL)	Canopy base height (CBH)	Canopy bulk density (CBD)
Understory removal with pile or broadcast burning.	Decrease SFL.*	Increases CBH (height of live fuels from the ground).*	Decrease or no effect to CBD.*
Overstory thinning – with pile burning, or broadcast burning, or whole tree yarding.	Decrease SFL.*	Increase or no effect to CBH.*	Decrease CBD.*
Slash pile burning	Decrease SFL.*		
Broadcast burning	Decrease SFL.*	Increase or no effect to CBH.*	

* Indicates a positive effect on reducing risk of high severity

Pruning lower live branches can reduce ladder fuels that contribute to crown fire initiation under low or moderate fire danger situations. Under high fire danger

conditions, pruning to a six to eight foot height on steep slopes is ineffective due to expected flame height and fuel ignition conditions. Pruning (and treating the created slash) to a six to eight foot height on steep slopes, combined with other treatments, will help reduce crown fire initiation. Pruning alone will not reduce basal area or tree stocking density, which play important roles in crown fire severity (Pollet 2002).

Low severity broadcast burns result in less heat damage to larger fire resistant trees than to smaller seedling/sapling and pole size trees. The ability of ponderosa pine and Douglas-fir to resist heat damage is a function of bark thickness, in which, the thicker the bark, the more heat resistant the tree. Bark thickness is related to tree diameter; the larger the diameter, the thicker the bark. Small diameter trees are at higher risk of lethal burn damage from prescribed fire than large trees. In the smaller size classes, Douglas-fir is more susceptible to fire damage at the base of the tree than ponderosa pine. Broadcast burning decreases the risk of crown fire initiation and propagation. On a stand basis, broadcast burning immediately reduces the surface ground fuels and consumes the fine fuels (live and dead) in the lower portion of the ladder fuel profile, often increasing the crown base height (Scott 2001). Thinning using broadcast burning reduces the risk of crown fire initiation, crown fire propagation, and crown fire spread in the overstory. Surface fuels are reduced. Risk of crown fire initiation and propagation fuels is reduced for the next 20 to 30 year period, depending on tree stocking density and height to live crowns. Risk of crown fire spread, is unlikely to be greatly reduced, since it correlates to reduction in basal area (Pollet 2002). The thinning of only small diameter trees (understory) has less impact on basal area or overstory crown density.

Treating ladder fuels by cutting allows for a more controlled thinning of the overstocked small tree component, and allows more control in ensuring that ponderosa pines are left instead of Douglas-fir. It also allows for more control when reducing ladder fuels around other high value resources. Surface fuels will be reduced, crown fire initiation and propagation fuels will be reduced (depending on tree stocking density and height to live crowns), and crown fire spread rate may be lowered as basal area is reduced.

Thinning small trees and removing some trees that are larger than eight inches dbh, leaving the largest trees in the stand, will lower the risk of crown fire initiation, propagation, and spread. Cut trees larger than eight inches dbh will reduce ladder fuels in the upper portions of the ladder fuel profile and reduce risk of crown fire propagation and crown fire spread.

Thinning trees ranging from seedlings to trees greater than eight inches dbh will result in a reduction of basal area, a reduction in stocking density, and an increase in height to live crown (and crown base height). Also, the resulting stand will have a greater average diameter and a higher percentage of ponderosa pine (where the species is still present in larger diameters).

Larger diameter ponderosa pine and Douglas-fir trees have higher fire resistance than smaller diameter trees. Ponderosa pine also has lower crown bulk density for a given size tree compared to Douglas-fir. Also, broadcast burned units will have reduced duff accumulations, lowering the risk of lethal damage to large diameter ponderosa pine and Douglas-fir from surface wildfires.

Understory Plant Vigor and Species Diversity

In the action alternatives, the trend toward high levels of competition for water, nutrients, and sunlight will be reversed by commercial and precommercial thinning. Ladder fuels reduction and thinning will favor and encourage ponderosa pine as a primary tree component.

Important grasses and forbs adapted to frequent low severity fire regimes and open forest canopy conditions will be allowed to reoccupy the understory of these dry forest type stands. The broadcast burns will have prepared seedbeds, cycled nutrients, and stimulated sprouting plant species.

Open forest conditions allow more sunlight to reach the forest floor. Some understory plants and ponderosa pine seedlings need these conditions. When forests are open, ponderosa pine seedlings are able to grow rapidly and out-compete Douglas-fir seedlings for nutrients, water, and light. Ponderosa pine trees that are released from heavy competition for water/nutrients and sunlight will be less susceptible to fire, insect, and competition mortality.

Open forest conditions have less living tree biomass per acre than the areas currently in OFMS, and UR, SECC. In areas with lower levels of living tree biomass, there is low competition for water and nutrients. Low levels of competition for water and nutrients result in increased plant vigor and growth. Understory plants have light, nutrients, and moisture available if forest canopy or tree stocking levels are low. Low levels of competition for needed resources result in high plant vigor. Higher vigor plants are generally able to produce more viable seeds or vegetative reproductive starts than plants of poor vigor. This will increase the understory plant community's ability to respond to wildfire and provide for rapid soil cover for stabilization.

Duff and Bark Flake Accumulations

Prescribed broadcast burn treatment allows a low severity fire to burn across designated treatment areas. A burn prescription will include parameters of wind speed, relative humidity, fuel condition and arrangement, and other important environmental factors, which influence fire behavior. The low severity fire will reduce the accumulation of duff, forest floor litter, and bark flake accumulations, as well as logs and branches. By reducing the duff layer with fire, under conditions that produce a low severity burn, damage to large diameter trees will be minimized.

The prescribed fire will be conducted with the object of reducing duff layers, not totally removing duff or other ground cover layers throughout the treatment areas. A low severity fire, which does not remove all the duff layers, will damage tree root systems much less than a high severity fire.

Insect and Disease Potential
The thinning prescribed in the action alternatives (B, C, and D) will reduce tree stocking density and reduce the number of trees drawing soil moisture from the growing sites, allowing fewer trees to compete for the same amount of water. This reallocation of soil moisture to the remaining trees will be beneficial to the remaining trees. Many of the old growth trees within the treatment areas will have more soil moisture available and are likely to respond with a visible increase in tree vigor.

Studies have shown that thinning resulted in improved uptake of water; greater nitrogen uptake resulting in an increase in needle surface area and mass; increase in carbon uptake; longer needles; a substantial increase in photosynthetic capacity which contributed to greater canopy growth; improves the vigor of ancient, pre-settlement ponderosa pine trees (Stone 1999).

An increase in tree vigor for old growth trees may increase their ability to withstand disturbances such as insect and disease attacks, and increases their resistance to wildfire damage. In addition, an increase in tree vigor can prolong the life expectancy of old growth trees.

Water Quality

Affected Environment
The analysis area to assess watershed effects includes the Anderson, Dahlonega, Lick, North Gibbonsville, and Sheep subwatersheds. This area was selected because it encompasses the geographic area that could contribute to direct and indirect effects to watershed resources, as well as cumulative effects from the proposed actions and past, ongoing and proposed management activities. These subwatersheds are all within the North Fork of the Salmon River Watershed.

Water Quality Components and Beneficial Uses
Water quality has three components: chemical, physical and biological. These parameters make up the water environment as defined by the Clean Water Act. Beneficial water uses are designated according to the uses for which they are presently suitable or are intended to become suitable based on water quality. Water quality standards are legally established rules consisting of three parts: designated uses, criteria to protect those uses, and an anti-degradation policy. Designated uses are those beneficial uses listed in the *Water Quality Standards and Wastewater Treatment Requirements* (Idaho Department of Health and

Welfare 1998). Criteria are the conditions presumed to support of protect the designated uses (State of Idaho, Division of Environmental Quality, 1996).

Designated beneficial uses for the North Fork of the Salmon River are: domestic water supply, agriculture water supply, cold water biota, salmonid spawning, primary contact recreation, secondary contact recreation and special resource water. The state has not designated Beneficial Uses for other streams located in the project area; however, existing beneficial water uses are cold-water biota, salmonid spawning, irrigation, domestic use and secondary contact recreation.

Anderson and Dahlonega Creeks are not designated as Public Water Supplies, but they are sources of domestic (potable) water for residents in Gibbonsville. The community of Gibbonsville gets its water from Anderson and Dahlonega Creeks via an open and untreated ditch system. Four households use the water from Dahlonega Creek for domestic purposes. Excess is diverted into the Anderson Creek dredge pond.

Currently all the homes in the Gibbonsville area located downstream from Anderson Creek use water from Anderson Creek for irrigation of lawns and pastures. A local resident states that approximately 50 acres is irrigated from the Anderson Creek ditch. Five homes use water from Anderson Creek as a domestic water source. The ditch water is plumbed directly into their homes and is their sole source of domestic water. The remaining homes have wells for domestic (potable) water and use Anderson Creek water for irrigation.

Section 303(d) of the Clean Water Act requires the State of Idaho to identify Water Quality Limited stream segments or water bodies. These are stream segments or water bodies that are not fully supporting beneficial uses. Currently there are no 303(d) stream segments identified in the project area, within the subwatersheds or within the North Fork of the Salmon River Watershed.

Watershed Risk Rating

The existing condition, watershed sensitivity and degree of management within a watershed or subwatershed affects the potential for adverse effects to watershed and aquatic resources. Research indicates that the probability of adverse effects increases as the percentage of the watershed or subwatershed affected by management actions or natural disturbances, such as fire, increases (USDA, Forest Service 1993). Based upon a watershed risk assessment presented in the document *Determining the Risk of Cumulative Watershed Effects Resulting from Multiple Activities* (USDA, Forest Service 1993), road density and percent of the subwatershed covered with “hydrologically immature” vegetation are indicators of potential effects on water yield and timing as well as erosion and sediment potential. The risk assessment procedure is included in the project record.

Roads can affect hydrologic functions and resultant water quality by altering groundwater interception, runoff distribution in time and space, and the potential for sediment production and delivery to streams. The risks of a road affecting water yield and/or quality are largely determined by location, maintenance level, dimensions, and surfacing. Road density expressed as miles per square mile provides an index of the overall potential for roads to affect watershed function. In general watersheds or subwatersheds with less than 30 percent watershed relief and road a density of three miles per square mile or less are at low risk for affecting watershed function (USDA Forest Service, 1993).

Young stands, resulting from harvest or natural ecosystem disturbances such as fire or disease, are indicative of the potential effects on the magnitude and timing of runoff from the watershed (Stednick J.D., 1996; Galbraith, 1975). For this analysis, hydrologic immaturity is represented by forested stands less than 30 years old. The percentage of the subwatershed in stands less than 30 years old is analyzed to determine if there is substantial risk of stream channel erosion from increased water yields (Galbraith, 1975).

Subwatersheds

Hydrologic Unit Code (HUC 6) subwatersheds were used for analysis because they provide logically sized drainage areas for analyzing effects of a proposed treatment on water resources. A summary of the subwatersheds within the watershed analysis area follows, including a description of the road density and percentage of stands less than 30 years old, and the Watershed Risk Rating assessment from these parameters.

- North Gibbonsville Subwatershed: This subwatershed is located north of the community of Gibbonsville. The drainage area of this subwatershed is 10,080 acres, of which 3,809 acres are within the project area. Land uses include residential areas, logging and dispersed recreation. The existing road density is 4 miles per square mile with about 65 miles of roads. About 2,560 acres of timber harvest areas are equivalent to 797 Equivalent Clearcut Acres (ECA) in stands less than 30 years old. Eight percent of the subwatershed is in stands less than 30 years old. Based on road density and the percentage of the subwatershed in stands less than 30 years old, the Watershed Risk Rating is **high.**

- Dahlonega Subwatershed: The Dahlonega subwatershed is 17,274 acres, of which 10,297 acres are within the project area. Gibbonsville is located within this subwatershed. Current land uses are residential, dispersed recreation, logging and grazing. Historically this area had a significant amount of mining activity. The road density is 1.42 miles per square mile, with about 38 miles of roads. About 1,200 acres of timber harvest areas are equivalent to 555 ECA in stands less than 30 years old (three percent of the subwatershed). Based on road density and the

percentage of the subwatershed in stands less than 30 years old, the Watershed Risk Rating is **low.**

- Anderson Subwatershed: Anderson Creek is a tributary of Dahlonega Creek. This subwatershed has been mapped as a separate drainage area because of the use of this drainage as the source of domestic water for homes in the Gibbonsville community. The Anderson subwatershed is 3,742 acres, of which 757 acres are within the project area. Current land uses are logging and dispersed recreation. Historically this subwatershed also had mining activity. The road density is 1.28 miles per square mile, with about 7.5 miles of roads. About 380 acres of timber harvest areas are equivalent to 64 ECA in stands less than 30 years old. Two percent of the subwatershed is in stands less than 30 years old. Based on road density and the percentage of the subwatershed in stands less than 30 years old, the Watershed Risk Rating is **low.**

- Lick Subwatershed: The Lick subwatershed is 7,030 acres, of which 6,798 acres are within the project area. Land uses include residential, logging, and dispersed recreation; numerous roads were constructed for logging. The road density is six miles per square mile, with about 66 miles of roads. About 2,65 acres of timber harvest areas are equivalent to 820 ECA in stands less than 30 years old (12 percent of the subwatershed). Based on road density and the percentage of the subwatershed in stands less than 30 years old, the Watershed Risk Rating is **high.**

- Sheep Subwatershed*:* The Sheep subwatershed is 24,564 acres, of which 783 acres are within the project area. Land uses in this subwatershed include residential, logging, mining and dispersed recreation. Some roads in this subwatershed were built for residential development, logging and mining, but most of the area is roadless. The road density is 0.5 miles per square mile, with about 19 miles of roads within the subwatershed. About 256 acres of timber harvest areas are equivalent to 111 ECA in stands less than 30 years old. The percentage of the subwatershed in stands less than 30 years old is 0.4 percent. Based on road density and the percentage of the subwatershed in stands less than 30 years old, the Watershed Risk Rating is **low.**

Environmental Consequences

Analysis Methods

Indices of measurement to compare alternatives and analyze the relative risk of cumulative watershed effects were: modeled probability of sediment delivery; achievement of compliance with state water quality standards; maintenance of beneficial water uses; a cumulative watershed effects risk rating based on road density (miles/square mile); and the percentage of the subwatershed in stands less than 30 years old.

Alternative A
Direct and Indirect Effects
The probability of sediment delivery to streams as a result of accelerated erosion will increase as higher levels of fuel accumulation and greater stand density increase the risk of severe wildfire.

Within the project area, 18,690 acres are on landtypes that have high or moderate inherent erosion potential. Of these acres, 12,057 acres have a high risk for severe wildfire based on fire behavior fuel model and structural stage classifications.

Hypothetically, if severe burning occurred on a large portion of the analysis area, runoff, erosion and sedimentation could be expected to increase. However, the magnitude of these increases will depend primarily on climatic conditions during the few years after the fire, in conjunction with the extent and severity of the burned areas, and the rate of vegetative recovery (Tiedemann, 1979).

The impact of a fire on runoff, erosion and sediment delivery will last for only a few years (Elliot, 2000). Within several months after a fire, needle cast from partially burned trees will decrease the area susceptible to raindrop impact and overland flow. Runoff velocities will be reduced, and eroded materials will be deposited in retention areas (Phannkuk and other, 2000). Retention areas may be natural catchments such as downed logs, depressions, or unburned parts of the landscape. Rapid regrowth of vegetation, generally at the beginning of the first growing season after the fire, covers the soil surface with plant litter, and potential erosion is quickly reduced (Elliot, 2000).

Observations from the Clear Creek Fire of 2000 show that stream substrate sediment levels greatly increased over pre-fire conditions. Pre-fire data consisted of eight years of McNeil core sampling information, which identifies levels of fine materials (less than 0.64 cm in diameter) within spawning gravels. Pre-fire monitoring identified an average of 19 percent fines at depth. During the summer following the fire, a high intensity storm event carried fines from the burnt hillslopes into Clear Creek, elevating levels of fines to 83 percent. Follow up monitoring during July of 2002 indicated that substrate sediment levels at depth had recovered to 24 percent. However, a second high intensity storm event later that year once again increased depth fines to 83 percent.

The Water Erosion Prediction Project (WEPP) model predictions follow this rationale. WEPP is a physically-based soil erosion model that provides estimates of soil erosion and sediment delivery by considering specific soil, climate, ground cover, and topographic conditions (Flanagan and Livingston, 1995). The accuracy of the projected rates is, at best, plus or minus 50 percent. Any predicted runoff or erosion value, by a model, will be within only plus or minus 50 percent of the true value (Elliot, 2000). The WEPP model was run on a set of representative flow paths or WEPP transects for the Action and No Action

alternatives and the Action alternatives with varying filter strip treatments (Table 3-9). With no fire introduced to the system, WEPP predicts a zero percent probability of sediment delivery to streams (Table 3-9). If a wildfire occurs in the high-risk areas (identified by structural stage, fuel model types, and erosive soils) the probability of sediment delivery is increased between 3 and 87 percent with an average of 57 percent for the units that were modeled.

Table 3-9. ***Probability of Sediment Delivery to Streams for Action and No Action Alternatives and Action Alternatives with Varying Filter Strip Treatments.***

		WEPP Model Percent Probability of Sediment Delivery			
WEPP Transect #	**Potential Units Included in transect**	**No Action**	**No Action Wild Fire**	**Action Alternatives Backing fire only in filter strips**	**Action Alternatives Ladder fuel reduction, hand piling and burning in filter strips**
1	57	0	3	3	7
2	49 50	0	63	3	10
3	55	0	3	3	7
4	59 60 61	0	63	7	7
5	58 60 61	0	63	7	10
6	pvt1	0	63	3	10
7	pvt1	0	63	3	7
8	62 pvt1 h1	0	63	N/A	N/A
9	h1	0	63	N/A	N/A
10	95 69 68 67 66 64 63	0	67	7	17
11	95 77 65 63	0	70	7	17
12	104 106 108	0	63	3	7
13	98 99	0	7	0	N/A
14	97	0	63	0	N/A
15	111 112	0	63	3	7
16	126	0	67	3	7
17	7	0	63	3	10
18	3 4	0	63	7	23
19	28	0	3	3	7
20	30 29	0	63	3	10
21	36	0	67	3	3
22	46 41 47	0	63	3	10
23	41	0	63	3	7
24	ws-1	0	73	3	17
25	ws-2	0	73	3	17
26	ws-3	0	87	3	7
27	ws-4	0	70	3	7
28	ws-5	3	73	10	17

Effects to water quality and beneficial uses
Since domestic water supply is not a designated beneficial use for Anderson and Dahlonega Creeks, state water quality standards technically do not apply. However, these waters have not and will not meet State standards for potable water. The No Action alternative without fire will not change the current condition. In the event of a wildfire, water quality could degrade and beneficial uses may not be fully supported.

Effects to watershed risk rating
The watershed risk ratings will not change due to activities on private land alone. The ECA will increase slightly with proposed private land activities (see Table 3-10) and road density will likely not change (see Table 3-11). In the event of wildfire, ECA will increase in all watersheds and the watershed risk rating could be increased from low and moderate to high in the Dahlonega, Anderson and Sheep watersheds (see Table 3-12). Effects from wildfire could bring the percent of watersheds in ECA above 20 percent and affect the magnitude and timing of runoff from the watersheds (Stednick, 1996).

Table 3-10. ***Percent of Watershed in Equivalent Clearcut Acres (ECA) by Alternative for Each HUC 6***

Subwatershed HUC 6	Alternative A	Alternative B	Alternative C	Alternative D
Anderson	2.0	2.7	2.7	2.7
Dahlonega	3.0	6.6	5.3	4.6
Lick	12.0	17.1	16.4	13.4
North Gibbonsville	8.0	9.8	9.1	9.1
Sheep	0.4	0.4	0.4	0.4

Table 3-11. ***Road Density (mi/mi^2) by Alternative for Each HUC 6***

Subwatershed HUC 6	Alternative A	Alternative B	Alternative C	Alternative D
Anderson	1.28	1.28	1.28	1.28
Dahlonega	1.42	1.42	1.39	1.39
Lick	6.02	5.65	4.84	5.09
North Gibbonsville	4.18	4.14	4.04	4.11
Sheep	0.05	0.49	0.49	0.49

Table 3-12. ***Watershed Risk Ratings***

Subwatershed HUC 6	No Action Alternative	No Action Alternative In the event of a wildfire 30% severely burned	Action Alternatives
Anderson	Low	High	Low
Dahlonega	Low	High	Low
Lick	High	High	High
North Gibbonsville	High	High	High
Sheep	Low	High	Low

Action Alternatives (Alternative B, C and D)

Treatments within Riparian Habitat Conservation Areas (RHCAs) and filter strips will be part of the project design for the alternatives (Table 3-13). RHCA and filter strip acres within the treatment areas are displayed in Table 3-14. A graphic depiction of RHCAs, filter strips, and riparian areas are displayed in Figure 3-8

Table 3-13. ***Description of Proposed Treatments within the RHCA, Forest Plan Filter Strips and Riparian Areas.***

Areas	Alternative B	Alternative C	Alternative D
RHCA	Ladder Fuel Reduction- • Hand Pile • Pile Burn • Broadcast Burn	Ladder Fuel Reduction- • Hand Pile • Pile Burn • Broadcast Burn	Ladder Fuel Reduction- • Hand Pile • Pile Burn • Broadcast Burn
Filter Strips	Ladder Fuel Reduction- • Hand Pile • Pile Burn • Broadcast Burn	Backing Fire only	Ladder Fuel Reduction- • Hand Pile • Pile Burn • Broadcast Burn
Riparian Area	No Treatment	No Treatment	No Treatment

Figure 3-8. ***Graphic Display of Riparian Areas, Filter Strips and RHCAs.***

Table 3-14. ***Breakdown of Acres in Units with RHCAs and Filter Strips.***

Unit	Total Unit Acres Including RHCA and Filter strips	Filter Strip Acres	RHCA Acres
3	354.1	5.0	0.0
4	39.4	6.0	1.6
7	28.6	3.0	0.5
16	14.9	2.4	0.0
17	24.1	0.2	0.3
20	52.3	3.6	1.5
21	34.7	3.6	1.7
24	10.5	1.5	1.8
25	34.0	0.5	0.9
29	15.6	1.8	4.1
30	29.8	2.1	2.0
31	26.8	0.9	1.9
36	16.7	3.0	8.3
37	33.1	10.3	22.8
38	30.4	0.0	0.9
39	45.8	0.0	5.4
41	142.8	9.9	5.2
42	12.1	0.0	0.4
43	20.3	0.1	2.4
44	4.7	0.0	2.4
45	15.3	0.0	1.2
48	24.4	8.0	3.0
50	54.0	1.2	0.7
57	159.1	3.9	28.1
61	128.3	1.4	33.1
63	53.8	9.3	9.3
94	16.4	0.8	1.7
106	10.1	0.0	1.8

These alternatives also include existing roads needed to access units for implementation of decommissioning roads. Road maintenance/reconstruction will be the minimum needed for log hauling or fire crews. The emphasis is to retain as much of the existing vegetation on the road surface as possible to reduce surface erosion. All roads opened temporarily for project implementation will be ripped and seeded to re-establish ground cover, if the road surface vegetative cover has been substantially removed by project activities.

Table 3-15 summarizes roads used by road classification and proposed changes in classification by alternative.

Table 3-15. ***Roads Used by Classification and Changes in Classification by Alternative.***

Current and Proposed Road Classifications	Alternative B (miles)	Alternative C (miles)	Alternative D (miles)
Open Classified, No Change	32.2	29.6	29.3
Closed Classified, No Change	15.9	15.4	10.2
Open Unclassified, Change to Open Classified	0.5	0.5	0.0
Open Unclassified, Change to Closed Classified*	6.4	5.3	3.1
Closed Unclassified, Change to Closed Classified*	15.5	11.6	8.5
Closed Unclassified, Change to Temporary*	0.1	0.4	0.4
Identified for Decommissioning, Not Used	14.8	8.8	6.1

* *These roads were constructed in the past for timber access but were not added to the Forest road system and inventory. In order to maintain an unclassified road for its intended use, the classification must be changed to a classified system road, or designate it a temporary road and decommissioned it at the completion of the authorized activity.*

Alternative B

Direct and Indirect Effects

Based on WEPP modeling of sediment yield and probability of sediment delivery to streams, the risk of sediment delivery will be increased slightly from the No Action alternative, but reduced from the potential wildfire scenario (Table 3-9). The probability of sediment delivery to streams would be reduced from 57 percent (potential wildfire) to 10 percent (prescribed burning in Forest Plan filter strips).

There is a 10 percent probability of sediment delivery to streams. This is a climate driven value based on local data reflecting the chance that a very large storm may occur before vegetation is established on the disturbed sites. Any modeled disturbance would show the chances of a runoff-producing storm event.

The watershed risk ratings will not change with the proposed activities (Table 3-12). However, the road densities and ECAs will be affected (Tables 3-10 and 3-11). The increases in ECA associated with the proposed activities will not exceed 20 percent and will therefore not affect the magnitude and timing of runoff from the project watersheds (Stednick, 1996).

Effects Due to Access and Hauling

The 6.9 miles of road proposed as haul roads in the action alternatives may contribute sediment to streams. These roads were modeled using WEPP road to determine the potential amount and increase in sediment yield to streams associated with the increase in traffic. Increased traffic is expected to increase sediment delivery from a predicted 1.31 tons per year to 2.19 tons per year (Table 3-16). This predicted increase of 0.88 tons per year will not be measurable at any of the existing downstream sediment monitoring stations.

Table 3-16*. Predicted Increase in Sediment Delivery from Roads Used for Haul During Project Implementation Using WEPP Road Model.*

Subwatershed HUC 6	No Action Alternative Sediment delivery from roads proposed for haul (tons/year)	Action Alternatives (Alt. B, C, D) Sediment delivery from roads proposed for haul including increases associated with haul traffic (tons/year)
Anderson	0.00	0.00
Dahlonega	0.85	1.42
Lick	0.23	0.38
North Gibbonsville	0.23	0.39
Sheep	0.00	0.00
Total	1.31	2.19

Alternative C

Direct and Indirect Effects

This alternative proposes to treat units that have a high fire risk rating (based on fire behavior fuel model and structural stage) and a high or moderate inherent erosion hazard rating. Five additional units (WS1-5), not identified in other action alternatives, with a high inherent erosion hazard and a high risk of severe wildfire are also proposed for treatment. Treatment of these units will minimize effects to soil and water resources in the event of a wildfire by reducing detrimental soil disturbances from severe burning, and decreasing erosion and sediment delivery to streams.

In this alternative no mechanical treatments will occur in filter strips. Backing fire will be allowed. In contrast, Alternatives B and D will allow ladder fuel reduction, hand piling, pile burning and broadcast burning in the filter strips (Table 3-13).

About 61 miles of existing roads will be used to access the treatment units and remove wood products from the Forest (Table 3-15). No new roads will be constructed. This alternative proposes 8.8 miles of immediate road decommissioning (Table 3-15).

Based on WEPP modeling of sediment yield and probability of sediment delivery to streams, the risk of sediment delivery will be increased slightly from no action but reduced from the potential wildfire scenario (Table 3-9). The probability of sediment delivery to streams will be reduced from an average of 57 percent (potential wildfire) to an average of four percent (prescribed burning in forest plan filter strips).

Effects to water quality and beneficial uses
Since domestic water supply is not a designated beneficial use for Anderson and Dahlonega Creeks, state water quality standards technically do not apply. However, these waters have not and would not meet State standards for potable water.

There is a four percent probability of sediment delivery to streams. This is a climate driven value based on local data reflecting the chance that a very large storm may occur before vegetation is established on the disturbed sites. Any modeled disturbance will show the potential for a runoff-producing storm event.

Alternative D
Direct and Indirect Effects
Approximately 50 miles of existing roads will be needed to access units to implement this alternative, and 6.1 miles of roads are proposed for decommissioning (Table 3-15).

Based on WEPP modeling of sediment yield and probability of sediment delivery to streams, the risk of sediment delivery will increase slightly from No Action but be reduced from the potential wildfire scenario (Table 3-9). The probability of sediment delivery to streams will be reduced from 57 percent (potential wildfire) to 10 percent (prescribed burning in Forest Plan filter strips).

Effects to water quality and beneficial uses
There is a 10 percent probability of sediment delivery to Anderson and Dahlonega Creeks. This is a climate driven value based on local data, reflecting the chance that a very large storm may occur before vegetation is established on the disturbed sites. Any modeled disturbance will show the potential for a runoff-producing storm event.

Soil Productivity

Affected Environment
An activity area is defined as the total area for which a ground impacting activity is planned (USDA-Forest Service, 1988). It may be a harvest unit within a timber sale, a prescribed burn, or a grazing area for domestic livestock (FSH 2509.18 – Soil Management Handbook, R4 Supplement 2509.18-2002-1).

Information about soil resources within the project area was obtained from the Lands System Inventory for the Salmon National Forest (USDA, 1978), field investigations and laboratory analysis. A map and descriptions of landtypes within the project area are included in the soil specialist report.

Forest Plan (USDA-Forest Service, 1988) direction states that soil resources will be managed to maintain soil productivity, minimize erosion and maintain the integrity of associated ecosystems. Site productivity will be protected and/or maintained at a level equal to or greater than 90 percent of natural conditions. This will be achieved by:

- Limiting detrimental soil disturbance to no more than 20 percent of an activity area following project implementation (USDA-Forest Service, 1988). Regional guidelines recommend that detrimental soil disturbances be limited to 15 percent of an activity area (USDA Forest Service, 1995[a]) and

- Limiting total soil resource commitment to no more than five percent of an activity area (USDA-Forest Service, 1988).

Although not specifically addressed by a Forest Plan standard, another important component of soil productivity is the presence of organic matter and coarse woody material on site. Organic matter is particularly important for water retention, cation exchange, nutrient cycling and erosion control (Page-Dumroese and others, 1991). Coarse woody material (woody material larger than three inches in diameter) is important for maintaining long-term soil productivity (Graham, 1994). Graham's research recommends retaining four to 15 tons of coarse woody material per acre, depending on forest type and fire return interval, for treatment units within the project area.

Some previously harvested timber stands within the project area may not contain the level of coarse woody debris recommended to maintain long-term soil productivity. Reports from annual timber sale monitoring reviews were evaluated to determine the extent of detrimental soil disturbances caused by timber harvesting and associated activities. Reports from field reviews of 17 timber sales conducted on the Forest from 1990 to 1997 provide a qualitative assessment of post-sale conditions (USDA-Forest Service, 1990-1997). The need for more coarse woody debris in previously harvested units was identified six times. However, over the entire project area, adequate (and in many cases excessive) coarse woody debris remains on the landscape to maintain long-term soil productivity. Fuel accumulations were calculated for 29 forested vegetation types in the project area. The total fuel accumulations for all vegetation types ranged from 2.01 tons per acre to 40.67 tons per acre. The mean for all vegetation types was 13.07 tons per acre.

Detrimental Soil Disturbances
A detrimental soil condition occurs when soil hydrologic function and site productivity are adversely affected. Detrimental soil disturbance is defined as the alteration of natural soil physical characteristics, resulting in immediate and /or prolonged violations of off-site resource quality standards (USDA-Forest Service, 1988). Soil compaction and displacement are examples of detrimental soil disturbance. Detrimental soil disturbance can also occur when soils are severely burned and the entire organic soil surface is consumed to bare mineral soil.

The activity area for determining detrimental soil disturbances from fuels reduction activities consists of the acres of the proposed treatments and varies by alternative.

The cumulative effects analysis area for determining total soil disturbances from management activities is 16,889 acres and encompasses the project area, except the acres of roads and the West Fork Nez Perce drainage. Roads are considered total soil resource commitments and are not included as compacted areas when determining detrimental disturbances. The West Fork Nez Perce drainage is excluded from analysis of total soil disturbances from management activities because it is not impacted from past actions and activities in that area associated with this proposal have been eliminated from further consideration.

During the past 30 years, approximately 7,336 acres of timber have been harvested within the project area. About 811 acres have been clear-cut and 6,525 acres have been harvested using a shelterwood prescription. Because of the level of past timber harvest, it is feasible that areas of detrimental soil disturbance from logging activities exist within the analysis area, however, no extensive areas of soil disturbance (areas greater than 1/10 acre in size) from past timber harvesting, thinning, or fuels treatments were observed during field investigations during the fall of 2001 (Gallogly, field notes 2001). This includes visible signs of compaction (such as obvious runoff from reduced water infiltration and stunted growth of young trees) or excessive displacement from skidding or decking logs, and hydrophobic soils from broadcast or jackpot burning.

Soil bulk density samples collected from skid trails and landings from three vegetation management projects during the past several years showed that detrimental soil compaction resulting from mechanical treatment is not extensive. Soil bulk density samples were collected within the analysis area and from other areas of the Forest with similar landforms and soils. Of the 14 bulk density samples and 30 soil penetrometer readings collected, only one sample was approaching the threshold of detrimental soil compaction according to the definition presented in Region 4 Supplement r4_2509.18-2002-1 to the Soil Management Handbook (These sampling results are included in the project file). To calculate a reasonable estimate of existing detrimental disturbances caused by past timber harvest, a detrimental soil disturbance factor of ten percent per treated acre (for tractor logging) has been used. Professional judgment,

literature review, monitoring data and site-specific field observations were considered when determining this factor.

The calculated level of existing detrimental soil disturbance from past harvest activities within the analysis area is 4.3 percent, which meets both the Forest Plan Standard and Intermountain Regional Guideline.

Amount of Soil Resource Commitments

Total resource commitment is defined as conversion of a productive site to an essentially nonproductive site for a period of more than 50 years. The activity area for determining total soil resource commitments is the project area. Inadequately restored haul roads, truck roads, landing areas, higher standard roads (system or non-system), and some stock driveways generally represent an essentially total commitment of the soil resource (USDA-Forest Service, 1988).

Approximately 150 miles of road (68.4 miles of open road and 78.5 miles of closed roads) are within the project area. Also, 7.98 miles of U.S. Highway 93 is within the project area. The total resource commitment is 325.92 acres or 1.58 percent of the 20,616-acre project area. This meets the Forest Plan standard of limiting total soil resource commitment to no more than five percent of an activity area.

Environmental Consequences

Analysis Methods

Detrimental soil disturbance and the potential of total soil resources committed were analyzed by using the Forest roads and harvest databases, Forest landtypes, erosion hazard and mass stability hazard ratings, monitoring data from disturbed sites, site –specific field observations, and literature review.

Alternative A

Direct and Indirect Effects

The probability of detrimental soil disturbances, such as severely burned soils and displacement from accelerated erosion, will increase over time as the risk of severe wildfire increases due to fuel accumulation and greater stand density.

Within the project area, 18,690 acres are in land types with high or moderate inherent erosion hazard ratings. Of these acres, 12,047 acres have a high risk for severe wildfire based on fire behavior fuel model and structural stage classifications. If severe burning occurred on 50 percent of the area identified as having a high risk for severe wildfire, 29 percent of the project area would be in a detrimentally disturbed condition.

Detrimental soil disturbances, specifically soil displacement (erosion) and severe soil burning will increase as a result of wildfire; however, where and when a severe wildfire might occur within the project area is unknown. Current Forest policy is to suppress all wildfires outside of designated wilderness areas. Fire

suppression activities such as hand line and dozer line construction increase soil displacement. This effect could be almost entirely mitigated through fire line rehabilitation.

A large number of acres within the project area are in land types with a high or moderate inherent erosion hazard rating, and are also at high risk for severe wildfire. In the event of a severe wildfire, detrimental soil disturbances could exceed the Forest Plan Standard and Regional Guideline. A severe wildfire will adversely affect soil hydrologic function and site productivity within the project area.

Total resource commitments will not change under the No Action alternative and will remain at 1.4 percent of the activity area.

All Action Alternatives (Alternatives B, C and D)

Table 3-17 provides a summary of effects by alternative. Design features common to all action alternatives, such as timing of ground-based activities, scarifying and reclaiming compacted skid trails and landings, and slash retention within treatment units, will minimize the impacts of the action alternatives on soils.

Ground disturbance associated with log skidding and machine-piling slash would cause some soil compaction, displacement and puddling. Both hand (drip torch) and aerial (heli-torch and PSD) ignition will be used in broadcast burning. Although low intensity broadcast burning is not expected to result in detrimental disturbance, burning of machine piles and “jackpot” burning will occur at relatively high intensities and result in small (less than 1/10 acre) localized adverse effects. The percentage of the activity areas in a non-detrimentally disturbed condition will meet Forest Plan Standards and Regional Guidelines for all action alternatives.

New road construction, landings and skids trails will not convert productive sites to a condition of total resource commitment. All of the action alternatives propose to decommission roads, returning committed sites to a productive state. All action alternatives would meet the Forest Plan Standard for total soil resource commitments.

Soil disturbance factors for the various treatments and activities, the calculations used to determine the total level of detrimental soil disturbances, and total soil resource commitments for all action alternatives are included in the project file. These calculated levels represent a “maximum disturbance scenario.” A disturbance factor is used for each potential disturbance activity, such as skyline yarding and machine piling and burning. When field monitoring reveals the same area on the ground to be both detrimentally compacted and detrimentally displaced, the area is counted only once. In determining the level of detrimental soil disturbance for this analysis, an acreage figure was calculated for each

activity that might cause detrimental disturbance, even though acres of disturbance might overlap. These calculations also do not take into account the mitigating effects of applying BMPs and Soil and Water Conservation Practices. The rationale for this approach is to analyze whether under a “maximum disturbance scenario” the level of detrimental soil disturbances for all action alternatives will comply with Forest Plan Standards and Regional Guidelines. Soil disturbance monitoring is being conducted on recently implemented projects on other areas of the Forest, and will also be conducted for this project.

Although some previously harvested timber stands may not meet the recommended level of coarse woody material for maintenance of long-term soil productivity, design features to retain coarse woody material will used in the proposed treatment units for all action alternatives. One to four tons of woody debris per acre will be retained in units within the urban interface and four to 15 tons of woody debris per acre will be retained in all other treatment units.

Alternative B
Direct and Indirect Effects
About 69 miles of existing roads are needed to implement the proposed treatments, and 14.5 miles of roads are proposed for decommissioning, reducing the total soil resource commitments to 1.44 percent of the activity area.

No detrimental soil disturbances are expected in hand-thinned units. About 26 acres of detrimental soil disturbances may occur in units harvested using skyline retrieval systems and 142 acres of detrimental soil disturbances may occur in units treated with tractor harvesting systems. An additional 90 acres of detrimental soil disturbances could be expected from slash disposal. The level of detrimental soil disturbances calculated for this alternative is 4.5 percent of the 5,690-acre activity area.

Alternative C
Direct and Indirect Effects
Units proposed for treatment have a high fire risk rating (based on fire behavior fuel model and structural stage) and a high or moderate inherent erosion hazard rating. Treatment of these units will minimize effects to soil resources in the event of a wildfire by reducing detrimental soil disturbances from severe burning, and decreasing erosion and potential sediment delivery to streams.

Approximately 62 miles of existing roads are needed to implement the proposed treatments and nine miles of roads are proposed for decommissioning, reducing the total soil resource commitments to 1.49 percent of the activity area.

No detrimental soil disturbances are expected in hand thinned units. About 18 acres of detrimental soil disturbances may occur in units logged with skyline retrieval systems, and about 77 acres of detrimental soil disturbances may occur in tractor logging units. An additional 61 acres of detrimental soil disturbances

could occur from slash disposal. The level of detrimental soil disturbances calculated for this alternative is 3.9 percent of the 4,016-acre activity area.

Alternative D
Direct and Indirect Effects
Approximately 50 miles of existing roads are needed to implement the proposed treatments. The 6.5 miles of roads proposed for decommissioning reduces the total soil resource commitments to 1.5 percent of the analysis area.

No detrimental soil disturbances are expected in hand thinned units. About seven acres of detrimental soil disturbances could occur in units logged using skyline retrieval systems, and about 60 acres in tractor logging units. An additional 26 acres of detrimental soil disturbances could occur from slash disposal. The level of detrimental soil disturbances calculated for this alternative is 3.7 percent of the 2,499-acre activity area.

Table 3-17. ***Summary of Effects to Soil Productivity by Alternative***

Alternatives	**Detrimental Soil Disturbance** (percent of activity area)	**Total Soil Resource Commitments** (percent of activity area)
A	4.3% current condition 29% if severe burning occurred on 50 percent of the area identified with a high risk for severe wildfire.	1.4%
B	4.5%	1.3%
C	3.9%	1.3%
D	3.7%	1.4%

Forest Products

Affected Environment
The analysis boundary for forested vegetation is the project area. The Gibbonsville area is characterized by highly diverse ecosystems. The mountainous terrain is typically steep and dissected, creating varied microclimates and plant communities. Fire suppression, in conjunction with human settlement and use over the last century, has altered the vegetation complex within the area. Major factors contributing to these changes include mining, fire suppression and the harvest of wood products.

The mature ponderosa pine stands typically have an understory dominated by Douglas-fir. Lower elevation stands in the Douglas-fir/ponderosa pine zone, particularly on the drier aspects, contain a mosaic of age classes developed from frequent burns. On higher elevation sites, the cooler and moister forest openings regenerate rapidly.

Timber sale harvests played a prominent role in altering accessible stands from the 1950's to the mid 1980's. In recent years harvest activities have been greatly reduced. Outside of this proposal, only one small project proposal to restore aspen is being considered.

Past harvest activities were concentrated in the higher value ponderosa pine and Douglas-fir stands. Of the total acres in the project area, approximately 30 percent has been cut over. Of this total, 28 percent received partial removals and three percent was clear-cut. Logging has been infrequent in recent years with only one active timber sale in the assessment area during the last decade.

Forest vegetation changed substantially during the twentieth century. Tree numbers (stocking density) increased with a consequent decline in vigor and growth. Within the Douglas- fir habitat types, the more shade tolerant Douglas-fir is the dominant species in many of the largely natural stands that have ponderosa pine as a major component in the overstory (District exam information). Endemic levels of insect and disease activities are observable throughout the area.

Conifers in the lower elevations include ponderosa pine and Douglas-fir. At the lowest elevations, widely spaced large diameter mature "yellow bark" ponderosa pine and occasional mature Douglas-fir are present in an open grown condition. Scattered pockets of younger trees containing mixtures of ponderosa pine/Douglas-fir ranging from seedlings to small saw timber have gradually been established. Young trees are scattered, but the area is still stocked with many more trees than were present historically. Down woody fuel levels are low due to frequent natural burns prior to the turn of the century and slow re-establishment of these hot sites.

In higher elevations and on cooler aspects, the mature overstory still has relatively open grown large diameter ponderosa pine/Douglas-fir, although the overstory trees are more closely spaced than at lower elevations. The understory contains assorted seedlings to small diameter saw timber pockets densely stocked with Douglas-fir mixed with smaller numbers of ponderosa pine. A relatively continuous understory has become established on these sites. The stands are becoming severely stressed due to lack of growing space. Mortality is accelerating, with a consequent buildup of fuels, due to increased competition, insects and disease. Species composition is shifting from ponderosa pine to the more shade tolerant Douglas-fir. The vigor and composition of lower elevation

stands is closer to historic, even though fires burned more frequently on those sites, because trees re-establish more slowly under these dry conditions.

Environmental Consequences

Analysis Methods

Estimated removal volumes were based on ocular walk-through exam estimates from the proposed treatment areas, supplemented with formal stand exam information stored in the District files and Region 4 FSVEG database. Estimated receipts and present net value (PNV) figures were based on a transaction evidence appraisal using a TSPAS (Timber Sale Planning and Analysis System) spreadsheet with values for the Bitterroot National Forest that was developed by the Forestry Sciences Laboratory in Missoula, Montana.

Alternative A

Direct and Indirect Effect

Under this alternative no forest products would be harvested. No expenses would be incurred for sale preparation or administration. No local jobs or revenues would be produced, nor would funds be generated for the county or federal treasuries. Over time, jobs and revenues from the harvest of forest products would be lost unless made available from other projects.

In the absence of sizeable disturbances, current stand development trends would continue. Stocking levels would increase while vigor and growth declined. Insect activity would increase and Douglas-fir would replace ponderosa pine. The current risk of an uncharacteristic wildfire and resource damage would remain.

Alternative B, C and D

One area included for treatment contains a mixed stand of decadent Douglas-fir and ponderosa pine. The stand is predominantly composed of Douglas-fir with some scattered residual ponderosa pine. The Douglas-fir is heavily infected with Douglas-fir dwarf mistletoe disease. The merchantable Douglas-fir will be harvested and the diseased sub-merchantable understory cut down. Scattered mature ponderosa pine will be left to provide seed and stand diversity. The slash would be broadcast burned and the area planted to ponderosa pine.

This treatment will improve stand health and vigor by replacing diseased and decadent trees with a stand of ponderosa pine. Removing stressed mature Douglas-fir will reduce the risk of bark beetle activity. There will be a shift in species composition from Douglas-fir towards ponderosa pine. Stand structure will be shifted to the stand initiation phase. Fuel loading and the corresponding fire risk will be reduced.

All of the proposed stands accessible for commercial products using conventional equipment contain pure to mixed stands of ponderosa pine and Douglas-fir. These stands would be thinned to a minimum average space of 18 feet between trees; trees greater than 8 inches dbh would be thinned to a stand

density index (SDI) of 80. SDI is a measure of stand density expressed as the number of trees per acre as if the average stand diameter were 10 inches (McCarter, 1986).

Using a SDI 80 would gradually increase the spacing between trees ranging from seven to 30 inch dbh from 18 to 56 feet between stems, respectively, with an estimated crown separation of six to 19 feet based on estimated crown width projections for open grown ponderosa pine (Frebis, 1982). Thinning will leave the tallest healthy larger diameter trees with the largest crowns and straightest stems. Ponderosa pine would be favored for retention over Douglas-fir.

This treatment would improve stand vigor and growth by leaving the healthier dominant and codominant trees while removing trees with lower vigor from intermediate and suppressed crown classes. Competition for moisture and light will be reduced for the leave trees and understory vegetation. Species composition will shift from Douglas-fir to the seral ponderosa pine component. The risk of insect and disease damage will lessen as a result of improved vigor and species composition.

In areas inaccessible for removal of commercial products, the serial forested component (primarily ponderosa pine) is prevalent, mixed with Douglas-fir in the overstory. The more shade tolerant Douglas-fir is more common in the understory. Removing the understory trees will shift the species composition towards ponderosa pine. There will be only a slight improvement in stand vigor, along with a minor decrease in the risk of insect and disease damage, since most of the competition-related stress is between intermediate and larger size trees that will not be treated. The availability of moisture and light will be largely unchanged.

Alternative B
Direct and Indirect Effects
Under this alternative, approximately 5,690 acres of forested stands will be treated to improve forest vigor and health. This alternative will produce 15,007 CCF of sawtimber with a present net value (PNV) of $1,619,290. In addition $3,413,950 will be spent on thinning, piling and burning treatments on 5,690 acres. The treatment cost per acre will be $315.

Alternative C
Direct and Indirect Effects
Under this alternative approximately 4,016 acres of forested stands will be treated to improve forest vigor and health. This alternative will make 9,191 CCF of sawtimber available with a present net value (PNV) of $937,120. In addition, $2,437,120 will be spent for thinning, piling and burning treatments on 4,016 acres. The treatment cost per acre will be $406.

Alternative D
Direct and Indirect Effects
Under this alternative approximately 2,499 acres of forested stands will be treated to improve forest vigor and health. This alternative will make 4,639 CCF of saw timber available with a present net value (PNV) of $452,929. In addition, $1,578,450 will be spent for thinning, piling and burning treatments on 2,499 acres. The treatment cost per acre will be $432.

Air Quality

Affected Environment
The analysis area for air resource impacts is Airshed 4 and 17. Airshed 17 is the airshed in which burning activities will occur. Airshed 4 is the airshed downwind of the project area and could be affected from an air resource viewpoint. Airshed 4 is the project area, and Airshed 17 includes the Bitterroot Valley.

The community of Gibbonsville, Idaho, is located within the analysis area and is considered to be a smoke sensitive area. The community of Salmon is also considered a smoke sensitive area. The Bitterroot Valley is located downwind of the project area in Airshed 4 and is considered a smoke sensitive.

Air quality is measured by the amount of tiny particles in the air called “particulate matter” (PM). PM can cause significant health problems, especially for people suffering from respiratory illnesses. Smoke also affects the clarity of the air (visibility). Particle size is measured in microns (one micron equals one millionth of a meter). Particles 50 microns or larger tend to settle out of the air quickly and are less likely to effect public health. Particles 10 microns and smaller (PM10) may be inhaled deep into the lungs and pose a threat to visibility and public health. Fine particles 2.5 microns and smaller (PM2.5) are of the highest concern and are generally emitted from activities such as industrial and residential combustion, wildland fire, agriculture burning and vehicle exhaust.

The 1970 Clean Air Act is the basic framework for controlling air pollutants in the United States. The Clean Air Act has established national ambient air quality standards for particulate matter. The state of Idaho has adopted these standards. Air quality standards for PM10 and PM2.5 are identified in Table 3-18.

Table 3-18. ***National Ambient Air Quality Standards (Federal Standards Adopted by Idaho)***

Pollutant	Time Period Average	Federal/Idaho
PM10	Annual Arithmetic Mean 24-Hour Average	50 ug/m^3 150 ug/m^3
PM2.5	Annual Arithmetic Mean 24-Hour Average	15 ug/m^3 65 ug/m^3

ug/m^3 = micrograms per cubic meter

The main air quality issue associated with this project is the amount and duration of PM produced by burning. Smoke from prescribed fire must meet the ambient air quality standards for PM-10 and PM-2.5. Smoke from wildland fire is not subject to the ambient air quality standards.

Topography and weather patterns determine the extent to which airborne PM accumulates and/or disperses. Air flows within valleys, upward with daytime heating and downward with nighttime cooling. Temperature inversions may occur at any time of the year, but are more common during the winter months of December, January, and February.

Prevailing southwesterly winds above the Forest's mountainous terrain usually moves smoke from the southwest toward the north and northeast, in the direction of the Bitterroot and Beaverhead-Deerlodge National Forests. Locally, topographic features and the heating and cooling of the earth's surface modify winds. Consequently, all major drainages in the project area are subject to local variations that can temporarily trap smoke, affecting its dilution and dispersal.

During prescribed burning in the spring and early summer, the dilution, dispersal and mixing conditions are generally good to excellent. Late fall often has weather patterns and cool nights with more frequent atmospheric inversion conditions which limit burning opportunities.

Environmental Consequences

Analysis Methods

For the air resource analysis, First Order Fire Effects Model (FOFEM) was used to predict the effects of prescribed fire and wildfire (Reinhardt, et. all, 2002). The FOFEM predicts fuel consumption, smoke production and tree mortality. For this analysis, the smoke production model of FOFEM was used.

The second computer program used is the Simple Approach Smoke Estimation Model (SASEM) predicts violations of Total Suspended Particulates (TSP) and PM10 (USDI Bureau of Land Management, 1988).

Alternative A
Direct and Indirect Effects
Alternative A is the least effective in reducing potential smoke emissions and associated pollutants from future wildland fires since there would be no reduction in fuels. But because this alternative does not include prescribed burning, this alternative would not have smoke associated with prescribed burns.

No Action would have direct and indirect effects on fire regimes and potential for future wildfire and smoke effects. Since Alternative A doesn't propose to conduct any harvest activities or fuel reduction treatments in the project area, FOFEM was not used to show predicted air quality emissions.

Alternatives B, C, and D
Direct and Indirect Effects
Prescribed burning is proposed in all of the action alternatives. Smoke emissions vary with combustion efficiency and quantity of fuel burned. Machine piles and hand piles tend to produce more smoke than other burns because much of the consumption occurs during the inefficient smoldering phase of combustion. Flaming and smoldering phase durations vary between spring and fall burning. Underburning tends to produce less smoke than jackpot burns because less fuel is available to burn. Computer models using the Fire and Environmental Research

The action alternatives differ in the number of acres treated by each treatment method and in the quantity of smoke that would be produced. Tables 3-19 and 3-20 display a summary of smoke emissions produced for spring and fall burning activities

The FOFEM predicted air quality emissions in pounds per acre for the action alternatives. Table 3-19 provides a summary for air quality emissions in pounds for spring burning for all action alternatives. Table 3-20 provides a summary for fall burning.

Table 3-19. ***Air Quality Emissions in lbs/acre for Spring Burning***

Alternatives B, C, D	PM 10	PM 2.5
Underburn - Spring	368	312
Pile and Burn - Spring	1,321	1,119
Broadcast Burn - Spring	992	841

Table 3-20. ***Air Quality Emissions in lbs/acre for Fall Burning***

Alternatives B, C, D	PM 10	PM 2.5
Underburn – Fall	455	386
Pile and Burn – Fall	1,321	1,119
Broadcast Burn - Fall	1,083	917

Based on the FOFEM model fewer emissions are produced during spring burns compared to fall burns. Other computer models, such as the Fire and Environmental Research Applications (FERA) and the Ventilation Climate Information System, indicate frequent optimal atmospheric dispersion conditions exist for spring burns while less frequent optimal atmospheric dispersion conditions exist for fall burning.

The Montana/Idaho Smoke Management Plan has standards for emissions levels and dispersion rates. The Salmon-Challis Forest operates under the guidelines of the Plan. Prior to all ignitions, the Management Plan Coordinator will evaluated all proposed burns, existing air quality, and forecasted weather conditions including atmospheric stability and transport winds for each burn unit. This information along with consultation with Montana and Idaho air quality regulators is used to issue daily burn restrictions, which are issued from March 1st through November 30th of each year. Burn restrictions will be followed. Prescribed burning in the project area will only be completed when atmospheric dispersion for smoke is favorable.

Visual Quality

Affected Environment

Visual quality in the project area is measured considering Visual Quality Objectives (VQO) established in the Forest Plan and sensitivity levels along travel routes. Sensitivity levels are a measure of people's concern for the scenic quality of the National Forests, based on the number and type of visitors (USDA. 1974).

Viewed area and distance zones are mapped for the project area. The resultant VQOs range from Retention to Modification. Retention provides for management activities that are not visually evident to the casual viewer. Partial Retention allows for management activities that are evident but remain visually subordinate to the characteristic landscape. Evidence of activities must be mitigated within one year of the activity.

The following travel routes are designated Sensitivity Level 1, highest sensitivity: Highway 93 (with a dual designation as the Lewis & Clark National Historic Trail and the Salmon River Scenic Byway) and the Continental Divide National Scenic Trail. Visible acres in the immediate foreground along Hwy 93 have a VQO of

Retention. Visible acres beyond the immediate foreground along Hwy 93 have a VQO of Partial Retention. The Dahlonega Creek Road, Hull Creek Road and Hughes Creek Road are designated Sensitivity Level 2, average sensitivity. Remaining roads and trails are designated Sensitivity Level 3, seldom seen. Acres not visible from a sensitive travel route have a VQO of Modification.

The natural appearing, forested viewshed has been relatively stable for the last 50 to 70 years. Only two management actions have occurred in the last 25 years that failed to meet assigned Visual Quality Objectives: One harvest unit from the Wagonhammer Timber Sale, circa 1978 and two timber harvest units from the Donnelly Gulch Timber Sale, circa 1980's. Both cases had an assigned VQO of Partial Retention, but the end result was a VQO of Modification. The overall trend in the North Fork drainage has been maintenance of a natural appearing, forested landscape.

Environmental Consequences

Analysis Methods

Visual Quality in the project area was measured by considering the VQOs. The proposed activities where compared against the viewed area and distance zones mapped in the project area.

Alternative A

There will be no direct, indirect, or cumulative effects to the visual resource under the No Action alternative. The natural appearing, forested setting will be maintained.

Alternatives B, C, and D

VQOs are the same for all of the action alternatives, since project design is the same for all action alternatives. The proposed thinning and burning activities will not have direct effects on visual quality and will meet the VQO of Retention in the immediate foreground view due to project design. Project design criteria for treatment units within the immediate foreground include:

- Within the visible range of the shoulder of U.S. Highway 93 where feasible; cut stumps as close to the ground as possible; do not allow machine piling or scarification or build burn piles; hand pile slash and use low intensity ground fire only; and vary standard 18 x 18 foot spacing
- Follow natural vegetative patterns and slope breaks for treatment unit layout.

The proposed thinning and burning activities will meet VQOs for all alternatives for the entire project area. Alternative B will affect the visual resource most, as it would treat the most acres. Alternative C will have less effect on the visual resource, and Alternative D will have the least effect on the visual resource, as it treats the least amount of acres.

Inventoried Roadless Area

Affected Environment

The analysis area is the Anderson Mountain Roadless Area located in the northern portion of the Gibbonsville project area. The roadless area is approximately 18,100 acres in size.

Inventory Roadless Areas (IRA) are undeveloped areas that typically exceed 5,000 acres and meet the minimum criteria for wilderness consideration under the Wilderness Act. These areas were inventoried during the Forest Service's Roadless Area Review and Evaluation (Rare II) process, subsequent assessments, or forest planning (USDA Forest Service, 2000(a)).

Access to the Anderson Mountain Roadless Area can be gained from Highway 93, from the ridge road to Anderson Mountain, and from the road along Dahlonega Creek. The opportunity for primitive recreation is high due to vegetation diversity and lack of recreation facilities. Current recreation uses include backpacking, trail bike riding, horseback riding, cross-country skiing and hunting. The Salmon Forest Plan did not recommend this IRA for wilderness designation.

Timber sale activities have occurred on 296 acres within the roadless area. These incursions occurred prior to the roadless area designation. All incursions are in the southwest corner of the roadless area, just above the community of Gibbonsville. Approximately two miles of system road are within the roadless area. Of the total road miles, about .5 miles are located on Anderson Butte, with the remaining miles in past timber harvest units located just north of Gibbonsville. In addition, the area includes 8.5 miles of the Continental Divide Trail and 16.5 miles of system trail.

There are eight characteristics of IRAs identified by the *Forest Service Roadless Area Conservation Final Environmental Impact Statement, Volume 1, 2000.* The characteristics are:

- Soil, water and air.
- Sources of public drinking water.
- Diversity of plant and animal communities.
- Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of recreation opportunities
- Reference landscapes.
- Landscape character and scenic integrity.
- Traditional cultural properties and sacred sites.
- Other locally identified unique characteristics

Environmental Consequences

Analysis Methods

The proposed actions were analyzed for potential effects to the eight roadless area characteristics.

Alternative A

Direct and Indirect Effects

If a wildland fire occurred in the Gibbonsville area, roadless area characteristics of clean air and scenic integrity might be degraded. If a wildland fire occurred in the roadless area, other characteristics, such as soils, water and diversity of plant and animal communities might be degraded.

Alternative B

Direct and Indirect Effects

Alternative B will treat eight acres within the Anderson Mountain IRA. The treatment acres are located above Gibbonsville, directly adjacent to private land. Ladder fuels will be cut, piled and burned. No road construction, reconstruction or timber harvest will occur. The eight acres are within a unit that was harvested in 1978 as a shelterwood cut. There is also 1.5 miles of existing road in the IRA within this unit. This road will be used to access the eight acres of ladder fuels. Eight acres is less than one-quarter of one percent (< 0.25 percent) of the entire 18,100 acre Anderson Mountain Roadless Area.

Effects to roadless characteristics are analyzed based on Roadless Area characteristics:

Soil, water and air qualities will be maintained in the IRA because less than 0.25 percent of the entire IRA will be treated.

The Anderson Creek drainage is used as a source of public drinking water for Gibbonsville. The eight acres proposed for treatment are located outside of this drainage. Treatment of the eight acres will maintain the source of public drinking water.

Diversity of plant and animal communities within the IRA will be maintained because only eight acres of the 18,100 acre Anderson Mountain Roadless Area is proposed for treatment. The treatment proposed is in an area that was previously harvested in 1978.

Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of recreation opportunities will not change. No new road construction or reconstruction will occur within the IRA. There are 1.5 miles of existing road within the IRA that will be used to access the eight acres. Travel is currently restricted on the road from August 25 through June 15.

The eight acres proposed for treatment were previously harvested in 1978. Because of previous management activity, this site was not maintained in a natural setting. Treating eight acres will not change the reference landscape of the 18,100 acre IRA.

Scenic integrity within the area proposed for treatment has been altered by previous management activity. Treating eight acres out of 18,100 acres will not change the current landscape character and scenic integrity of the Anderson Mountain IRA.

Cultural resource field surveys were conducted in 1997 and various project files were searched for documentation of cultural sites. There are no known traditional cultural or sacred sites on the eight acres proposed for treatment.

The eight acres proposed for treatment does not contain any locally identified unique characteristics.

Treating eight acres of ladder fuels within the Anderson Mountain Roadless Area will have no measurable effect on the eight roadless characteristics. Therefore Alternative B will have no direct or indirect effects to the Anderson Mountain Roadless Area.

Alternatives C and D
Direct and Indirect Effects
No treatments are proposed in the IRA under Alternatives C or D. There would be no direct, indirect, or cumulative effects to roadless characteristics related to management activities.

Unroaded Areas

Affected Environment
Analysis of unroaded areas will focus on the amount of unroaded areas within the project area that are contiguous with IRAs.

Unroaded areas are defined as an area without the presence of a classified road, of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition. Unroaded areas do not overlap within inventoried roadless areas (36 CFR 219.36). Inventoried Roadless Areas (IRAs) surround the project area on two sides: The West Big Hole IRA to the south/southeast and the Anderson Mountain IRA to the north.

With the 22,600-acre project area, there are 147 miles of classified and unclassified roads. No road construction or reconstruction is proposed. Over the past 30 years, approximately 30 percent of the area has been harvested.

Environmental Consequences

Analysis Methods

Analysis of unroaded areas will focus on the amount of unroaded areas within the project area that are contiguous with IRAs.

Alternative A

Direct and Indirect Effects

There would be no change to the existing condition of unroaded areas.

Alternative B, C and D

Direct and Indirect Effects

The Gibbonsville project does not propose any road construction or reconstruction. All treatment areas will be accessed using exiting roads.

There are no unroaded areas greater then 700 acres that are contiguous to IRAs. There are no activities proposed in unroaded areas that are contiguous with IRAs. These areas will remain in there present condition and may be analyzed for potential additions or inclusions to the existing IRAs in the future Forest Plan revision. The Gibbonsville project will not affect these areas for future IRA consideration.

Alternative B proposes to treat 5,690 acres. Approximately 50% of the acres are in areas that have been previously treated. Alternative C proposes to treat approximately 45% of previously treated acres. Alternative D proposes to treat approximately 30% of previously treated acres.

The Gibbonsville project proposes to treat some acres that have not been previously subject to management actions. These previously untreated areas are not contiguous with IRAs and, in general, are in areas that are already roaded and adjacent to areas that have been treated. No new road construction is proposed with the project and the actions that are proposed would not change the overall character of the landscape.

Noxious Weeds

Affected Environment

The analysis area for noxious weeds is the project area. The project area contains approximately 7, 011 acres of noxious weeds. Spotted knapweed has been observed within the project area since the early 1980s. It is established on suitable sites within the entire project area, and particularly well established along most road and travelways, trails, and upland sites that have been subjected to disturbance. Of perhaps greater concern is the spread of knapweed within healthy wildlands adjacent to and extending some distance away from roads.

Forest and grassland areas at low to mid-elevations contain habitat types most extensively invaded by noxious weeds in the northern Rocky Mountains. Vegetation types such as foothills grassland (including bluebunch wheatgrass and Idaho fescue), and mixed xeric forest savannah (including ponderosa pine, Douglas-fir, bluebunch wheatgrass, Idaho fescue, rabbitbrush, and other deciduous shrubs), are similar to those found within the proposed project area, and have been identified as most at risk to invasion by spotted knapweed and other noxious weeds (Losensky 1987). Approximately 87 percent of the proposed project area contains these cover types. The situation is compounded because 86 percent of the proposed units have already been subjected to ground-based disturbance associated with previous activities and now largely infested with spotted knapweed.

Data from the *Scientific Assessment from the Interior Columbia Basin Ecosystem Management Project* (Quigley et. al., 1996) describe the susceptibility of various habitats to invasion by noxious weeds and other exotic species. Vegetation types within the proposed project area have been rated as having a high susceptibility (warm forest with ponderosa pine, riparian, and dry grassland) or moderate susceptibility (cool Douglas-fir types and dry shrublands) to invasion by spotted knapweed (USDA Forest Service, 1997). A high rating indicates the vegetation type is inherently susceptible to invasion by exotic species even in the absence of intense or frequent disturbance. A moderate rating indicates the exotic species is a successful invader because disturbance removes the normal canopy cover, and/or creates bare, mineral soil.

Noxious weed control activities are disclosed in the Salmon National Forest Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) (June 1987), and in an addendum (March 1988) to the Forest EA. The EA is tiered to the Final Environmental Impact Statement for the Intermountain Region Noxious Weed and Poisonous Plant Control Program (October 1986). Noxious weed control activities as disclosed in that EA/FONSI are incorporated by reference.

Environmental Consequences

Analysis Methods

Data gathered to support this analysis was obtained from field reviews, surveys, and aerial photographs from 1991 to present. Noxious weed acreage figures were computed from the Forest GIS database.

Alternative A

Direct and Indirect Effects

Areas already colonized by noxious weeds will increase in size unless treated. This is particularly true along roadways and other disturbed sites, especially when the adjacent habitat types are susceptible to invasion. Weed density may also increase depending on the resistance of the existing vegetation. A change in species diversity together with a potential replacement of established desirable

vegetation along roadsides may occur over the long term unless control measures are implemented. This situation can produce adverse impacts on watershed quality by the replacement of desirable species that help control erosion along roadways and within upland sites (Lacey et al 1989).

The risk of noxious weed spread and subsequent colonization of adjacent upland native communities will continue. Areas are steadily being converted from native plant communities to those dominated by exotic species, with long-term impacts on wildlife habitat, visuals, and species diversity.

Alternative B, C and D
Direct and Indirect Effects
The risk of potential importation and/or spread of existing noxious weed populations will likely increase above the natural rate of expanding weed populations due to ground disturbing activities associated with thinning activities and prescribed fire. Ground disturbance is likely to expose buried knapweed seeds to conditions of light and moisture that favor germination since knapweed seeds are viable in the soil for periods of eight to ten years. Depending on the timing of treatments, weed seeds will likely be transported throughout the project area on tire treads and vehicle undercarriages.

There is the risk of spreading weed seeds to areas that have not been subjected to previous timber harvest activities (654 acres). There is an opportunity for knapweed acres to increase up to 13 percent above the current level. However, this estimate may vary substantially because knapweed spread into unifested areas depends on several factors. Factors include distance to nearest weed populations, extent of the seed bank, number and types of transportation vectors, size and severity of disturbance, time, and suitability of the unifested site regarding aspect, habitat type, and essential nutrients, light, and moisture.

Areas proposed for fuel treatment in Alternative B includes approximately 2, 784 acres of noxious weeds. Alternative C treatment areas include approximately 1,649 acres of weeds. Alternative D contains about 1,122 acres of weeds in which fuel treatments are proposed. Table 3-21 displays noxious weed acres in the project area, and infested acres in which fuel treatments are proposed by each alternative.

Table 3-21. ***Acres of Noxious Weed Infestation***

	Alternative B	Alternative C	Alternative D
Noxious Weed Acres	2,784	1,649	1,122

All Alternatives (A, B, C, D)
Fire (either wildfire or prescribed) may adversely affect the native bunchgrass communities, primarily Idaho fescue and bluebunch wheatgrass. Idaho fescue is very sensitive to fire and can be severely damaged. These sites may not return to pre-fire conditions for several years because these southerly slopes can be dry, harsh, and erosive sites. During the time needed for bunchgrass plant recovery, the exposed bare soil will be extremely susceptible to invasion and colonization by spotted knapweed, cheatgrass, and other weeds. Because these exotic species are well established in areas adjacent to and within the proposed burn, there is potential for fire to convert the native perennial grassland community to one dominated by annual or biannual species (A. H. Winward, pers. comm., 1996).

Fisheries

Affected Environment
The analysis area for fisheries is the North Fork River Salmon River watershed, which include the Gibbonsville project area.

Aquatic surveys have been conducted in the North Fork Salmon River watershed since 1991. Surveys used to collect data include the *R1/R4 Stream Habitat Inventory*, *GAWS Level III Stream Ecosystem Baseline Survey,* snorkeling and electro-shocking for fish presence, sedimentation surveys and water temperature monitoring. Fish species present in the project area include chinook salmon, steelhead, bull trout, westslope cutthroat trout, eastern brook trout, mountain whitefish and sculpin. There are no endangered species in the project area. However, there are spring/summer chinook salmon, steelhead and bull trout, all designated threatened species. Critical habitat for threatened chinook salmon has also been designated in the project area.

Fish bearing streams within the project area include Anderson Creek, Dahlonega Creek, Hammerean Creek, Johnson Gulch, Little Sheep, Nez Perce Creek, North Fork of the Salmon River, Sheep Creek, Smithy Creek, Stein Gulch and Threemile Creek (Table 3-22). Surveys verify rainbow trout/steelhead are present in Anderson Creek, Dahlonega Creek, Sheep Creek, Smithy Creek, Stein Gulch and the North Fork Salmon River. Surveys also verify the presence of bull trout in Dahlonega Creek, Sheep Creek and Smithy Creek. Surveys verify chinook salmon in the North Fork Salmon River. Although surveys have not verified chinook in other streams, anecdotal information has identified chinook in Dahlonega and Sheep Creeks.

Table 3-22. ***Summary of Fish Streams.***

Stream	Rainbow /Steelhead	Chinook Salmon	Bull Trout	Westslope Cutthroat Trout	Designated Critical Habitat Salmon/ Steelhead	Proposed Designated Critical Habitat Bull Trout
Anderson Creek	X			X	Y	N
Anderson Creek, West Fork				X	Y	N
Dahlonega Creek	X	X	X	X	Y	Y
Hammerean Creek				X	Y	N
Johnson Gulch				X	Y	N
Little Sheep Creek				X	Y	N
Nez Perce Creek				X	Y	N
Nez Perce Creek, West Fork				X	Y	N
North Fork of the Salmon River	X	X	X	X	Y	Y
Sheep Creek	X	X	X	X	Y	Y
Sheep Creek, North Fork			X		Y	Y
Sheep Creek, South Fork			X		Y	Y
Smithy Gulch				X	Y	N
Stein Gulch	X			X	Y	N
Threemile Creek				X	Y	N

Stream inventories suggest temperature and sedimentation are not limiting factors in habitat quality. However, the number and size of pools and large woody debris in some streams are considered limiting factors to habitat quality and quantity.

In the early 1990's, macroinvertebrate surveys were conducted in 10 streams within the North Fork Salmon River watershed including the North Fork Salmon River, Sheep Creek, and Threemile Creek within the project area. Macroinvertebrates were found in abundance and diversity in all the streams. The taxa included predators, gatherers, grazers, shredders, and filterers.

Stream connectivity, or the ability of fish to move up and down streams is limited on some streams. The inability of fish to move up or downstream may lead to a loss of diversity within and among native fish populations (U.S and Wildlife Service, 1998). Seven culverts on Forest Service roads limit fish movement. The culverts are located in Anderson Creek, Hammerean Creek, Johnson Gulch, Smithy Creek and Threemile Creek. An unscreened ditch with a diversion dam exists on private land on Anderson Creek, preventing fish from moving upstream. Fish are also lost in the unscreened ditch.

Population viability is defined as a population with sufficient numbers and distribution of reproductive individuals to ensure continued existence throughout the project area (ICBEMP, 2000). Population surveys indicate that overall coldwater fish stocks within the project area are depressed. Habitat inventories indicate that a lack of pools and large woody debris in some streams limit the quantity and quality of spawning and rearing habitat. Culverts and irrigation diversions in some streams reduce stream connectivity and essential migration corridors within the project area.

Environmental Consequences

Analysis Methods

The following fisheries analysis is based upon stream habitat inventories and fisheries surveys, primarily from 1991 to present. The specifics and summaries of the fisheries data can be found in the project record.

Alternative A

Direct and Indirect Effects

R1/R4 Stream Habitat Inventory:

Current stream habitat trends and natural fluctuations in stream flow timing and magnitude would continue. Although changes may occur, they would be in response to natural events. Continued natural trends and fluctuations in channel morphology are also expected. An analysis of the R1/R4 data collected on streams and professional judgment made while collecting other trend monitoring data indicates the two habitat parameters that typically are not meeting the desired future condition are number of pools/100 meters and number of large woody debris /100 meters.

If there were to be large stand replacing wildfires within the one tree height of perennial fish bearing streams, depending upon the direction the dead trees may fall, there may be an increase in the streams large woody debris/100 meters component. This scenario although beneficial to large woody debris recruitment to the stream, in the short term (approximately 20 to 30 years) would be detrimental to future large woody debris recruitment in the long term (approximately 30 to 100 years). Large woody debris is an important component in the formation of pools in the perennial fish bearing streams. Although the large stand replacing wildfire scenario may introduce large woody debris to the stream, the quality and quantity of the pools formed by this new introduction of

wood may be offset by the introduction of additional sediment delivery to the stream channel after the wildfire. This additional sediment would tend to deposit in the streams slow water, which includes the pools. The additional sediment in these pools will be flushed out over time. The natural removal of sediment from a stream and from pools is directly related to flushing flow events. These flushing flow events come from high intensity storms and spring runoff when there is normal or above normal snow pack in the mountains.

Fish Presence/Absence and Population:
Strong self-sustainable populations of both anadromous and resident fish characterize the desired future condition for fish species. In recent years the chinook salmon redd counts have significantly declined over historic numbers. Also, the presence of and competition with undesirable non-native fish like the eastern brook trout plays an integral role in viable bull trout populations. Fish distribution and densities are expected to remain near current conditions.

Except for stream temperatures, all of the other fisheries resource measurement indices are contributing to the depressed fish populations. Other factors that are contributing to the depressed fish populations are the streams low nutrient levels and small prey base populations. Both the streams low nutrient levels and small prey base populations are directly related to the decline of the anadromous fish populations in the streams.

It is impossible to predict the effects to fish populations from large stand replacing wildfires. Too many factors directly or indirectly affect fish populations that would lead to too many “what if” scenarios. The worst-case scenario would be the immediate elimination of a local stream population. Over time, this stream would repopulate as long as the stream does not have any migration barriers to other fish bearing streams. The best-case scenario would be a short term (1 to 2 years) increase in nutrients delivered to a stream, low quantities of additional sediment delivered from the burned hillsides and an increase in a streams large woody debris/100 m and pools/100 m component. This scenario could actually increase a streams local fish population.

Stream Sediment % Fines by Depth:
Continued natural trends and fluctuations in percent fines by depth are expected because no change in stream habitat conditions or riparian/upland habitats would occur because of human activities. Although changes may occur, they would be in response to natural events.

If there were to be large, stand-replacing wildfires there would be a high risk of measurable negative impacts to a stream from additional sediment delivered from the burned hillsides.

Stream Temperature:
Water temperature of the streams would continue to fluctuate naturally because no change in stream habitat conditions or riparian/upland habitats would occur because of human activities.

If there were to be large, stand-replacing wildfires there would be a high risk of measurable negative impacts to stream temperatures because of a reduction stream side shading and the water surface would be exposed to direct sunlight.

Stream Connectivity:
Stream connectivity would continue to be a problem on those streams and their fish populations associated with the seven identified fish barrier culverts. There would also continue to be a connectivity problem associated with the unscreened stream diversions and diversions that create migration barriers.

Road Density:
Road density would remain the same as described in the current condition in the water resource analysis.

Percent of stands less than 30 years:
Percent of stands less than 30 years would remain the same as described in the current condition in the water resource analysis.

Alternative B, C, and D
Direct and Indirect Effects
The Effects of all the action alternatives on fisheries resources would be similar since the types of treatments are unchanged and the design features common to all action alternatives, such as timing of ground-based activities, scarifying and reclaiming compacted skid trails and landings, slash retention within treatment units and prescribed fire would be similar.

Commercial thinning activities would take place beyond 50 feet to 300 feet (depending on stream type) from the stream channels. Thinning would not impact the fish habitat or fish species because the activity is away from the stream channel.

Treatment activities could have a beneficial effect to the fish and aquatic habitat by reducing the risk of large stand replacing wildfires. Alternative B would have the greatest potential to reducing the risk of stand replacing fires on the aquatic resource, compared to the other alternatives, because this alternative treats the greatest number of acres, 5,690.

Large Woody Debris
The Salmon National Forest Soil and Water Standard and Guidelines, Best Management Practices (BMPs), PACFISH, INFISH, Idaho Forest Practices Act

(July 1998), and site-specific soil/water/fisheries mitigation measures are designed to address, minimize, and eliminate potential impacts to fish and fish habitat. Implementing these measures ensure 1) sediment generated as a result of these activities is both minimized and intercepted before entering stream channels, 2) riparian integrity is maintained or enhanced to ensure adequate shading of stream channels, future large woody debris recruitment is maintained or enhanced, and the retention of streams overhead cover from predators, 3) activities do not result in physical or chemical fish immigration or emigration problems, 4) transportation route crossings of streams containing fisheries resources are designed and maintained to accommodate fish species specific migration needs, 5) basin harvest intensity is constrained to levels which do not produce significant modification of peak streamflow intensities and/or timing, and 6) State Water Quality for Coldwater Biota and salmonid spawning are met or exceeded.

The proposed thinning activities are consistent with the PACFISH Timber Management standard/guideline TM-1 page C-10 and General Riparian Area Management standard/guidelines RA-1 thru RA-5 page C-17. The proposed activities and objectives are also consistent with the INFISH Timber Management standard/guideline TM-1 page A-7 and General Riparian Area Management standard/guidelines RA-1 thru RA-5 page A-12.

There are no commercial thinning proposed within the PACFISH/INFISH RHCAs, and therefore would not negatively impact the measurement indices in the short term, because of the location of these activities to fish bearing streams. In the long term, these activities could have a beneficial effect to the measurement indices by reducing the risk of large stand replacing wildfires.

Road Maintenance

The road maintenance activities are designed to maximize the maintenance and enhancement of the Riparian Management Objectives as described in PACFISH and INFISH. These proposed activities and objectives are consistent with the PACFISH Roads Management standard/guidelines RF-1 thru RF-5 pages C-10 thru C-12 and PACFISH General Riparian Management standard/guidelines RA-1 thru RA-5 page C-17. These proposed activities and objectives are also consistent with the INFISH Roads Management standard/guidelines RF-1 thru RF-5 pages A-7 thru A-8 and INFISH General Riparian Management standard/guidelines RA-1 thru RA-5 page A-12.

Prescribed Fire

The Prescribed Fire activities are designed to maximize the maintenance and enhancement of the Riparian Management Objectives as described in PACFISH and INFISH. These proposed activities and objectives are consistent with the PACFISH Timber Management standard/guideline TM-1 page C-10, Fire/Fuels Management standard/guidelines FM-1 thru FM-5 pages C-15-16 and General Riparian Area Management standard/guidelines RA-1 thru RA-5 page C-17.

These proposed activities and objectives are also consistent with the INFISH Timber Management standard/guideline TM-1 page A-7, Fire/Fuels Management standard/guidelines FM-1 thru FM-5 page A-11 and General Riparian Area Management standard/guidelines RA-1 thru RA-5 page A-12.

The alternatives would allow fire ignition within the PACFISH/INFISH RHCAs and the FLRMP Filter Strips. The Silvicultural and Fire prescription within the RHCA's would be to maintain or restore natural vegetative processes. While meeting the prescribed fire objectives in the burn plan, the prescribed fire activities would not negatively impact the measurement indices in the short term, less than 5 years, because of the planned low intensity burns adjacent to stream channels. In the long term, these activities could have a beneficial effect to the measurement indices by reducing the risk of large stand replacing wildfires.

R1/R4 Stream Habitat Inventory:
The project as designed and planned would maintain or restore the measurement indices of: width-to-depth ratio, large woody debris, and pool frequency. There would be no ground disturbing activities that would be introducing measurable amounts of sediment into stream channels. There are no ground disturbing activities associated with the thinning activities and prescribed burning activities within the SNFLRMP designated filter strip width. This filter strip is designed intercept potential sediment delivery to a stream channel.

The prescribed fire activities are designed to minimize and prevent sediment delivery to stream channels and reduce overstory tree mortality within the PACFISH/INFISH RHCAs. The prescribed fire activities are planned, as low intensity burns adjacent to stream channels.

The road maintenance activities are designed to minimize and prevent road sediment delivery to stream channels.

Fish Presence/Absence and Population:
All action alternatives would maintain or restore the measurement indices fish species presence and population tends. There would be no activities degrading fish habitat parameters or having a negative impact directly or indirectly on the fish species.

The prescribed fire activities are planned, as low intensity burns adjacent to stream channels.

Stream Sediment % Fines by Depth:
All action alternatives would maintain or restore the measurement indices stream sediment % fines by depth. There would be no ground disturbing activities that would be introducing measurable amounts of sediment into stream channels.

There is no ground disturbing activities, associated with the thinning activities and prescribed burning activities within the SNFLRMP designated filter strip width.

The road maintenance activities are designed to minimize and prevent road sediment delivery to stream channels.

The prescribed fire activities are planned, as low intensity burns adjacent to stream channels. Depending upon high intensity storm events and spring snow melt these activities may increase sediment delivery to stream channels after the implementation of the burn because of the short term reduction in the filter strips capability to slow down and trap sediment before it enters the stream channel.

Stream Temperature:
Stream temperature would be maintained or restored since no trees would be harvested within the PACFISH/INFISH RHCAs and the silvicultural prescription within the RHCA's would be to maintain or restore natural vegetative processes including a healthy overstory canopy.

The road maintenance activities are designed to minimize and prevent road sediment delivery to stream channels. There would be no overstory removal of trees providing shade to stream channels.

The prescribed fire activities are planned, as low intensity burns adjacent to stream channels. The prescribed fire activities are designed to minimize and prevent sediment delivery to stream channels and reduce overstory tree mortality within the PACFISH/INFISH RHCAs.

Stream Connectivity:
The project as designed and planned would maintain the measurement indices stream connectivity. The activities associated with the commercial and non-commercial thinning of trees would not put any trees or slash into a stream channel thus it would not create any fish migration barriers. The activities would also not have any effect on dewatering any stream channels or restoring fish migration opportunities.

The road maintenance activities would not create any new fish migration barriers but at the same time will not be restoring fish migration at the seven identified fish migration barrier culverts.

The prescribed fire activities would not create any new fish migration barriers. The prescribed fire activities are planned, as low intensity burns adjacent to stream channels.

Road Density:
Alternative B would reduce road density in the Lick watershed from 6.02 mi/mi^2 to 5.65 mi/mi^2 and the North Gibbonsville watershed from 4.18 mi/mi^2 to 4.14 mi/mi^2 and increase road density in the Sheep watershed from 0.05 mi/mi^2 to 0.49 mi/mi^2. These changes would have immeasurable effects to fish and fish habitat and would have no change to the watershed risk ratings.

Alternative C would reduce road density in the Dahlonega watershed from 1.42 mi/mi^2 to 1.39 mi/mi^2, the Lick watershed from 6.02 mi/mi^2 to 4.84 mi/mi^2 and the North Gibbonsville watershed from 4.18 mi/mi^2 to 4.04 mi/mi^2 and increase road density in the Sheep watershed from 0.05 mi/mi^2 to 0.49 mi/mi^2. These changes would have immeasurable effects to fish and fish habitat and would have no change to the watershed risk ratings.

Alternative D would reduce road density in the Dahlonega watershed 1.42 mi/mi^2 to 1.39 mi/mi^2, the Lick watershed from 6.02 mi/mi^2 to 5.09 mi/mi^2 and the North Gibbonsville watershed from 4.18 mi/mi^2 to 4.11 mi/mi^2 and increase road density in the Sheep watershed from 0.05 mi/mi^2 to 0.49 mi/mi^2. These changes would have immeasurable effects to fish and fish habitat and would have no change to the watershed risk ratings.

Percent of stands less than 30 years:
Alternative B would increase percent of stands less than 30 years in the Anderson watershed from 2.0 to 2.7, in the Dahlonega watershed from 3.0 to 6.6, in the Lick watershed from 12.0 to 17.1, and in the North Gibbonsville watershed from 8.0 to 9.8. There would be no change in the Sheep watershed, as it would remain at 0.4. These changes would have immeasurable effects to fish and fish habitat and would have no change to the watershed risk ratings.

Alternative C would increase percent of stands less than 30 years in the Anderson watershed from 2.0 to 2.7, in the Dahlonega watershed from 3.0 to 5.3, in the Lick watershed from 12.0 to 16.4, and in the North Gibbonsville watershed from 8.0 to 9.1. There would be no change in the Sheep watershed, as it would remain at 0.4. These changes would have immeasurable effects to fish and fish habitat and would have no change to the watershed risk ratings.

Alternative D would increase percent of stands less than 30 years in the Anderson watershed from 2.0 to 2.7, in the Dahlonega watershed from 3.0 to 4.6, in the Lick watershed from 12.0 to 13.4, and in the North Gibbonsville watershed from 8.0 to 9.1. There would be no change in the Sheep watershed, as it would remain at 0.4. These changes would have immeasurable effects to fish and fish habitat.

Fisheries- Management Indicator Species

Affected Environment

The analysis area for the MIS fisheries is the North Fork Salmon River watershed, which includes the Gibbonsville project area.

On February 3, 2004 the Salmon-Challis National Forest amended their Forest Plan Management Indicator Species (MIS) list in order to improve its reliability, efficiency, and cost-effectiveness in meeting information needs for the biological effects of active management. Management Indicator Species (MIS) are defined as "plant and animal species, communities, or special habitats selected for emphasis in planning, and which are monitored during Forest Plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (FSM 2620.5).

The fish species selected for the aquatic habitat/community type is the bull trout. Forest Wide bull trout population data is currently available and protocols exist for collection of scientifically credible data. Since being listed as a "Threatened" under the Endangered Species Act, bull trout and their habitat have been intensively monitored throughout the Forest. The data collected has followed well-established protocols for electro-fishing, snorkeling and redd counts. Bull trout occur in streams within virtually all-coniferous forest communities, which are subject to resource management activities, including timber and grazing. They are known to be sensitive to stream habitat and watershed alterations.

As stated in the Bull Trout Status Report (August 2004) forest-wide bull trout populations are generally stable to slightly increasing. This forest-wide assessment of bull trout populations would also be true for this project's FAA.

Also according to the Bull Trout Status Report (August 2004) forest-wide bull trout total acres and potential vegetation types within the aquatic habitat/community type and distribution of this habitat/community type are 3,763 acres of water.

Environmental Consequences

Analysis Methods

The following fisheries analysis is based upon stream habitat inventories and fisheries surveys, primarily from 1991 to present. The specifics and summaries of the fisheries data can be found in the project record.

Aquatic surveys have been conducted in the North Fork Salmon River watershed since 1991. Surveys used to collect data include *the R1/R4 Stream Habitat Inventory, GAWS Level III Stream Ecosystem Baseline Survey*, water temperature monitoring, sedimentation surveys; and starting in 1997 snorkeling and electro-shocking for fish presence. Bull trout are present within the project

area. Bull trout are present in Dahlongea Creek, Sheep Creek and the North Fork Salmon River.

Alternative A
Direct and Indirect Effects
Under the no action alternative, there would be no fuels reduction activities or road maintenance activities. Current fish and fish habitat trends with natural fluctuations will continue to occur but would be at risk to the effects of a catastrophic wildfire.

Alternatives B, C, and D
Direct and Indirect Effects
Using the previously mentioned fisheries indices as identified above, the activities associated with the action alternatives "may effect, but will not likely adversely affect" bull trout. This analysis is consistent with the August 18, 2003 fisheries biological assessment and its determination for the Gibbonsville fuel reduction project. The Gibbonsville Wildland Urban Interface Fuels Reduction project will not alter Forest wide bull trout populations or habitat.

Wildlife- Management Indicator Species and Threatened and Endangered Species

Affected Environment
The analysis area for MIS and Threatened and Endangered species includes both the Forest and project area. In addition to the Forest and project area, some species were analyzed at larger scales such as the Northern Rockies Bird Conservation Region (BCR), Central Idaho Ecological Unit (ERU), or designated management areas such as Lynx Analysis Units.

Management Indicator Species
The following vertebrate species represents the complete terrestrial and semi-terrestrial listing of MIS for the Salmon-Challis National Forest, as amended (Salmon-Challis NF 2004):

- Pileated woodpecker
- Greater sage-grouse
- Columbia spotted frog

There are 2 terrestrial and one semi-terrestrial vertebrate species on the Salmon-Challis National Forest amended MIS list. Two of these species, pileated woodpecker and Columbia spotted frog, were selected for analysis for this project. These two species are known to occur in suitable habitats across the project area.

Greater sage-grouse prefer sagebrush steppe habitats and do not use forested habitats. The North Fork District has very limited montane and lower montane

sagebrush and grassland habitats and this proposal area does not have contiguous expanses of the representative types of sagebrush/steppe habitats that are used by this species on other portions of the Forest. Proposed actions do not focus on the treatment of sagebrush or grassland habitats, although use of fire to reduce fuels may modify isolated patches of sagebrush or grass within forested communities. Use of the greater sage-grouse as a management indicator for the Gibbonsville EA would not be appropriate.

Threatened and Endangered Species

The current 90-Day Species List Update, provided quarterly by the FWS, lists the following threatened, endangered or proposed terrestrial wildlife species as occurring on the Salmon National Forest, including the project area: gray wolf, Canada lynx and bald eagle. The gray wolf (*Canis lupis*) is an endangered species but, in central Idaho, are considered to be an experimental, nonessential population. Both the Canada lynx (*Lynx Canadensis*) and the bald eagle (*Haliaeetus leucocephalus*) are classified as threatened species. All three of these species are analyzed in the Biological Assessment for this project, as required by Section 7 of the Endangered Species Act (ESA).

The complete list of Forest terrestrial and semi-terrestrial vertebrate MIS and Federally listed species, their habitat descriptions and rationale for elimination or retention for further analysis in this document is provided in Table 3-23. The following sections, including Table 3-23, are organized by source habitat family.

Table 3-23. ***Forest Plan terrestrial management indicator species (MIS), Federally listed species, and rationale for selection or elimination of species for further analysis in the Gibbonsville EA.***

Species and Status	Special Habitat Features	Rationale	Selected for this project
Family 2 Pileated woodpecker (MIS)	Ponderosa pine, Douglas-fir and mixed pine/fir mature and old growth. Large diameter snags and down logs.	Habitat and individuals present in project area. Selected because proposed activities may affect habitat (designated and non-designated old growth units); and as an ecological indicator for ponderosa pine, Douglas fir and mixed pine/fir old growth.	Yes
Family 3 Canada lynx (Threatened)	Dense lodgepole pine and subalpine fir thickets and down logs.	Habitat present in the project area. Proposed thinning and burning activities may affect habitat for this species.	Yes
Family 5 Gray wolf (Endangered, exp./nonessential pop.)	Habitat generalist, requires good prey populations (mule deer and elk) and security.	Habitat and individuals present in project area. Selected because proposed activities may affect important habitats for prey species.	Yes
Family 7 Columbia spotted frog (MIS)	Riparian willows, sedges and grasses, beaver ponds and forested riparian corridors and adjacent uplands.	Selected as an ecological indicator. Habitat present along river and stream corridors. Some proposed treatments are adjacent to riparian zone and may directly modify habitat (prescribed fire).	Yes
Bald eagle (Threatened)	Tall trees, snags or cliffs near water for nesting.	Habitat present in project area. Proposed activities may affect presence of large snags.	Yes
Family 11 Greater sage-grouse (MIS)	Sagebrush/ grasslands	Not selected. Expansive patches of sagebrush are not present within project area. Not a good indicator for proposed action because treatment activities are focused on timbered habitats. No sagebrush stands are proposed for treatment although some isolated patches of sagebrush may be indirectly treated by prescribed fire.	No

The following section describes the affected environment (status) of terrestrial and semi-terrestrial Forest MIS and Federally listed species selected for analysis in this project area and evaluates the effects of alternatives on these species. The status of habitats for selected species are evaluated based on Salmon-Challis NF GIS vegetation data layers and data analyzed during the interior Columbia River Basin ecological assessment as presented in Hann and others (1997) and Wisdom and others (2000). Population trend for the pileated woodpecker was obtained from the Breeding Bird Surveys and Partners in Flight Species Assessment Database (PIF 2002) for the Central Rocky Mountains Physiographic Area (PA). Population trend data does not exist for Canada lynx. Gray wolf population trend was obtained from Weekly Progress Reports provided by the USFWS and filed in their website (http://westerngraywolf.fws.gov/). Bald eagle population trend data was obtained from the annual Idaho Bald Eagle Nesting Reports compiled by the Idaho Department of Fish and Game (Sallabanks 2002). Columbia spotted frog population status and trend is based on the Idaho Natural Heritage Program and Conservation Data Center data provided in *Atlas of Idaho's Wildlife* (Groves and others 1997).

Source habitats for the pileated woodpecker include old coniferous forests (late-seral), both single-strata and multi-strata stages, of the subalpine, montane and lower montane communities and riparian woodland communities (Wisdom and others 2000). Current estimates for the coniferous forest potential vegetation type (PVT) on the entire Salmon-Challis Forest totals approximately 2,540,400 acres, an estimated 1,264,595 acres of which occurs on the Salmon NF portion. Although this species may occasionally forage in many of the forested communities included in this total, source habitats of most importance to pileated woodpeckers are late-seral single- and multi-strata Douglas-fir, ponderosa pine and mixed Douglas-fir/ponderosa pine stands within the montane and lower montane forested communities. PVT's included in these communities occur in the Dry Forest Potential Vegetation Group (PVG) which constitutes approximately 95 percent of the Gibbonsville project area or roughly 21,450 acres (Table 3-24).

Table 3-24. ***Historic and current vegetation and structure for the Cold Forest and Dry Forest PVG's and seral stages (%) for the Central Idaho Ecological Reporting Unit (ERU) (Hann and others 1997), Salmon NF and Gibbonsville Project Area (acres). [PVG's that are represented by less than 1 percent (250 acres) within the project area (moist forest, riparian shrub, dry shrub, riparian woodland, rock and water) are not included in this table].***

PVG and Seral Stage	Central Idaho ERU Historic*	Central Idaho ERU Current*	Salmon National Forest	Gibbonsville Project Area
Total Acres			1,797,682	22,580
	Percent	Percent	Percent	Percent
Cold Forest			**27**	**5**
Early Seral Forest	28	39	1	0
Mid Seral Forest	49	33	65	73
Late Seral Multi-layer	10	12	24	26
Late Seral Single-layer	12	14	4	+
Dry Forest			**42**	**95**
Early Seral Forest	21	31	4	10
Mid Seral Forest	37	48	46	37
Late Seral Multi-layer	12	17	38	42
Late Seral Single-layer	13	2	3	4

*Historic and current values are from Hann and others (1997)
+Less than 0.5%

The above data suggest that a substantial increase in late-seral multi-layer pileated woodpecker habitat has occurred not only in the central Idaho ERU, but in the forest and within the project area, as well. This is probably a correct assessment because fire exclusion has resulted in measurable increases in old forest or late-seral multi-layered stands of lower elevation Douglas-fir and ponderosa pine forests throughout the interior Columbia River Basin, at the expense of late-seral single-layered stands (Wisdom and others 2000). This data also clearly shows the decrease in early-seral forest stands that provide good snowshoe hare habitat and thus constitute source habitats for Canada lynx. There is no apparent habitat trend for the gray wolf however, as wolves are habitat generalist and source habitats include all habitats of importance to primary prey species such as elk and deer. Prey populations for this large carnivore are much more important than habitat types.

For the Columbia spotted frog, riparian habitat data is not easily obtained or analyzed. Current estimates are based on satellite mapping of vegetation (LANDSAT 1992) that provides information across all ownerships and all types of vegetation including riparian types. However, small linear features such as riparian areas are known to be underestimated due to the imagery (pixel size) constraints. Current GIS data for this forest indicates a riparian habitat community potential vegetation type (PVT) of approximately 60,000 acres and condition trend is considered to be upward due to incorporation of riparian habitat conservation area (RHCA) management standards that were recently identified in PACFISH/INFISH (USDA Forest Service 1995). For these reasons, spotted frog population trend on this forest and in the Gibbonsville project area is conservatively considered to be stable but may actually be upward, in concert with habitat trend.

Family 2 Broad Elevation, Old Forest Family-*Pileated Woodpecker*

The analysis area for pileated woodpecker is the project area, Forest and the Columbia River Basin Region.

Although found in a wide variety of coniferous forested habitats, as previously mentioned, the pileated woodpecker is considered to be an ecological indicator for mature and old growth (late-seral) ponderosa pine, mixed pine/Douglas-fir and Douglas fir habitats, especially those in a multi-layered condition, but also including single-layered stands. Current estimates of these habitats for the Salmon Forest and the project area are approximately 300,000 acres and 9,800 acres, respectively. Based on historic and current habitat estimates for the central Idaho ERU (Table 3-24, above), it appears that pileated woodpecker source habitats are significantly increasing. This species is also known to utilize cottonwood galleries where large, old trees are present, especially during winter. Most of these riparian woodland communities occupy small acreages at lower elevations, often on private lands, and may be in decline due to human development and agriculture.

Global and state conservation ratings consider the pileated woodpecker populations secure but with long term concerns for population trends at the state and local level (G5 and S4). The pileated woodpecker is not considered a priority species in the Idaho Partners in Flight priority ranking (Partners in Flight 2002). “An uncommon resident” (Roberts 1992), the pileated woodpecker is considered somewhat vulnerable due to a low number of breeding individuals within its range, relative to other species. Breeding (source) and non-breeding habitats are widely distributed across central Idaho, this Forest and the Gibbonsville project area. The Central Rockies PA supports a moderate abundance of breeding individuals relative to other parts of the pileated woodpeckers breeding range. Trend for breeding source habitat is considered a significant increase during the past 30 years; future source habitat conditions are expected to remain relatively stable. However, slight shifts from late-seral multi-

layer stands to single-layer stands may occur as silvicultural practices are employed on project areas such as this to increase forest health and reduce the threat of stand replacing fires, especially near communities.

This Family 2 species uses late-seral multi- and single-layered stages of the montane and lower montane communities (Wisdom and others 2000). Pileated woodpeckers commonly use a mix of cover types including lower elevation ponderosa pine and interior Douglas fir. Most of the species in this family, and especially the pileated woodpecker, depend on snags, down logs and large hollow trees for foraging or nesting. Pileated woodpecker prey species, such as wood-boring beetles, depend on special features common in the late seral stages, including large standing and down dead woody material. High populations of wood boring beetles that commonly occur after large stand replacing fires attract the pileated woodpecker. Special habitat features for the pileated woodpecker include large diameter (> 21 inch) snags for nest and roost cavities (Bull and others 1992 and1986). Pileated woodpeckers also forage on large snags and logs (Bull and Holthausen 1993), and depend on large, hollow live or dead trees for roosting (Bull and others 1992).

Broadscale-Columbia River Basin

Most watersheds in the Columbia River Basin (59 percent) showed a declining trend in source habitats for Family 2 (Wisdom and others 2000). The Central Idaho ERU was reported as having a neutral trend but was among the group of sub-basins that had 43 percent or more of the watersheds in a declining trend. Basin-wide source habitat for pileated woodpeckers (and most species in Family 2) declined due to the decrease in ponderosa pine habitats. Basin-wide declines in source habitat for this family are associated with timber harvest, fire exclusion and changes in insect and disease infestation cycles.

Declines in source habitats primarily occurred in late-seral lower montane single-layer forests, which were projected to have more than an 80 percent decline in spatial extent since the historic period (Hann and others 1997). However, lower montane and montane late-seral mulit-layered forests have concurrently increased due largely to fire exclusion.

Salmon National Forest and Project Area

Declines in ponderosa pine and dry Douglas fir old-forest single-story have occurred Forest-wide and within the project area (Forest Service 1985). The primary reasons for decline are timber harvest and fire exclusion, the latter especially resulting in a concurrent increase in multi-storied stands. The decline in ponderosa pine within the dry Douglas fir PVT's is directly related to fire suppression. Dry Douglas fir PVT's have gradually shifted from ponderosa pine dominated communities to more shade tolerant Douglas fir which is represented by an increase in late-seral multi-layer forests, a preferred habitat for pileated woodpeckers.

Road densities are high (>2 miles per square mile) in most of the project area where pileated woodpecker (Family 2) source habitats exist. The large diameter snags (>21 inch) required for nesting, roosting and foraging are more common in unmanaged stands than along the many roads within the project area.

Within the project area, most urban development occurs in the lower elevation ponderosa pine habitat that tends to be on or near the valley within the dry Douglas fir PVT in Dahlonega Creek, Sheep Creek, Hughes Creek, Ditch Creek and along the North Fork of the Salmon River.

Environmental Consequences

Analysis Method

Local monitoring data, Breeding Bird Surveys and Christmas Bird Counts were used to determine presence or absence of bird species within the project area. Bird population trends are more appropriately evaluated across a broader extent than the project area, since many variables that influence population trends, particularly for migratory bird populations, apply across larger areas.

Interpretation of local monitoring data without the broader context of the BCR can result in misleading population trends. Bird population trends were analyzed using data sources from Idaho's Partners in Flight database for the Northern Rockies BCR and the Patuxent wildlife research center. The latter maintains a large scale, long-term monitoring program designed to track the status and trends of North American bird populations.

This analysis method was used for most species and will be referred to in the following discussions.

Alternative A

Direct and Indirect Effects

The no action alternative continues the current situation, but with somewhat less concern related to the lack of ponderosa pine dominance. However, there are a large number of species in this family, pileated woodpeckers included, associated with large snags, down logs, and black snags from fire, and the lack of these elements raises the level of concern. In addition, vulnerability of remaining snags and logs to firewood cutting in roaded accessible areas, and risk of loss of large, old trees from crown fire are greater.

Alternative B, C, and D

Direct and Indirect Effects

Alternative B provides the best response for source habitats for pileated woodpeckers, followed by Alternatives C and D respectively. The large amount of late-seral multi-layer forest that remains in comparison to historic, roughly 3 times the historic amount (Table 3-25), is a concern due to continued risk of

crown fire at the landscape level and potential loss of large diameter trees that would limit future ability to create more late-seral single-layer stands through thinning. Treatments of late-seral multi-layer stands for Alternatives B, C and D include commercial thinning (995 acres, 726 acres, and 270 acres respectively), ladder fuel reduction (853 acres, 1,143 acres, and 615 acres respectively), and seed tree harvest (27 acres for Alternatives B and C). All treatments would include use of prescribed fire for fuel reduction (pile or broadcast burning). Late-seral multi-layer structure would be reduced and the effect would be a 38 to 56 percent increase in late-seral single-layer forests, and a slight increase in early seral (27 acres) (Table 3-25). Maintenance treatments of late-seral single-layer stands for Alternatives B, C, and D include commercial thinning (177 acres, 88 acres, and 67 acres respectively) and ladder fuel reduction (121 acres, 110 acres and 87 acres respectively). Pileated woodpeckers use late-seral single-layer forests and the substantive increase would improve habitat diversity. A minor amount of late-seral multi-layer forest (27 acres) will be treated in alternatives B and C causing a shift to early seral, resulting in a slight (less than 1 percent) loss of source habitat for this Family 2 species.

Table 3-25. ***Pileated woodpecker (Family 2), current and future source habitat (acres) on Forest Service and private lands for the No Action Alternative (Alternative A), and Alternatives B, C and D.***

Source Habitat	Current		Future			
	Forest Service	Private	Alternative			
			A	B	C	D
Aspen/ Cottonwood Early Seral	17	82	(0)	(0)	(0)	(0)
Aspen/ Cottonwood Mid Seral	26	19	(0)	(0)	(0)	(0)
Aspen/ Cottonwood Late Seral Multi	49	60	(0)	(0)	(0)	(0)
Dry and Cold Forests Late Seral Multi	8,198	783	(0)	-(12)	-(12)	-(5)
Dry and Cold Forests Late Seral Single	700	115	(0)	(56)	(56)	(38)
Total	8,990	1,059	(0)	-(+)	-(+)	(0)

(+) Less than 1 percent change; (0) No change

Prescribed burn treatments (pile and broadcast burning) could decrease the amount of down logs, snags and hollow trees available for use by the pileated woodpecker. Forest Plan standards for snag and down log retention would be met and it is expected that snags, down logs and hollow trees would remain in sufficient amounts to not preclude use for snag dependent species. Thinning

and ladder fuel treatments in Douglas-fir stands with ponderosa pine late-seral multi-layer components would increase the dominance of ponderosa pine late-seral single-layer and improve source habitat structural and species composition diversity. Harvest and burning activities would result in short duration disruption (less than 1 year) to the bird community (Huff and Smith 2000). Multiple entries (thinning, ladder fuel reduction, and burn) could temporarily displace pileated woodpeckers and other Family 2 species repeatedly for several years.

Based on available information on population and habitat trends for this Family 2 species, the amount of Forest source habitat, and the beneficial changes in late-seral single-layer forested acres within the project area source habitats, all action Alternatives B, C and D would maintain habitat for pileated woodpecker well distributed across the Forest and allow the population of this species to persist on the Forest and in the project area. Alternative A (No Action) would not contribute any adverse effects to the current situation, nor would it improve source habitats for this Family 2 MIS.

Family 3 Forest Mosaic Family-*Canada lynx*

Selected analysis area for the lynx includes two individual lynx analysis units (LAU).

On July 8, 1998, the USFWS published a proposed rule to list the Canada lynx as a threatened species under the Endangered Species Act of 1973, as amended. The normal 12 month rule-making process was extended for an additional six months to allow for consideration of new scientific information and additional public comments on the proposed rule. An interagency lynx coordination effort that included the USFWS, US Forest Service (FS), Bureau of Land Management (BLM), and the National Park Service (NPS) participated in the publication of lynx conservation documents. Three products produced by the interagency team that are important to the conservation of lynx on federally managed lands include:

- The Scientific Basis for Lynx Conservation (Ruggiero and others 2000);
- The Lynx Conservation Assessment and Strategy (LCAS) (Ruediger and others 2000); and
- The Lynx Conservation Agreement (CA) (US Forest Service 2000)

The Canada lynx was classified as Threatened in Idaho on March 24, 2000, and is currently protected under the Endangered Species Act. A recovery plan for the Canada lynx has not yet been completed.

The Forest identified and mapped (USFS 2000) lynx analysis units (LAU) based on general guidance provided in the Lynx Conservation Assessment and Strategy (Ruediger and others 2000). LAU boundaries are based on HUC6 and are generally larger than 10,000 acres. The project area contains 56 percent of

Dahlonega and 10 percent of the Granite Mountain LAU. The Sheep Creek LAU is less than 1 percent of the project area and is not considered further in this analysis. Habitat for the lynx exists within the project area. The vegetation types defined as lynx habitat on the Forest include all riparian, deciduous and conifer types, except ponderosa pine and dry Douglas-fir potential vegetation types.

The Forest is situated along the west side of the northern continental divide, a widely recognized landscape linkage corridor connecting the Northern and Southern Rockies (Montgomery 2001, Noss and others 2001). The Forest lynx map has designated this Northern Continental Divide Corridor for providing north-south connectivity for dispersing lynx and other wide-ranging carnivores. Linkage corridors are defined as landscape areas that "connect forested habitats that allow lynx and other wide ranging carnivores to easily move long distances in search of food, cover and mates" (Ruediger and others 2000). Landscape corridors characterized by extensive, continuous habitat connectivity go beyond the function of allowing daily and seasonal movements between home range segments. Such corridors in a fragmented habitat matrix may provide key connectivity between subpopulations in large habitat patches, functioning as landscape linkages and dispersal corridors (Harris 1984).

Lodgepole pine and Douglas-fir that transition to spruce and subalpine fir, and other moist vegetation types that support a dense understory characterize lynx habitat within the project area. Lynx habitat mapped within the project area accounts for 7,289 acres. Aspen, snowberry, serviceberry, and chockecherry, and dense stands of young conifer provide important habitat for snowshoe hare, the primary prey species for lynx. Mature closed canopy forests provide habitat for the red squirrel an important alternate prey species for lynx. Riparian habitats, willow, cottonwood and other streamside vegetation provide important travel corridors for lynx.

Moderate to high road densities exist in lynx habitat within the project area with generally greater than 1 to 2 miles per square mile. A relatively small portion of the project area (less than 10 percent) is seasonally closed. In addition to restricted areas, there are few roads closed by gates either yearlong or September 25 through June 15. There are 27 miles of roads closed with gates or barriers or within closure areas that restrict motorized traffic during the winter months, but allow non-motorized winter activities. Open roads may be used during the winter for snowmobile, cross-country skiing and snowshoe activities. There are 36 miles of open road.

Highway 93 is plowed during the winter. Forest Service Road 79 connecting Gibbonsville with the Big Hole Valley in Montana to the east is not plowed in the winter, however snowmobile use is permitted. A network of Forest Service and private roads provide access throughout the project area. Passenger vehicles

and light trucks primarily use these roads to access National Forest lands during day light hours, although low levels of nighttime use occur.

Winter activities include cross-country skiing, snowshoeing and groomed and non-groomed snowmobile routes. Groomed routes are maintained throughout the winter season and the non-groomed routes receive sufficiently regular use that they are considered season long snow packed routes. There is a winter outfitter guide that operates guided mountain lion hunts during the winter season.

There are very few authenticated records of lynx where a photograph or pelt and a specific location are documented. Less than 15 or 20 authenticated accounts of lynx in the Salmon area are documented in the past 20 years. The Idaho Conservation Data Center has 215 records of lynx in Idaho from 1874 to1998. The limited amount of observations and harvest records does not provide sufficient data for a determination of population trends, historic or current. It is recognized in the literature (Ruediger and others 2000) that the number of lynx in the continental United States is low.

Environmental Consequences

Analysis Method

See analysis methods on page 3-76.

Alternative A

Direct and Indirect

The no action alternative continues the current situation and may provide a better outcome lynx as compared to the action alternatives B or C. Lack of thinning treatments in lynx habitats maintains the current amount of habitat. However, because of lack of any recent stand replacement or mixed fires in lynx habitat quantity of habitat is low. There is a substantial risk of stand replacement fire for the No Action alternative as a result of multiple layers and high fuel loadings. A stand replacement fire could benefit lynx by creating conditions favorable to dense regeneration of early-seral lodgepole pine in the more moist sites and by creating an abundance of snags that could improve future denning habitat conditions.

Alternatives B, C and D

Direct and Indirect

Alternatives B and C contain between 641 to 425 acres of precommercial thinning in the more moist early-seral higher elevation and north aspect stands that provide key foraging habitat for the lynx (Table 3-26). The primary concern relates to the loss of existing lynx foraging conditions when there is currently a lack of dense early-seral regeneration present within the LAU's and at the Forest level. There are no treatments of vegetation or fuel proposed in lynx habitat for Alternative D. The effects of Alternative D are similar to Alternative A (no action).

Table 3-26. ***Vegetation and fuel treatments in the Dahlonega and Granite Mountain LAU's.***

	Alternatives			
	A	**B**	**C**	**D**
All Vegetation Treatments				
Dahlonega	0	492	306	0
Granite Mountain	0	149	119	0
Precommercial Thin				
Dahlonega	0	234	173	0
Granite Mountain	0	41	41	0
Commercial Thin				
Dahlonega	0	222	97	0
Granite Mountain	0	14	0	0
Seed Tree				
Dahlonega	0	36	36	0
Granite Mountain	0	14	0	0
Ladder Fuel Reduction				
Dahlonega	0	0	0	0
Granite Mountain	0	94	93	0
All Fuel Treatments				
Dahlonega	0	492	306	0
Granite Mountain	0	149	119	0

Table 3-27. ***Canada lynx (Family 3), current and future source habitat (acres) on Forest Service and private lands for the No Action Alternative (Alternative A), and Alternatives B, C and D.***

Source Habitat	Current		Future			
	Forest Service	Private	Alternative			
			A	B	C	D
Aspen/ Cottonwood Early Seral[Lynx]	17	82	(0)	(0)	(0)	(0)
Aspen/ Cottonwood Mid Seral[Lynx]	26	19	(0)	(0)	(0)	(0)
Aspen/ Cottonwood Late Seral Multi[Lynx]	49	60	(0)	(0)	(0)	(0)
Douglas-fir without ponderosa pine, spruce/ fir, aspen, cottonwood Early Seral	506	50	(0)	-(3)	(2)	(0)
Douglas-fir without ponderosa pine, spruce/ fir, aspen, cottonwood Mid Seral	4,064	19	(0)	(+)	(+)	(0)
Douglas-fir without ponderosa pine, spruce/ fir, aspen, cottonwood Late Seral Multi	3,093	114	(0)	-(8)	-(6)	-(2)
Douglas-fir without ponderosa pine, spruce/ fir, aspen, cottonwood Late Seral Single	47	16	(0)	(82)	(78)	(59)
Rock	21	11	(0)	(0)	(0)	(0)
Total	7,823	390	(0)	(0)	(0)	(0)

[Lynx] Aspen and cottonwood are used by the lynx
(+) Less than 1 percent change

The No Action (Alternative A) and Alternative D comply with Section 9 of ESA and with the Lynx Conservation Assessment and Strategy (Ruediger and others 2000) and would have no predicted adverse effect on lynx or source habitats. Alternatives B and C do not comply with Section 9 of ESA or the Lynx Conservation Assessment and Strategy standards for precommercial thinning and loss of lynx foraging habitat and no new foraging habitat would be created to offset the loss. These two action alternatives, as stated, may result in adverse effects to source habitats for Canada lynx.

Family 5 Forest and Range Mosaic Family-*Gray wolf*

The Central Idaho Experimental Management Area (CIEMA) is used for analysis of gray wolf populations (USFWS 1995).

Gray wolves were considered eradicated from much of the western states including Idaho since the 1920's (Fish and Wildlife Service 1984). Gray wolves were listed as an endangered species throughout the lower 48 states in 1973, except for Minnesota where they are listed as threatened (Fish and Wildlife Service 1995; Federal Register 14678). Idaho also classified wolves as a state endangered species in 1977. Wolves began to re-colonize various portions of the northwestern US in the 1980's but none were known to be reproducing in Idaho. In 1994 after an Environmental Impact Statement was prepared by the USFWS, a decision was published by the Secretary of Interior to reintroduce wolves into Yellowstone National Park and Central Idaho as an experimental non-essential population.

Subsequently to that decision, a total of 35 Canadian gray wolves were reintroduced into the central Idaho experimental management area (CEIMA) at Corn Creek and the Middle Fork areas of the Frank Church River of No Return Wilderness on the Salmon-Challis NF via releases in 1995 and 1996. There are currently (August 2004) 45 established packs or breeding groups of wolves being monitored in the CEIMA and a minimum of 106 pups were produced this year (FWS Gray Wolf Recovery Weekly Progress Report, August 13, 2004). Several wolf packs are established in areas surrounding and including the Gibbonsville project area and wolves from one or more of these packs are known to use portions of the project area during all seasons of the year.

Idaho contains portions of 3 wolf recovery areas that each has a slightly different management strategy because of different endangered species status of wolves in those areas. The Salmon-Challis National Forest is one of 8 National Forests that form the core of the CIEMA which includes all of Idaho located south of I-90 and that portion of Montana that is also south of I-90 and west of I-15. The project area is wholly located within the CIEMA and wolves there are currently still being managed as a "nonessential experimental population" (FWS 1987). This population has rapidly increased since reintroduction and the trend is expected to continue upward under current management.

The gray wolf uses all structural stages in the montane, lower montane and subalpine community types. Special habitat features include riparian, woodlands, shrublands, and herblands. Wolves require an adequate supply of vulnerable prey, ideally in an area with a low risk of human-induced mortality. The wolf is a predator primarily of large, wild ungulates. This prey is generally depended upon for food year-round. In central Idaho the principal prey species are deer and elk. Smaller mammals such as beaver, marmots, ground squirrels, snowshoe hare, pocket gophers, and voles can be important alternative prey in

snow free months. Although summer and winter range habitat for the major wolf prey species (mule deer and elk) is adequate to maintain historical population levels, the presence of human activities including livestock grazing, private residences, and road access has increased the risk of mortality for gray wolf in the project area.

Environmental Consequences

Analysis Method

See analysis methods on page 3-76.

Alternative A

Direct and Indirect

The No Action alternative continues the current situation. Primary concerns are related to changes in habitats for wolf prey species, especially elk and deer, and include the risk of uncharacteristic wildland fire and increases in exotic noxious weeds and annual grasses.

Alternatives B, C and D

Direct and Indirect

Treatments would include a 13 percent, 14 percent, and 6 percent reduction in thermal cover for Alternatives B, C and D respectively (Table 3-28). The loss in elk and deer thermal cover would result from thinning followed by burning in mid-seral and late-seral multi-layer stands. Thinning and ladder fuel treatments in late-seral multi-layer stands would increase the amount of late-seral single-layer stands and decrease the quality of thermal and hiding cover. Thinning in late-seral single-layer will maintain the single-layer stand structure. The cover type composition will remain about the same.

Table 3-28. Gray wolf (Family 5) current and future source habitat (acres) on Forest Service and private lands for the No Action Alternative (Alternative A), and Alternatives B, C and D.

Source Habitat	Current		Future			
	Forest Service	Private	Alternative			
			A	B	C	D
Aspen/ Cottonwood Early Seral	17	82	(0)	(0)	(0)	(0)
Aspen/ Cottonwood Mid Seral	26	19	(0)	(0)	(0)	(0)
Aspen/ Cottonwood Late Seral Multi	49	60	(0)	(0)	(0)	(0)
Ponderosa pine, Douglas-fir and Lodgepole Early Seral Closed	1,887	152	(0)	-(16)	(+)	-(+)

Ponderosa pine, Douglas-fir and Lodgepole Mid Seral Closed	8,117	534	(0)	(1)	(+)	(+)
Ponderosa pine, Douglas-fir and Lodgepole Late Seral Multi	8,199	783	(0)	-(13)	-(14)	-(6)
Ponderosa pine, Douglas-fir and Lodgepole Late Seral Single	700	115	(0)	(57)	(59)	(39)
Closed Herbland	94	0	(0)	(0)	(0)	(0)
Open Herbland	1,291	211	(0)	(0)	(0)	(0)
Closed Mid Shrub	4	0	(0)	(0)	(0)	(0)
Total	20,384	1,806	(0)	(0)	(0)	(0)

(+) Less than 1 percent change

The No Action Alternative (A) and all three Action Alternatives, B, C and D, would reduce late-seral multi-layer stands in favor of late-seral single-layer stands, more in line with historic conditions. However, changes in source habitats would be very small (Table 3-28) and post-project thermal cover values would increase via natural regeneration of conifers in treated areas. Wolf pack territories greatly exceed the size of this project area and predicted decreases in quality of prey species source habitats would be both short-term and negligible on a territory scale. These changes would not jeopardize the continued existence of this nonessential experimental population of gray wolves and will have no effect on critical habitat for this species as none has been designated in the CIEMA.

Family 7 Forest, Woodland, and Sagebrush-*Columbia spotted frog and Bald eagle*

Spotted Frog

The analysis area for Columbia spotted frogs is the project area and Forest.

The spotted frog is an ecological indicator (MIS) for riparian habitats, especially willow, aspen, sedge and grass community types. At the time the Forest Plan was written, existing habitat was estimated to be 43,000 acres and the potential habitat for the 50-year planning period was estimated to be 47,000 acres. Current estimates based on the GIS PVT data layer indicates over 60,000 acres of riparian habitat community types on this forest. This apparent increase is thought to reflect better inventory technology, not a change in amount of riparian habitat. Consequently, the amount of available riparian habitat for this species is considered to be stable in the absence of data to indicate change.

The Columbia spotted frog is classified as a “protected non-game species” in Idaho and is considered “not rare and apparently secure but with cause for long-term concern” on both a state and global basis (Groves and others 1997) but, the

species is thought to be declining in southern portions of its range (i.e. south of the Snake River). However, in the northern portions of its range (i.e. north of the Snake River), including central Idaho, this Forest and project area, this species is considered widespread and abundant (Groves and others 1997). Observation and survey data on this Forest support the above statement as this species has been found to be our most abundant and widespread amphibian. With the exception of the Lost River Mountain Range, it is well distributed at all elevations wherever suitable riparian habitat occurs. Monitoring efforts were initiated across the Forest in 2004 to begin gathering population data that will, over time, help determine trend for this species.

The Columbia spotted frog was listed as a USDA Forest Service R4 Sensitive Species in 1990 and a Conservation Assessment was prepared (USFS 1994) to help prevent a trend towards federal listing.

Riparian source habitat trends for the Salmon-Challis National Forest and project area are thought to be stable to possibly increasing due largely to Riparian Habitat Conservation Area (RHCA) management standards and guidelines established by PACFISH/INFISH (USDA Forest Service 1995) associated with recovery of salmonid species. However, pasture conversion of willow habitat on adjacent private lands results in a loss of source habitat.

Environmental Consequences

Analysis Method

See analysis methods on page 3-76.

Alternative A

Direct and Indirect Effects

The No Action alternative continues the current situation. The primary habitat concern relates to fire exclusion and the current lack of diversity of the vegetation mosaic in comparison to the historic mosaic. In addition, there is considerable concern with the current risk of uncharacteristic stand replacement fire in both riparian areas and adjacent uplands, and post-disturbance increases in exotic noxious weeds and annual grasses.

Alternative B, C, and D

Direct and Indirect Effects

As currently proposed, all action alternatives, B thru D, would include vegetative manipulation, both mechanical and non-mechanical (fire) within the RHCA's that constitute virtually all habitat for the Columbia spotted frog. However, within the actual riparian portion of the various RHCA's no treatments of any kind would be planned. Consequently, the only changes in source habitats for this species would involve moving towards more natural vegetative conditions on uplands adjacent to riparian areas. These actions should greatly decrease the risk of

stand replacing fire in both coniferous and deciduous riparian areas and contribute to an increase in long-term habitat quality for spotted frogs.

None of the action alternatives, B, C, or D, will negatively affect riparian source habitats for spotted frogs because they will not include management actions within the actual riparian areas. These alternatives, however, may result in increased quality of upland source habitats thru restoration of more natural vegetative conditions. In addition, Alternatives B, C, and D should help preclude future adverse effects to riparian source habitats by decreasing the potential for stand replacing fires adjacent to and/or within riparian areas. Consequently, all three action alternatives should help maintain habitats for and populations of Columbia spotted frogs well distributed across the forest and within the project area. Alternative A (no action alternative) would not contribute any adverse effects to the current situation, nor would it improve source habitats for this Family 7 MIS.

Bald Eagle

The analysis area for the Bald Eagle is the Regional Northern Rockies physiographic and project area.

The bald eagle was federally listed as an endangered species in 1978 for most of the lower 48 states, including Idaho. Bald eagle population estimates increased after the species was listed due to initiation of intensive nesting surveys and documented population growth (Flath and others 1991). Due to population increase throughout the range of this species, bald eagle status was changed to threatened in 1995 and in 1998 the US Fish and Wildlife service began the process to delist the species in hopes of declaring it fully recovered by July 2000. However, the bald eagle currently remains listed as a threatened species due to concerns about potential threats to source habitats should the species become delisted.

The PIF database interpretation for bald eagle breeding population trend is a “significant increase” for the Northern Rockies physiographic area (Partners In Flight 2002). Global and local threats to breeding and non-breeding habitat were rated as “moderate decline in the future suitability”.

An active nest is present on the North Fork Ranger District within 7 to 10 air miles of the project area. Annual Bald Eagle Reports from 1992 through 2000 (Idaho Department of Fish and Game 2000) indicate the nest has been active and produced 1 to 3 young annually. District observations indicate the nest site has remained active each year since 2000. This species is commonly observed along the North Fork of the Salmon River within several miles south of the project area but is not known to inhabit or even frequent the actual area.

Bald eagles use a mosaic of forest, woodland, and sagebrush vegetation types and structural stages as their source habitats (Wisdom and others 2000).

Special requirement for roosting or nesting include tall snags, large trees and cliffs near bodies of water. There is a decline in riparian habitat quantity and quality, especially on private lands, due to residential and agricultural developments. Special nesting and roosting requirements that depend on cliffs have probably not changed much from historic conditions; however losses of tall snags have occurred due to firewood cutting in areas accessible by roads and timber harvest activities have reduced the presence of large trees in some areas.

Environmental Consequences

Analysis Method

See analysis methods on page 3-76.

Alternative A

Direct and Indirect Effects

The No Action alternative continues the current situation. The primary concern relates to fire exclusion and the current lack of diversity of the vegetation mosaic in comparison to the historic mosaic. In addition, there is considerable concern with the current risk of uncharacteristic stand replacement fires that would cause losses of large trees and tall snags

Alternatives B, C and D

Direct and Indirect Effects

Predicted changes in source habitat are relatively small, especially for early-seral and mid-seral (Table 3-29). The greatest change would be in the reduction of late- seral multi-layer and the subsequent increase in late-seral single-layer stands. All species in Family 7, bald eagles included use late-seral single-layer stands and the increase would improve habitat structural diversity. Cover types will remain the same except for the 35 acres of Douglas-fir that would change to early seral ponderosa pine in Alternatives B and C. Total source habitat acres remain stable for Alternatives B, C and D and actions taken to reduce the incidence of stand replacing fires would help ensure continued presence of large trees for roosting or nesting.

Table 3-29. ***Bald eagle (Family 7), current and future source habitat (acres) on Forest Service and private lands for the No Action Alternative (Alternative A), and Alternatives B, C and D.***

Source Habitat	Current		Future			
	Forest Service	Private	Alternative			
			A	B	C	D
Aspen/ Cottonwood Early Seral	17	82	(0)	(0)	(0)	(0)
Aspen/ Cottonwood Mid Seral	26	19	(0)	(0)	(0)	(0)

Aspen/ Cottonwood Late Seral Multi	49	60	(0)	(0)	(0)	(0)
Ponderosa pine / Douglas-fir Early Seral	1,887	152	(0)	-(12)	(+)	-(+)
Ponderosa pine/ Douglas-fir Mid Seral	7,248	534	(0)	(1)	(+)	(+)
Ponderosa pine/ Douglas-fir Late Seral Multi	7,883	783	(0)	-(15)	-(15)	-(6)
Ponderosa pine/ Douglas-fir Late Seral Single	697	697	(0)	(59)	(59)	(39)
Open Herbland	39	115	(0)	(0)	(0)	(0)
Closed Herblan	1,263	211	(0)	(0)	(0)	(0)
Open Low Shrub	90	0	(0)	(0)	(0)	(0)
Open Mid Shrub	27	0	(0)	(0)	(0)	(0)
Total	19,226	2,653	(0)	(0)	(0)	(0)

(+) Less than 1 percent change

The bald eagle is not known to use the project area for nesting or foraging. However, none of the alternatives considered in this analysis would alter source habitats for the bald eagle to the point of precluding potential or future use of the project area by this species. Adequate large trees will be retained for nesting or roosting and riparian habitats will be maintained or enhanced. Alternative A, the no action alternative, will not help restore late-seral single-layer stands that have been lost to fire exclusion but it will not adversely affect source habitats. Alternatives B, C and D will help restore late-seral single-layer stand conditions to a point nearer to historic conditions and thus should help perpetuate the presence of large trees. None of the four alternatives include provisions for either reducing or increasing the presence of tall snags in the project area.

Table 3-30. ***Summary of Determination of Effects for Threatened and Endangered Species.***

Species Status	Alternative			
	A	**B**	**C**	**D**
Threatened or Endangered				
Bald eagle	NE	NLAA	NLAA	NLAA
Gray wolf	NLAA	NLAA	NLAA	NLAA
Lynx	NLAA	LAA	LAA	NLAA

Forest Service, Region 4 Sensitive Species

Affected Environment

Analysis area for sensitive species includes the project area, Forest, Central Idaho ERU and the Interior Columbia Basin Region.

Forest Service sensitive species are those species identified by Regional Foresters that warrant special management emphasis to ensure their viability and preclude trends that may lead towards endangerment and a need for federal listing. There are 14 terrestrial or semi-terrestrial vertebrate species currently on the USDA Forest Service, Intermountain Region Regional Forester's Sensitive Species List for the Salmon and Challis National Forest. Twelve of these sensitive species (see list below) have been included for analysis in this document and are discussed in the Biological Evaluation. The 14 terrestrial vertebrate sensitive species for the Salmon-Challis National Forest are:

Amphibians	
Columbia spotted frog	*Rana luteiventris (=pretiosa)*
Birds	
American peregrine falcon	*Falco peregrinus anatum*
Boreal owl	*Aegolius funereus*
Flammulated owl	*Otus flammeolus*
Great gray owl	*Strix nebulosa*
Harlequin duck	*Histrionicus histrionicus*
Northern goshawk	*Accipiter gentiles*
Three-toed woodpecker	*Picoides tridactylus*
Greater sage-grouse**	*Centrocercus urophasianus*
Mammals	
Fisher	*Martes pennanti*
Spotted bat	*Euderma maculatum*
Townsend's big-eared bat	*Corynorhinus townsendii*
Wolverine	*Gulo gulo*
Pygmy rabbit**	*Brachylagus idahoensis*

*The Columbia spotted frog was discussed previously under the MIS section of this EA and thus will not be discussed further.
**Species not selected for analysis, habitat not present in the project area.

Species are grouped, relative to their source habitats, as presented by Wisdom and others (2000) in their analysis of terrestrial vertebrates for the Interior Columbia Basin. The 11 sensitive species selected for this analysis are organized into 4 families and 9 groups (Table 3-30). The source habitat approach was used for this type of analysis because broad-scale trends that describe historic and current changes within the basin and sub-basin help

understand source habitat conditions at the project or fine-scale. This analysis is similar to Wisdom and others (2000) except only species whose source habitat trends are best analyzed at the fine-scale versus the broader scaled basin or sub-basin level were selected. Species were included that are dependent on fine-scale features such as riparian or wetland habitat and describe local source habitat trends using fine scale mapping and local data.

Source habitat groups are composed of one or more species that share common source habitats as defined by vegetation cover types and structural stages. Similar groups also are clustered into families whose source habitats generally fall into similar terrestrial community groups, a broader classification that includes several cover types.

The 9 source habitat groups and 4 families assigned to the 11 terrestrial vertebrate species analyzed in this document based on Wisdom and others (2000).

Family 2	**Broad Elevation, Old Forest Family**
Group 5	Northern goshawk (summer habitat), flammulated owl, fisher
Group 7	Boreal owl
Group 8	Great gray owl
Group 11	Three-toed woodpecker.
Family 3	**Forest Mosaic Family**
Group 15	Wolverine
Family 6	**Forest, Woodland, Montane Shrub Family**
Group 25	Northern goshawk (winter)
Family 7	**Forest, Woodland, and Sagebrush Family**
Group 26	Harlequin duck
Group 27	Townsend's big-eared bat
Group 28	Spotted bat, peregrine falcon

Source habitat trends for the Central Idaho ERU (Table 3-31) are neutral for all 4 families described in this document (Wisdom and others 2000). The use of family level habitat trends is a coarse-filter approach and provides an understanding of changes at the broad-scale. At the project level, a fine-filter approach focuses on rare species and communities.

Table 3-31. ***Source habitat trends for the 5 families in the Central Idaho Basin ERU (Wisdom and others 2000) used for analysis in this document*.**

Family	Percentage of watersheds decreasing	Percentage of watersheds neutral	Percentage of watersheds increasing	Dominant Trend
2	43	22	35	Neutral
3	21	48	31	Neutral
6	48	22	30	Neutral
7	34	36	30	Neutral

Affected Environment

The analysis area for species in this family is the project boundary.

Family 2 Broad Elevation, Old Forest Family

Group 5 Northern goshawk (summer habitat), flammulated owl, fisher
Group 7 Boreal owl
Group 8 Great gray owl
Group 11 Three-toed woodpecker

Species in family 2 use late-seral multi- and single-layered stages of the montane community (Wisdom and others 2000). This family uses a mix of cover types including lower elevation ponderosa pine and interior Douglas-fir. All of the selected species in this family utilize snags; several including the fisher, also depend on down logs for foraging or nesting. Large hollow trees are also important to the flammulated owl and boreal owl. Prey species for many species in this group depend on special features common in the late-seral stages such as lichens and fungi. High populations of wood boring beetles that occur after large stand replacing fires attract the three-toed woodpecker. Stands that display high edge contrast, such as early-seral adjacent to late-seral, provide important habitat conditions for the “contrast species” like the great gray owl which forages in the early-seral and nests in snags typical of late-seral. Goshawks nest in stands characterized by dense canopy cover and require large home ranges that are greater than 5,930 acres (Reynolds and others 1992). Foraging habitat occurs in various cover types and structural stages; and the juxtaposition of several habitats seems to enhance the quality of foraging habitat around the nest (Hargis and others 1994). Fishers prefer forested stands with dense canopy and tend to avoid highly fragmented habitats such as those with multiple clear cuts (Buskirk and Powell 1994, Jones and Garton 1994).

Broadscale-Columbia River Basin and the Central Idaho ERU

Most watersheds (59 percent) showed a declining trend in source habitat for Family 2 (Wisdom and others 2000). The Central Idaho ERU was reported as having a neutral trend but among the group of sub-basins that had 43 percent or more of the watersheds in a declining trend. Basin-wide source habitat for most

species in Family 2 declined due to the decrease in ponderosa pine habitats. Exceptions were three-toed woodpecker source habitat, which increased, and great gray owl source habitat, which remained neutral because their source habitats are not ponderosa pine. Basin-wide declines in source habitat for Family 2 are associated with timber harvest, fire exclusion and changes in insect and disease infestation cycles. Declines in source habitats primarily occurred in late-seral lower montane single-layer forest, which was projected to have more than an 80 percent decline in spatial extent since historic period (Hann and others 1997).

Salmon National Forest and Project Area

Declines in ponderosa pine and dry Douglas-fir old-forest single-story have occurred Forest-wide and within the project area (Forest Service 1985). The primary reasons for decline are timber harvest, fire exclusion, both of which contribute to decline in old-forest single-story and the resulting increase in multi-storied stands. The decline in ponderosa within the dry Douglas-fir potential vegetation type (PVT's) is directly related to fire suppression. Dry Douglas-fir PVT's have gradually shifted from ponderosa pine dominated communities to more shade tolerant Douglas-fir which is represented by an increase in late-seral multi-layer forests.

Northern goshawk

The northern goshawk was listed as a Forest Service Intermountain Region (Region 4) sensitive species in 1991. Hoffman and others (1996) theorize that declining trends for migrating young goshawks in eastern Idaho in past 20 years may in part be due to changes in forest habitat structure. Global and state conservation ratings consider the northern goshawk populations secure but with long term concerns at both the global and state level (G4 and S4). "A rare resident" (Roberts 1992) and a level II priority species (Partners in Flight 2002), northern goshawk populations are considered somewhat vulnerable because the species occurs in very low abundance within its range, relative to other species (Partners in Flight 2002). Breeding and non-breeding habitat is widely distributed and is not considered a contributing factor to the species vulnerability. The Central Rockies PA functions as a core area for breeding individuals and as important non-breeding source habitat. Population trend for breeding source habitats is interpreted as "possibly declining" in BCR 10. The northern goshawk is an old-growth dependent species and current and future threats to breeding and non-breeding habitats are expected to produce a moderate decline in the future suitability of source habitat.

Formal goshawk surveys began on the Salmon NF in 1992 (Craig 1992). Surveys were usually conducted in areas of proposed timber sales. Prior to 2004, the last documented survey on the North Fork District was 1996; within the project area, the last surveys were conducted in 1994. During those formal surveys, 4 documented observations were made on the North Fork District, of

which1 goshawk observation was within the project area at North Dahlonega. The most recent observation of goshawk fledglings was June 26, 2002, in the Lick Creek drainage within the project area. More than 15 incidental sightings are documented on the forest occurring from 1992 – 1997 from March thru December, mostly single bird observations of goshawk eating prey (grouse, pine squirrels) and 1 nesting pair at Musgrove Creek opposite French Gulch (1992). The Leadore District reported an active territory in 2001. A goshawk survey was conducted within the project area this year (2004) but no birds were detected.

Boreal Owl

The boreal owl is a sensitive species for the Salmon-Challis National Forest and a Level II priority in the Idaho Bird Conservation Plan (Idaho Partners in Flight 2000). Conservation ratings vary, at the global level the boreal owl is considered widespread, abundant, and secure (G5); at the state level the boreal owl is considered an imperiled species with concern for it's sustainability due to low population numbers (S2). "A rare resident" (Roberts 1992) the boreal owl has the lowest relative abundance rating assigned by PIF. Breeding and non-breeding distribution does not appear to be restrictive. Boreal owls are present but in low relative abundance within the Central Rockies PA. There are no data available for trend estimates. Future conditions are expected to be stable; there are no known threats (Partners in Flight 2002).

Boreal owls have been detected during surveys in the North Fork drainage, adjacent to the project area and this species likely occurs within the area.

Great gray owl

The great gray owl is a sensitive species for the Salmon-Challis National Forest and a Level II priority in the Idaho Bird Conservation Plan (Partners in Flight 2000). Conservation ratings vary the same as for the boreal owl, at the global level the great gray owl is considered widespread, abundant, and secure (G5); at the state level the great gray owl is considered an imperiled species with concern for it's sustainability due to low population numbers (S2).

Roberts (1992) reported the great gray owl as a "very rare resident" which contributes to the species vulnerability based on very low abundance within its range, relative to other species. Breeding and non-breeding habitat distribution does not appear to be limited and great gray owls appear to be present in moderate relative abundance within the Central Rockies PA. There are no data available for trend estimates; future conditions appear to be stable and threats are assumed to be low. This species has been observed within the North Fork drainage, on Anderson Mountain, and likely occurs within the project area.

Three-toed woodpecker

The three-toed woodpecker is a sensitive species for the Salmon National Forest and a Level II priority species in the Idaho Bird Conservation Plan (Idaho

Partners in Flight 2000). Conservation ratings vary from stable at the global level (G5) and vulnerable at the state level (S3). On the Forest, the three-toed woodpecker is "a rare resident but evenly distributed where there is lodgepole pine" (Roberts 1992). Low relative abundance of the species within its range contributes to the species vulnerability. Insufficient data makes population trend determinations uncertain. The Central Rockies PA provides important wintering habitat relative to other areas within the species range.

The three-toed woodpecker is a burned area specialist and serious concerns exist for the future sustainability of breeding conditions at both the global and local scales (Partners in Flight 2002).

Flammulated owl

The flammulated owl is Salmon National Forest sensitive species and a Level I priority species for ponderosa pine habitat on the Idaho PIF priority species list (Idaho Partners in Flight 2002). Concern exists for the long-term population trend at the global level (G4) and increased concern at the state level where the flammulated owl is considered vulnerable (S3) (Groves and others 1997). Roberts (1992) described the flammulated owl as a "very rare summer resident" on the Salmon National Forest. The flammulated owl is vulnerable due to very low relative abundance within the species range; and future threats including decline in ponderosa pine source habitat and special features such as large diameter live and dead trees for nesting. The Central Rockies PA is an important source habitat for breeding populations. There are no data available for trend estimates.

Flammulated owls have been observed on the Salmon National Forest, the highest number of territories was recorded on the North Fork Ranger District (Atkinson and Atkinson 1990); and Forest personnel located additional owls during surveys conducted in the early 1990's. Flammulated owl territories have been documented within the project area near Lick Creek, Sheep Creek, and Hughes Creek; an active nest was recorded in Hughes Creek (Atkinson and Atkinson 1990, Wenger 1992).

Fisher

Fisher population data is sparse; there are some reliable reports from the 1920's for fisher (Weckwerth and Wright 1968, cited in Powell and Zielinski 1994). Anecdotal reports such as Merriam (1891) suggest that fisher were "common" in Idaho during historic periods. Idaho Department of Fish and Game trapping are not available for fisher and very little is known about this species within central Idaho. The only observation on this Forest within the past 5 years was made during a winter track survey within the project area. There is no documentation of a reproducing population on this Forest or within the project area.

Environmental Consequences

Analysis Method

See analysis methods on page 3-76.

Alternative A

The No Action alternative continues the current situation. A large number of species in this family are associated with large snags, down logs, and black snags from fires, and the lack of these elements raises the level of concern. In addition, the vulnerability of remaining snags and logs to firewood cutting near roads, and the risk of loss of large, old trees from crown fires are greater.

Alternatives B, C, and D

Alternative B provides the best response for this family, followed by Alternatives C and D respectively. The large amount of late seral multi-layer that remains, roughly three times the historic amount, is a concern due to continued risk of crown fires at the landscape level. The potential loss of large diameter trees would limit the ability to create more late seral single layer stands through thinning. Treatments of late seral multi-layer for Alternatives B, C and D include commercial thinning (995 acres, 726 acres, and 270 acres respectively), ladder fuel reduction (853 acres, 1,143 acres, and 615 acres respectively), and seed tree harvest (27 acres for Alternatives B and C). All treatments would include use of prescribed fire for fuel reduction (pile or broadcast burning). Late seral multi-layer would be reduced and the effect would be a 38 to 56 percent increase in late seral single layer, and early seral (27 acres). Maintenance treatments of late seral single layer for Alternatives B, C and D include commercial thinning (177 acres, 88 acres, and 67 acres respectively), ladder fuel reduction (121 acres, 110 acres and 87 acres respectively). All species in Family 2 use late seral single layer and the substantive increase would improve habitat diversity. A minor amount of late seral multi-layer (27 acres) will be treated in Alternatives B and C, causing a shift to early seral, resulting in a slight (less than one percent) loss of source habitat for Family 2.

Prescribed burn treatments (pile and broadcast burning) may decrease the number of hollow logs and hollow trees available for use by marten, fisher, and boreal owl. Forest Plan standards for snag and down log retention would be met and snags, down logs and hollow trees will remain for use by snag dependent species. Thinning and ladder fuel treatments in Douglas-fir with ponderosa pine late seral multi-layer would increase the dominance of ponderosa pine late seral single layer and improve source habitat structural and species composition diversity. All family 2 species use ponderosa pine and stands of mixed ponderosa and Douglas-fir except fisher, boreal owl and great gray owl. Thinning and ladder fuel treatments in mid seral habitats may maintain habitat for goshawk, whose populations may be in decline in the Northern Rockies BCR. Harvest and burning activities will disrupt bird habitat for less than one year (Huff

and Smith 2000). Multiple entries (thinning, ladder fuel reduction, and burning) may temporarily displace Family 2 species repeatedly for several years.

Family 3 Forest Mosaic Family

Group 15 Wolverine

The wolverine is a habitat generalists and use a variety of different habitats in the lower-montane, montane, subalpine and riparian woodlands. Special habitat features include downed logs that are used for resting and denning sites and talus slopes as potential denning sites for the wolverine (Wisdom and others 2000). Additionally, large remote tracts of land with limited human disturbance are important (Ruggiero and others 1994).

Broadscale-Columbia River Basin and the Central Idaho ERU

Trends in source habitat for Family 3 were predominately neutral for watersheds within the basin including the Central Idaho ERU (Wisdom and others 2000). Overall changes in the extent of source habitats since historic period were not substantial, however Hann and others (1997) detected notable changes in the extent of terrestrial community types that compose source habitat. In particular, the lower montane community, montane and subalpine communities showed contrasting changes in structural stages. The lower montane and montane communities were projected as having a decline in early- and late-seral stages and an ecologically significant increase in mid-seral stages. The subalpine communities showed a decline in late-seral multi-layer and ecologically significant increases in early- and late-seral single-layer.

Basin-wide there was a substantial change detected in structure and spatial distribution (Wisdom and others 2000). Much of the change reflects the lack of historical structure, which included large snags and large emergent trees that survived crown fires, clumps of upland trees that survived because of mixed fire behavior, and narrow stringers of old-forest structure in riparian, and large down logs (Hann and others 1997, Hessburg and others 1999).

Salmon National Forest and Project Area

Trends vary for the lower montane and montane habitats for the Salmon National Forest and project area compared to trends reported by Hann and others (1997) for the Central Idaho ERU. Similarities include a decline in early- and late-seral. Specific to the Forest and project area is a substantial decline in late-seral single and increases in mid-seral. Notable differences between the Forest and project area in comparison to the ERU include a greater departure in late-seral multi-layer, which is nearly double the amount of the current ERU, and early-seral which is less than half of the current ERU. This suggests the Forest and project area are in much greater departure from historic than the overall values assigned to the ERU for early-seral and late-seral multi-layer stands for the dry forest PVG's.

Wolverine
Wolverines are considered rare mammals and little is known about this carnivore. Historical accounts are few, but a biological reconnaissance of south-central Idaho (Merriam 1891) describes wolverines as “common” to the spruce and Douglas fir zones of the Salmon River Mountains. Wolverines are considered secretive and solitary, and they are notorious for occupying inaccessible high elevation mountainous habitat (Banci 1994). Wolverines also use boreal and mountain forests (Groves and others 1997) in all structural stages except closed canopy stem exclusion (Wisdom and others 2000). The project area contains many of the primary source habitats used by the wolverine except for alpine tundra. High elevation basins that function as natal den sites are found in the upper reaches of watersheds adjacent to the project area boundary.

Population densities of this wide-ranging carnivore are very low even under optimal conditions (Banci 1994), with individual home ranges often exceeding several hundred square miles. In Stanley Basin in central Idaho, Copeland (1996) estimated one wolverine per 198 square kilometers. Population dynamics of wolverines are not well known in Idaho or anywhere in the range of the species.

Environmental Consequences
Analysis Method
See analysis methods on page 3-76.

Alternative A
The no action alternative continues the current situation and may provide a better outcome for wolverine compared with the action alternatives B or C. The No Action alternative contains a substantial risk of stand replacement fire as a result of multiple layers and high fuel loadings.

Alternatives B, C and D
The effects of Alternative D are similar to Alternative A (no action).
Changes in source habitat are relatively small for early and mid seral. The greatest change would be in the reduction of late seral multi-layer and the subsequent increase in late seral single layer. The wolverine uses late seral layer single and the increase would improve habitat structural diversity. Cover types will remain the same except for the 27 acres of Douglas-fir that would change to early seral ponderosa pine in Alternatives B and C. Ponderosa pine is not considered source habitat for Family 3.

Family 6 Forest, Woodland, Montane Shrub Family

Northern goshawk (winter)
Source habitats that occur in the project area for this family include lower montane (ponderosa pine, dry Douglas-fir PVT’s), montane forests (interior Douglas-fir PVT), riparian and upland woodlands, chokecherry-serviceberry-rose,

mountain mahogany, and riparian shrublands. Special habitat features include goshawk prey species requirements such as snags, downed logs and woody debris, large trees, openings, herbaceous and shrubby understories, and an intermixture of various forest structural stages (Reynolds and others 1992, Wisdom and others 2000).

Broadscale-Columbia River Basin and the Central Idaho ERU
The majority of watersheds (45 percent) in the basin had decreasing trends, 37 percent had increasing trends; the Central Idaho ERU is reported as having an overall neutral trend. Declines were associated with reduction in late-seral and early-seral lower montane and montane forests, riparian woodlands, and riparian shrublands (Hann and others 1997). Increases were associated with transitions to mid-seral forests, primarily managed young forests, and to increases in the upland woodland community group.

Salmon National Forest and Project Area
The Salmon National Forest and project area follow the same trends described for the broad-scale basin and Central Idaho ERU. Declines in early-seral and late-seral single-layer lower montane and montane communities have resulted in an increase in mid-seral and late-seral multi-layer structures in the ponderosa pine and dry Douglas-fir PVT's.
Trends for riparian and upland woodland are not known for the fine-scale Forest and project area, however, it is likely that these communities have declined due to the increase in mid-seral conditions.

Northern goshawk is considered a "rare resident" (Roberts 1992) and a Region 4 Forest Service sensitive species. Summer habitat for the northern goshawk is described in Family 2. Northern goshawks populations are known as partial migrants, an undetermined portion of northern goshawk populations winter outside their breeding areas, while others do not (Squires and Reynolds 1997). Source habitats include old forest and unmanaged young forest structures.

Family 7 Forest, Woodland, and Sagebrush

Group 26 Harlequin duck
Group 27 Townsend's big-eared bat
Group 28 Peregrine falcon and spotted bat.

All species in this family use a variety of vegetation types and structural stages as their source habitat (Wisdom and others 2000). Several of these specie have canyons, cliffs or caves as a special requirement for roosting or nesting (except spotted frogs); and most require proximity to water to meet habitat needs. The Townsend's big-eared bat requires caves or mine shafts for roosting or hibernacula; the spotted bat uses cracks and crevices in cliffs and canyon walls; the peregrine falcon nests on cliff ledges generally near large bodies of water; and the harlequin duck hens nest in cliff cavities or tree cavities near forested

streams. Both bat species use riparian areas for foraging because of high insect density, peregrines often include fish in their diet (although in Idaho they primarily eat small birds), and the harlequin duck feeds on crustaceans and small fish.

Broadscale-Columbia River Basin and the Central Idaho ERU
Broadscale trends for species in the group are limited to Townsend's big-eared bat and the spotted bat. No broadscale trends are available for the other species in this Family due to fine scale mapping characteristics of their source habitats (Wisdom and others 2000). For the 2 bat species, basin-wide trends were mixed with the majority (47 percent) of watersheds showing a neutral trend; and 32 percent had declining trends. The Central Idaho ERU had an overall neutral trend with 34 percent of the watersheds reported as declining and 32 percent increasing. Basin-wide decreases in old-forest structural stages have been offset by increases in mid-seral stages (Hann and others 1997). Riparian vegetation has declined in extent, basin-wide (Lee and others 1997).

Salmon National Forest and Project Area
Trends for the Salmon National Forest and project area are similar to the broad-scale trends for the basin and ERU. Particularly the decline in riparian habitat across all land ownerships and in large tree structures associated with riparian conditions. Special nesting and roosting requirements that depend on cliffs and crevices have probably not changed much from historic conditions; however mine shafts constructed in the late 1800's and early 1900's, that offered suitable bat roosting and wintering sites, may have declined in recent years due to mine closures for safety reasons.

Harlequin duck
The Harlequin duck is a Salmon National Forest sensitive species, a PIF level II priority for riparian habitat (Idaho PIF 2002), and is considered a "rare migrant" on the Salmon National Forest (Roberts 1992). The PIF database does not have any trend data for the Harlequin duck. Breeding habitat occurs in 8 physiographic areas; and non-breeding habitat is more restrictive, occurring along coasts of North America (Erlich and others 1988). Global and local threats to breeding and non-breeding habitat are rated as "moderate decline in the future suitability of breeding and non-breeding habitat" (Idaho PIF 2002).

Townsend's big-eared bat
Townsend's big-eared bats use abandoned mine tunnels and shafts for roosting and as winter hibernaculum sites. They commonly forage in dry Douglas-fir communities and along riparian areas. This species is known to occur on the Forest within 10 miles south of the project area and is assumed to utilize portions of the project area. No population trend data are available for the Townsend's big-eared bat.

Spotted Bat
The spotted bat roosts in crevices rocks and cliffs and forages along steep cliff faces as well as over open (i.e. un-forested) areas, including natural meadows and irrigated fields. This species is only known to occur on this Forest in the Middle Fork of the Salmon River where one species was netted during a bat survey. No population trend data are available for the spotted bat in central Idaho, on this Forest or the project area.

Peregrine Falcon
The peregrine falcon was removed from the endangered species list in 1999 and is currently a Salmon National Forest sensitive species. Idaho PIF lists the peregrine as a Level I priority species for cliff and rock source habitats. Global rankings indicate a secure population status; however, in Idaho the species is considered critically imperiled because of extreme rarity (Groves 1997). Population vulnerability includes very low relative abundance within the species range and future threats to breeding habitat. The Central Rockies PA is an important source of breeding and non-breeding source habitat for the peregrine falcon. Population trend for breeding source habitats is uncertain. As of 1995 there were 13 pairs of peregrines in established territories in Idaho (Groves and others 1997).

Several active peregrine falcon eyries have recently been reported on the Salmon-Challis National Forest, the closest of which is approximately 3 miles south of the project boundary. Potential habitat exists within the project boundary and this species probably forages there; however, no active peregrine eyries have been observed to date.

Environmental Consequences

Analysis Method
See analysis methods on page 3-76.

Alternative A
The No Action alternative continues the current situation. The primary concern is fire exclusion and lack of diversity in the vegetation mosaic compared to the historic mosaic. An additional concern is the risk of uncharacteristic stand replacement fires and increases in exotic noxious weeds and annual grasses.

Alternatives B, C and D
Changes in source habitat are relatively small for early and mid-seral. The greatest change will be in the reduction of late seral multi-layer and the subsequent increase in late seral single layer. All species in Family 7 except the Townsend's big-eared bat and the spotted bat use late seral single layer and the increase would improve habitat structural diversity. Cover types will remain the same except for the 35 acres of Douglas-fir that will change to early seral ponderosa pine in Alternatives B and C. The Townsend big-eared bat and

spotted bat are the only species in this family that utilize early seral ponderosa pine, and they will benefit from the slight increase in early seral acres. Total source habitat acres remain stable for Alternatives B, C and D.

Impacts to the Townsend's big-eared bat are expected to be insignificant because thinning and low intensity burning will not affect abandoned mine habitat. This bat does not use trees for resting habitat. However, some small positive or negative effects may occur to prey species (moths, beetles) that use trees, down logs and brushy vegetation as habitat. A positive effect might occur for prey species that use early seral vegetation created by seed tree harvest or burning treatments. A negative effect may occur to prey species that inhabit down logs or decayed trees if their habitat components decline following thinning and burning. Riparian habitat is not the focus of harvest or burning treatments, but small inclusions may be affected by broadcast burning. This effect to riparian habitat is considered insignificant. Burning will result disrupt bird and mammal communities for less than one year (Huff and Smith 2000). Multiple entry burn activities could temporarily displace species in Family 7.

Table 3-32. ***Summary of Determination of Effects for Sensitive Species.***

Species Status	Alternative			
	A	B	C	D
Sensitive Species				
Boreal owl	NI	NL	NL	NL
Flammulated owl	NI	NL	NL	NL
Fisher	NI	NL	NL	NL
Great gray owl	NI	NL	NL	NL
Harlequin duck	NI	NL	NL	NL
Northern goshawk	NI	NL	NL	NL
Peregrine falcon	NI	NL	NL	NL
Spotted bat	NI	NL	NL	NL
Three-toed woodpecker	NI	NL	NL	NL
Townsend's big-eared bat	NI	NL	NL	NL
Wolverine	NI	NL	NL	NL

NI- No impact
NL- Not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of viability range wide.

Designated Old Growth

Affected Environment

The area selected for analysis represents all 26 of the Forest Plan designated old growth stands within the project area boundaries.

There are about 1,280 acres of Forest Plan designated old growth units mapped within the project area, represented by 26 mapped stands (see project file). Vegetation types within the designated old growth units are Douglas-fir (70 percent), lodgepole pine (7 percent), and subalpine fir (1 percent) on the northerly aspects, and ponderosa pine (17 percent) on the southerly aspects. Inclusions of grass-shrub make up less than 5 percent (Table 3-33). Stands of relatively moist Douglas-fir and lodgepole pine were historically maintained by infrequent fires (35-45 year fire return interval) with a mix of surface burning severities. Tree patches were usually open and had low amounts of surface fuel, however some torching occurred where tree patches were closed and had high amounts of surface fuel. This type of fire regime allowed development of large trees, typically growing in groups, with interspersed patches of grass, shrubs or smaller trees. In comparison, the drier Douglas-fir or combinations with ponderosa pine, were historically maintained by more frequent (25-35 year interval) surface fires with a small percentage of tree patches that torched, resulting in a more uniform single layer old forest structure with greater amounts of large diameter ponderosa pine or Douglas-fir per acre. Some multiple story old growth stands occurred in moist stream-side areas on the landscape where fire occurred less frequently (100+ year interval), thus allowing more understory trees to mature, or in small areas of the surface or mixed fire regimes that missed a fire cycle.

Currently most of the designated old growth within the project area is in the late-seral multiple-layer structure (52 percent) and mid-seral structure (33 percent) with low representation in the early-seral and late-seral single-layer structures (7 percent and 8 percent respectively). In comparison, historic old growth structures were very different with a greater amount of late-seral single-layer and lesser amounts of late-seral multi-layer. Many of the old growth stands that contain Douglas-fir with scattered ponderosa pine in the late-seral multiple-layer structure have “missed” several mixed or surface fire events in the past 100 years. These stands typically have several understory layers of smaller diameter trees, down woody fuel, and thick duff and litter layers. This situation places these stands at risk of having a stand replacement (crown fire) event and losing the larger diameter trees and replacement trees to future fire events. Historic accounts (Work 1913) of the North Fork area report “mature yellow pine” (ponderosa pine) were commonly 40 inches (diameter) and trees as old as 400 years with diameters of 5 feet were present. Few of these large “yellow pines” are present on the landscape today.

Table3-33. ***Designated Old Growth Seral Stage and Vegetation Cover Type (acres).***

	Early Seral	Mid Seral	Late Seral Multi-layer	Late Seral Single-layer	Closed Herb	Open Shrub
Douglas-fir	25	379	606	51	0	0
Lodgepole pine	0	47	69	0	0	0
Ponderosa pine	11	69	99	74	0	0
Subalpine fir	0	0	4	0	0	0
Grass	0	0	0	0	50	0
Wyoming Sage	0	0	0	0	0	22
Total	36	495	778	125	50	22

Designated old growth units are more fragmented now than historically. Patch sizes are smaller and do not provide as secure habitat as larger blocks of old growth would have in the past. Patch size was historically patterned by large mixed and surface fire events. Contemporary patch size has occurred due to past timber harvest and road construction which has reduced the size of contiguous old growth patches.

Under their current management prescriptions, Designated Forest Plan old growth stands are not considered suitable for timber management and are "to be retained as old growth" (US Forest Service 1988). Forest Plan management direction includes no harvest in identified and mapped old growth stands; however timber harvest is permitted where silvicultural treatments would benefit the resource [old growth] and removal can be accomplished in a manner compatible with old growth management objectives (US Forest Service 1988).

Environmental Consequences

Analysis Methods

Criteria used in the assignment of Forest Plan designated old growth units include representation of dominant cover types to meet the minimum 10 percent designated old growth requirement (Forest Service 1988). At the time of the Forest Plan when designated old growth units were selected there was an inadequate amount of old growth in some cover types to meet the 10 percent requirement. In order to recruit future old growth to meet the 10 percent requirement some stands that did not have old growth characteristics were designated as old growth units so they could be managed for old growth in the future. This may have been the case for a few of the 26 designated old growth stands in the project area.

Field review of designated old growth stands was conducted for most of the designated old growth units in the project area (McNicoll 2002). Characteristics evaluated included vegetation type, structural stage, disturbance regime and risk of loss of old growth characteristics. All of the units reviewed are currently in a late-seral structural stage and provide quality old growth habitat.

Alternative A
Direct and Indirect Effects
The No Action alternative meets the Forest Plan standard for old growth by continuing to retain 10 percent of the landscape in designated old growth. Old growth characteristics (large trees, snags, logs) will continue to develop in the designated units. Continued fire exclusion and the subsequent development of multiple layers of smaller trees and down fuels will increase the risk of uncharacteristic stand replacement (crown) fire in Douglas-fir and ponderosa pine types that were historically maintained in a park-like condition by frequent surface fires with little crown fire. Douglas-fir stands with lodgepole, historically maintained in an open and patchy condition by infrequent mixed fires, have a similar risk of uncharacteristic stand replacement (crown) fire. Recognizing that "designated old growth," allows for natural disturbance (fire, insect, disease), fire exclusion has placed many old growth stands at high risk of losing large diameter trees from crown fire.

Alternatives B, C and D
Direct and Indirect Effects
Alternatives B, C, and D propose thinning, ladder fuel treatments and prescribed fire in some designated old growth units (Table 3-34). Treatment acreage ranges from a small portion of a designated unit to 100 percent of some. A limited amount of acres, 131 to 149 acres, would benefit from thinning and ladder fuel treatments. Designated Old Growth Units 129, 130 and 132 are ponderosa pine late-seral multi-layer stands located on low elevation, southerly aspects. Treatments would remove understory trees that have established due to fire exclusion and shift these stands from late-seral multi-layer to late-seral single-layer conditions. This would reduce the risk of uncharacteristic crown fire and potential loss of large diameter trees. The remaining designated old growth units are located on northerly aspects and are a mix of Douglas fir, ponderosa pine, and lodgepole in a late-seral multi-layer condition. These stands were historically maintained by a mixed surface and stand replacement fire regime that resulted in a more dense, and layered structure with groups of large trees, interspersed with small patches of shrubs and grass or smaller trees. Thinning and fuel reduction treatments in Designated Old Growth Units 114,120, 125, 140, 141, 144, 145, and 146, as proposed in these three alternatives would remove lower and intermediate layers, create openings in the overstory, reduce ground fuels, and change stand characteristics. The stands would no longer retain their layered old growth characteristics, and ground fuels would be removed through use of fire. Since not all of the treatments designed for the designated old growth units were

designed to benefit the old growth resource these thinning and ladder fuel treatments would result in a loss of designated old growth below the 10 percent standard. The Proposed Action (Alternative B), and Alternatives C and D would reduce 158, 254, and 58 acres, respectively, of old growth characteristics and benefit 133, 131 and 149 acres of designated old growth.

Table 3-34. ***Designated Old Growth units (acres) by Alternative.***

Designated Old Growth Unit	Total Acres	Alternatives			
		A	B	C	D
114	171	0	52	52	52
120	30	0	4	1	1
125	53	0	0	41	0
129	58	0	41	37	57
130	57	0	54	55	54
132	39	0	38	39	38
140	73	0	7	7	0
141	109	0	24	95	5
144	48	0	19	36	0
145	41	0	33	22	0
146	28	0	19	0	0

Big Game Winter Range

Affected Environment

Winter range selected for analysis is represented by the project area (20,680 acres Forest Service ownership) and that area designated by the Forest Plan as MA 3A-4A (2,157 acres).

The project area is located within an important area of big game winter range and a seasonal migration corridor for elk and mule deer. Winter range is a term referring to elk and deer habitat during the non-summer and fall, non-hunting season. The migration corridor facilitates movement of “inter-state” elk and deer herds that primarily summer in Montana and winter in Idaho. The Forest Plan identified a portion of this winter range as Management Area (MA) 4A, key big game winter range. Characteristics of optimal big game winter range include mosaic of high quality foraging areas, thermal cover and security habitat. These characteristics are used to evaluate habitat effectiveness, which is the ability of the habitat to meet needs for growth and welfare requirements (Christensen and others 1993).

Cover: Forage Ratios

Thermal cover is composed of forested areas with trees greater than 40 feet in height and a closed canopy, greater than 60 percent. This type of forested habitat provides snow interception (reduced snow depth), protection from wind and low temperatures (thermal cover), and seclusion from human activities and predators (hiding cover) (Ruediger 1977). Conifer types on the Forest that provide thermal cover include Douglas fir, spruce-fir, and lodgepole in mid seral and late seral multi-layer structural stages. Ponderosa pine typically does not have a closed canopy greater than 60 percent and does not normally offer high quality thermal cover. Forage includes grasses and shrubs such as mountain mahogany and willow that are within a 5 foot zone above ground (snow) level.

Optimal winter range habitat consists of 25 percent cover and 75 percent forage. The total winter range within this project area has more cover (49 percent) and less forage (51 percent) than optimal (Table 3-35). In the Key Winter Range, MA 4A, cover:forage ratios are close to optimal (26:74). These values are optimistic because they do not take into account the size, shape, spatial configuration, or proximity to open roads, which greatly influence the suitability of thermal cover for big game.

Table 3-35. *Cover and forage habitat (percent) on winter range and management area (MA) 4A*.

Habitat	Optimal	Winter Range	MA 4A
Thermal Cover	25	49	26
Forage	75	51	74

Habitat Effectiveness

Habitat effectiveness is a measure of how well the existing habitat provides the basic requirements of food, cover and seclusion for big game winter range. Factors that are considered include cover: forage ratios and level of disturbance. It is important that deer and elk be relatively free from disturbance particularly in the winter. Recent research suggests that thermal cover and seclusion may be more influential in meeting survival requirements for big game on winter range than available forage (Christensen and others 1993). Road densities for open roads, greater than 0.5 mile per square mile, reduce habitat effectiveness below 80 percent; road densities exceeding 2 miles per square mile reduce habitat effectiveness by more than 50 percent (Lyon 1983). The Forest Plan standard is for 80 percent effectiveness. Current average road density in winter range is 3.1 miles per square mile; and in MA 4A road density is 4 miles per square mile resulting in habitat effectiveness that does not meet the 80 percent standard.

Environmental Consequences

Analysis Methods

The analysis method used is based on the Elk Habitat Relationships for Central Idaho (Ralph, R.M. et. al., 1981).

Cover: Forage Ratios

Data used for estimating big game winter range cover and forage comes from the vegetation type and structure mapping for the project area. Potential big game winter range cover is estimated as the combined acreage of suitable conifer types in mid- and late-seral multiple-layer stands. Within the project area forage is estimated as the single- or multiple-layer conifer types with canopy cover less than 60 percent and all structural stages of aspen, cottonwood, grass and shrub types.

Habitat Effectiveness

Open road densities include all roads with use by 4-wheel drive, motorcycles, and all terrain vehicles (ATV's) including snowmobiles (Forest Service 2002 Roads Analysis Process). All closed roads are considered nonexistent in evaluating road densities if they are gated during the normal period elk would be in the area and the only exception to the closure is infrequent administrative use.

Alternative A

Cover: Forage Ratios

Direct and Indirect

Cover to forage ratio would meet Forest Plan standards for MA 4A. Average cover to forage ratio for MA 4A is 26:74. Thermal cover and shrubs that provide critical forage during the worst winter conditions will remain in areas designated as MA 4A. The remaining winter range will continue to provide adequate thermal cover with a limited amount of forage. Fire exclusion will continue to contribute to development of understory trees, which can provide thermal cover but reduces forage production. However, fire exclusion also increases the risk of uncharacteristic fire that can result in a subsequent loss of cover and an increase in forage.

Habitat Effectiveness

Direct and Indirect

Habitat effectiveness will remain low due to high road densities. There are 4 miles per square mile of open roads in MA 4A. The No Action alternative will maintain habitat effectiveness at less than 30 percent within MA 4A, which is below the Forest Plan 80 percent standard. The remaining portions of winter range have an average road density of 3.1 miles per square mile. The no action alternative maintains winter range habitat effectiveness of less than 40 percent within the overall project area.

Alternatives B, C and D
Cover: Forage Ratios
Direct and Indirect
Thinning and burning treatments in alternatives B, C, and D would reduce existing cover in MA 4A from 26 percent to 16, 14, and 19 percent, respectively (Table 3-36). Amount of cover would be lower than Forest Plan cover standards for MA 4A. Total winter range cover would be reduced to 37, 43 and 45 percent for Alternatives B, C and D, respectively. Area available for forage in MA 4A would increase to 84, 86, and 81, respectively, while the area in overall winter range would increase to 48, 48, and 53 percent. However, forage value would not be noticeably increased because the amount of overstory canopy cover remaining would not stimulate understory grass and shrub production.

Table 3-36. ***Vegetation treatments and big game cover values on MA 4A and winter range for Alternative A (No Action), and Alternatives B, C and D***

Percent Thermal Cover Remaining	**Alternatives**			
	A	**B**	**C**	**D**
MA 4A	26	16	14	19
Winter Range	49	42	42	47

Appendix A

List of Contributors

Appendix A

List of Contributors

Name	Title	Project Role/Contributors
Bill Baer	Fisheries Biologist	Team Leader/ Inventory roadless analysis and report
Gail Baer	Public Affairs Specialist	Public Involvement
Tony Beke	Engineer	Roads analysis and reports
Scott Belknap	Frank Church – River of No Return Wildland Fire Use Coordinator	FARSITE modeling
Lynn Bennett	Fire Ecologist	Fire analysis and reports
Louise Brannon	Writer/Editor	Writing/Editing
Elizabeth Davy	Forester/Fuels	Fuels analysis and reports
David Deschaine	Hydrologist	Water quality analysis and reports
Karen Gallogly	Soil Scientist	Soils analysis and reports
Dan Garcia	Fisheries Biologist	Fish analysis and reports
Cindy Haggas	Ecologist	Noxious weeds analysis and reports
Dale Hoskisson	GIS Computer Specialist	Roads data and maps
Terri Knauth	Forest Fuels Coordinator	Air quality analysis and reports
James Logsdon	GIS Computer Specialist	GIS data and maps
Dick Wenger	Wildlife Biologist	Wildlife and old growth analysis and reports
Ken Stauffer	Landscape architect/Recreation	Visual quality/recreation analysis and reports
Eugene Sundberg	Forester	Forest products/timber analysis and reports

Appendix B

Silvicultural and Burn Prescriptions
by
Alternatives

Gibbonsville Wildland Urban Interface Fuels Reduction Project
November 2004

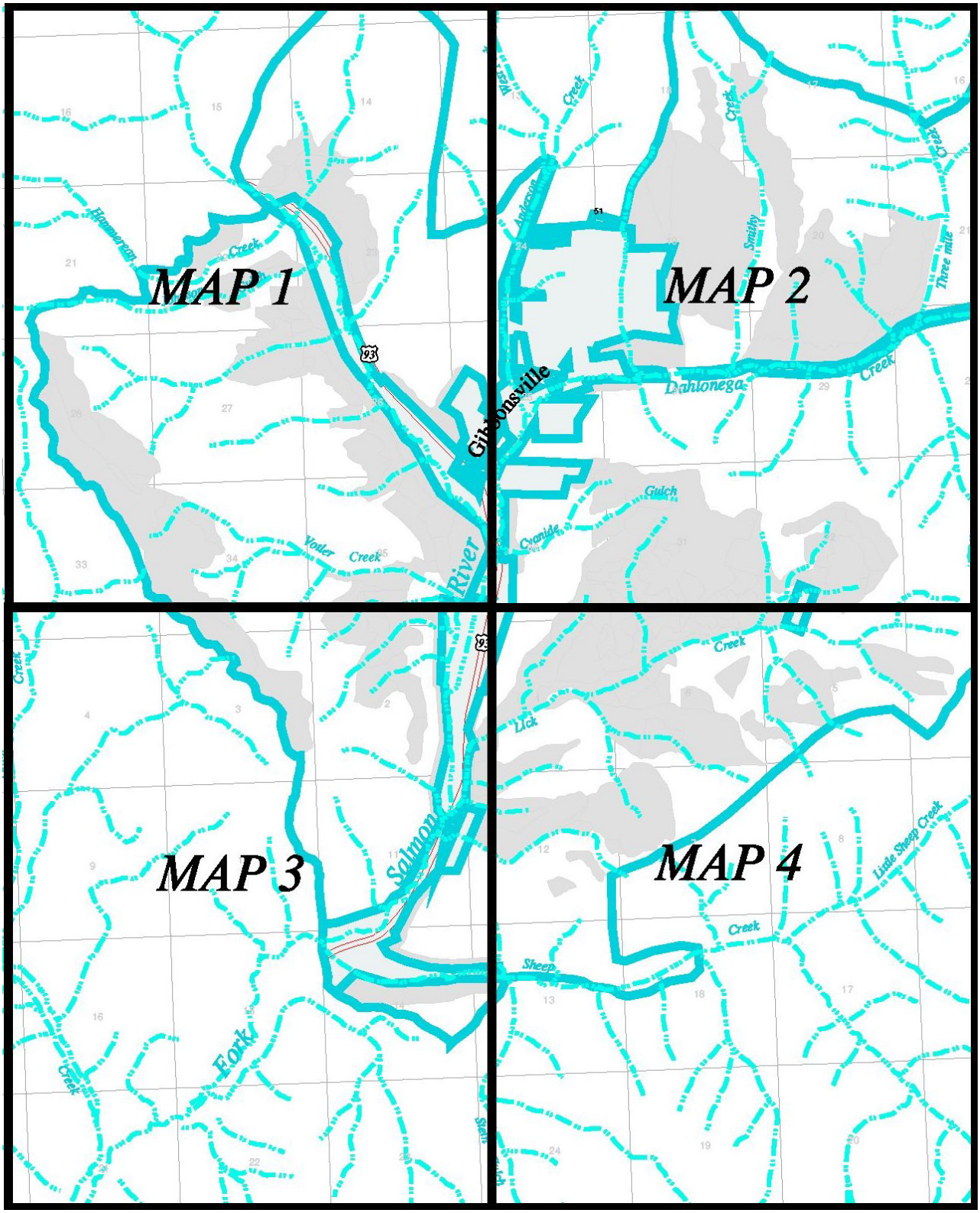
Appendix B

Silvicultural and Burn Prescriptions

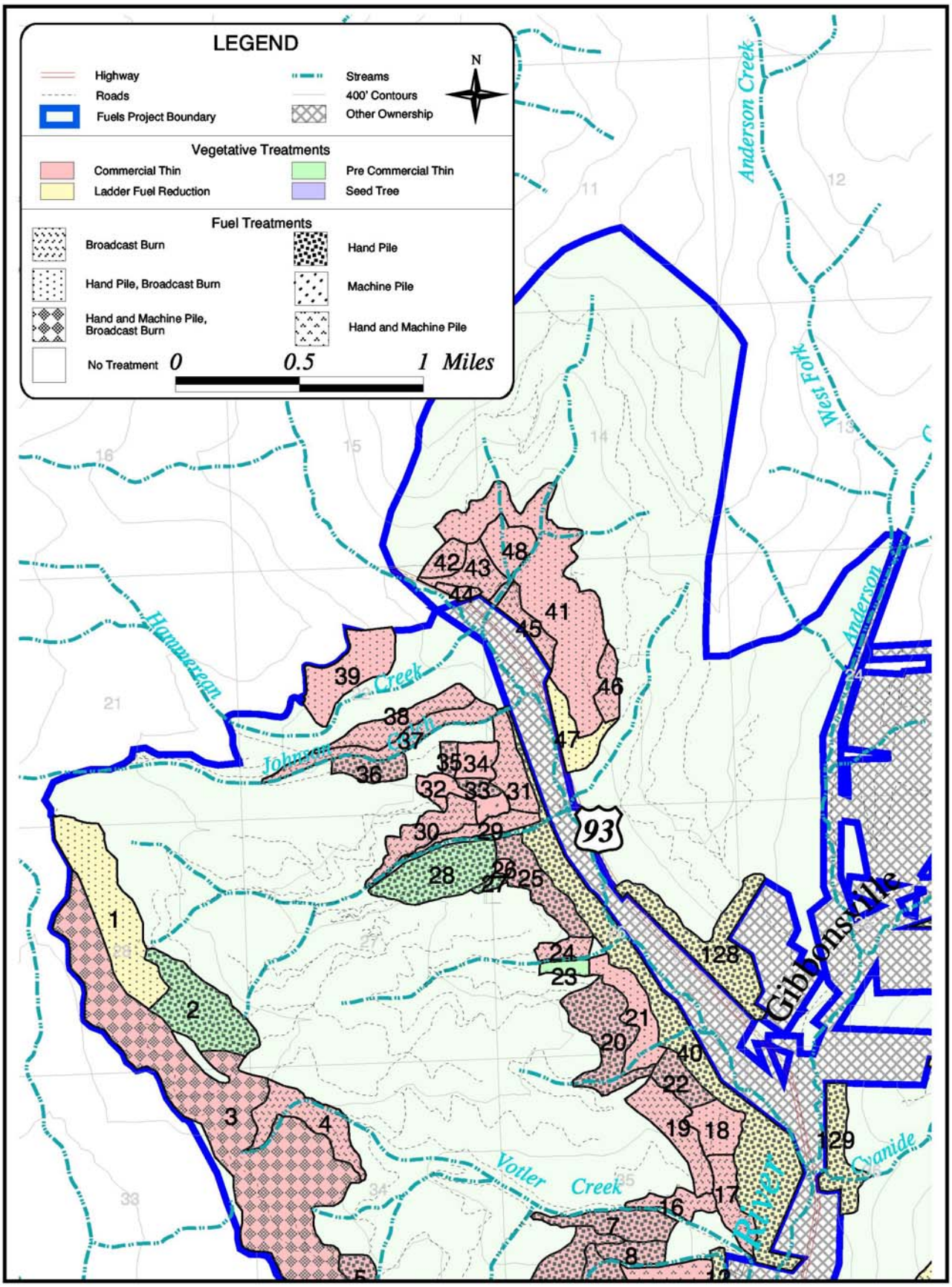
Appendix B includes maps and spreadsheets for each alternative. Map 4, labeled "Unit Index Map" (page B-2), identifies the project area in four sections. Each alternative is displayed in four sections.

The spreadsheet identifies specific information of each unit by alternative. For example, *tree species* within a unit are identified as PP (ponderosa pine), DF (Douglas-fir), or LP (lodge pole pine). *Habitat types* are identified as a mixture of Douglas-fir (Psme) and Ponderosa Pine (Pipo) with variations of understory vegetation, depending on elevation and slope aspect. Units where *Existing Down Woody Material Prior to Treatment* was estimated, are represented with an "e" in the column.

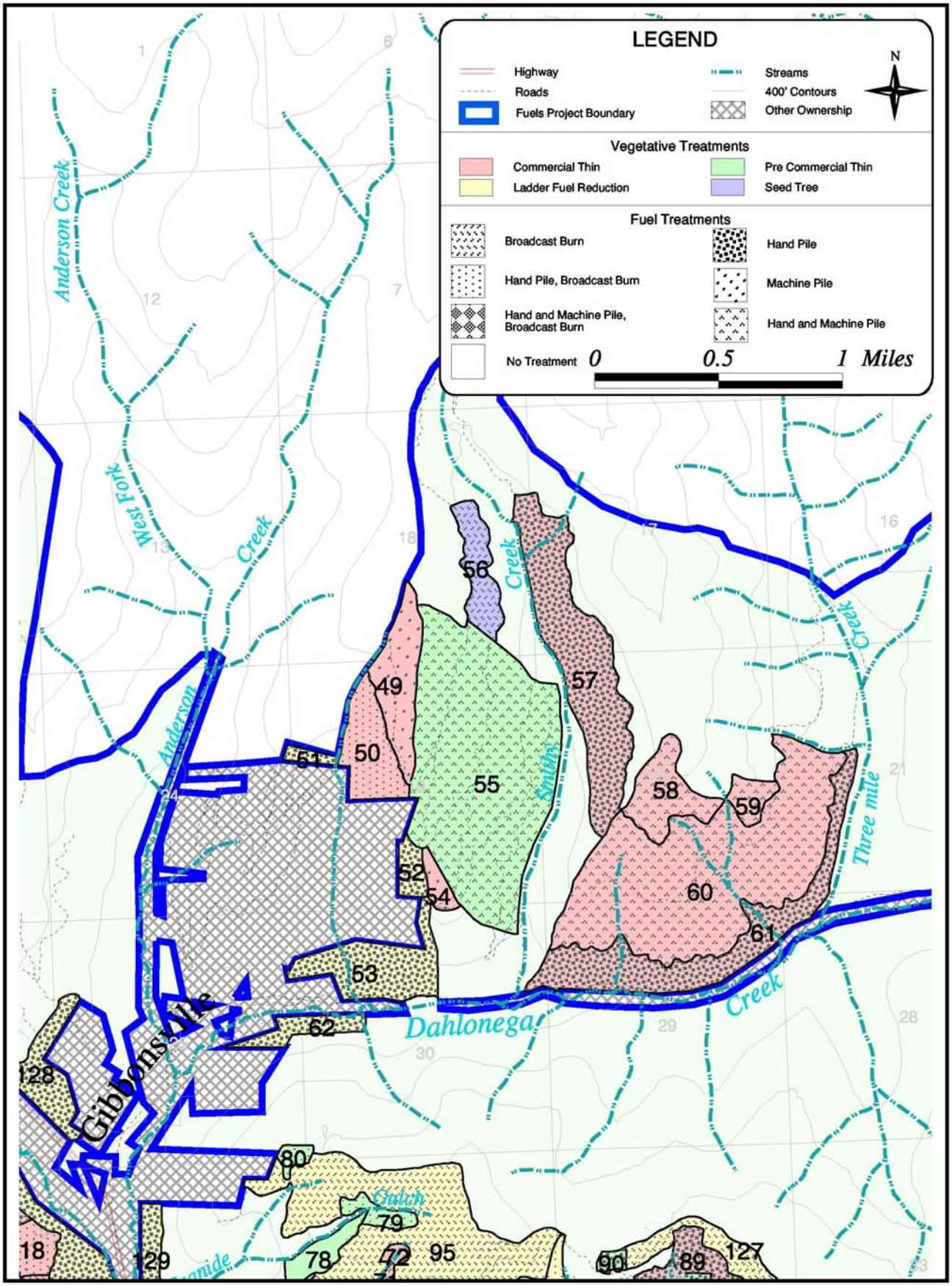
Map 4. ***Unit Index Map***



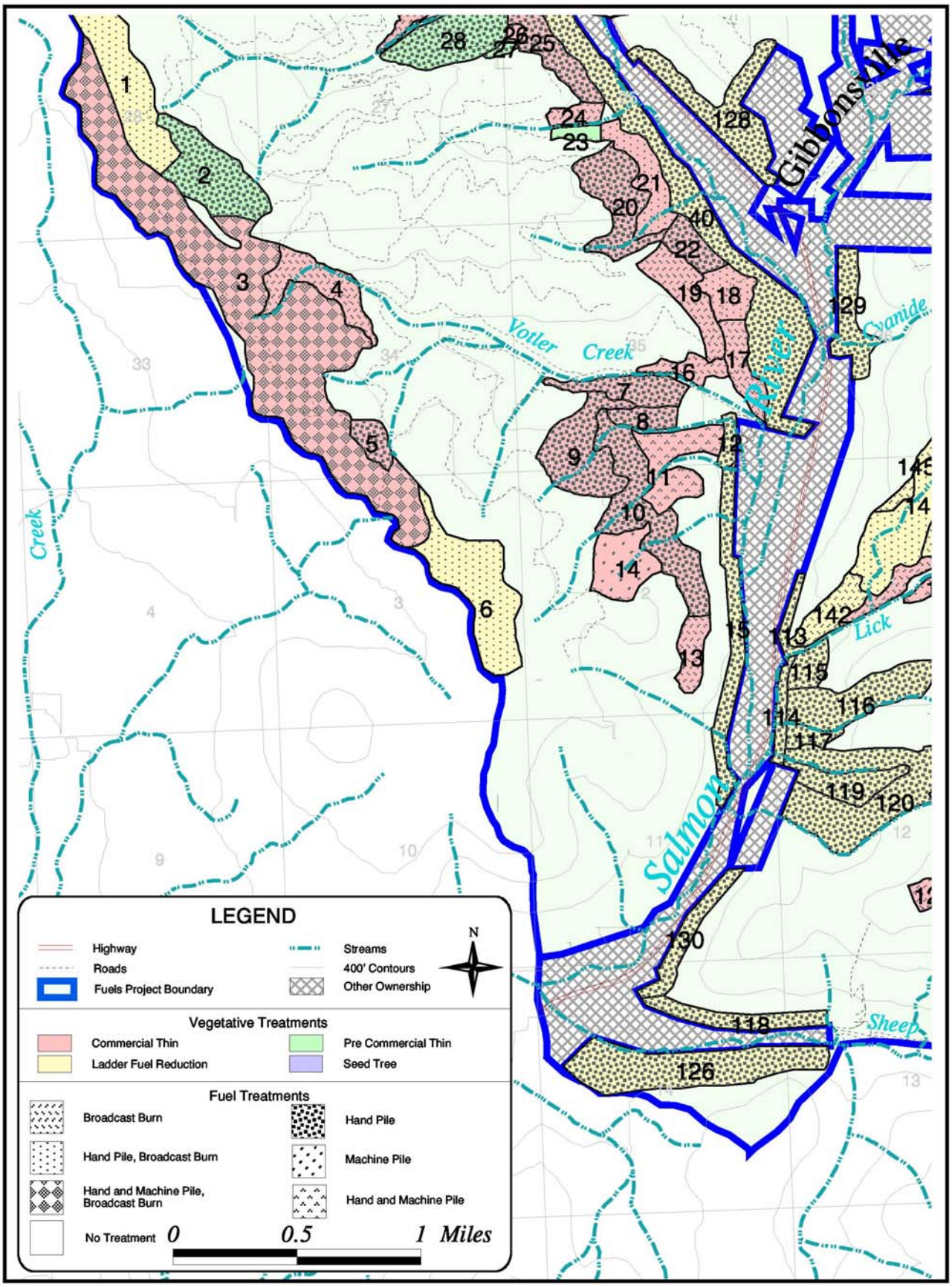
Map 5. *Alternative B Map 1*



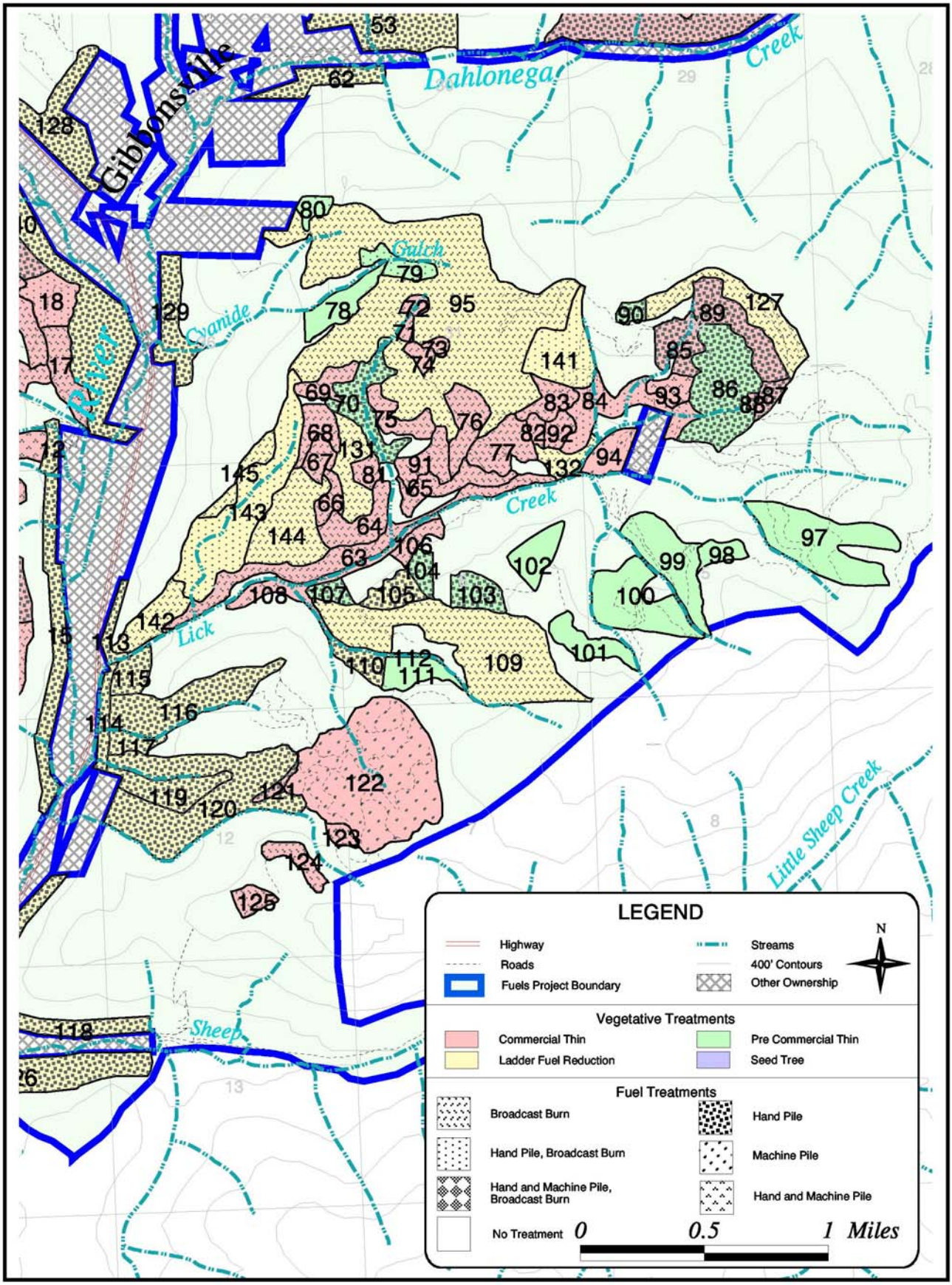
Map 6. ***Alternative B Map 2***



Map 7. ***Alternative B Map 3***



Map 8. ***Alternative B Map 4***



Alternative B

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
1	83		PP/DF	Psme/Spbe/Pipo	Hand	Ladder		40		83		2	13	9 e	4 to 15	6	Shaded fuelbreak. Thin trees less than 8" dbh to 18 foot spacing. Remove conifers from pockets of aspen.
												8	60			1	
												10	10			4.8	
2	**61**		**DF/LP/PP**	**Psme/Spbe/Pipo**	**Hand**	**Thin**		**61**				**1**	**11**	**8 e**	**4 to 15**	**4**	**Precommercial thin seedling/sapling stand to 18X18 feet.**
												2	**3**			**6**	
												8	**6**			**1**	
												10	**41**			**4.8**	
3	5	RHCA	PP/DF	Psme/Spbe/Pipo	Hand	Ladder				5		9	5	15 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	349		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	6	100	100	349	30	1	9	15 e	4 to 15	4	Shaded fuelbreak. Thin to a min. space 18 foot between trees and SDI 80.
												2	20			6	
												5	3			4	
												8	207			1	
												9	110			2.6	
4	**8**	**RHCA**	**PP/DF**	**Psme/Spbe/Pipo**	**Hand**	**Ladder**				**8**		**9**	**8**	**15 e**	**4 to 15**	**2.6**	**Remove ladder fuels to 8" dbh with min. space 18 foot. 1 treatment.**
	32		**PP/DF**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**6**			**32**		**8**	**15**	**15 e**	**4 to 15**	**1**	**Shaded fuelbreak. Thin to a min. space 18 foot between trees and SDI 80.**
												9	**11**			**2.6**	
												2	**5**			**6**	
5	14		PP/DF	Psme/Spbe/Pipo	Skyline	Thin	4	14				8	9	15 e	4 to 15	1	Shaded fuelbreak. Thin to a min. space 18 foot between trees and SDI 80.
												2	5			6	
6	**83**		**PP/DF**	**Psme/Spbe/Pipo**	**Hand**	**Ladder**		**83**		**83**		**8**	**43**	**8 e**	**4 to 15**	**1**	**Shaded fuelbreak. Thin trees less than 8" dbh to 18 foot spacing. Remove conifers from pockets of aspen.**
												9	**34**			**2.6**	
												10	**6**			**4.8**	
7	4	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				4		9	4	41 e	4 to 15	2.6	Thin from below trees less than 8" dbh up to 18 foot space.
	25		PP/DF	Psme/Syal/Pipo	Skyline	Thin	4	25		25		8	10	41 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
												9	15			2.6	
8	**14**		**PP/DF**	**Psme/Feid/Pipo**	**Skyline**	**Thin**	**4**	**14**				**2**	**14**	**41**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
9	57		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	6	57				2	5	41 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	44			1	
												9	8			2.6	
10	**78**		**PP/DF**	**Psme/Syal/Pipo**	**Skyline**	**Thin**	**4**	**78**				**1**	**3**	**41 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80.**
												2	**22**			**6**	
												8	**43**			**1**	
												9	**10**			**2.6**	
11	44		PP/DF	Psme/Syal/Pipo	Tractor	Thin	4	14	30			8	22	41 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
												9	22			2.6	
12	**8**		**PP/DF**	**Psme/Syal/Pipo**	**Hand**	**Ladder**		**8**				**8**	**3**	**11 e**	**1 to 4**	**1**	**Remove ladder fuels. 1-3 treatments to avoid excessive fuel accumulation at 1 time.**
												9	**5**			**2.6**	
13	19		PP/DF	Psme/Feid/Pipo	Skyline	Thin	4			19		1	5	11 e	1 to 4	4	Chainsaw fell ladder fuels and pull away from leave trees.
												2	10			6	
												9	4			2.6	
14	**38**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**6**		**38**			**1**	**2**	**11 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**36**			**1**	
15	50		PP/DF	Psme/Feid/Pipo	Hand	Ladder		50				1	10	11 e	1 to 4	4	Remove ladder fuels. 1-3 treatments to avoid excessive fuel accumulation at 1 time.
												2	26			6	
												5	3			4	
												9	11			2.6	
16	**2**	**RHCA**	**PP/DF**	**Psme/Feid/Pipo**	**Hand**	**Ladder**				**2**		**2**	**2**	**13 e**	**4 to 15**	**6**	**Remove ladder fuels. 1 treatment.**
	12		**PP/DF**	**Psme/Feid/Pipo**	**Skyline**	**Thin**	**4**			**12**		**2**	**12**	**13 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
17	1	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				1		9	1	13 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	24		PP/DF	Psme/Syal/Pipo	Tractor	Thin	4			24	8	2	18	13 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	2			1	
												9	4			2.6	
18	**24**		**PP/DF**	**Psme/Syal/Pipo**	**Tractor**	**Thin**	**6**	**12**		**24**	**18**	**1**	**2**	**13 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80. Potential green fuelwood area.**
												2	**16**			**6**	
												9	**6**			**2.6**	

Alternative B

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
19	37		PP/DF	Psme/Syal/Pipo	Tractor	Thin	6			37		1	6	9	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												2	21			6	
												9	10			2.6	
20	**5**	**RHCA**	**PP/DF**	**Psme/Syal/Pipo**	**Hand**	**Ladder**				**5**		**9**	**5**	**13 e**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment.**
	47		**PP/DF**	**Psme/Syal/Pipo**	**Skyline**	**Thin**	**4**	**47**		**47**		**2**	**23**	**13 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**24**			**1**	
21	5	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				5		9	5	13 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	29		PP/DF	Psme/Syal/Pipo	Skyline	Thin	3	29		29		2	13	13 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	7			1	
												9	9			1	
22	**19**		**PP/DF**	**Psme/Syal/Pipo**	**Skyline**	**Thin**	**6**	**19**				**2**	**6**	**13 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**13**			**2.6**	
23	7		PP/DF	Psme/Phma/Pipo	Hand	Thin						8	4	13 e	4 to 15	1	Ponderosa pine plantation with DF/PP naturals. Thin to 18x18 ft.
												9	3			2.6	
24	**3**	**RHCA**	**PP/DF**	**Psme/Feid/Pipo**	**Hand**	**Thin**				**3**		**9**	**3**	**19 e**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment.**
	7		**PP/DF**	**Psme/Feid/Pipo**	**Skyline**	**Thin**	**4**			**7**		**2**	**5**	**19 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**2**			**1**	
25	1	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Thin				1		9	1	19	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	33		PP/DF	Psme/Syal/Pipo	Skyline	Thin	2	33				2	19	19	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80. Treat dwarf mistletoe diseased trees.
												8	14			1	
26	**3**		**PP/DF**	**Psme/Syal/Pipo**	**Tractor**	**Thin**	**6**		**3**			**2**	**1**	**19 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**2**			**1**	
27	4		PP/DF	Psme/Phma/Pipo	Hand	Ladder		4				2	3	24 e	4 to 15	6	Remove ladder fuels. 1 treatment.
												8	1			1	
28	**53**		**PP/DF**	**Psme/Spbe/Pipo**	**Hand**	**Thin**		**20**				**2**	**1**	**24**	**4 to 15**	**6**	**Thin seedling/sapling stand to 18x18 feet.**
												8	**50**			**1**	
												9	**2**			**2.6**	
29	6	RHCA	PP/DF	Psme/Feid/Pipo	Hand	Ladder				6		9	6	15 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	10		PP/DF	Psme/Feid/Pipo	Skyline	Thin	3			10		9	10	15 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
30	**4**	**RHCA**	**PP/DF**	**Psme/Feid/Pipo**	**hand**	**Ladder**				**4**		**9**	**4**	**15 e**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment.**
	26		**PP/DF**	**Psme/Feid/Pipo**	**Skyline**	**Thin**	**5**			**26**		**2**	**10**	**15 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**1**			**1**	
												9	**15**			**2.6**	
31	3	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				3		9	3	15	1 to 4	2.6	Remove ladder fuels. 1 treatment.
	24		PP/DF	Psme/Syal/Pipo	Skyline	Thin	6			24		2	6	15	1 to 4	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	18			2.6	
32	**19**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**4**		**19**			**8**	**10**	**15 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**9**			**2.6**	
33	6		PP/DF	Psme/Spbe/Pipo	Skyline	Thin	4	6				9	6	15 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
34	**15**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**6**		**15**			**2**	**2**	**15 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**13**			**2.6**	
35	5		PP/DF	Psme/Phma/Pipo	Skyline	Thin	3	5				8	3	15 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
												9	2			2.6	
36	**11**	**RHCA**	**DF**	**Psme/Vagl**	**Hand**	**Ladder**		**8**		**3**		**8**	**11**	**10 e**	**4 to 15**	**1**	**Remove ladder fuels. 1 treatment.**
	5		**DF**	**Psme/Vagl**	**Skyline**	**Thin**	**12**	**5**				**8**	**5**	**10 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
37	33	RHCA	PP/DF	Psme/Feid/Pipo	Hand	Ladder				33		2	9	10 e	4 to 15	6	Remove ladder fuels. 1 treatment.
												8	12			1	
												9	12			2.6	
38	**1**	**RHCA**	**PP/DF**	**Psme/Feid/Pipo**	**Hand**	**Ladder**				**1**		**9**	**1**	**10 e**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment.**
	30		**PP/DF**	**Psme/Feid/Pipo**	**Tractor**	**Thin**	**6**			**30**		**1**	**5**	**10 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80.**
												2	**4**			**6**	
												8	**7**			**1**	
												9	**14**			**2.6**	

Alternative B

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
39	5	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				5		9	5	10 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	40		PP/DF	Psme/Syal/Pipo	Skyline	Thin	8	40		40		2	34	10 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80. Treat dwarfmistletoe diseased trees. Remove slide in Rd #449 for access.
												8	2			1	
												9	4			2.6	
40	**162**		**PP/DF**	**Psme/Syal/Pipo**	**Hand**	**Ladder**		**29**				**8**	**139**	**17**	**1 to 4**	**1**	**Remove ladder fuels. 1-3 treatments to avoid excessive fuel accumulation at 1 time.**
												9	**23**			**2.6**	
41	15	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				15		9	15	22	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	128		PP/DF	Psme/Syal/Pipo	Skyline/ Tractor	Thin	4	45		128	5	1	4	22	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												2	17			6	
												8	87			1	
												9	20			2.6	
42	**12**		**PP/DF**	**Psme/Syal/Pipo**	**Skyline**	**Thin**	**4**			**12**		**2**	**10**	**9**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**2**			**2.6**	
43	2	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				2		9	2	20	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	18		PP/DF	Psme/Syal/Pipo	Tractor	Thin	6			18		2	7	20	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	11			2.6	
44	**2**	**RHCA**	**PP/DF**	**Psme/Syal/Pipo**	**Hand**	**Ladder**				**2**		**2**	**2**	**12**	**1 to 4**	**6**	**Remove ladder fuels. 1 treatment.**
	2		**PP/DF**	**Psme/Syal/Pipo**	**Skyline**	**thin**	**6**			**2**		**2**	**2**	**12**	**1 to 4**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
45	1	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				1		9	1	12 e	1 to 4	2.6	Remove ladder fuels. 1 treatment.
	14		PP/DF	Psme/Syal/Pipo	Tractor	Thin	5			14	14	2	8	12 e	1 to 4	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	4			1	
												9	2			2.6	
46	**14**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**4**			**14**		**1**	**4**	**12 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**1**			**1**	
												9	**9**			**2.6**	
47	24		PP/DF	Psme/Feid/Pipo	Hand	Ladder		24		24		1	5	8 e	1 to 4	4	Remove ladder fuels. 1 treatment.
												2	3			6	
												8	9			1	
												9	7			2.6	
48	**11**	**RHCA**	**PP/DF**	**Psme/Syal/Pipo**	**Hand**	**Ladder**		**11**		**11**		**9**	**11**	**12**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment.**
	13		**PP/DF**	**Psme/Syal/Pipo**	**Skyline**	**Thin**	**2**	**13**		**13**		**2**	**1**	**12**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**7**			**1**	
												9	**5**			**2.6**	
49	60		DF	Psme/Spbe/Pipo	Tractor	Thin	4		60			1	3	12 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												2	37			6	
												8	8			1	
												9	12			2.6	
50	**2**	**RHCA**	**DF**	**Psme/Spbe/Pipo**	**Hand**	**Thin**				**2**		**9**	**2**	**12 e**	**1 to 4**	**2.6**	**Remove ladder fuels. 1 treatment.**
	52		**DF**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**8**	**27**		**52**		**2**	**1**	**12 e**	**1 to 4**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**7**			**1**	
												9	**44**			**2.6**	
51	7		DF	Psme/Spbe/Pipo	Hand	Ladder		8				8	7	2	1 to 4	1	Remove ladder fuels. 1 to 3 treatments.
52	**15**		**DF/PP**	**Psme/Spbe/Pipo**	**Hand**	**Ladder**		**15**				**8**	**11**	**7 e**	**1 to 4**	**1**	**Remove ladder fuels. 1 to 3 treatments.**
												9	**4**			**2.6**	
53	72		DF/PP	Psme/Syal/Pipo	Hand	Ladder		72				1	3	9	1 to 4	4	Remove ladder fuels. 1 to 3 treatments.
												2	17			6	
												8	36			1	
												9	16			2.6	
54	**12**		**DF/PP**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**2**		**12**			**2**	**4**	**7 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**1**			**1**	
												9	**7**			**2.6**	
55	361		PP/DF	Psme/Spbe/Pipo	Hand	Thin		150	200			1	24	7	1 to 4	4	Precommercial thin seedling/sapling ponderosa pine plantation and natural regeneration to 18X18 feet.
												2	237			6	
												8	19			1	
												9	81			2.6	

Alternative B

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
56	**38**		**PP/DF**	**Psme/Spbe/Pipo**	**Skyline**	**Seedtree**	**12**			**38**		**2**	**3**	**12 e**	**4 to 15**	**4**	**Where available leave healthy mature ponderosa pine seed trees providing 12 to 14 foot crown spacing. Remove or destroy dwarf mistletoe diseased Douglas fir.**
												8	**30**			**1**	
												10	**5**			**4.8**	
57	32	RHCA	PP/DF	Psme/Spbe/Pipo	Hand	Ladder		32				8	32	7 e	4 to 15	1	Remove ladder fuels. 1 treatment.
	127		PP/DF	Psme/Spbe/Pipo	Skyline	Thin	4	127				2	13	7 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	89			1	
												9	14			2.6	
												10	11			4.8	
58	**50**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**8**	**25**	**25**			**2**	**24**	**13**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**15**			**1**	
												9	**11**			**2.6**	
59	17		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	8	10	7			2	11	7 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	6			1	
60	**346**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor/ Skyline**	**Thin**	**8**	**146**	**200**			**2**	**111**	**7**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**111**			**1**	
												9	**124**			**2.6**	
61	128		PP/DF	Psme/Phma/Pipo	Skyline	Thin	10	128				2	39	8	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	53			1	
												9	36			2.6	
62	**22**		**DF/ES/PP**	**Psme/Phma/Pipo**	**Hand**	**Ladder**		**22**				**8**	**22**	**10**	**1 to 4**	**1**	**Remove ladder fuels. 1 to 3 treatments.**
63	19	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				19		9	19	2 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	35		PP/DF	Psme/Syal/Pipo	Tractor	Thin	4			35		2	25	2 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												5	1			4	
												8	9			1	
64	**24**		**PP/DF**	**Psme/Feid/Pipo**	**Skyline**	**Thin**	**4**			**24**		**1**	**7**	**8 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80.**
												2	**11**			**6**	
												8	**2**			**1**	
												9	**4**			**2.6**	
65	22		PP/DF	Psme/Phma/Pipo	Skyline	Thin	4			22		2	15	8 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												9	7			2.6	
66	**9**		**PP/DF**	**Psme/Syal/Pipo**	**Tractor**	**Thin**	**4**			**9**		**2**	**9**	**9 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
67	10		PP/DF	Psme/Syal/Pipo	Skyline	Thin	4			10		2	8	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	2			2.6	
68	**16**		**PP/DF**	**Psme/Syal/Pipo**	**Tractor**	**Thin**	**4**			**16**		**2**	**6**	**9 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**10**			**2.6**	
69	13		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4			13		9	13	8 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
70	**34**		**PP/DF**	**Psme/Phma/Pipo**	**Hand**	**Thin**		**34**				**2**	**16**	**7 e**	**4 to 15**	**6**	**Thin Ponderosa/Douglas fir seedling/saplings to 18X18 feet.**
												8	**1**			**1**	
												9	**17**			**2.6**	
71	3		DF	Psme/Spbe/Pipo	Skyline	Thin	8			3		8	3	8 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
72	**5**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**4**			**5**		**2**	**1**	**8 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**4**			**1**	
73	3		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4			3		9	3	8 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
74	**6**		**DF/PP**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**8**			**6**		**8**	**3**	**8 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**3**			**2.6**	
75	17		PP/DF	Psme/Feid/Pipo	Skyline	Thin	5			17		2	1	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	1			1	
												9	15			2.6	
76	**23**		**PP/DF**	**Psme/Feid/Pipo**	**Skyline**	**Thin**	**4**			**23**		**9**	**23**	**9 e**	**4 to 15**	**2.6**	**Thin to a min. space 18 foot between trees and SDI 80.**
77	27		PP/DF	Psme/Feid/Pipo	Tractor	Thin	4			27		2	22	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	5			2.6	
78	**22**		**PP/DF**	**Psme/Phma/Pipo**	**Hand**	**Thin**						**8**	**22**	**7 e**	**4 to 15**	**1**	**Thin Ponderosa pine/Douglas fir seedling/sapling plantation to 18X18 feet**
79	14		PP/DF	Psme/Phma/Pipo	Hand	Thin		14		14		1	2	7 e	4 to 15	4	Thin ponderosa pine/Douglas fir seedling/sapling plantation to 18X18 feet
												9	12			2.6	
80	**8**		**PP/DF**	**Psme/Phma/Pipo**	**Hand**	**Thin**		**8**		**8**		**2**	**6**	**7 e**	**4 to 15**	**4**	**Thin Ponderosa pine/Douglas fir seedling/sapling to 18X18 feet. Remove ladder fuels and dwarf mistletoe diseased Douglas fir.**
												8	**2**			**1**	

Alternative B

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
81	7		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4			7		2	7	8 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
82	**5**		**PP/DF**	**Psme/Phma/Pipo**	**Tractor**	**Thin**	**4**			**5**		**2**	**5**	**8 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
83	15		PP/DF	Psme/Feid/Pipo	Tractor	Thin	4			15		2	4	8 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	11			2.6	
84	**40**		**PP/DF**	**Psme/Phma/Pipo**	**Skyline**	**Thin**	**4**	**20**		**20**		**1**	**3**	**8 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80.**
												2	**13**			**6**	
												8	**21**			**1**	
												9	**7**			**2.6**	
85	23		PP/DF	Psme/Spbe/Pipo	Skyline	Thin	5	23				1	1	8 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												8	2			1	
												9	20			2.6	
86	**70**		**PP/DF/LP**	**Psme/Spbe/Pipo**	**Hand**	**Thin**		**35**				**8**	**38**	**7 e**	**4 to 15**	**1**	**Thin Ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.**
												9	**30**			**2.6**	
												10	**2**			**4.8**	
87	7		DF	Psme/Spbe/Pipo	Tractor	Thin	3	7				8	4	2 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
												10	3			4.8	
88	**2**		**DF**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**4**	**2**				**8**	**2**	**9 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
89	35		DF/PP	Psme/Spbe/Pipo	Skyline	Thin	4	35				2	5	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	26			1	
												10	4			4.8	
90	**6**		**PP/DF**	**Psme/Spbe/Pipo**	**Hand**	**Thin**		**6**				**1**	**6**	**7 e**	**4 to 15**	**4**	**Thin ponderosa pine/Douglas fir seedling/sapling post harvest regeneration to 18X18 feet.**
91	19		PP/DF	Psme/Syal/Pipo	Tractor	Thin	1			19		2	7	8 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	12			2.6	
92	**9**		**PP/DF**	**Psme/Phma/Pipo**	**Tractor**	**Thin**	**3**			**9**		**2**	**9**	**8 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
93	11		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4	6	5			8	11	9 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
94	**2**	**RHCA**	**PP/DF**	**Psme/Phma/Pipo**	**Hand**	**Ladder**						**9**	**2**	**9 e**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment.**
	14		**PP/DF**	**Psme/Phma/Pipo**	**Tractor**	**Thin**	**5**		**3**			**8**	**9**	**9 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**5**			**2.6**	
95	355		PP/DF/LP	Psme/Feid/Pipo	Hand	Ladder				355		1	88	16	4 to 15	4	Remove ladder fuels. 1 treatment
												2	74			6	
												8	82			1	
												9	105			2.6	
												10	6			4.8	
97	**72**		**PP/DF**	**Psme/Phma/Pipo**	**Hand**	**Thin**						**1**	**6**	**7 e**	**4 to 15**	**4**	**Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.**
												2	**39**			**6**	
												8	**23**			**1**	
												10	**4**			**4.8**	
98	10		DF/LP/PP	Psme/Cage/Pipo	Hand	Thin						1	2	7 e	4 to 15	4	Ponderosa pine plantation. Thin Ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.
												10	8			4.8	
99	**44**		**DF/LP/PP**	**Psme/Phma/Pipo**	**Hand**	**Thin**						**8**	**42**	**7 e**	**4 to 15**	**1**	**Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.**
												10	**2**			**4.8**	
100	51		DF/LP/PP	Psme/Phma/Pipo	Hand	Thin						2	9	7 e	4 to 15	6	Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.
												8	26			1	
												10	16			4.8	
101	**21**		**DF/LP/PP**	**Psme/Phma/Pipo**	**Hand**	**Thin**						**1**	**5**	**7 e**	**4 to 15**	**4**	**Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.**
												2	**5**			**6**	
												10	**11**			**4.8**	
102	20		DF/LP/PP	Psme/Phma/Pipo	Hand	Thin						8	20	7 e	4 to 15	1	Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.
103	**18**		**DF/PP**	**Psme/Phma/Pipo**	**Hand**	**Thin**		**18**				**1**	**6**	**7 e**	**4 to 15**	**4**	**Ponderosa pine plantation with reserve trees. Thin from below providing a min. 18 foot space between trees and 12-14 foot space between the tree crowns.**
												8	**12**			**1**	
104	9		DF/PP	Psme/Phma/Pipo	Hand	Thin		9				8	9	7 e	4 to 15	1	Ponderosa pine plantation with reserve trees. Thin from below providing a min. 18 foot space between trees and 12-14 foot space between the tree crowns.

Alternative B

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
105	**15**		**DF/PP**	**Psme/Spbe/Pipo**	**Hand**	**Ladder**		**15**				**8**	**15**	**17 e**	**4 to 15**	**1**	**Thin from below to remove ladder fuels, provide crown separation and favor seral ponderosa pine. 1-3 treatments.**
106	2	RHCA	DF/PP	Psme/Phma/Pipo	Hand	Ladder				2		8	2	17 e	4 to 15	1	Remove ladder fuels. 1 treatment.
	8		DF/PP	Psme/Phma/Pipo	Skyline	Thin	10			8		8	8	17 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
107	**8**		**DF/PP**	**Psme/Phma/Pipo**	**Hand**	**Thin**		**8**				**8**	**8**	**7 e**	**4 to 15**	**1**	**Thin from below to remove ladder fuels, provide crown separation and favor seral ponderosa pine. 1-3 treatments.**
108	24		DF/PP	Psme/libo	Hand	Thin			6	16		2	5	17 e	4 to 15	6	Treat ladder fuels, dwarf mistletoe diseased and stimulate aspen regeneration.
												8	19			1	
109	**141**		**DF/PP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**				**141**		**1**	**26**	**8 e**	**4 to 15**	**4**	**Remove ladder fuels. 1 treatment.**
												2	**50**			**6**	
												8	**54**			**1**	
												9	**9**			**2.6**	
												10	**2**			**4.8**	
110	14		DF/PP	Psme/Phma/Pipo	Hand	Ladder		14				8	12	9 e	4 to 15	1	Thin from below to remove ladder fuels, provide crown separation and favor seral ponderosa pine. 1-3 treatments.
												9	2			2.6	
111	**19**		**PP/DF**	**Psme/Phma/Pipo**	**Hand**	**Thin**						**2**	**4**	**7 e**	**4 to 15**	**6**	**Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.**
												8	**15**			**1**	
112	2		DF/PP	Psme/Phma/Pipo	Hand	Ladder		2				2	1	7 e	4 to 15	6	Remove ladder fuels. 1 treatment. Pile excess accumulations of downed woody.
												8	1			1	
113	**9**		**DF/PP**	**Psme/Syal/Pipo**	**Hand**	**Ladder**		**9**				**2**	**2**	**8 e**	**1 to 4**	**6**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												8	**7**			**1**	
114	11		DF/PP	Psme/Syal/Pipo	Hand	Ladder		11				2	4	9 e	1 to 4	6	Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.
												8	7			1	
115	**15**		**DF/PP**	**Psme/Phma/Pipo**	**Hand**	**Ladder**		**15**				**2**	**1**	**8 e**	**4 to 15**	**6**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												8	**14**			**1**	
116	59		PP/DF	Psme/Feid/Pipo	Hand	Ladder		59				1	25	17 e	4 to 15	4	Remove ladder fuels. 1 treatment.
												2	22			6	
												8	4			1	
												9	8			2.6	
117	**10**		**DF/PP**	**Psme/Phma/Pipo**	**Hand**	**Ladder**		**10**				**8**	**8**	**9 e**	**4 to 15**	**1**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												9	**2**			**2.6**	
118	29		PP/DF	Psme/Feid/Pipo	Hand	Ladder		29				1	23	2 e	1 to 4	4	Remove ladder fuels. 1 treatment.
												2	6			6	
119	**28**		**DF/PP**	**Psme/Phma/Pipo**	**Hand**	**Ladder**		**28**				**2**	**1**	**9 e**	**1 to 4**	**6**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												8	**27**			**1**	
120	116		PP/DF	Psme/Feid/Pipo	Hand	Ladder		116				1	60	8 e	1 to 4	4	Remove ladder fuels. 1 treatment.
												2	23			6	
												8	19			1	
												9	14			2.6	
121	**4**		**DF/PP**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**4**	**4**				**8**	**4**	**17 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
122	164		DF/PP	Psme/Syal/Pipo	Tractor	Thin	2		82			1	9	17 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												8	83			1	
												9	72			2.6	
123	**6**		**DF/PP**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**6**			**6**		**8**	**6**	**9 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
124	13		DF/PP	Psme/Spbe/Pipo	Skyline	Thin	8			13		8	13	9 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
125	**9**		**DF/PP**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**6**			**9**		**8**	**9**	**9 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
126	94		DF/PP	Psme/Spbe/Pipo	Hand	Ladder		94				2	12	8 e	1 to 4	4	Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.
												8	31			1	
												9	51			2.6	
127	**45**		**DF/PP**	**Psme/Cage/Pipo**	**Hand**	**Ladder**		**22**		**23**		**1**	**7**	**17 e**	**4 to 15**	**4**	**Remove ladder fuels. 1 treatment.**
												8	**34**			**1**	
												9	**4**			**2.6**	
128	61		PP/DF	Psme/Feid/Pipo	Hand	Ladder		61				1	6	3	4 to 15	4	Remove ladder fuels. 1 treatment
												2	17			6	
												8	20			1	
												9	18			2.6	

Alternative B

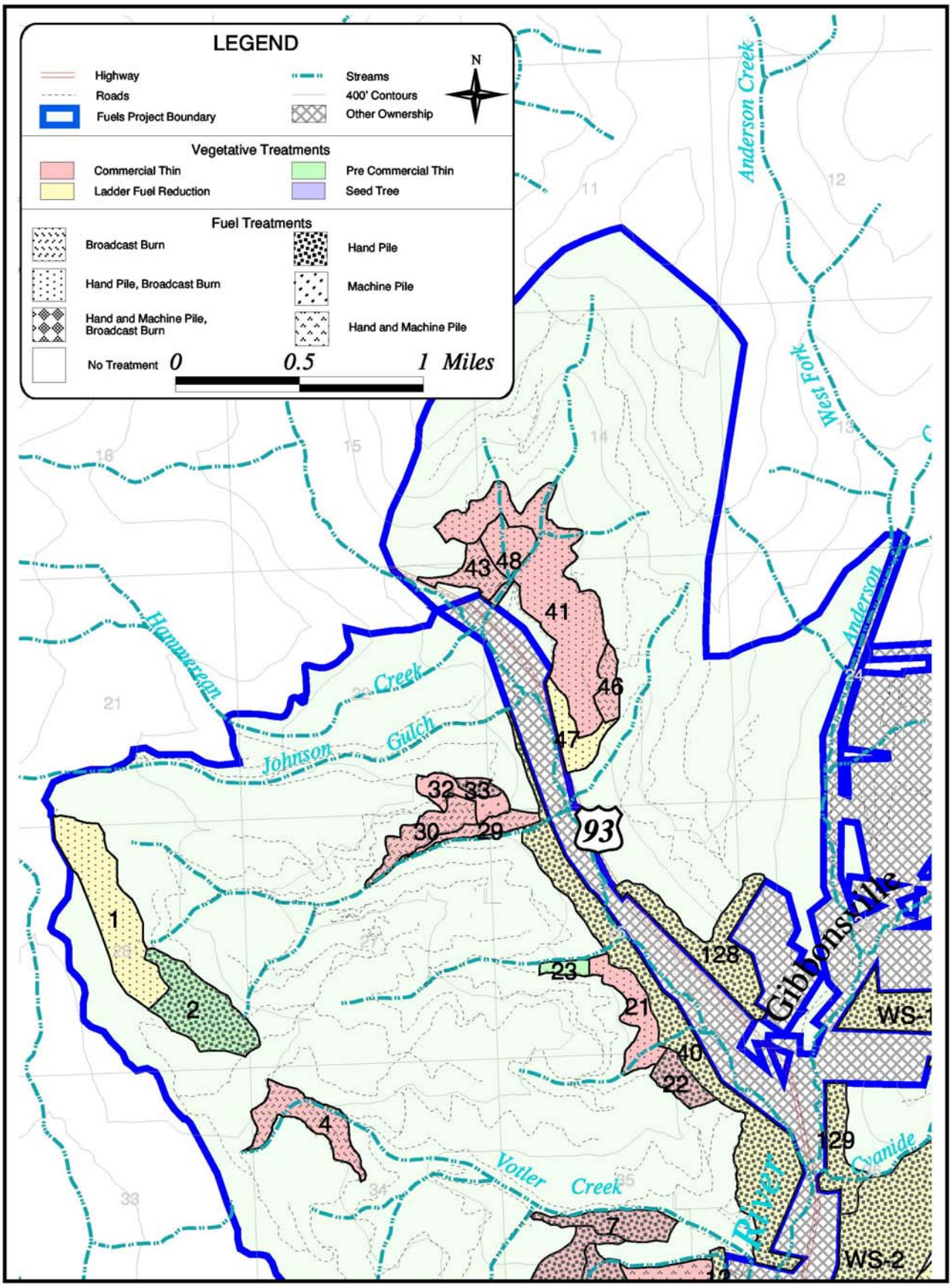
Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
129	**31**		**PP/DF**	**Psme/Syal/Pipo**	**Hand**	**Ladder**		**31**				**1**	**1**	**3 e**	**4 to 15**	**4**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												2	**5**			**6**	
												8	**18**			**1**	
												9	**7**			**2.6**	
130	24		DF/PP	Psme/Syal/Pipo	Hand	Ladder		24				1	2	9 e	1 to 4	4	Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.
												8	22			1	
131	**27**		**DF/PP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**				**27**		**1**	**4**	**8 e**	**4 to 15**	**4**	**Remove ladder fuels. 1 treatment.**
												2	**19**			**6**	
												9	**4**			**2.6**	
132	13		DF/PP	Psme/Syal/Pipo	Hand	Ladder				13		1	5	17 e	4 to 15	4	Remove ladder fuels. 1 treatment.
												2	5			6	
												8	3			1	
141	**41**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**		**41**		**41**		**8**	**21**	**16**	**4 to 15**	**1**	**Remove ladder fuels less then 9 inches away from large diameter ponderosa pine and douglas-fir trees. Leave clumps of small trees (less then 9 inches) that are not a threat to large diameter trees.**
												10	**4**			**4.8**	
												1	**10**			**4**	
												9	**6**			**2.6**	
142	24		PP/DF/LP	Psme/Feid/Pipo	Hand	Ladder				24		2	10	16	4 to 15	6	Remove ladder fuels. 1 treatment
												5	11			4	
												9	3			2.6	
143	**91**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**		**39**		**91**		**9**	**30**	**16**	**4 to 15**	**2.6**	**Remove ladder fuels less then 9 inches away from large diameter ponderosa pine and douglas-fir trees. Leave clumps of small trees (less**
												8	**61**			**1**	
144	55		PP/DF/LP	Psme/Feid/Pipo	Hand	Ladder				55		1	28	16	4 to 15	4	Remove ladder fuels. 1 treatment
												2	15			6	
												9	12			2.6	
145	**13**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**				**13**		**9**	**13**	**16**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment**
TOTAL	5690						391	2505	805	2504	75						

PP - Ponderosa Pine
DF - Douglas Fir
LP - Lodge Pole Pine

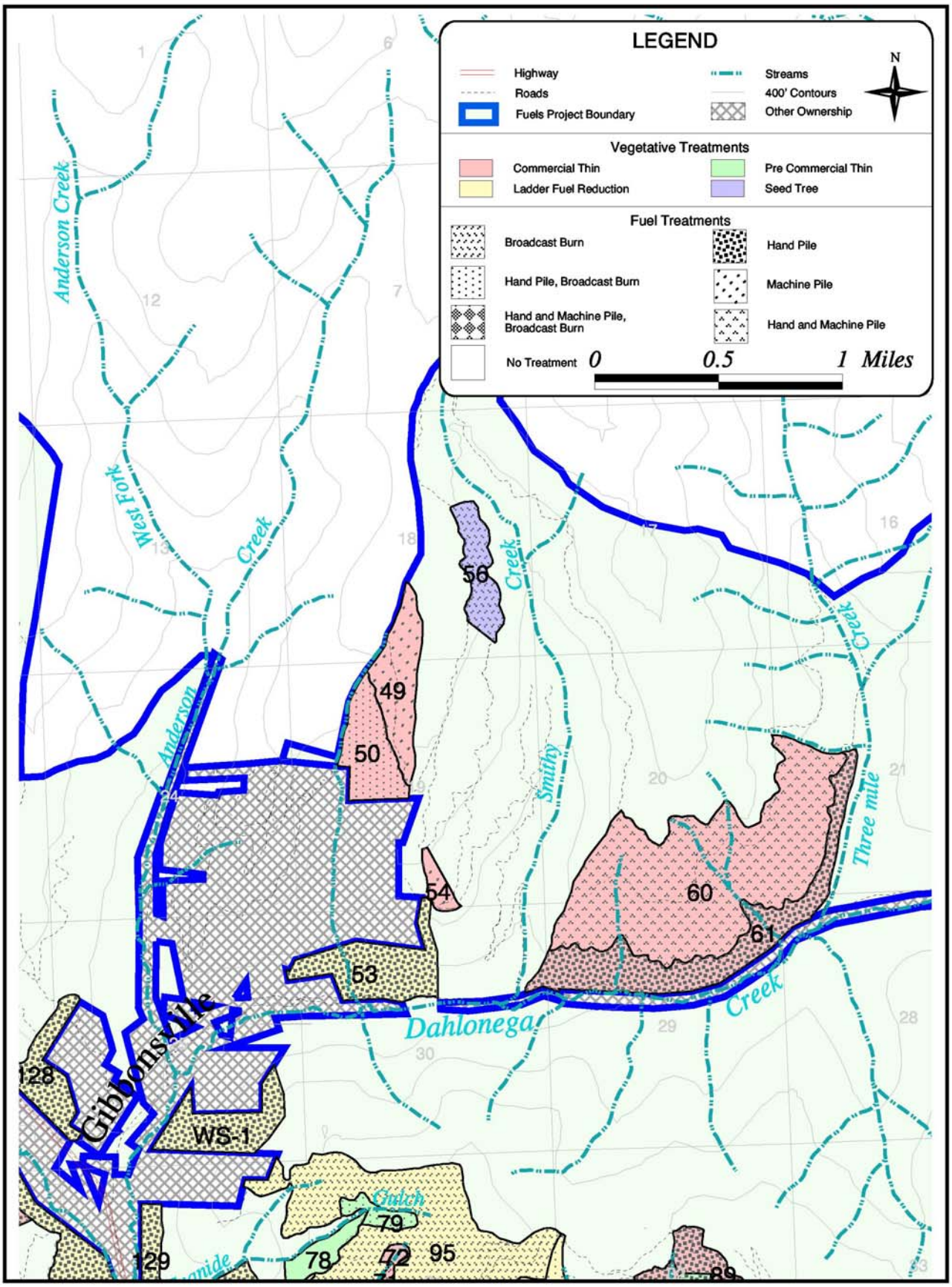
Psme/xx/Pipo = Mixed Doug-Fir/Ponderosa Pine forest community (understory varies by elevation, aspect)

e = estimated

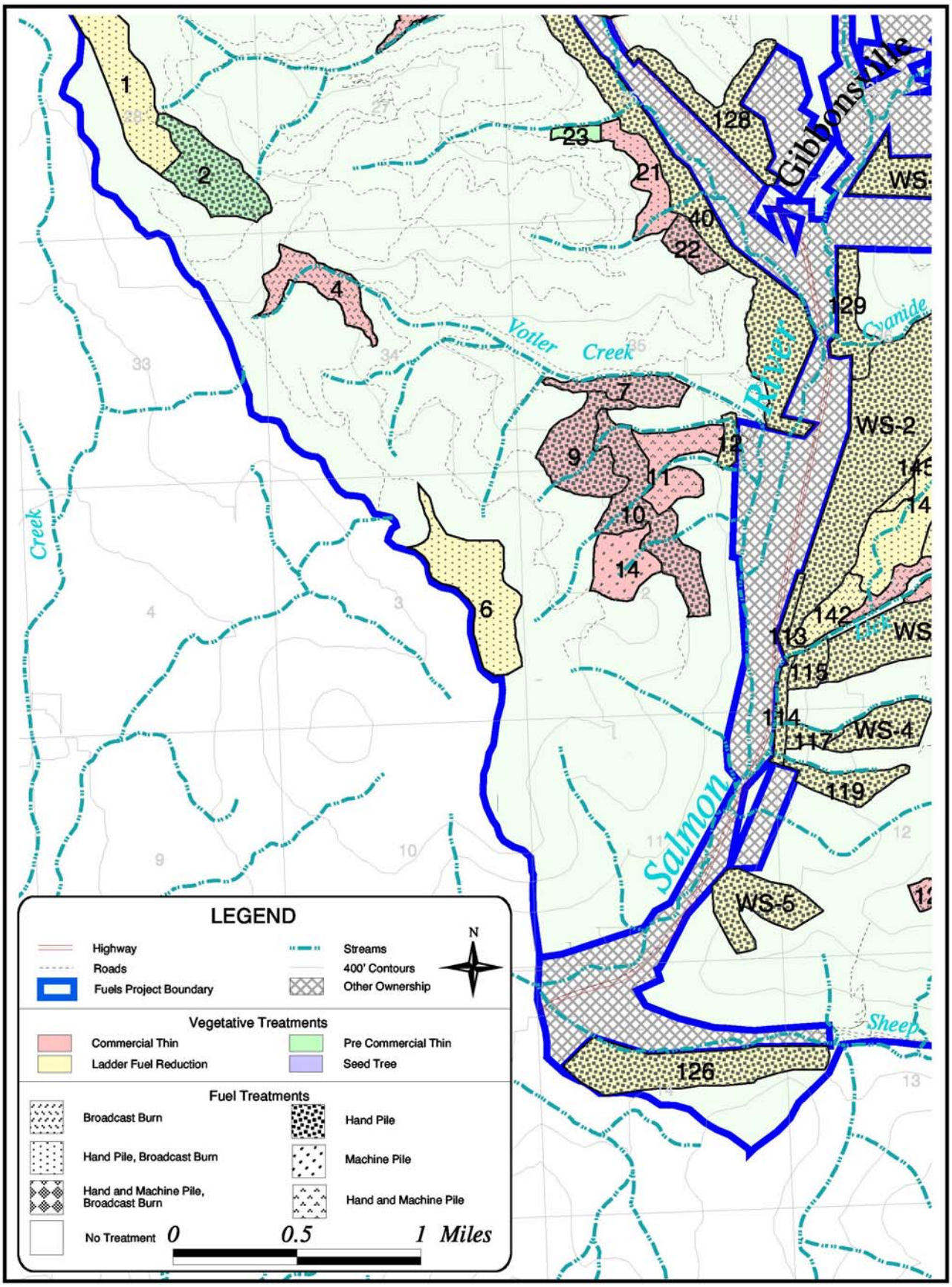
Map 9. *Alternative C Map 1*



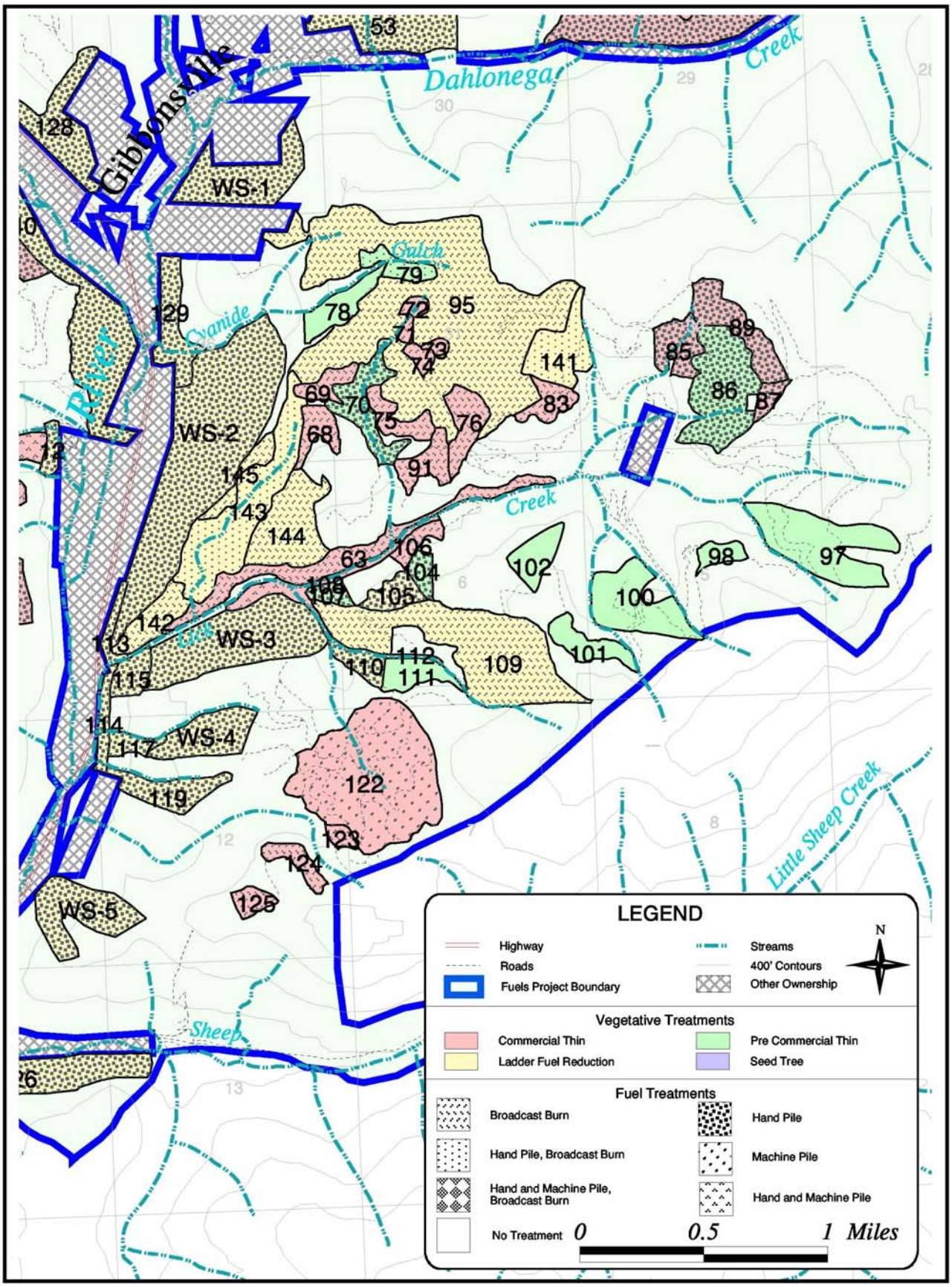
Map 10. ***Alternative C Map 2***



Map 11. ***Alternative C Map 3***



Map 12. ***Alternative C Map 4***



Alternative C

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
1	83		PP/DF	Psme/Spbe/Pipo	Hand	Ladder		40		83		2	13	9 e	4 to 15	6	Shaded fuelbreak. Thin trees less than 8" dbh to 18 foot spacing. Remove conifers from pockets of aspen.
												8	60			1	
												10	10			4.8	
2	**61**		**DF/LP/PP**	**Psme/Spbe/Pipo**	**Hand**	**Thin**		**61**				**1**	**11**	**8 e**	**4 to 15**	**4**	**Precommercial thin seedling/sapling stand to 18X18 feet.**
												2	**3**			**6**	
												8	**6**			**1**	
												10	**41**			**4.8**	
4	8	RHCA	PP/DF	Psme/Spbe/Pipo	Hand	Ladder				8		9	8	15 e	4 to 15	2.6	Remove ladder fuels to 8" dbh with min. space 18 foot. 1 treatment.
	32		PP/DF	Psme/Spbe/Pipo	Skyline	Thin	6			32		8	15	15 e	4 to 15	1	Shaded fuelbreak. Thin to a min. space 18 foot between trees and SDI 80.
												9	11			2.6	
												2	6			6	
6	**83**		**PP/DF**	**Psme/Spbe/Pipo**	**Hand**	**Ladder**		**83**		**83**		**8**	**43**	**8 e**	**4 to 15**	**1**	**Shaded fuelbreak. Thin trees less than 8" dbh to 18 foot spacing. Remove conifers from pockets of aspen.**
												9	**34**			**2.6**	
												10	**6**			**4.8**	
7	4	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				4		9	4	41 e	4 to 15	2.6	Thin from below trees less than 8" dbh up to 18 foot space.
	25		PP/DF	Psme/Syal/Pipo	Skyline	Thin	4	25		25		8	10	41 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
												9	15			2.6	
9	**57**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**6**	**57**				**2**	**5**	**41 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**44**			**1**	
												9	**8**			**2.6**	
10	78		PP/DF	Psme/Syal/Pipo	Skyline	Thin	4	78				1	3	41 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												2	22			6	
												8	43			1	
												9	10			2.6	
11	**44**		**PP/DF**	**Psme/Syal/Pipo**	**Tractor**	**Thin**	**4**	**14**	**30**			**8**	**22**	**41 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**22**			**2.6**	
12	8		PP/DF	Psme/Syal/Pipo	Hand	Ladder		8				8	3	11 e	1 to 4	1	Remove ladder fuels. 1-3 treatments to avoid excessive fuel accumulation at 1 time.
												9	5			2.6	
14	**38**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**6**		**38**			**1**	**2**	**11 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**36**			**1**	
21	5	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				5		9	5	13 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	29		PP/DF	Psme/Syal/Pipo	Skyline	Thin	3	29		29		2	13	13 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	7			1	
												9	9			1	
22	**19**		**PP/DF**	**Psme/Syal/Pipo**	**Skyline**	**Thin**	**6**	**19**				**2**	**6**	**13 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**13**			**2.6**	
23	7		PP/DF	Psme/Phma/Pipo	Hand	Thin						8	4	13 e	4 to 15	1	Ponderosa pine plantation with DF/PP naturals. Thin to 18x18 ft.
												9	3			2.6	
29	**6**	**RHCA**	**PP/DF**	**Psme/Feid/Pipo**	**Hand**	**Ladder**				**6**		**9**	**6**	**15 e**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment.**
	10		**PP/DF**	**Psme/Feid/Pipo**	**Skyline**	**Thin**	**3**			**10**		**9**	**10**	**15 e**	**4 to 15**	**2.6**	**Thin to a min. space 18 foot between trees and SDI 80.**
30	4	RHCA	PP/DF	Psme/Feid/Pipo	hand	Ladder				4		9	4	15 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	26		PP/DF	Psme/Feid/Pipo	Skyline	Thin	5			26		2	10	15 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	1			1	
												9	15			2.6	
32	**19**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**4**		**19**			**8**	**10**	**15 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**9**			**2.6**	
33	6		PP/DF	Psme/Spbe/Pipo	Skyline	Thin	4	6				9	6	15 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
40	**162**		**PP/DF**	**Psme/Syal/Pipo**	**Hand**	**Ladder**		**29**				**8**	**139**	**17**	**1 to 4**	**1**	**Remove ladder fuels. 1-3 treatments to avoid excessive fuel accumulation at 1 time.**
												9	**23**			**2.6**	
41	15	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				15		9	15	22	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	128		PP/DF	Psme/Syal/Pipo	Skyline/ Tractor	Thin	4	45		128	5	1	4	22	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												2	17			6	
												8	87			1	
												9	20			2.6	
43	**2**	**RHCA**	**PP/DF**	**Psme/Syal/Pipo**	**Hand**	**Ladder**				**2**		**9**	**2**	**20**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment.**
	18		**PP/DF**	**Psme/Syal/Pipo**	**Tractor**	**Thin**	**6**			**18**		**2**	**7**	**20**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**11**			**2.6**	

Alternative C

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
46	14		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4			14		1	4	12 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												8	1			1	
												9	9			2.6	
47	**24**		**PP/DF**	**Psme/Feid/Pipo**	**Hand**	**Ladder**		**24**		**24**		**1**	**5**	**8 e**	**1 to 4**	**4**	**Remove ladder fuels. 1 treatment.**
												2	**3**			**6**	
												8	**9**			**1**	
												9	**7**			**2.6**	
48	11	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder		11		11		9	11	12	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	13		PP/DF	Psme/Syal/Pipo	Skyline	Thin	2	13		13		2	1	12	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	7			1	
												9	5			2.6	
49	**60**		**DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**4**		**60**			**1**	**3**	**12 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80.**
												2	**37**			**6**	
												8	**8**			**1**	
												9	**12**			**2.6**	
50	2	RHCA	DF	Psme/Spbe/Pipo	Hand	Ladder				2		9	2	12 e	1 to 4	2.6	Remove ladder fuels. 1 treatment.
	52		DF	Psme/Spbe/Pipo	Skyline	Thin	8	27		52		2	1	12 e	1 to 4	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	7			1	
												9	44			2.6	
53	**72**		**DF/PP**	**Psme/Syal/Pipo**	**Hand**	**Ladder**		**72**				**1**	**3**	**9**	**1 to 4**	**4**	**Remove ladder fuels. 1 to 3 treatments.**
												2	**17**			**6**	
												8	**36**			**1**	
												9	**16**			**2.6**	
54	12		DF/PP	Psme/Spbe/Pipo	Tractor	Thin	2		12			2	4	7 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	1			1	
												9	7			2.6	
56	**38**		**PP/DF**	**Psme/Spbe/Pipo**	**Skyline**	**Seedtree**	**12**			**38**		**2**	**3**	**12 e**	**4 to 15**	**4**	**Where available leave healthy mature ponderosa pine seed trees providing 12 to 14 foot crown spacing. Remove or destroy dwarf mistletoe diseased Douglas fir.**
												8	**30**			**1**	
												10	**5**			**4.8**	
60	346		PP/DF	Psme/Spbe/Pipo	Tractor/ Skyline	Thin	8	146	200			2	111	7	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	111			1	
												9	124			2.6	
61	**128**		**PP/DF**	**Psme/Phma/Pipo**	**Skyline**	**Thin**	**10**	**128**				**2**	**39**	**8**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**53**			**1**	
												9	**36**			**2.6**	
63	19	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				19		9	19	2 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	35		PP/DF	Psme/Syal/Pipo	Tractor	Thin	4			35		2	25	2 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												5	1			4	
												8	9			1	
68	**16**		**PP/DF**	**Psme/Syal/Pipo**	**Tractor**	**Thin**	**4**			**16**		**2**	**6**	**9 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**10**			**2.6**	
69	13		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4			13		9	13	8 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
70	**34**		**PP/DF**	**Psme/Phma/Pipo**	**Hand**	**Thin**		**34**				**2**	**16**	**7 e**	**4 to 15**	**6**	**Thin Ponderosa/Douglas fir seedling/saplings to 18X18 feet.**
												8	**1**			**1**	
												9	**17**			**2.6**	
71	3		DF	Psme/Spbe/Pipo	Skyline	Thin	8			3		8	3	8 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
72	**5**		**PP/DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**4**			**5**		**2**	**1**	**8 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**4**			**1**	
73	3		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4			3		9	3	8 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
74	**6**		**DF/PP**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**8**			**6**		**8**	**3**	**8 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**3**			**2.6**	
75	17		PP/DF	Psme/Feid/Pipo	Skyline	Thin	5			17		2	1	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	1			1	
												9	15			2.6	

Alternative C

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
76	**23**		**PP/DF**	**Psme/Feid/Pipo**	**Skyline**	**Thin**	**4**			**23**		**9**	**23**	**9 e**	**4 to 15**	**2.6**	**Thin to a min. space 18 foot between trees and SDI 80.**
78	22		PP/DF	Psme/Phma/Pipo	Hand	Thin						8	22	7 e	4 to 15	1	Thin Ponderosa pine/Douglas fir seedling/sapling plantation to 18X18 feet
79	**14**		**PP/DF**	**Psme/Phma/Pipo**	**Hand**	**Thin**		**14**		**14**		**1**	**2**	**7 e**	**4 to 15**	**4**	**Thin ponderosa pine/Douglas fir seedling/sapling plantation to 18X18 feet**
												9	**12**			**2.6**	
83	15		PP/DF	Psme/Feid/Pipo	Tractor	Thin	4			15		2	4	8 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	11			2.6	
85	**23**		**PP/DF**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**5**	**23**				**1**	**1**	**8 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80.**
												8	**2**			**1**	
												9	**20**			**2.6**	
86	70		PP/DF/LP	Psme/Spbe/Pipo	Hand	Thin		35				8	38	7 e	4 to 15	1	Thin Ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.
												9	30			2.6	
												10	2			4.8	
87	**7**		**DF**	**Psme/Spbe/Pipo**	**Tractor**	**Thin**	**3**	**7**				**8**	**4**	**2 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
												10	**3**			**4.8**	
89	35		DF/PP	Psme/Spbe/Pipo	Skyline	Thin	4	35				2	5	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	26			1	
												10	4			4.8	
91	**19**		**PP/DF**	**Psme/Syal/Pipo**	**Tractor**	**Thin**	**1**			**19**		**2**	**7**	**8 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
												9	**12**			**2.6**	
95	**355**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**				**355**		**1**	**88**	**16**	**4 to 15**	**4**	**Remove ladder fuels. 1 treatment**
												2	**74**			**6**	
												8	**82**			**1**	
												9	**105**			**2.6**	
												10	**6**			**4.8**	
97	72		PP/DF	Psme/Phma/Pipo	Hand	Thin						1	6	7 e	4 to 15	4	Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.
												2	39			6	
												8	23			1	
												10	4			4.8	
98	**10**		**DF/LP/PP**	**Psme/Cage/Pipo**	**Hand**	**Thin**						**1**	**2**	**7 e**	**4 to 15**	**4**	**Ponderosa pine plantation. Thin Ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.**
												10	**8**			**4.8**	
100	**51**		**DF/LP/PP**	**Psme/Phma/Pipo**	**Hand**	**Thin**						**2**	**9**	**7 e**	**4 to 15**	**6**	**Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.**
												8	**26**			**1**	
												10	**16**			**4.8**	
101	21		DF/LP/PP	Psme/Phma/Pipo	Hand	Thin						1	5	7 e	4 to 15	4	Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.
												2	5			6	
												10	11			4.8	
102	**20**		**DF/LP/PP**	**Psme/Phma/Pipo**	**Hand**	**Thin**						**8**	**20**	**7 e**	**4 to 15**	**1**	**Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.**
104	9		DF/PP	Psme/Phma/Pipo	Hand	Thin		9				8	9	7 e	4 to 15	1	Ponderosa pine plantation with reserve trees. Thin from below providing a min. 18 foot space between trees and 12-14 foot space between the tree crowns.
105	**15**		**DF/PP**	**Psme/Spbe/Pipo**	**Hand**	**Ladder**		**15**				**8**	**15**	**17 e**	**4 to 15**	**1**	**Thin from below to remove ladder fuels, provide crown separation and favor seral ponderosa pine. 1-3 treatments.**
106	2	RHCA	DF/PP	Psme/Phma/Pipo	Hand	Ladder				2		8	2	17 e	4 to 15	1	Remove ladder fuels. 1 treatment.
	8		DF/PP	Psme/Phma/Pipo	Skyline	Thin	10			8		8	8	17 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
107	**8**		**DF/PP**	**Psme/Phma/Pipo**	**Hand**	**Thin**		**8**				**8**	**8**	**7 e**	**4 to 15**	**1**	**Thin from below to remove ladder fuels, provide crown separation and favor seral ponderosa pine. 1-3 treatments.**
108	24		DF/PP	Psme/libo	Hand	Thin			6	16		2	5	17 e	4 to 15	6	Treat ladder fuels, dwarf mistletoe diseased and stimulate aspen regeneration.
												8	19			1	
109	**141**		**DF/PP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**				**141**		**1**	**26**	**8 e**	**4 to 15**	**4**	**Remove ladder fuels. 1 treatment.**
												2	**50**			**6**	
												8	**54**			**1**	
												9	**9**			**2.6**	
												10	**2**			**4.8**	

Alternative C

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
110	14		DF/PP	Psme/Phma/Pipo	Hand	Ladder		14				8	12	9 e	4 to 15	1	Thin from below to remove ladder fuels, provide crown separation and favor seral ponderosa pine. 1-3 treatments.
												9	2			2.6	
111	**19**		**PP/DF**	**Psme/Phma/Pipo**	**Hand**	**Thin**						**2**	**4**	**7 e**	**4 to 15**	**6**	**Ponderosa pine plantation. Thin ponderosa pine/Douglas fir seedling/saplings to 18X18 feet.**
												8	**15**			**1**	
112	2		DF/PP	Psme/Phma/Pipo	Hand	Ladder		2				2	1	7 e	4 to 15	6	Remove ladder fuels. 1 treatment. Pile excess accumulations of downed woody.
												8	1			1	
113	**9**		**DF/PP**	**Psme/Syal/Pipo**	**Hand**	**Ladder**		**9**				**2**	**2**	**8 e**	**1 to 4**	**6**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												8	**7**			**1**	
114	11		DF/PP	Psme/Syal/Pipo	Hand	Ladder		11				2	4	9 e	1 to 4	6	Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.
												8	7			1	
115	**15**		**DF/PP**	**Psme/Phma/Pipo**	**Hand**	**Ladder**		**15**				**2**	**1**	**8 e**	**4 to 15**	**6**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												8	**14**			**1**	
117	10		DF/PP	Psme/Phma/Pipo	Hand	Ladder		10				8	8	9 e	4 to 15	1	Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.
												9	2			2.6	
119	**28**		**DF/PP**	**Psme/Phma/Pipo**	**Hand**	**Ladder**		**28**				**2**	**1**	**9 e**	**1 to 4**	**6**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												8	**27**			**1**	
122	164		DF/PP	Psme/Syal/Pipo	Tractor	Thin	2		82			1	9	17 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												8	83			1	
												9	72			2.6	
123	**6**		**DF/PP**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**6**			**6**		**8**	**6**	**9 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
124	13		DF/PP	Psme/Spbe/Pipo	Skyline	Thin	8			13		8	13	9 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
125	**9**		**DF/PP**	**Psme/Spbe/Pipo**	**Skyline**	**Thin**	**6**			**9**		**8**	**9**	**9 e**	**4 to 15**	**1**	**Thin to a min. space 18 foot between trees and SDI 80.**
126	94		DF/PP	Psme/Spbe/Pipo	Hand	Ladder		94				2	12	8 e	1 to 4	4	Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.
												8	31			1	
												9	51			2.6	
128	**61**		**PP/DF**	**Psme/Feid/Pipo**	**Hand**	**Ladder**		**61**				**1**	**6**	**3**	**4 to 15**	**4**	**Remove ladder fuels. 1 treatment**
												2	**17**			**6**	
												8	**20**			**1**	
												9	**18**			**2.6**	
129	31		PP/DF	Psme/Syal/Pipo	Hand	Ladder		31				1	1	3 e	4 to 15	4	Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.
												2	5			6	
												8	18			1	
												9	7			2.6	
141	**37**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**		**37**		**37**		**8**	**17**	**16**	**4 to 15**	**1**	**Remove ladder fuels less then 9 inches away from large diameter ponderosa pine and douglas-fir trees. Leave clumps of small trees (less then 9 inches) that are not a threat to large diameter trees.**
												10	**4**			**4.8**	
												1	**10**			**4**	
												9	**6**			**2.6**	
142	24		PP/DF/LP	Psme/Feid/Pipo	Hand	Ladder				24		2	10	16	4 to 15		Remove ladder fuels. 1 treatment
												5	11				
												9	3			6	
143	**91**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**		**39**		**91**		**9**	**30**	**16**	**4 to 15**	**2.6**	**Remove ladder fuels less then 9 inches away from large diameter ponderosa pine and douglas-fir trees. Leave clumps**
												8	**61**			**1**	
144	55		PP/DF/LP	Psme/Feid/Pipo	Hand	Ladder		55		55		1	28	16	4 to 15	4	Remove ladder fuels. 1 treatment
												2	15			6	
												9	12			2.6	
145	**13**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**				**13**		**9**	**13**	**16**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment**
ws-1	55				Hand	Ladder		55				8	55	8e	1 to 4	1	Remove ladder fuels.
ws-2	**208**				**Hand**	**Ladder**		**208**				**1**	**12**	**8e**	**1 to 4**	**4**	**Remove ladder fuels. 1 treatment**
												2	**10**	**8e**	**1 to 4**	**6**	
												8	**181**	**8e**	**1 to 4**	**1**	
												9	**5**	**8e**	**1 to 4**	**2.6**	
ws-3	97				Hand	Ladder		97				8	97	8e	1 to 4	1	Remove ladder fuels. 1 treatment

Alternative C

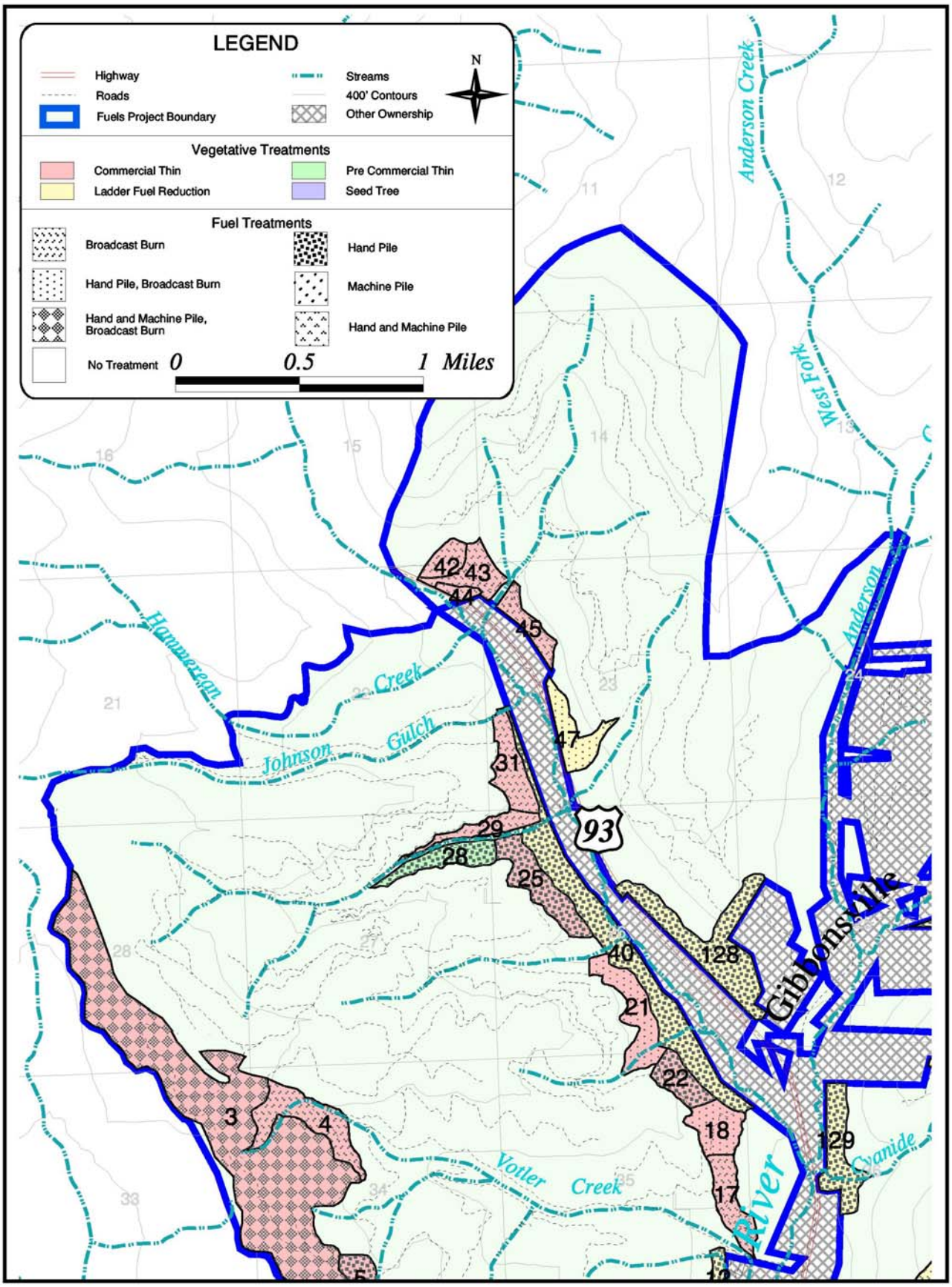
Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
ws-4	**37**				**Hand**	**Ladder**		**37**				**8**	**37**	**8e**	**1 to 4**	**1**	**Remove ladder fuels. 1 treatment**
ws-5	49				Hand	Ladder		49				5	13	8e	1 to 4	4	Remove ladder fuels. 1 treatment
												9	11	8e	1 to 4	2.6	
												8	25	8e	1 to 4	1	
TOTAL	4016						209	1947	447	1590	5						

PP - Ponderosa Pine
DF - Douglas Fir
LP - Lodge Pole Pine

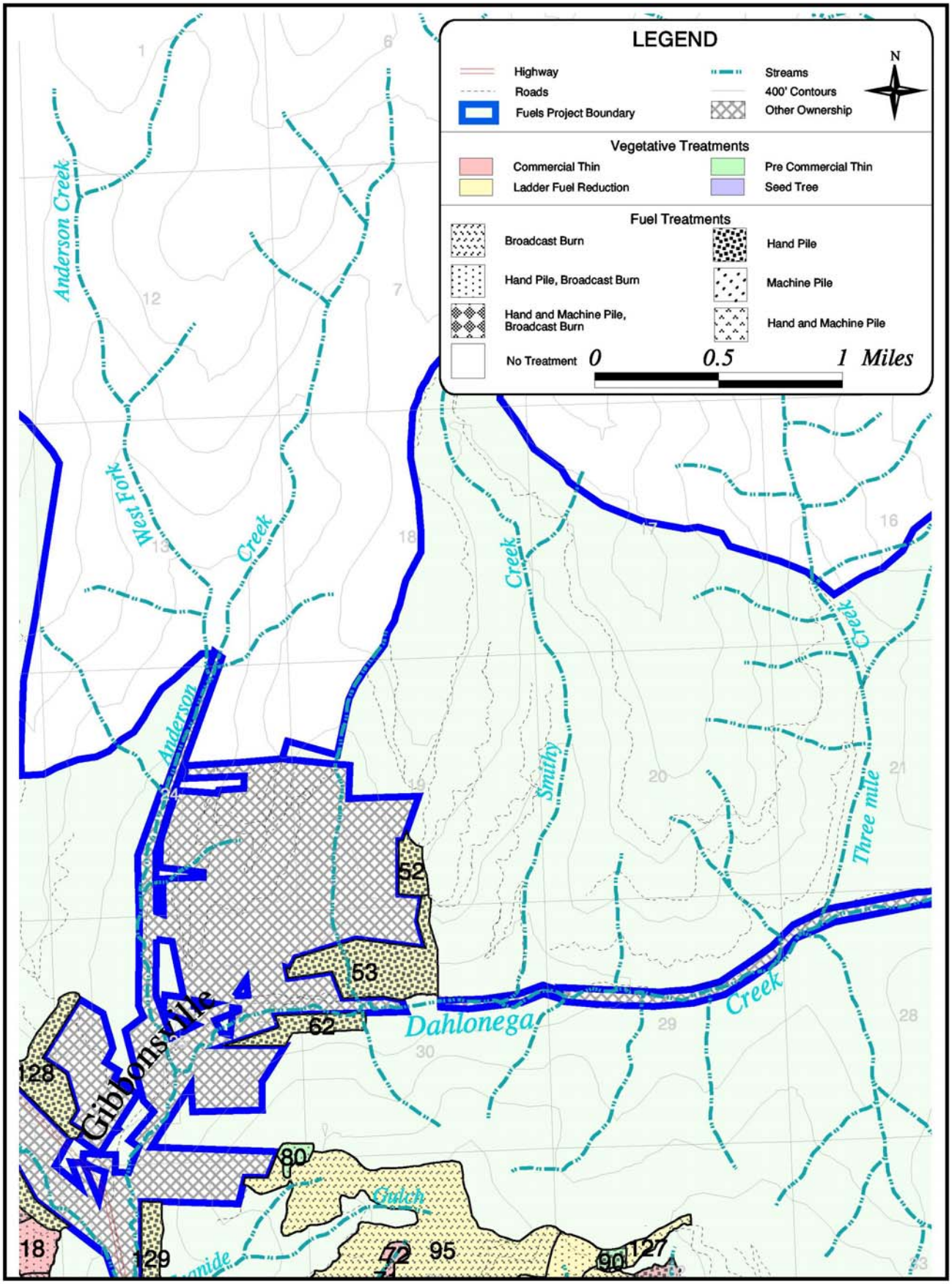
Psme/xx/Pipo = Mixed Doug-Fir/Ponderosa Pine forest community (understory varies by elevation, aspect)

e = estimated

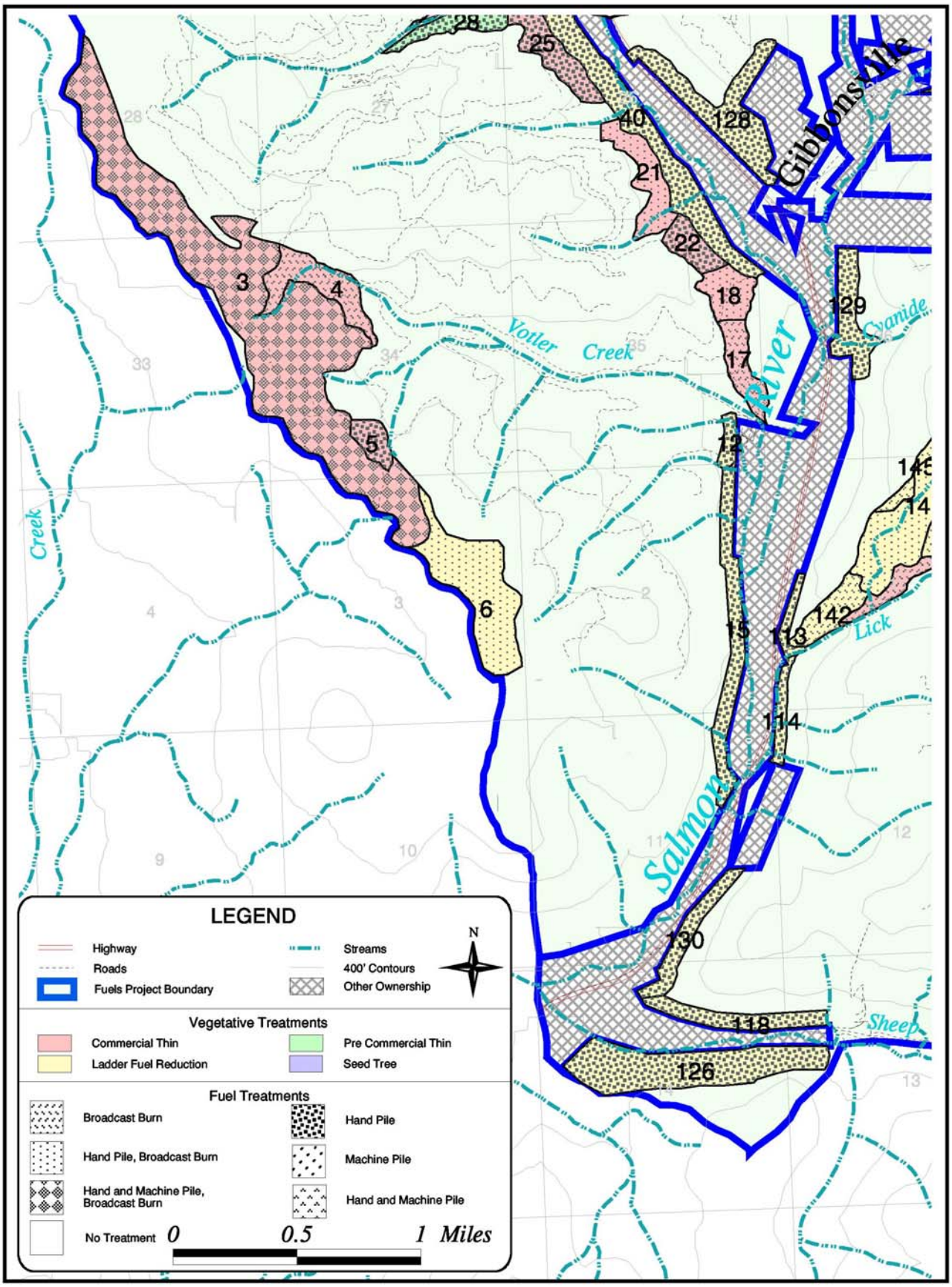
Map 13. *Alternative D Map 1*



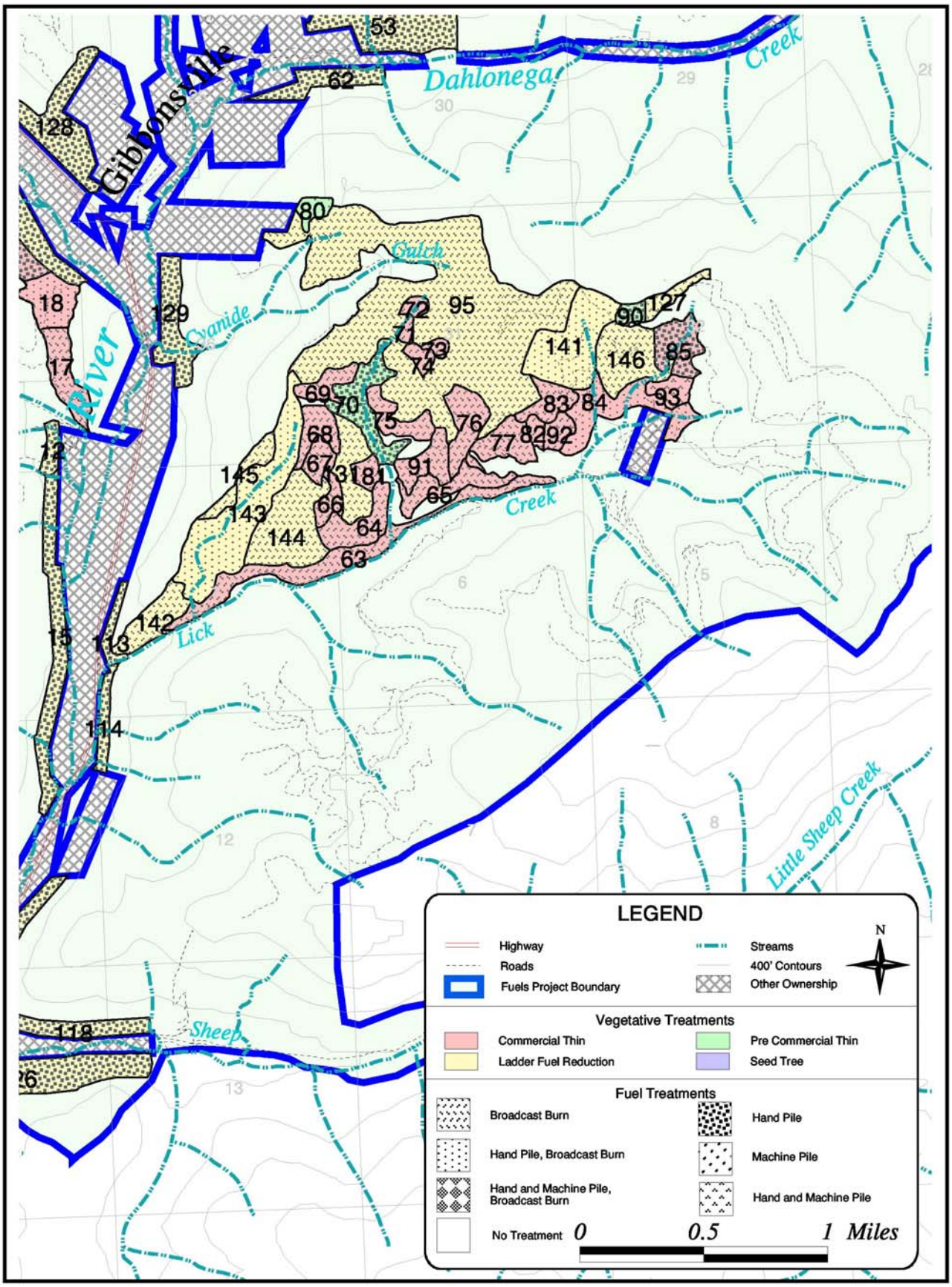
Map 14. *Alternative D Map 2*



Map 15. ***Alternative D Map 3***



Map 16. ***Alternative D Map 4***



Alternative D

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
3	5	RHCA	PP/DF	Psme/Spbe/Pipo	Hand	Ladder				5		9	5	15 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	349		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	6	100	100	349	30	1	9	15 e	4 to 15	4	Shaded fuelbreak. Thin to a min. space 18 foot between trees and SDI 80.
												2	20			6	
												5	3			4	
												8	207			1	
												9	110			2.6	
4	8	RHCA	PP/DF	Psme/Spbe/Pipo	Hand	Ladder				8		9	8	15 e	4 to 15	2.6	Remove ladder fuels to 8" dbh with min. space 18 foot. 1 treatment.
	32		PP/DF	Psme/Spbe/Pipo	Skyline	Thin	6			32		8	15	15 e	4 to 15	1	Shaded fuelbreak. Thin to a min. space 18 foot between trees and SDI 80.
												9	11			2.6	
												2	6			6	
5	14		PP/DF	Psme/Spbe/Pipo	Skyline	Thin	4	14				8	9	15 e	4 to 15	1	Shaded fuelbreak. Thin to a min. space 18 foot between trees and SDI 80.
												2	5			6	
6	83		PP/DF	Psme/Spbe/Pipo	Hand	Ladder		83		83		8	43	8 e	4 to 15	1	Shaded fuelbreak. Thin trees less than 8" dbh to 18 foot spacing. Remove conifers from pockets of aspen.
												9	34			2.6	
												10	6			4.8	
12	8		PP/DF	Psme/Syal/Pipo	Hand	Ladder		8				8	3	11 e	1 to 4	1	Remove ladder fuels. 1-3 treatments to avoid excessive fuel accumulation at 1 time.
												9	5			2.6	
15	50		PP/DF	Psme/Feid/Pipo	Hand	Ladder		50				1	10	11 e	1 to 4	4	Remove ladder fuels. 1-3 treatments to avoid excessive fuel accumulation at 1 time.
												2	26			6	
												5	3			4	
												9	11			2.6	
17	1	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				1		9	1	13 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	24		PP/DF	Psme/Syal/Pipo	Tractor	Thin	4			24	8	2	18	13 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	2			1	
												9	4			2.6	
18	24		PP/DF	Psme/Syal/Pipo	Tractor	Thin	6	12		24	18	1	2	13 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80. Potential green fuelwood area.
												2	16			6	
												9	6			2.6	
21	5	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				5		9	5	13 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	29		PP/DF	Psme/Syal/Pipo	Skyline	Thin	3	29		29		2	13	13 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	7			1	
												9	9			1	
22	19		PP/DF	Psme/Syal/Pipo	Skyline	Thin	6	19				2	6	13 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	13			2.6	
25	1	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				1		9	1	19	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	33		PP/DF	Psme/Syal/Pipo	Skyline	Thin	2	33				2	19	19	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80. Treat dwarf mistletoe diseased trees.
												8	14			1	
28	53		PP/DF	Psme/Spbe/Pipo	Hand	Thin		20				2	1	24	4 to 15	6	Thin seedling/sapling stand to 18x18 feet.
												8	50			1	
												9	2			2.6	
29	6	RHCA	PP/DF	Psme/Feid/Pipo	Hand	Ladder				6		9	6	15 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	10		PP/DF	Psme/Feid/Pipo	Skyline	Thin	3			10		9	10	15 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
31	3	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				3		9	3	15	1 to 4	2.6	Remove ladder fuels. 1 treatment.
	24		PP/DF	Psme/Syal/Pipo	Skyline	Thin	6			24		2	6	15	1 to 4	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	18			2.6	
40	162		PP/DF	Psme/Syal/Pipo	Hand	Ladder		29				8	139	17	1 to 4	1	Remove ladder fuels. 1-3 treatments to avoid excessive fuel accumulation at 1 time.
												9	23			2.6	
42	12		PP/DF	Psme/Syal/Pipo	Skyline	Thin	4			12		2	10	9	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	2			2.6	
43	2	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				2		9	2	20	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	18		PP/DF	Psme/Syal/Pipo	Tractor	Thin	6			18		2	7	20	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	11			2.6	
44	2	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				2		2	2	12	1 to 4	6	Remove ladder fuels. 1 treatment.
	2		PP/DF	Psme/Syal/Pipo	Skyline	thin	6			2		2	2	12	1 to 4	6	Thin to a min. space 18 foot between trees and SDI 80.

Alternative D

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
45	1	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				1		9	1	12 e	1 to 4	2.6	Remove ladder fuels. 1 treatment.
	14		PP/DF	Psme/Syal/Pipo	Tractor	Thin	5			14	14	2	8	12 e	1 to 4	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	4			1	
												9	2			2.6	
47	24		PP/DF	Psme/Feid/Pipo	Hand	Ladder		24		24		1	5	8 e	1 to 4	4	Remove ladder fuels. 1 treatment.
												2	3			6	
												8	9			1	
												9	7			2.6	
52	15		DF/PP	Psme/Spbe/Pipo	Hand	Ladder		15				8	11	7 e	1 to 4	1	Remove ladder fuels. 1 to 3 treatments.
												9	4			2.6	
53	72		DF/PP	Psme/Syal/Pipo	Hand	Ladder		72				1	3	9	1 to 4	4	Remove ladder fuels. 1 to 3 treatments.
												2	17			6	
												8	36			1	
												9	16			2.6	
62	22		DF/ES/PP	Psme/Phma/Pipo	Hand	Ladder		22				8	22	10	1 to 4	1	Remove ladder fuels. 1 to 3 treatments.
63	19	RHCA	PP/DF	Psme/Syal/Pipo	Hand	Ladder				19		9	19	2 e	4 to 15	2.6	Remove ladder fuels. 1 treatment.
	35		PP/DF	Psme/Syal/Pipo	Tractor	Thin	4			35		2	25	2 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												5	1			4	
												8	9			1	
64	24		PP/DF	Psme/Feid/Pipo	Skyline	Thin	4			24		1	7	8 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												2	11			6	
												8	2			1	
												9	4			2.6	
65	22		PP/DF	Psme/Phma/Pipo	Skyline	Thin	4			22		2	15	8 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												9	7			2.6	
66	9		PP/DF	Psme/Syal/Pipo	Tractor	Thin	4			9		2	9	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
67	10		PP/DF	Psme/Syal/Pipo	Skyline	Thin	4			10		2	8	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	2			2.6	
68	16		PP/DF	Psme/Syal/Pipo	Tractor	Thin	4			16		2	6	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	10			2.6	
69	13		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4			13		9	13	8 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
70	34		PP/DF	Psme/Phma/Pipo	Hand	Thin		34				2	16	7 e	4 to 15	6	Thin Ponderosa/Douglas fir seedling/saplings to 18X18 feet.
												8	1			1	
												9	17			2.6	
71	3		DF	Psme/Spbe/Pipo	Skyline	Thin	8			3		8	3	8 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
72	5		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4			5		2	1	8 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	4			1	
73	3		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4			3		9	3	8 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
74	6		DF/PP	Psme/Spbe/Pipo	Skyline	Thin	8			6		8	3	8 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
												9	3			2.6	
75	17		PP/DF	Psme/Feid/Pipo	Skyline	Thin	5			17		2	1	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	1			1	
												9	15			2.6	
76	23		PP/DF	Psme/Feid/Pipo	Skyline	Thin	4			23		9	23	9 e	4 to 15	2.6	Thin to a min. space 18 foot between trees and SDI 80.
77	27		PP/DF	Psme/Feid/Pipo	Tractor	Thin	4			27		2	22	9 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	5			2.6	
80	8		PP/DF	Psme/Phma/Pipo	Hand	Thin		8		8		2	6	7 e	4 to 15	4	Thin Ponderosa pine/Douglas fir seedling/sapling to 18X18 feet.
												8	2			1	Remove ladder fuels and dwarf mistletoe diseased Douglas fir.
81	7		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4			7		2	7	8 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
82	5		PP/DF	Psme/Phma/Pipo	Tractor	Thin	4			5		2	5	8 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
83	15		PP/DF	Psme/Feid/Pipo	Tractor	Thin	4			15		2	7	8 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												8	1			1	
												9	11			2.6	

Alternative D

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
84	**40**		**PP/DF**	**Psme/Phma/Pipo**	**Skyline**	**Thin**	**4**	**20**		**20**		**1**	**3**	**8 e**	**4 to 15**	**4**	**Thin to a min. space 18 foot between trees and SDI 80.**
												2	**13**			**6**	
												8	**21**			**1**	
												9	**7**			**2.6**	
85	23		PP/DF	Psme/Spbe/Pipo	Skyline	Thin	5	23				1	1	8 e	4 to 15	4	Thin to a min. space 18 foot between trees and SDI 80.
												8	2			1	
												9	20			2.6	
90	**6**		**PP/DF**	**Psme/Spbe/Pipo**	**Hand**	**Thin**		**6**				**1**	**6**	**7 e**	**4 to 15**	**4**	**Thin ponderosa pine/Douglas fir seedling/sapling post harvest regeneration to 18X18 feet.**
91	19		PP/DF	Psme/Syal/Pipo	Tractor	Thin	1			19		2	7	8 e	4 to 15	6	Thin to a min. space 18 foot between trees and SDI 80.
												9	12			2.6	
92	**9**		**PP/DF**	**Psme/Phma/Pipo**	**Tractor**	**Thin**	**3**			**9**		**2**	**9**	**8 e**	**4 to 15**	**6**	**Thin to a min. space 18 foot between trees and SDI 80.**
93	11		PP/DF	Psme/Spbe/Pipo	Tractor	Thin	4	6	5			8	11	9 e	4 to 15	1	Thin to a min. space 18 foot between trees and SDI 80.
95	**355**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**				**355**		**1**	**88**	**16**	**4 to 15**	**4**	**Remove ladder fuels. 1 treatment.**
												2	**74**			**6**	
												8	**82**			**1**	
												9	**105**			**2.6**	
												10	**6**			**4.8**	
113	9		DF/PP	Psme/Syal/Pipo	Hand	Ladder		9				2	2	8 e	1 to 4	6	Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.
												8	7			1	
114	**11**		**DF/PP**	**Psme/Syal/Pipo**	**Hand**	**Ladder**		**11**				**2**	**4**	**9 e**	**1 to 4**	**6**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												8	**7**			**1**	
118	29		PP/DF	Psme/Feid/Pipo	Hand	Ladder		29				1	23	2 e	1 to 4	4	Remove ladder fuels. 1 treatment.
												2	6			6	
126	**94**		**DF/PP**	**Psme/Spbe/Pipo**	**Hand**	**Ladder**		**94**				**2**	**12**	**8 e**	**1 to 4**	**4**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												8	**31**			**1**	
												9	**51**			**2.6**	
127	45		DF/PP	Psme/Cage/Pipo	Hand	Ladder		22		23		1	7	17 e	4 to 15	4	Remove ladder fuels. 1 treatment.
												8	34			1	
												9	4			2.6	
128	**61**		**PP/DF**	**Psme/Feid/Pipo**	**Hand**	**Ladder**		**61**				**1**	**6**	**3**	**4 to 15**	**4**	**Remove ladder fuels. 1 treatment.**
												2	**17**			**6**	
												8	**20**			**1**	
												9	**18**			**2.6**	
129	31		PP/DF	Psme/Syal/Pipo	Hand	Ladder		31				1	1	3 e	4 to 15	4	Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.
												2	5			6	
												8	18			1	
												9	7			2.6	
130	**24**		**DF/PP**	**Psme/Syal/Pipo**	**Hand**	**Ladder**		**24**				**1**	**2**	**9 e**	**1 to 4**	**4**	**Remove ladder fuels. 1-3 treatments over a 5 to 7 year period.**
												8	**22**			**1**	
131	27		DF/PP	Psme/Feid/Pipo	Hand	Ladder				27		1	4	8 e	4 to 15	4	Remove ladder fuels. 1 treatment.
												2	19			6	
												9	4			2.6	
141	**56**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**		**56**		**56**		**1**	**10**	**16**	**4 to 15**	**4**	**Remove ladder fuels less then 9 inches away from large diameter ponderosa pine and douglas-fir trees. Leave clumps of small trees (less then 9 inches) that are not a threat to large diameter trees.**
												8	**36**			**1**	
												9	**6**			**2.6**	
												10	**4**			**4.8**	
142	24		PP/DF/LP	Psme/Feid/Pipo	Hand	Ladder		24		24		2	10	16	4 to 15	6	Remove ladder fuels. 1 treatment
												5	11			4	
												9	3			2.6	
143	**91**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**		**39**		**91**		**8**	**61**	**16**	**4 to 15**	**1**	**Remove ladder fuels less then 9 inches away from large diameter ponderosa pine and douglas-fir trees. Leave clumps of**
												9	**30**			**2.6**	
144	55		PP/DF/LP	Psme/Feid/Pipo	Hand	Ladder				55		1	28	16	4 to 15	4	Remove ladder fuels. 1 treatment
												2	15			6	
												9	12			2.6	

Alternative D

Area	Acres Total	RHCA	Tree Species	Habitat Type	Mech. System	Treatment Method (Acre)	Removal Volume/acre (ccf)	Handpile & Burn (Acre)	Machine Pile and Burn (Acre)	Broadcast Burn (Acre)	Green Fuelwood (Acre)	Fuel Model		Existing Down Woody Material Prior to Treatment (Tons/Acre)	Down Material Remaining After Treatment (Tons/Acre)	Flame Length (Feet)	Comments
												Model Number	Acres				
145	**13**		**PP/DF/LP**	**Psme/Feid/Pipo**	**Hand**	**Ladder**		**13**		**13**		**9**	**13**	**16**	**4 to 15**	**2.6**	**Remove ladder fuels. 1 treatment**
146	38		PP/DF/LP	Psme/Feid/Pipo	Hand	Ladder				38		1	7	16	4 to 15	4	Remove ladder fuels. 1 treatment.
												8	19			1	
												9	12			2.6	
TOTAL	2499						161	1040	105	1676	70						

PP - Ponderosa Pine
DF - Douglas Fir
LP - Lodge Pole Pine

Psme/xx/Pipo = Mixed Doug-Fir/Ponderosa Pine forest community (understory varies by elevation, aspect)

e = estimated

Appendix C

Proposed Road Classification Changes By Alternative

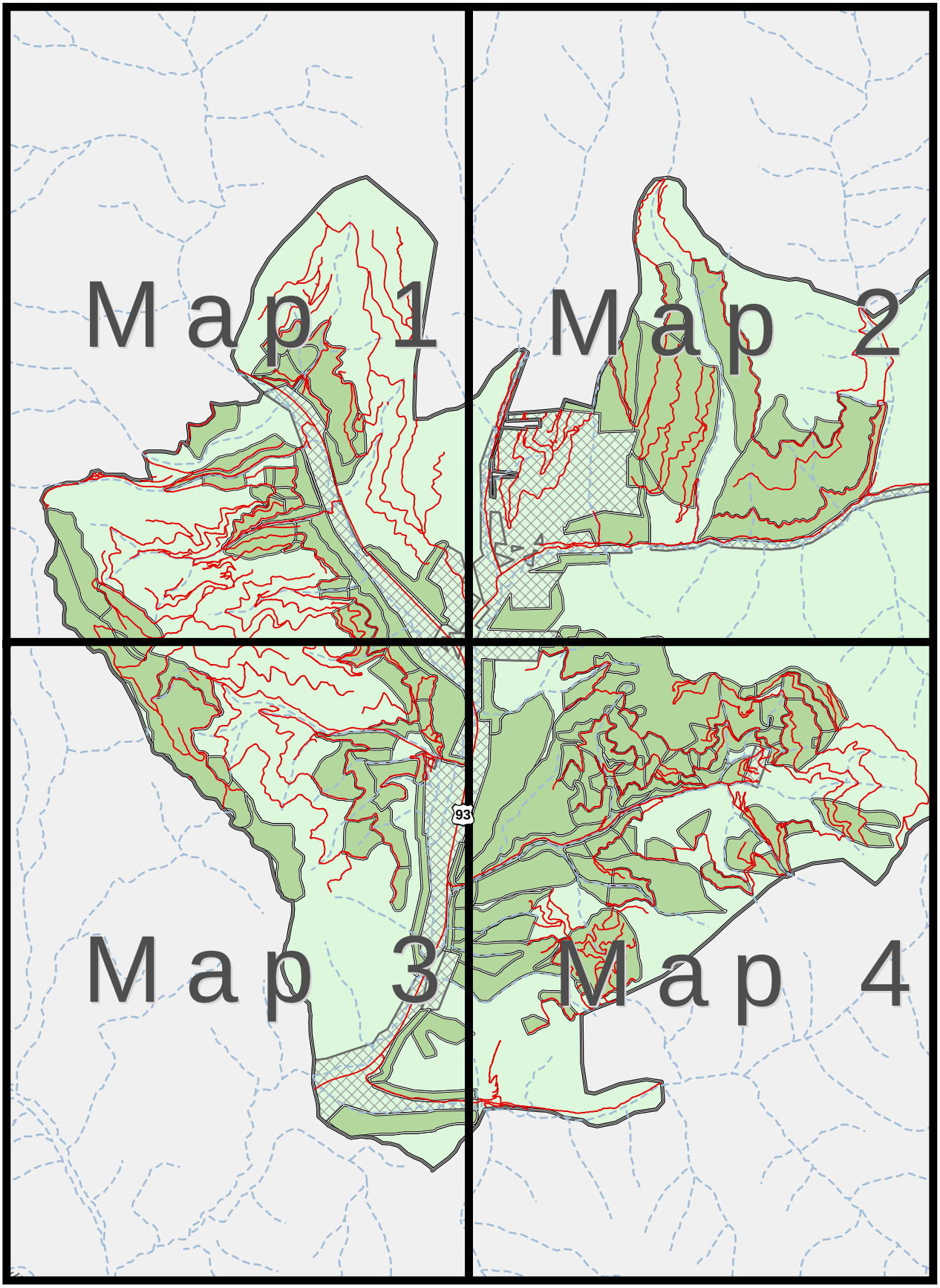
Gibbonsville Wildland Urban Interface Fuels Reduction Project
November 2004

Appendix C

Proposed Road Classification Changes by Alternative

Appendix C includes maps for each alternative. Map 17, labeled “Unit Index Map” (page C-2), identifies the project area in four sections. Each alternative is displayed in the four sections.

Map 17. ***Unit Index Map***



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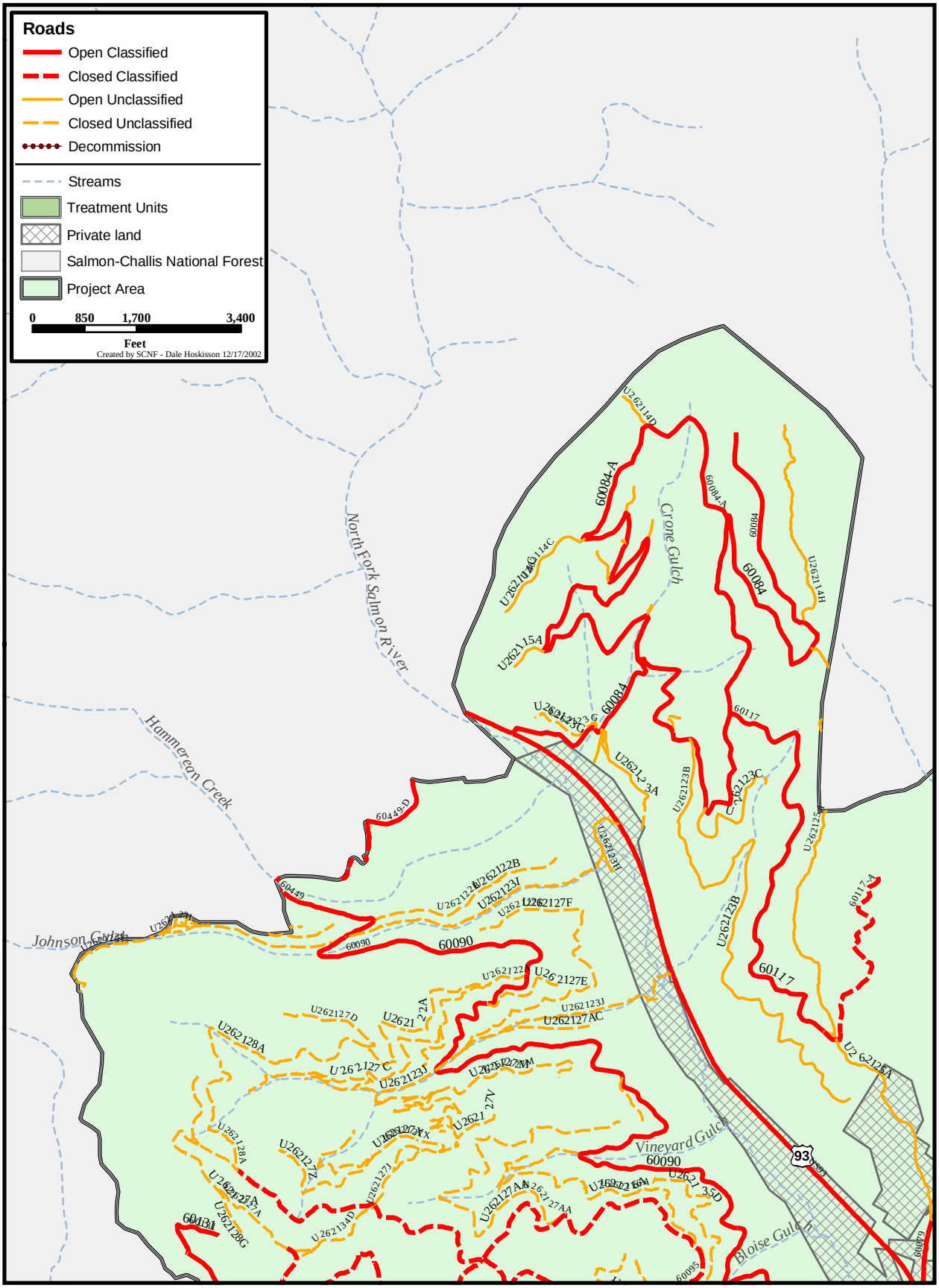
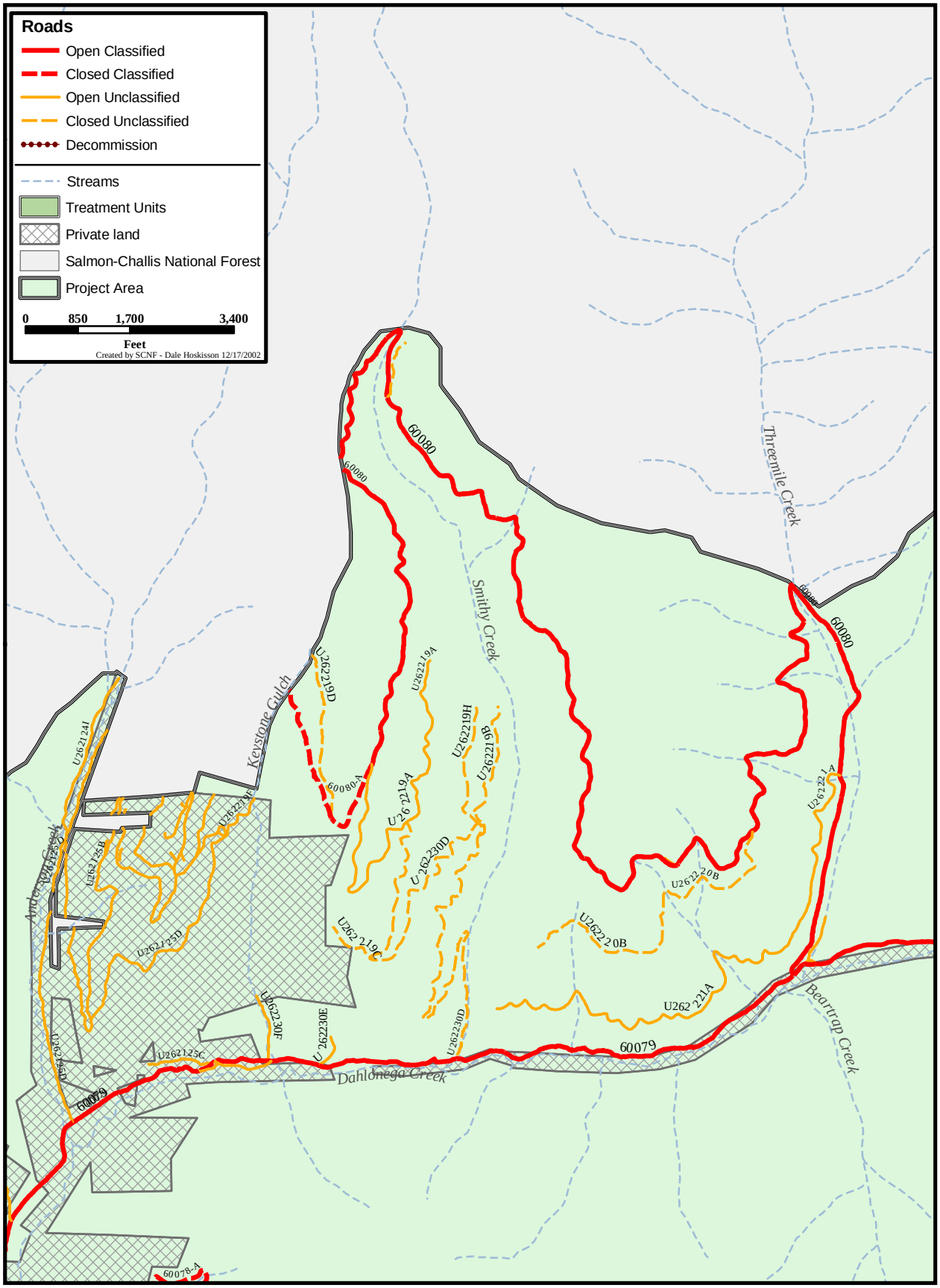
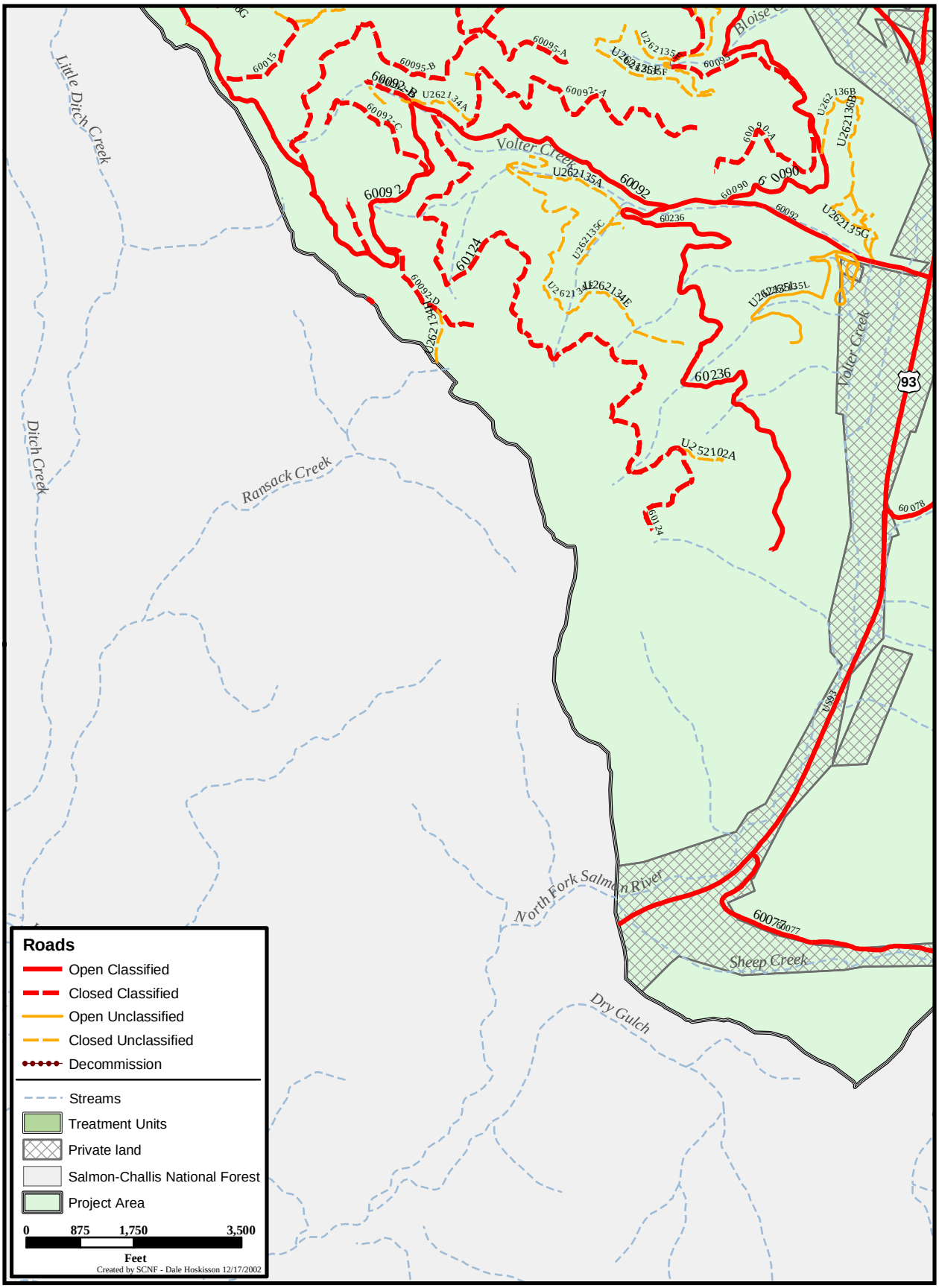
Map 18. *Existing Condition Map 1*



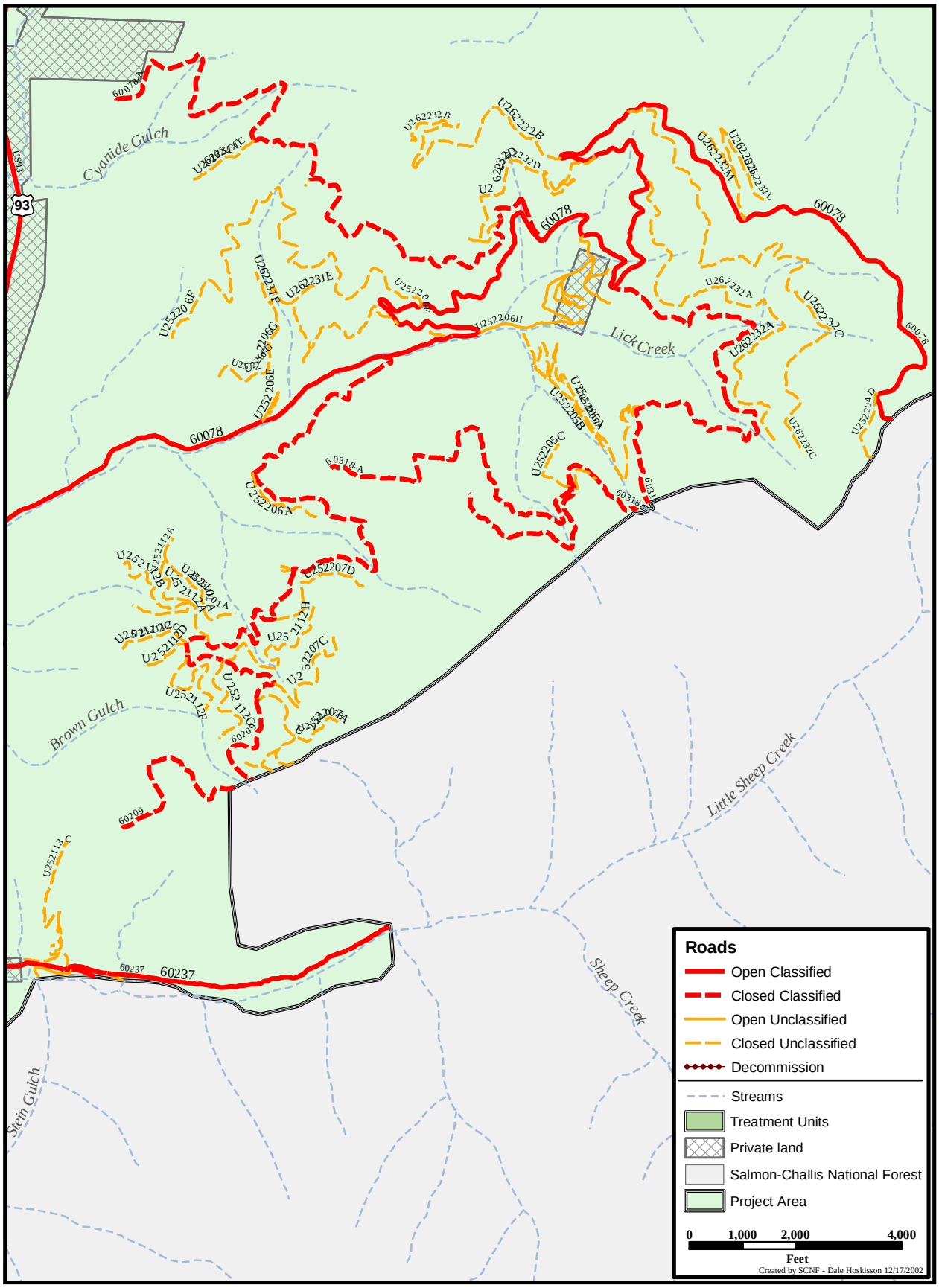
Map 19. *Existing Condition Map 2*



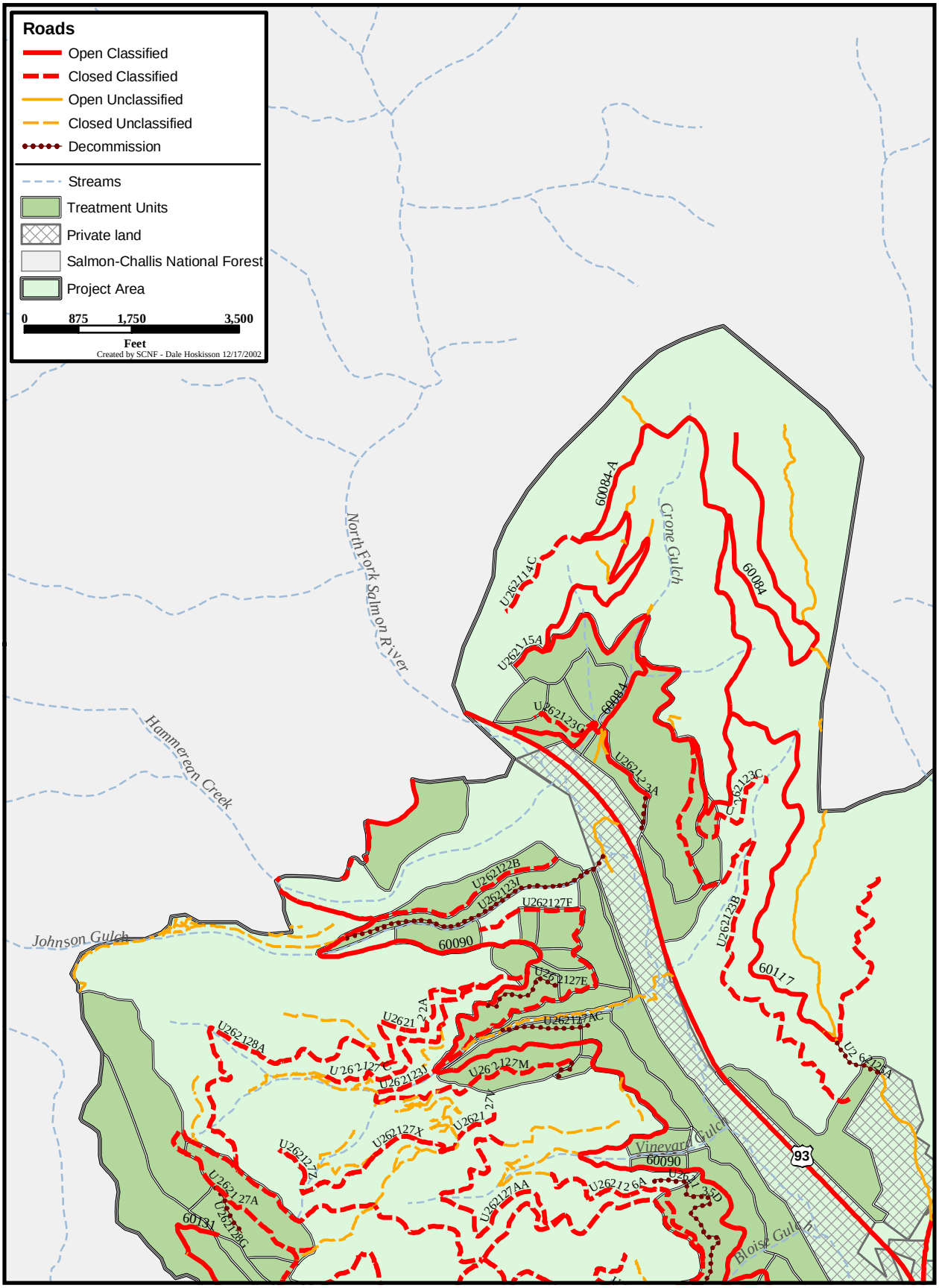
Map 20. *Existing Condition Map 3*



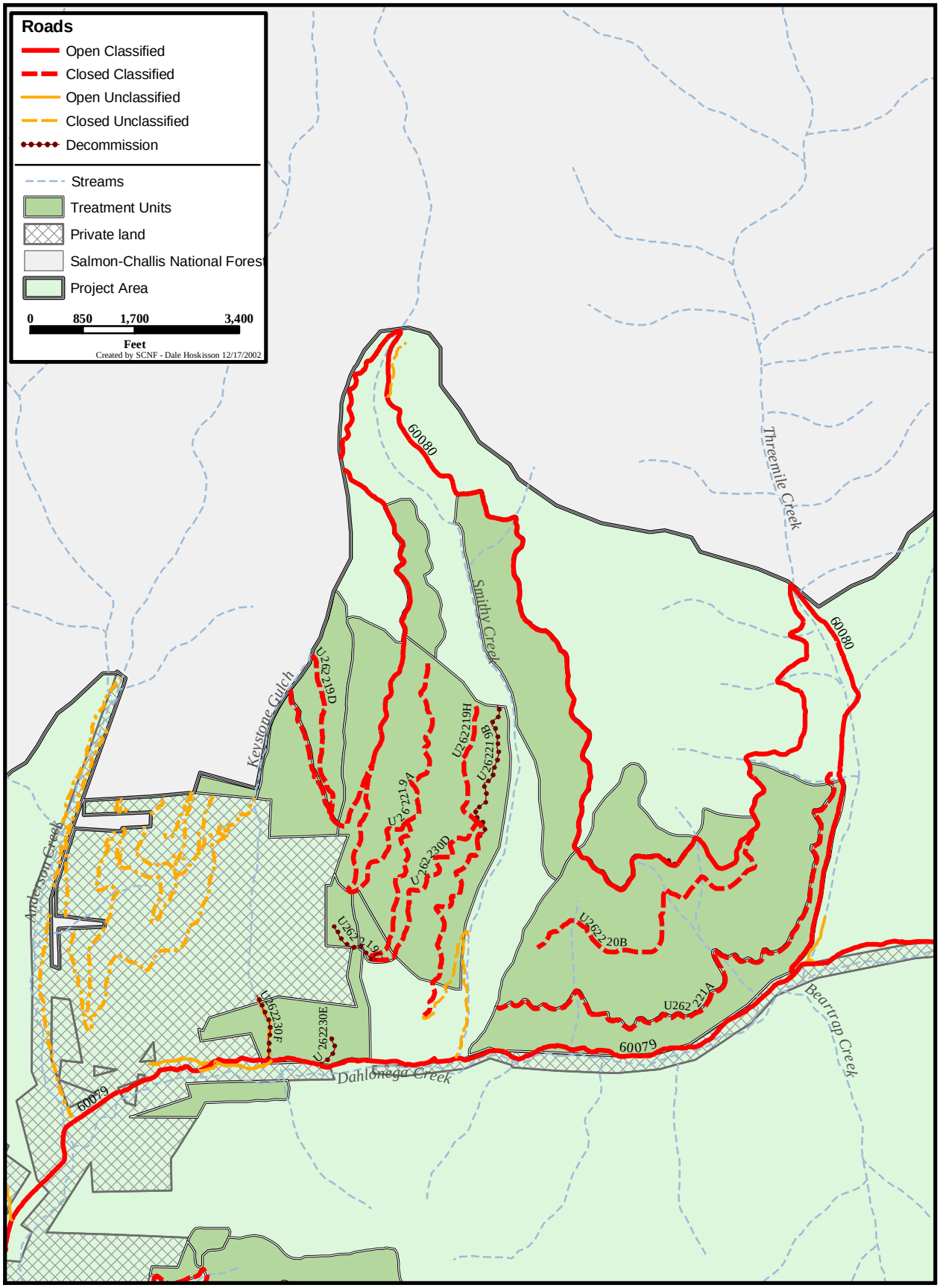
Map 21. *Existing Condition Map 4*



Map 22. *Alternative B Map 1*



Map 23. *Alternative B Map 2*



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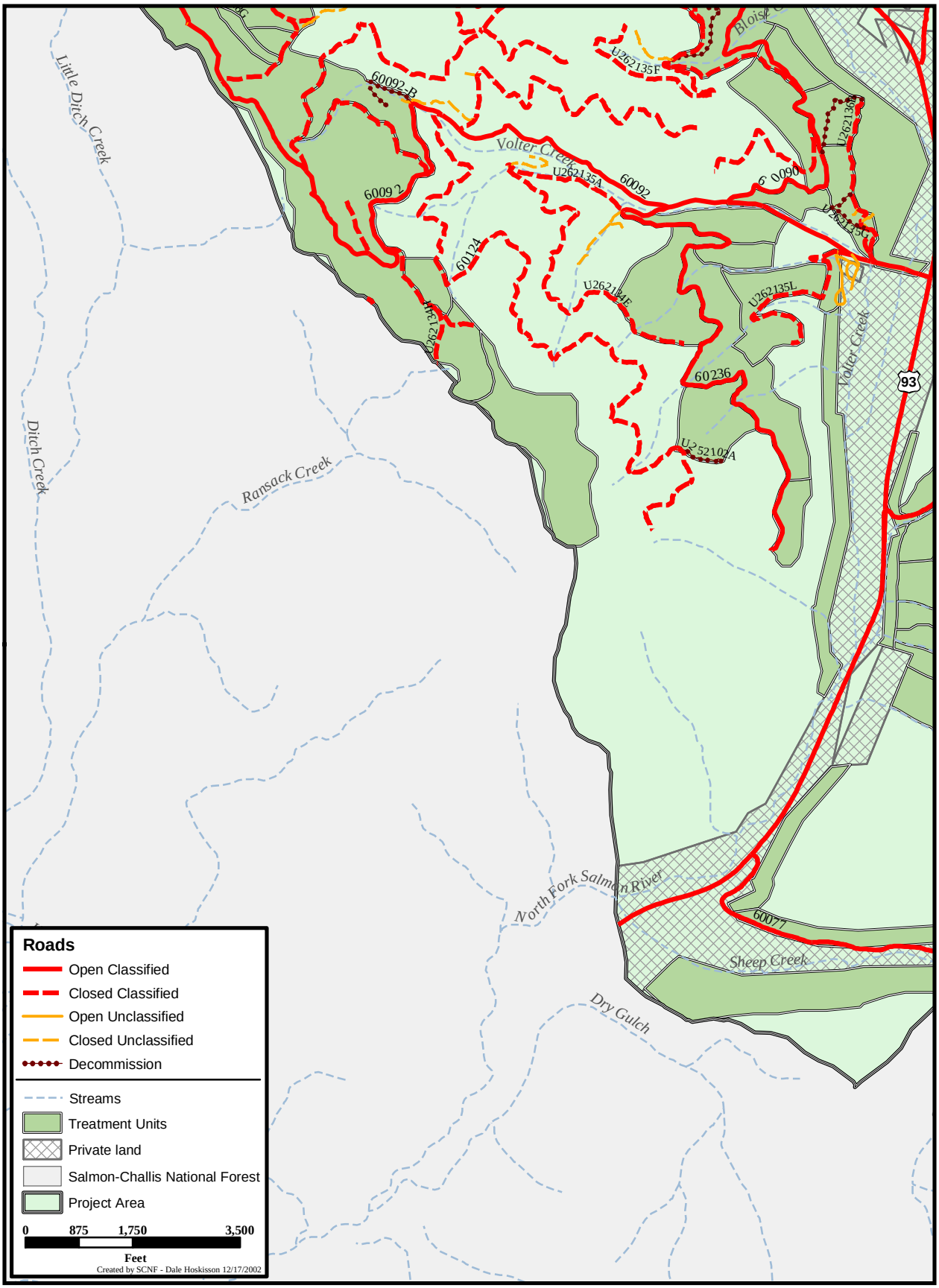
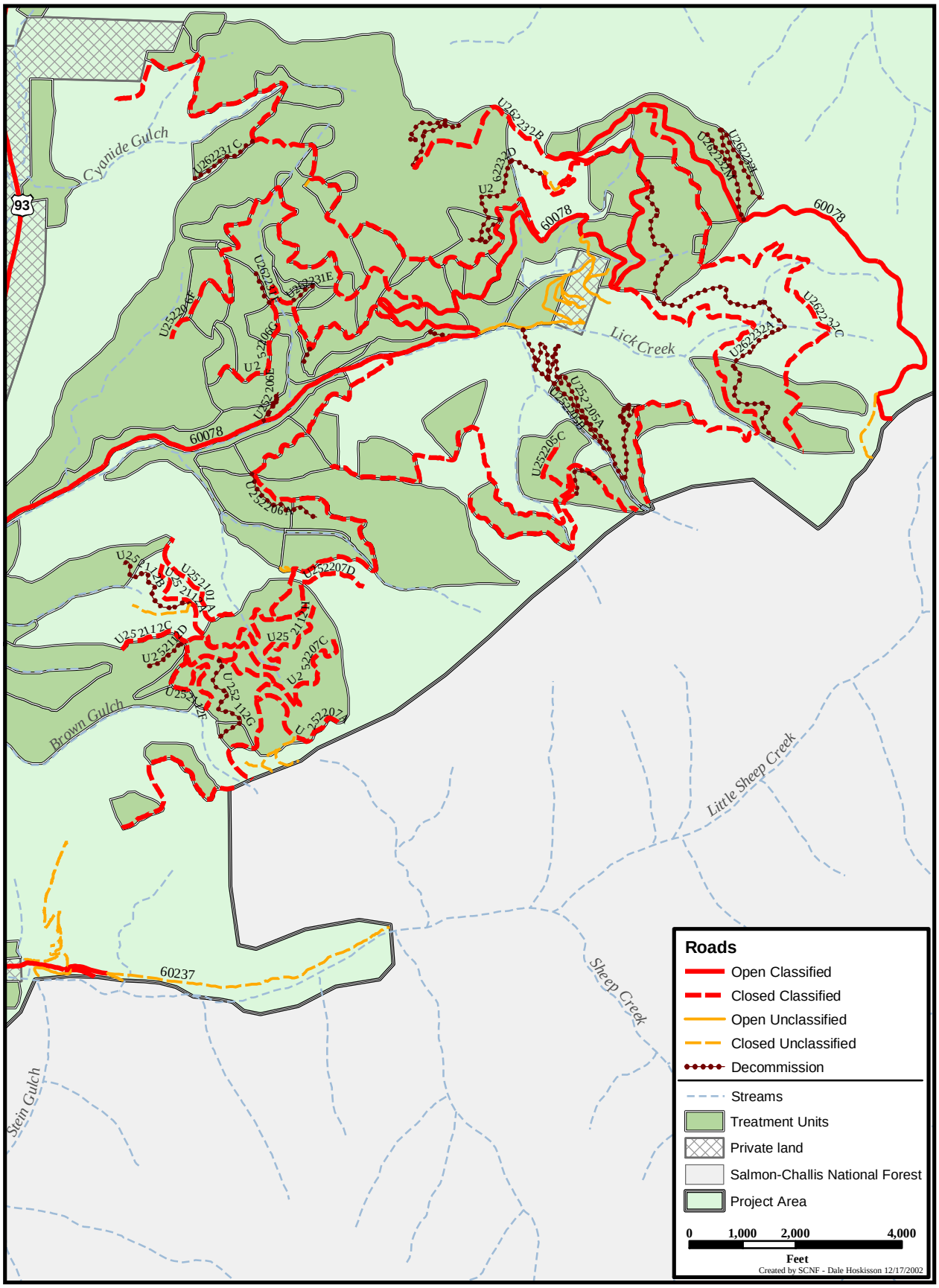
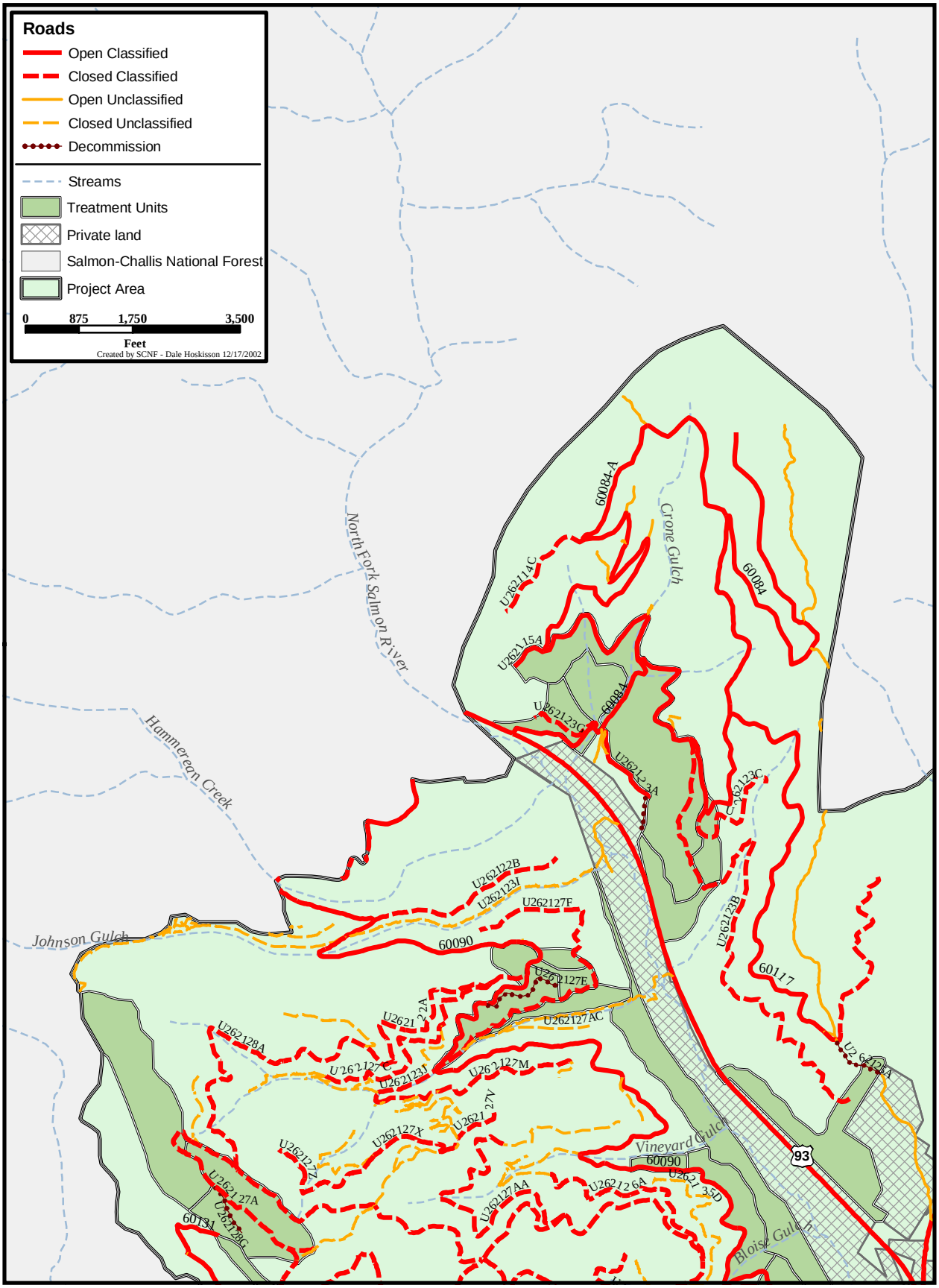
Map 24. *Alternative B Map 3*



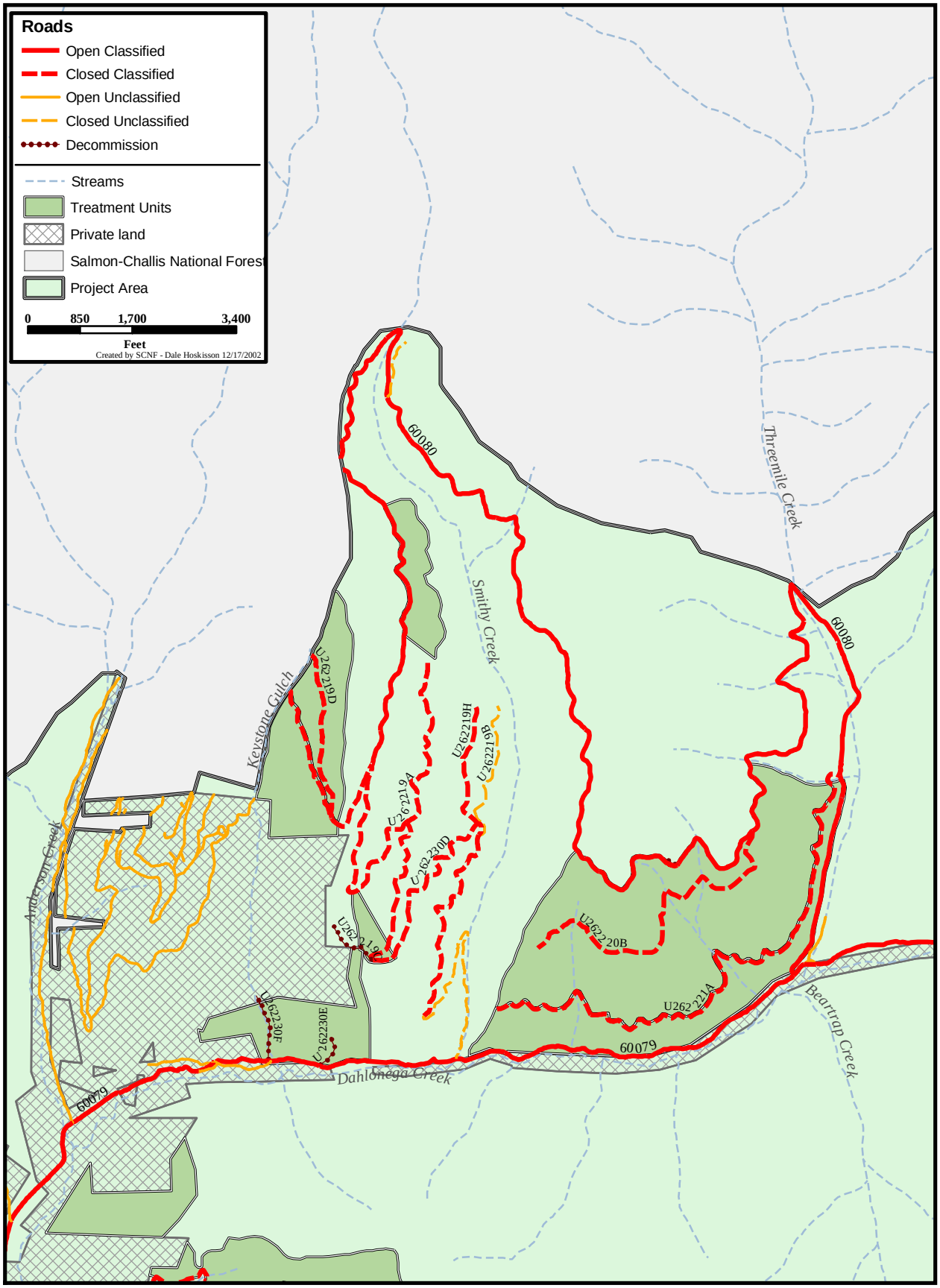
Map 25. *Alternative B Map 4*



Map 26. *Alternative C Map 1*



Map 27. *Alternative C Map 2*



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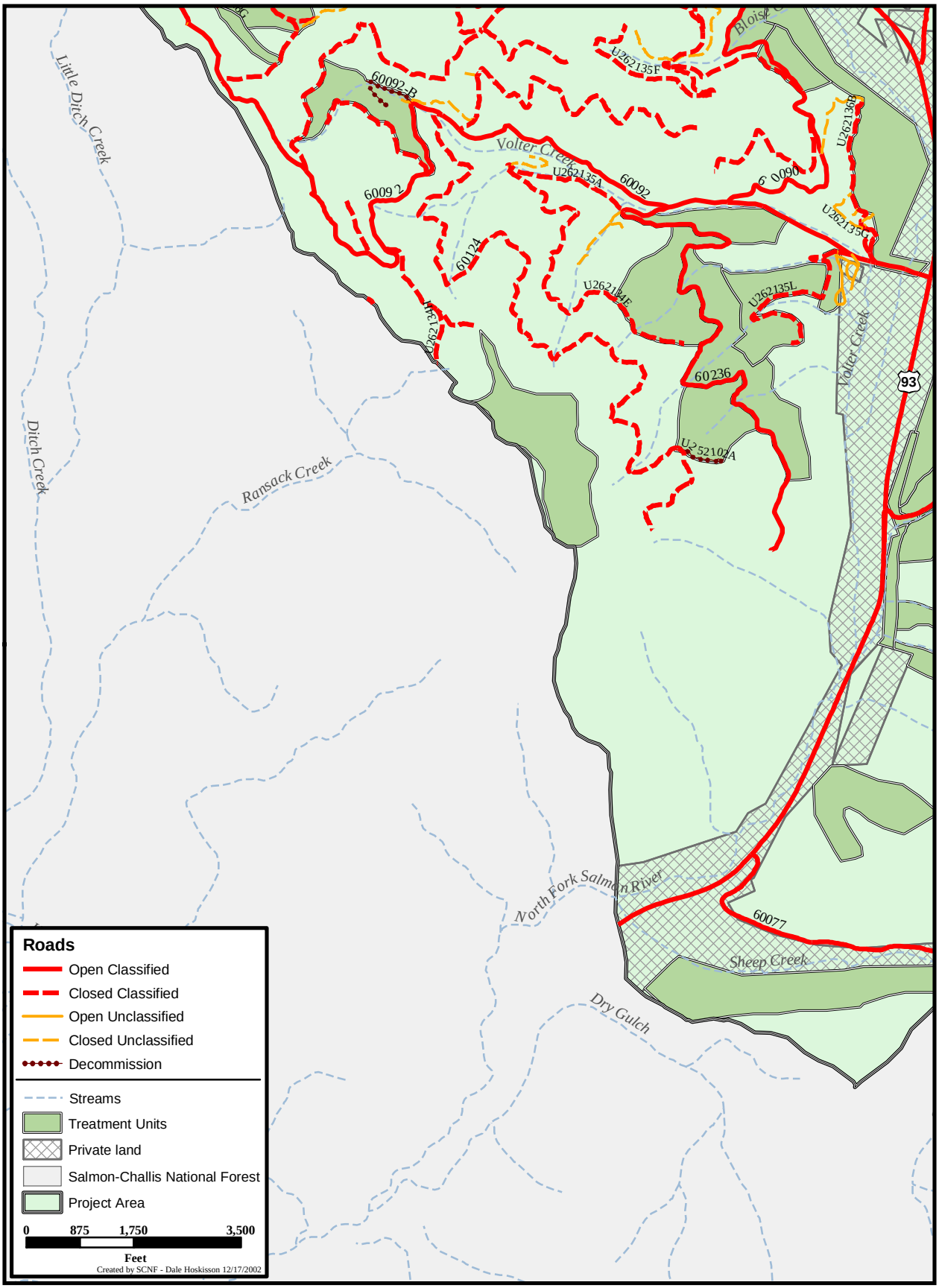
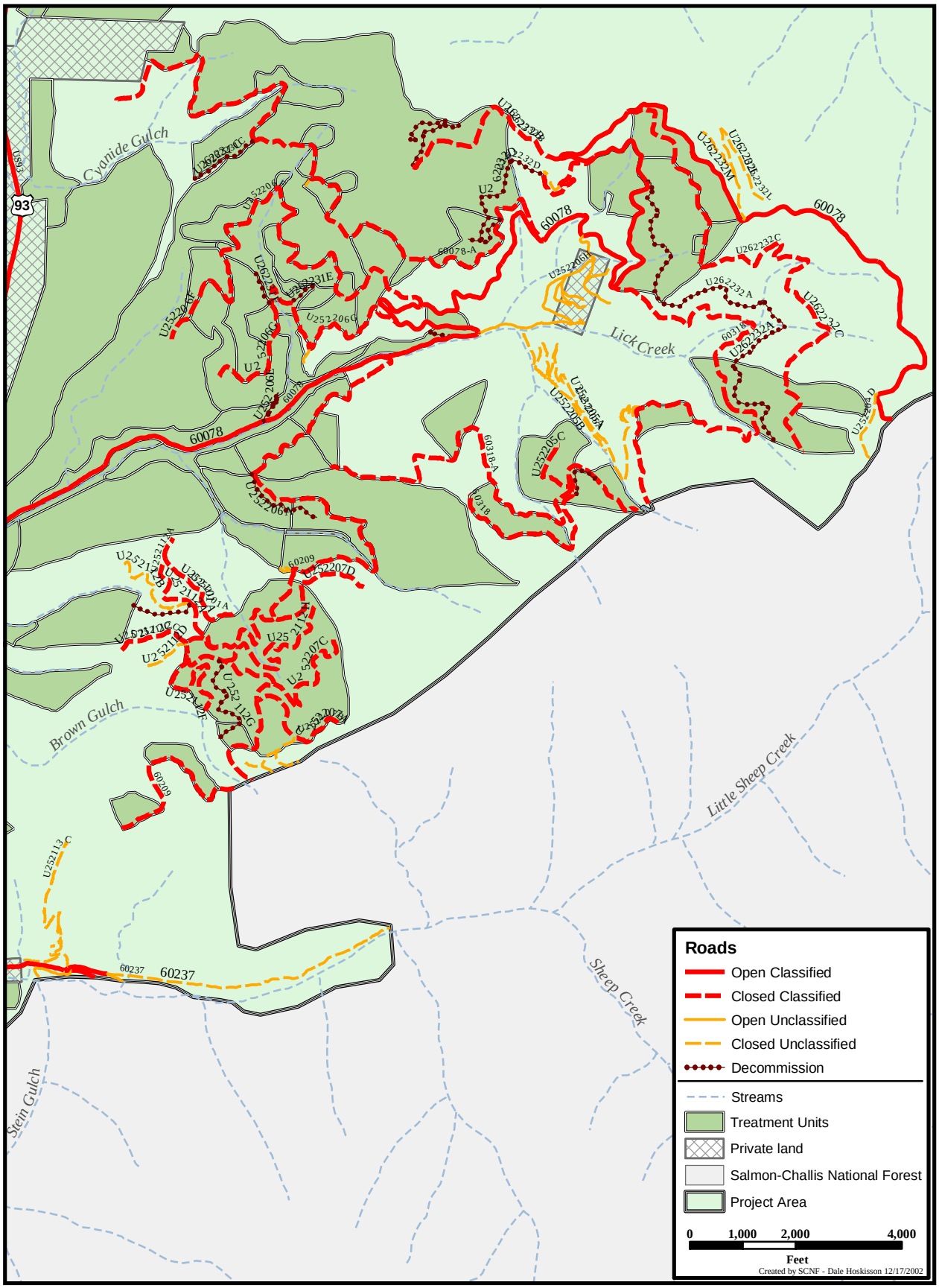
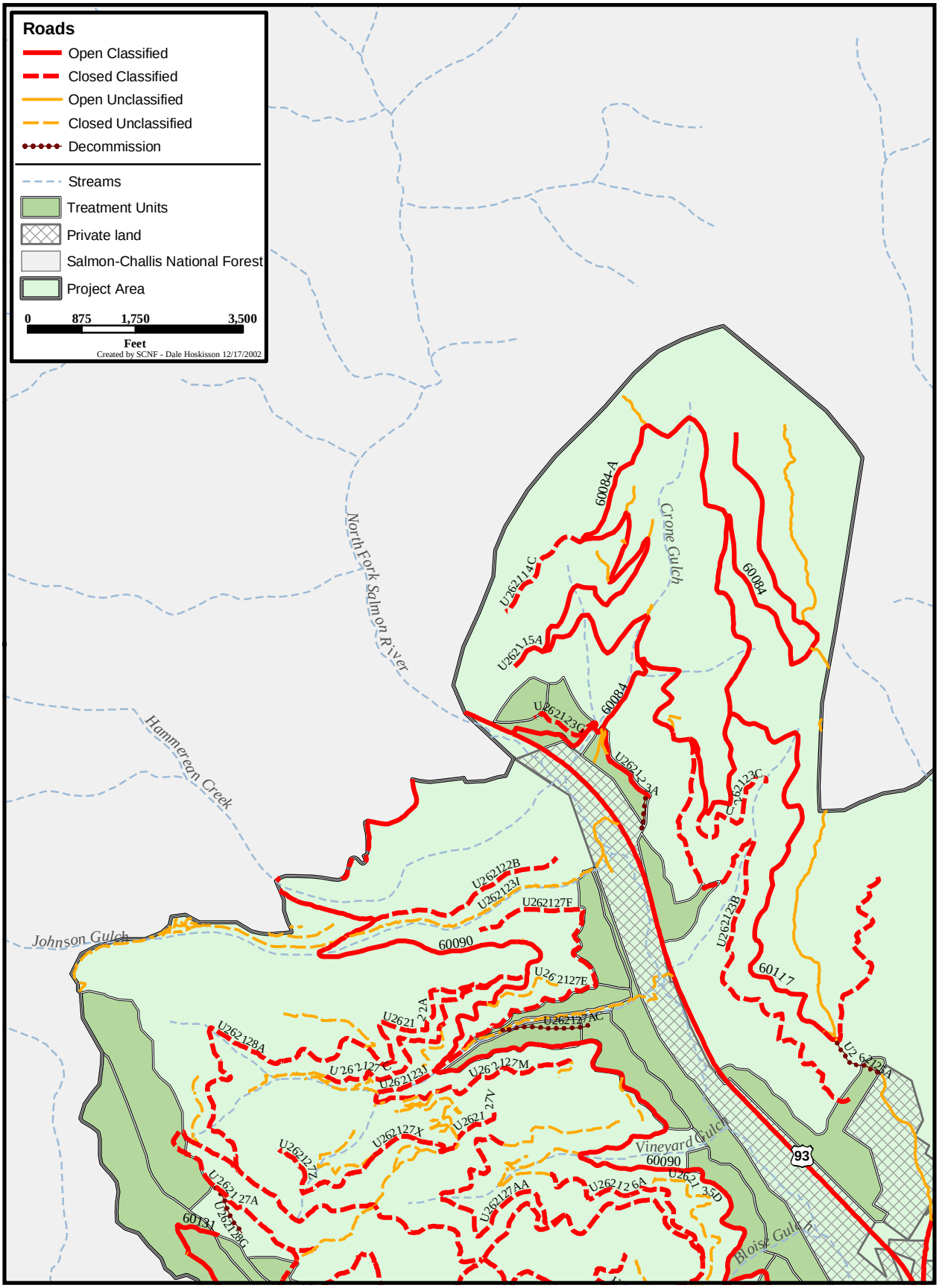
Map 28. *Alternative C Map 3*



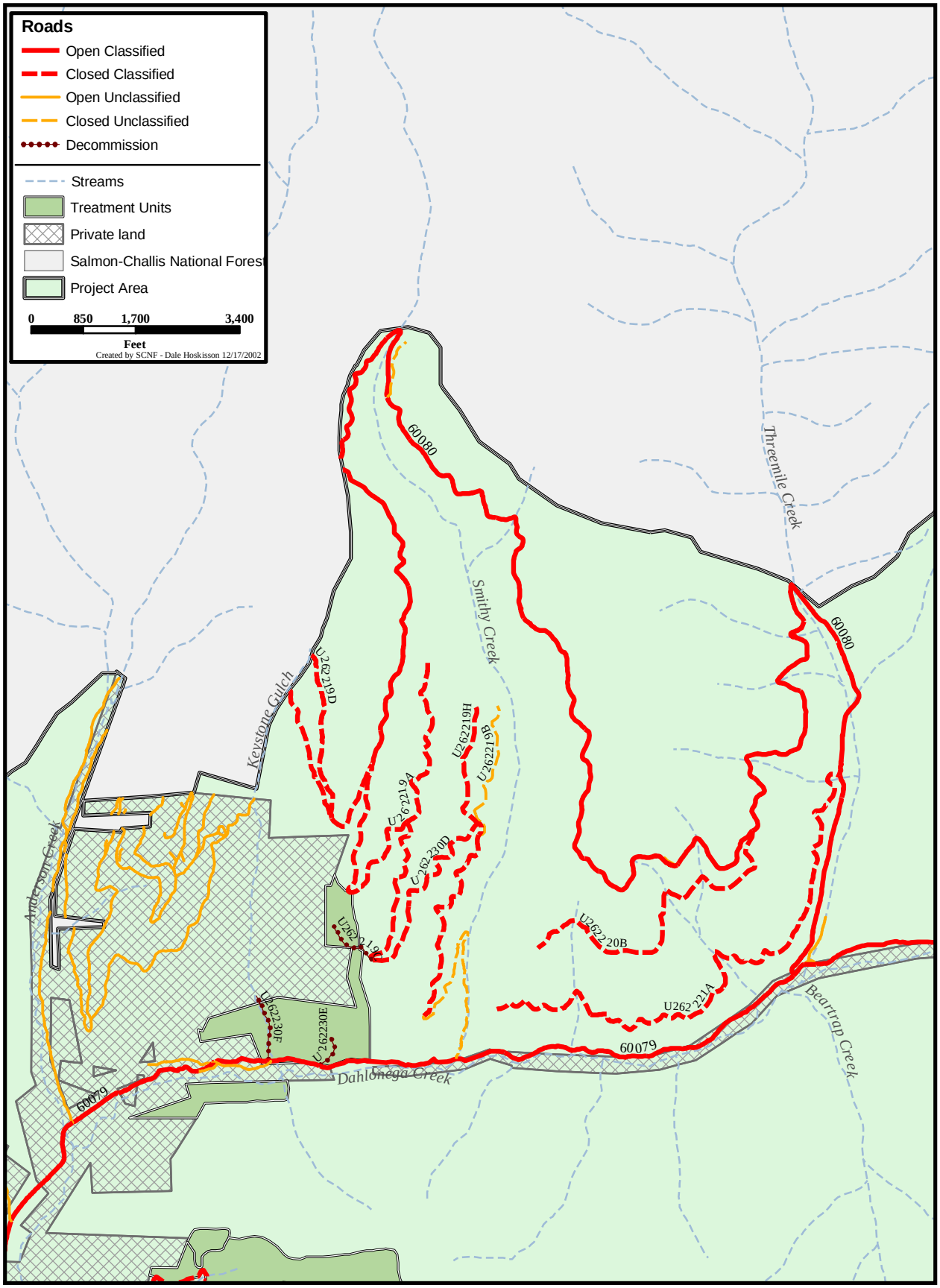
Map 29. *Alternative C Map 4*



Map 30. *Alternative D Map 1*



Map 31. *Alternative D Map 2*



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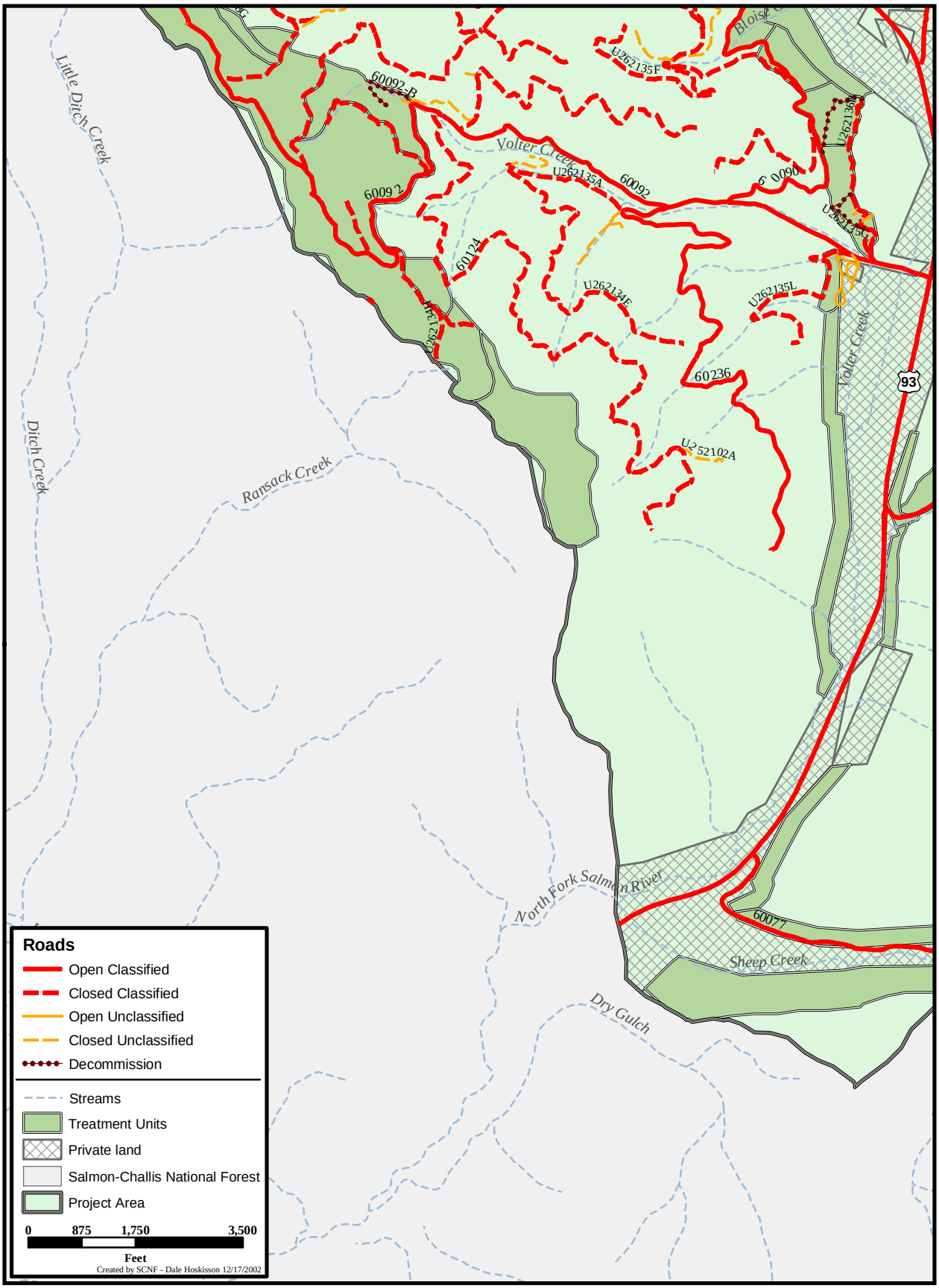
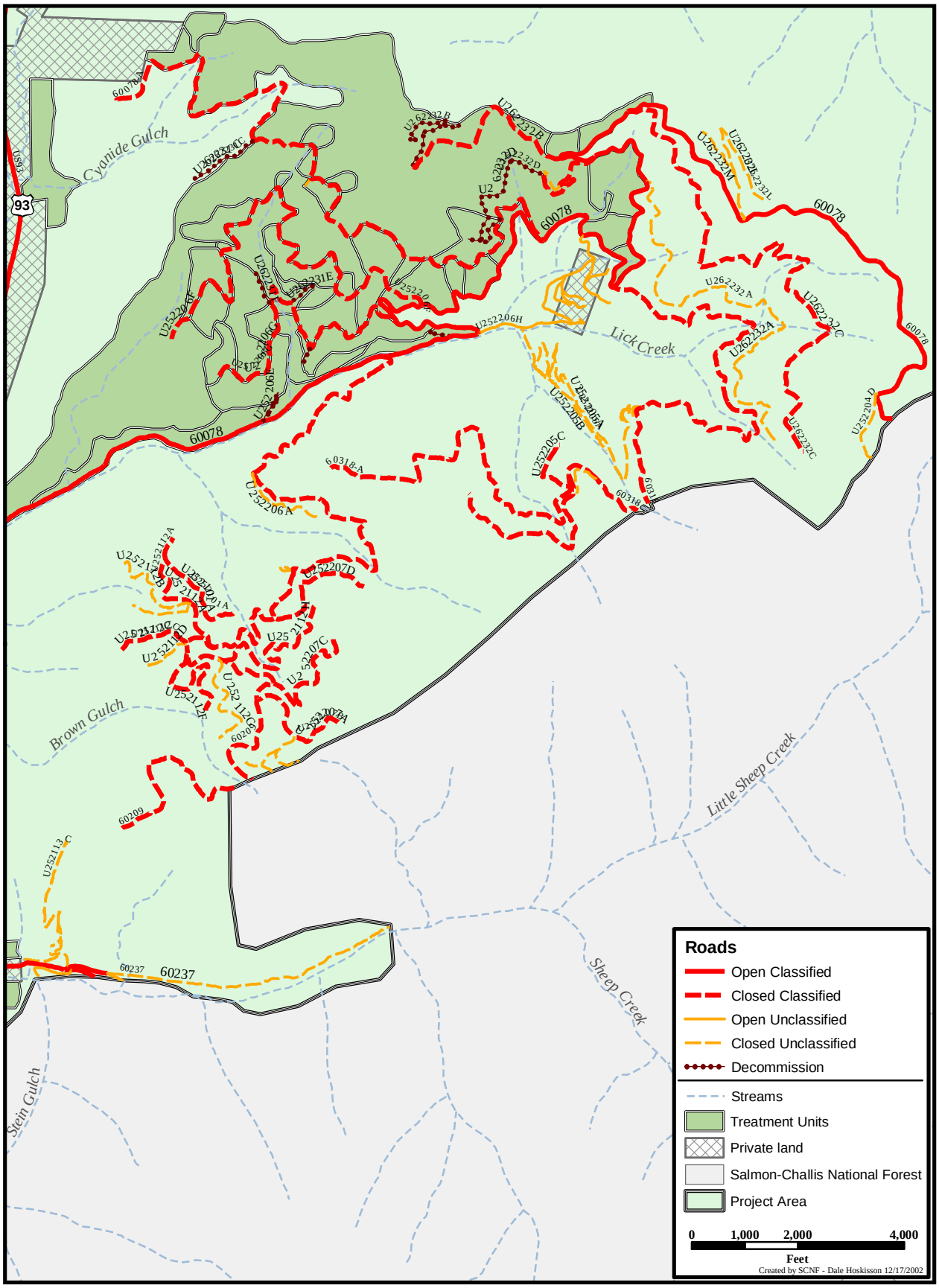
Map 32. *Alternative D Map 3*



Map 33. *Alternative D Map 4*



Appendix D

Cumulative Effects

Gibbonsville Wildland Urban Interface Fuels Reduction Project
November 2004

Appendix D.

Cumulative Effects

Described below are activities within the vicinity of the proposed Gibbonsville Wildland Urban Interface Fuels Reduction Project Area that have already or will likely occur in or near the project area. These activities may have environmental effects on resources relevant to the proposal and have been considered in the cumulative effects for the pertinent resources. How each activity cumulatively effects the resources is discussed below and are displayed in Tables D-1 through D-40.

Past Activities

Fire

Wildfire – Most of the fires were nonlethal and small in size. Since 1919, wildfires have burned mostly forested areas and the majority of the fires have averaged less than 10 acres in size. Total acres burned is 2,095.

Table D-1. ***Fire History***

Decade	Number of fires	Acres burned
1910-1920	13	65
1920-1930	48	240
1930-1940	90	450
1940-1950	39	195
1950-1960	39	195
1960-1970	77	385
1970-1980	44	220
1980-1990	37	185
1990-2000	32	160
Total	**419**	**2095**

Prescribed Fire

Several areas were burned after timber harvest on public land; see “Timber Sale History below. Some burning was conducted on private ground as land was being developed. The exact acres are unknown.

Timber Sales

Removal of small (less than 10 inches dbh) trees were cut to be used in mines. This most likely occurred adjacent to active mines. Total Acres cut within last 30 years is 10,693. Total acres cut at an unknown time or type of cut is 3,345.

In 2002, 300 hundred (300) acres were harvested on private land directly above the community of Gibbonsville. Activities included a seedtree cut, and slash piles at the landings. Whole trees were logged by tractor, skyline or helicopter.

Approximately 5 acres were harvested around homes in the Sheep Creek drainage.

Table D-2. ***Harvest History.***

Year	Acres Clearcut	Acres Shelterwood cut
1972	69	541
1974	6	2597
1975	121	64
1976	0	97
1977	0	50
1978	60	416
1979	199	46
1980	56	545
1981	22	0
1982	0	213
1983	177	607
1984	34	15
1985	18	321
1986	44	0
1991	0	345
1993	26	108
1995	0	20
1997	5	526
Total	**837**	**6511**

The timeframe for cumulative effectives analysis for timber harvest is from 1972 to 2010. Listed below are the timber sales from 1972 to present.

Table D-3. ***Timber Sale History.***

Timber Sale	Acres Cut	Type of Treatment	Slash Treatment
Deep Creek Power Pole. 1978 T26N R21E Secs 8,15	5	Unknown	Hand pile and burn slash
Anderson 3 Mile 1972	1035	305 Ac clearcut, 438 Ac overstory removal, 292 Ac Individual Tree	538 Ac tractor piled or windrow and burn. 100Ac jackpot burn

Table D-3, cont. ***Timber Sale History.***

Timber Sale	Acres Cut	Type of Treatment	Slash Treatment
Buster Gulch 1981	68	Unknown	24Ac tractor pile and burn
Buster Gulch 1982	35	Unknown	Unknown
Crone Gulch 1974 T26N R21E Secs 10,11,13,14,15,22,23,24,25,26	1268	90% tractor, 10% cable. 84% overstory removal, 13% seedtree, 3% clearcut.	553 tractor pile
Crone Gulch 1977 T26N R21E Sec. 23	35	Commercial Thin	30Ac machine pile
Cemetary Gulch 1976 T26N R21E Sec 27. T25N R21E Sec 2	40	Unknown	27 Ac machine pile and burn
Vineyard Gulch 1976	14	Individual tree cut	No slash treatment
Granite Mountain 1980.	137	Individual tree cut	20 Ac handpile and burn, 40 Ac machine pile and burn, 17 Ac broadcast burn
Lower Votler Creek T26N R21E Sec 34,35. T25N R21E Sec 2	56	Overstory removal	Lop and scatter
Compartment 40 1973 T26N R21E sec 27,28,33,34,35,36 T25N R21E Sec 2,3	135	Remove mistletoe infected trees	Unknown
Votler Creek 1972	135	Commercial Thin	Unknown
Votler Creek 1975 T26N R21E Sec 33,34,35	490	Individual Tree Removal	140 Ac jackpot pile
Thompson Gulch T26N R22E Sec 22,23,24	38	Individual Tree Removal	8 Ac machine piled and burned

Table D-3, cont. ***Timber Sale History.***

Timber Sale	Acres Cut	Type of Treatment	Slash Treatment
Lick Creek 1982	346	Clearcut and overstory removal. 129 Ac plant	Unknown
Lick Creek 1974 T25N R21E Sec 1, T25N R22e Sec 2,4,5,6,8 T26N R21E Sec 25, T26N R22E Sec 31,32,33	310	Individual tree removal. 43 Ac plant	182 Ac jackpot pile and burn. 8 Ac broadcast burn
Lick Creek 1978	146	Clearcut, 146 Ac plant	Unknown
Let's Stop 1977 T26N R21E Sec 36 T25N R21E Sec 1	18	Worthless Tree removal	Pile and burn

Mining

Placer mining first occurred in the project area in 1877 and some evidence of these historic activities remains today. Major placer operations were conducted along the North Fork River, Anderson Creek, Dahlonega Creek, Hughes Creek, and Three Mile Creek. In addition, many other creek segments were subject to more localized placer mining activities. In most cases the placer activities occurred on private land that was either homesteaded or patented because of its mineral potential.

The residual effects of the past placer activities vary greatly depending on the size of the operation and the placer method that was utilized i.e. a dredge, hydraulic giant, sluice etc. In many cases the placered areas have rehabilitated themselves to the point that the casual observer would not know they had been mined. In the most severe cases the stream channels that have re-established following mining are channels that are confined by placer tailings, and the streams can no longer access their historic floodplains. Piles of unconsolidated dredge tailings have replaced both riparian habitat and historic floodplains. While some vegetation has been re-established within the historic riparian area, portions of the flood plain may be barren in the placered area. (NOTE: There are no existing quantitative estimates or qualitative descriptions of the past placer disturbances within the project area).

Relatively rich lode deposits were discovered shortly after placer mining began in the area. Lode ores were milled with arrastras and later with stamp mills. Lode mining lasted much longer than placer mining and helped establish the permanence of Gibbonsville.

Evidence of past lode mining and exploration is scattered throughout the project area in the form of adits, waste dumps, old cabins and associated support structures and equipment. Residual environmental impacts/concerns associated with the lode mining are small when compared to the significantly altered riparian areas of the project area brought about by placer mining.

Livestock Grazing
Sheep Creek Allotment. Cattle and horse allotment that had 75 cow/calf pairs until 1980. Allotment has not been grazed since. A portion of the allotment is in the project area; north and east of Sheep Creek to the Montana boarder.

Firewood Cutting
Removal of standing or down dead trees in areas accessible by roads. Removal occurred over much of the accessible terrain. Both standing dead and down trees have been harvested.

Summer and Winter Motorized Recreation Use
Motorized vehicles drove anywhere that terrain and equipment allowed. New roads and motorized trails have been pioneered. Users have established dispersed campsites along the roads and in riparian areas. Vehicles, livestock and foot traffic have compacted the soil. Vegetation may be sparse and noxious weeds may be present.

Noxious Weed Treatments
Spray chemical 10 feet on either side of an open road to kill noxious weeds, primarily spotted knapweed. Approximately 200 acres have been treated along open roads. Thirty (30) acres were treated along the three-mile trail in the Nez Perce prescibed burn.

Private Land Development
Gibbonsville established in late 1877 as a mining town with populations exceeding 3000.

Hunting
The area has been opened to elk, deer and moose from September through December. Small game such as grouse are hunted as well as mountain lions and black bears in the spring and fall. There is not much control over access during hunting season

Special Use Permits
Unknown

Present Activities

Fire
No active wild or prescribed fires.

Timber Sales
Forty (40) acres of private land west of Highway 93 in Johnson Gulch is being helicopter logged. This is a seedtree cut.

Mining
Currently there are two approved plans of operation for gold exploration on National Forest Lands within the project area. The first operation is located in Cyanide Gulch. The Operator is in the process of opening three old adits in order to take samples for assay. The Operator is authorized to cut approximately 5 thousand board feet to be used as mine timbers.

The second operation is located in Vineyard Gulch. The Operator is in the process of opening one old adit in order to take samples for assay. An estimated 20-30 cubic yard of slough material has been excavated and placed in a waste dump in order to re-open the portal.

The Votler Pit is a public gravel pit located on National Forest lands approximately 500 feet from the North Fork of the Salmon River. The pit poses no threat to the River or its riparian area. The pit contains high quality gravel that is typically used for road surfacing. Material is typically removed with a front-end loader and dump truck between May and October.

Livestock Grazing
Indian Ridge Allotment. Cattle and horse allotment that has 140 cow/calf pairs. The grazing season is 5/23 to 10/30. A portion of the allotment lies within the project boundary from Votler Creek south.

Firewood Cutting
Removal along open roads.

Summer and Winter Motorized Recreation Use
Lick Creek area open to cross-country motorized use. Three mile to Anderson Creek is closed to cross-country motorized use after 8/25. Snowmobiles can go anywhere. New roads and motorized trails have been pioneered. Dahlonega road is a groomed snowmobile trail in the winter. Dispersed campsites continue to be used along roads and in riparian areas.

Noxious Weed Treatments
Treatment of known populations along open roads.

Private Land Development
Eighty-five (85) to 100 residents as well as a few businesses. New homes are being built on old mining claims surrounded by National Forest.

Hunting
Seasonal road closures and year-long road closures. Road 80 and Bloise Gulch road are open from 6/15 to 8/25 and closed during hunting season.

Special Use Permits

- Lick Creek. T25N, R21E, Sec 12. Domestic water source. Cement spring box with 600 feet of 1 1/4 inch buried pipe.

- Lick Creek. T24N, R21E, Sec 2. Domestic water source. Concrete spring box surrounded by 300 feet of protection fence. 125 feet of 1 inch pipeline.

- Crone Gulch. T26N, R21E, Sec 23. Domestic water source. Metal spring box with 800 feet of 1 1/2 inch buried pipe.

- Crone Gulch. T26N, R21E, Sec 23. Domestic water source. Metal spring box with 200 feet of 1 inch buried pipe.

- Crone Gulch. T26N, R21E, Sec 23. Domestic and livestock water source. Metal spring box with 400 feet of pipe above ground.

Future Activities

Fire
Potential for wildfire at any time with the amount of lightening strikes that hit the North Fork area. When and where the fire would start is unpredictable. Weather, topography and amount of fuels would determine how intense and severe a fire could be.

Prescribed Fire
The Gibbonsville Fuel Reduction project proposes to treat fuels through broadcast burning along with machine and had piling and burning. The acres proposed for prescribed burns vary by alternative. Prescribed fire proposed by the Gibbonsville project is designed to minimize and reduce the potential effects to the soils and water resources from an uncharacteristic wildfire.

Timber Sales
There is approximately 475 acres of private land scheduled for harvest within the project area. A combination of ground and helicopter harvest will be used to remove the trees. Harvest activities are scheduled in the following areas; about 160 acres around the Dahlonega and Nez Perce Creek confluence; 240 acres above the community of Gibbonsville; and 73 acres northwest of Gibbonsville and east of Highway 93.

Mining Operations
The Operators noted above have the option of submitting a new plan of operation for additional exploration activities or mining. In the event a new proposal is received all appropriate resources will be re-analyzed. The type of decision

document utilized i.e. Decision Memo, Environmental Assessment, etc. will depend upon the scope of the proposal and the associated issues.

A number of sources were contacted regarding the likelihood of any new mining on private lands in the near future. Those contacted included: Eric Wilson, Idaho Dept. of Lands; Paul Werner and Jim Riggins, long-time Gibbonsville residents and part-time miners; and Pete Peters, Salmon-Challis Mining Engineer and former Gibbonsville resident. These individuals have no knowledge of any new mining proposals.

In conclusion the project area is a place where gold has been historically found and produced. While it appears there are no new mining activities planned for the immediate future, it is really not a question of "if" any new activities will be initiated but "when."

Livestock Grazing
Existing permit holders will continue to graze livestock.

Firewood Cutting
Continue removal along open roads.

Summer and Winter Motorized Recreation Use
Same as present with an Increase in ATV users. Disperse campsites may increase.

Noxious Weed Treatments
Treatment of known populations along open roads.

Private Land Development
Potential growth with speculation on the ski hill and second home-owners buying or building a vacation home. Recreation visitors may increase.

Hunting
Same as present.

Granite Mountain Lookout Restoration
Restore lookout, maintain ¼ mile of road to lookout by graveling road. Construct 1/8 mile of foot trail from guard station to lookout. The lookout will be available for public rental.

Harvey Mill Site Highway Enhancement Project
Construct a rest stop and interpretive site at the mill site. Fence some areas, construct a turnout, install interpretive signs and possibly install a restroom.

Lick Creek Aspen Restoration
This project is located 10 miles north of North Fork along east side of Hwy 93 adjacent to road 78 in T25N, R21E, section 1. Enhance aspen communities to provide wildlife habitat and promote aspen as a structural component for native

species diversity across the landscape. Remove invading conifers from existing aspen stands, remove conifer within 100 feet of the existing aspen stands. Harvested trees moved across Lick Creek will be skidded on snow or temporary bridge material to protect streambanks. This would occur on 5 acres along one mile of Lick Creek. Fencing is needed to discourage existing and future aspen regeneration from ungulate browsing. Rock barriers may be placed within the meadow to direct recreational traffic away from regenerating aspen.

Cumulative Effects by Resource

The following discussions and tables disclose the effects of individual past, present and future projects for each resource discussed in Chapter 3.

Large High Severity Wildfire and Urban Interface

The analysis area for cumulative effects project area, since the surrounding landscape can affect fire behavior.

Past activities such as fire suppression and logging have changed the vegetative composition and structure within the project area, creating a situation where fire cannot play its natural role without seriously affecting the landscape. Given the current vegetative situation and a hot dry year, a fire has the potential to consume anything in its path, leaving a pattern of dead vegetation, abundant snags, and fewer ponderosa pines than desired. Heavy concentrations of down woody material will result once snags fall to the ground.

The following is a description of how past, present and future activities affect fuels and fire behavior:

Fire – Past wildfires have contributed to the current vegetative condition. The lack of fire due to suppression efforts has increased the amount of fine surface fuels, increased ladder fuels (especially in ponderosa pine-dominated stands) and increased the amount of large woody debris in some areas. Currently, no fires are allowed to burn in the area. Future wildfires may become unmanageable due to the high concentrations of fuels in the area and could burn with greater intensity than in the past.

Prescribed Fire – In the past, slash in logging units has been reduced by broadcast burning or by the piling and burning of slash. This has reduced surface fuels and large down woody material in those areas. No prescribed burns are currently planned for the area.

Timber Sales – Past cutting practices have contributed to the current state of forest vegetation. Timber sales reduced density of crowns, promoted stands of seedlings that are relatively “fire proof”, allowed Douglas-fir seedlings in the understory to grow into ladder fuels, and opened the stand canopy, thus allowing growth of grasses, forbs, and shrubs. This increased fine surface fuels. Currently, timber is being cut on private land, thinning crowns, removing the

ladder fuels and treating slash by piling and burning. Similar conditions would result on National Forest lands if an action alternative were implemented. No timber sales are planned in the area.

Mining – Historic mining created the current ownership pattern in the project area. Timber was cut near the mines for mining construction and firewood, creating the current vegetation state. No new vegetation treatments are planned in association with these mines. No new mines are planned.

Livestock Grazing – Grazing can reduce fine fuels such as grass that carry a fire. Past grazing practices greatly reduced fine fuels, preventing most fires from burning in the area. Current and future grazing practices can have the same effect.

Firewood Cutting – Past firewood cutting practices contributed to current fuel conditions. Firewood cutting within the next few years could increase the fine fuels as twigs and branches are left on the ground. Firewood cutting slightly reduces large down woody material, but not enough to greatly affect fire behavior.

Summer and Winter Motorized Recreation – These activities do not change fuel characteristics, amount or distribution, and do not affect fire behavior.

Noxious Weed Treatment – Past noxious weed treatment has no effect on fuel characteristics, amount or distribution. Current and future treatments may slightly increase flammability as vegetation dies, but overall causes no increase in fuels.

Private Land Development – Past development established the land ownership pattern within the project area. Current and future development would increase the need for urban interface protection from possible catastrophic fire.

Hunting – Hunting has no effect on fuel characteristics, amount, or distribution and therefore does not affect fire behavior. Hunters are a possible ignition source, especially in the autumn when vegetation has cured and is more susceptible to burning.

Special Uses – Special use activities have no effect on fuel characteristics, amount or distribution and therefore do not affect fire behavior.

Table D-4. *<u>Past</u> Cumulative Effects to Large High Severity Wildfire in the Urban interface for Alternatives B, C and D.*

Activities	Does Not Effect Urban Interface	Effects to Urban Interface
Past Activities		
Fires		Suppression of wildfires contributed to current condition.
Timber Sales		Contributed to fuel loadings and fuel continuity.
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest		Reduced ladder fuels, fuel loadings, and disrupted fuel continuity.
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development		Disrupted fuel continuity.
Hunting	X	
Special Use Permits	X	

Table D-5. *<u>Present</u> Cumulative Effects to Large High Severity Wildfire in the Urban interface for Alternatives B, C and D.*

Activities	Does Not Effect Urban Interface	Effects to Urban Interface
Present Activities		
Fires		Suppression of wildfires will contribute to current condition.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest		Firewood harvest will reduce fuel loadings and continuity.
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development		Will reduce fuel loadings and fuel continuity in immediate surroundings.
Hunting	X	
Special Use Permits	X	

Table D-6. *<u>Future</u> Cumulative Effects to Large High Severity Wildfire in the Urban interface for Alternatives B, C and D.*

Activities	Does Not Effect Urban Interface	Effects to Urban Interface
Future Activities		
Fires		Suppression of wildfires will contribute to future condition.
Timber Sales		Will contribute to fuel loadings and continuity if slash is not treated.
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest		Would reduce ladder fuels, fuel loadings, and fuel continuity.
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	

Table D-6, cont. *Future* Cumulative Effects to Large High Severity Wildfire in the Urban interface for Alternatives B, C and D.

Activities	Does Not Effect Urban Interface	Effects to Urban Interface
Private Land Development		Would disrupt fuel continuity, could also increase fuel loadings due to lack of fire.
Granite Peak Lookout Restoration	X	
Hunting	X	
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits	X	
Lick Creek Aspen Restoration		Could affect fuel loadings and continuity. Fuel loadings would increase if slash is not treated after treatment.

Forest Health

The analysis area for cumulative effects project area, since the surrounding landscape can affect fire behavior.

Activities that could affect Forest Health include fire, timber harvest, grazing, noxious weeds, private land development, and aspen restoration. Other activities such as mining operations are not expected to affect forest health.

Past activities such as fire suppression and logging have changed the vegetative composition and structure within the project area, creating a situation where wildfire under high fire danger situations cannot play its natural role without seriously affecting the landscape. Given the current vegetative situation and a hot dry year, a wildfire may kill even fire resistant trees, shrubs, and grasses, leaving a pattern of dead vegetation and unprotected soil surfaces. This situation would result in non-functioning ecosystems (unhealthy forests), producing soil damage, habitat loss, and heavy concentrations of down woody material (due to falling snags).

The following is a description of how past, present and future activities affect forest health:

Fire – Past exclusion of wildfires have contributed to the current vegetative condition. The lack of fire due to suppression efforts has increased the amount of fine surface fuels, increased ladder fuels and increased the amount of large woody debris in some areas. As a result, lethal fires are more likely in areas where historically fires would have been non-lethal. Currently, no wildfires are

allowed to burn in the area. Wildfires in the future may become unmanageable due to the high concentrations of fuels in the area and could burn with greater intensity than in the past, producing vast acres of lethal fire effects in historically non-lethal ecosystems.

Prescribed Fire – In the past, slash in some logging units has been reduced by broadcast burning or by the piling and burning of slash. This has reduced surface fuels and large down woody material in those areas, decreasing the risks of lethal fire damage to fire resistant overstory trees. No prescribed burns are currently planned for the area.

Timber Sales – Past cutting practices have contributed to the current state of forest vegetation. Timber sales reduced density of crowns, which reduces the risk of an overstory crown fire, allowed Douglas-fir seedlings in the understory to grow into ladder fuels, and opened the stand canopy, thus allowing growth of grasses, forbs, and shrubs. Where ladder fuel stocking is dense, and where logging slash was left against the base of the overstory trees, there is a higher risk of lethal wildfires in non-lethal fire ecosystems. In harvest areas where ladder fuels are at lower stocking densities, and logging slash was adequately treated the risk of lethal wildfire has been reduced. Currently, timber is being cut on private land, thinning crowns, removing the ladder fuels and treating slash by piling and burning. Similar conditions would result on National Forest lands if an action alternative were implemented. No timber sales are planned in the area.

Livestock Grazing – Grazing reduced fine fuels such as grass that carry a fire. Past grazing practices greatly reduced fine fuels (grass), preventing most grass wildfires from burning in the area. Wildfires historically burnt as surface fires burning through the grasses. These fires would greatly reduce the number of tree seedling, preventing dense accumulations of ladder fuels that facilitate uncharacteristic lethal wildfires. Current and future grazing practices could have the similar effects depending on intensity and timing of the grazing.

Noxious Weed Treatment – Past noxious weed treatment have reduced the spread of noxious weeds or delayed their spread rate in some areas. Current and future treatments may maintain or increase forest health characteristics.

Private Land Development – Past development established the land ownership pattern within the project area. Current and future development would thin the forest and may reduce the rate of crown fire spread.

Lick Creek Aspen Restoration – This treatment will improve the health of the aspen clone and contributing to the areas forest health. By reducing competition from conifers within and surrounding the aspen clone, the aspen clone will be stronger and healthier.

Table D-7. *Past* Cumulative Effects to Forest Health for Alternatives B, C and D.

Activities	Does Not Effect Forest Health	Effects to Forest Health
Past Activties		
Fires		Fire suppression has contributed to the current condition.
Timber Sales		Contributed to current condition.
Mining Operations	X	
Livestock Grazing		Contributed to current condition.
Firewood Harvest	X	.
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development		Contributed to current condition.
Hunting	X	
Special Use Permits	X	

Table D-8. *Present* Cumulative Effects to Forest Health for Alternatives B, C and D

Activities	Does Not Effect Forest Health	Effects to Forest Health
Present Activities		
Fires		Suppression of wildfires contribute to current condition
Timber Sales		Contributes to current condition.
Mining Operations	X	
Livestock Grazing		Contributes to current condition.
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments		Contributes to current condition.

Table D-8, cont. ***Present*** ***Cumulative Effects to Forest Health for Alternatives B, C and D***

Activities	Does Not Effect Forest Health	Effects to Forest Health
Private Land Development		Contributes to current condition.
Hunting	X	
Special Use Permits	X	

Table d-9. ***Future*** ***Cumulative Effects to Forest Health for Alternatives B, C and D***

Activities	Does Not Effect Forest Health	Effects to Forest Health
Future Activities		
Fires		Contributes to forest health condition.
Timber Sales		Contributes to forest health condition.
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments		Contributes to forest health condition.
Private Land Development		Contributes to forest health condition.
Granite Peak Lookout Restoration	X	
Hunting	X	
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits	X	
Lick Creek Aspen Restoration		Contributes to forest health condition.

Water Quality

Ongoing and proposed activities that could affect water resources include wildfire, timber harvest, mining operations, livestock grazing, motorized recreation, noxious weed treatments, private land development and aspen restoration. Other listed activities such as firewood gathering are not expected to affect water resources.

The risk of adverse cumulative watershed effects was calculated for each subwatershed in the analysis area. Table 3-12 displays a summary of the risk ratings.

One hundred thirteen (113) wildfires averaging less than 10 acres in size have occurred in the project area within the past 30 years. Most of these were small in size due to aggressive fire control. Because these fires did not kill the overstory, they did not contribute to the overall ECA of the subwatersheds and would not affect the timing and quantity of water yield.

Past timber sales up to 30 years old were included in ECA calculations (Table 3-10). Future harvesting is proposed on 300 acres of private land. The proposed harvest will increase the ECA and road density in the Dahlonega and Anderson subwatersheds. Increases in ECA and road density associated with this harvest will not change the overall watershed risk rating from a low rating, but an increase in sediment delivery to Dahlonega and Anderson Creeks is possible. The increased ECA may also affect the timing and quantity of water yield.

Effects from mining activities are expected to be small. Past mining activities are presently stable and vegetated and do not negatively affect critical components. The two active mining claims are both adits with little above ground activity.

Livestock grazing may degrade water quality if allotments are not properly managed. Observations of grazing on the Sheep Creek allotment have not detected degraded water quality. The area from Votler Creek south is within the Indian Ridge allotment, which has 140 cow/calf pairs. Livestock grazing is not expected to adversely effect water quality if the annual operating plan is followed and forage utilization standards are meet.

Cross-county motorized use is allowed in portions of the project area where new roads and motorized trails have been pioneered. Localized water quality degradation occurs when these trails cross streams. Pioneered roads and trails increase road density and may increase cumulative effects.

Noxious weed treatments in the project area can affect water quality by killing streamside vegetation and reducing the effectiveness of the filter strips. If procedures found in the *Programmatic Biological Assessment of Effects of 2002 Herbicide treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest* (USDA Forest Service, 2002) are followed, no increased adverse affects to water quality are expected.

Private land development will probably increase in the area, which could increase road density and ECA. The extent or effects of this potential activity are unknown.

The Lick Creek Aspen Restoration project proposed on five acres along Lick Creek has the potential to slightly increase ECA and the risk of cumulative watershed effects in the Lick creek subwatershed. Harvesting over snow as proposed would minimize soil disturbances and indirect effects to water quality.

The action alternatives will not change the cumulative effects risk rating for any subwatersheds. Vegetation treatments will only slightly change the ECA, and the reduction of road densities is not high enough to change the overall rating. Therefore cumulative effects to water resources are essentially the same as those described for the No Action Alternative. Ongoing and proposed activities are not expected to affect water quality or beneficial uses.

The watershed risk ratings will not change with the proposed activities (Table 3-12). However, the road densities and ECAs will be affected (Tables 3-10 and 3-11). The increases in ECA associated with the proposed activities will not exceed 20 percent and will therefore not affect the magnitude and timing of runoff from the project watersheds (Stednick, 1996).

Table D-10. *Past Cumulative Effects to Water Quality for Alternatives B, C and D.*

Activities	Does Not Effect Water Quality	Effects to Water Quality
Past Activities		
Fires	< 1% of project area burned, fires less then 10 acres.	
Timber Sales		Increase in ECA and road density with an increase in potential for stream sedimentation.
Mining Operations		Change in channel morphology.
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter		Increase road density, minor localized sedimentation at stream crossings.
Noxious Weed Treatments		
Private Land Development	X	
Hunting	X	
Special Use Permits	X	

Table D-11. *Present* Cumulative Effects Water Quality for Alternatives B, C and D.

Activities	Does Not Effect Water Quality	Effects to Water Quality
Present Activities		
Fires	X	
Timber Sales		Increased ECA, and potential stream sedimentation
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter		Increased road density, minor localized sedimentation at stream crossings.
Noxious Weed Treatments	X	
Private Land Development		Slight potential to increase ECA
Hunting	X	
Special Use Permits		Consumptive use of water.

Table D-12. *Future* Cumulative Effects to Water Quality for Alternatives B, C and D.

Activities	Does Not Effect Water Quality	Effects to Water Quality
Future Activities		
Fires		Severe wildfire would increase potential for sedimentation and would increase ECA.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter		Increased road density, minor localized sedimentation at stream crossings.
Noxious Weed Treatments		Slight potential to increase ECA.
Private Land Development	X	

Table D-12, cont. ***Future Cumulative Effects to Water Quality for Alternatives B, C and D.***

Activities	Does Not Effect Water Quality	Effects to Water Quality
Granite Peak Lookout Restoration	X	
Hunting	X	
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits		Consumptive use of water
Lick Creek Aspen Restoration		Slight increase in ECA

Soil Productivity

Ongoing and proposed projects and activities that could affect detrimental soil disturbance, total soil resource commitments and long-term soil productivity include timber harvesting, livestock grazing, firewood removal, mining operations, development of private land, dispersed recreation and aspen restoration.

During the past several years, about 300 acres of timber have been harvested on private land in the vicinity of Keystone Gulch. Bulk density samples collected from skid trails in the area showed that the soil was not detrimentally compacted. Soil displacement was apparent resulting in about 30 acres of detrimental soil disturbance. An additional 40 acres of private land are currently being helicopter logged and another 773 acres of harvest on private land could occur within the next several years. Since the amount of tractor logging and skyline logging have not yet been determined, detrimental soil disturbances were calculated assuming that all acres would be tractor logged. It is not known if any permanent roads would be constructed as part these operations, therefore it is not possible to determine if total resource commitments from roads would increase. If an adequate level of coarse woody material were not retained on the site, long-term soil productivity would be reduced within theses harvested area.

A portion of the Indian Ridge Cattle and Horse allotment is located within the project area south of Votler Creek. No detrimental soil disturbances from excessive grazing were observed during field reviews of the area in the fall of 2001 and in the spring of 2002. Compliance with grazing standards determined in the annual operating plan should prevent any detrimental soil disturbance.

Firewood removal and dispersed recreation are expected to slightly increase the level of detrimental soil disturbances by increasing compaction and displacement. Off-road, all-terrain vehicle (ATV) use, very popular form of recreation, is expected to increase soil compaction and erosion on localized areas. Total resource commitments are not expected to increase, although

coarse woody material that contributes to long-term soil productivity may be slightly reduced by firewood removal.

No mining operations that would increase detrimental disturbances or total resource commitments are proposed within the project area.

Development of private land is expected to increase within the project area, increasing the level of total resource commitments from roads. Soil disturbances will be minor and temporary during building construction, and no long-term adverse effects to soil resources are anticipated.

A proposed aspen restoration project in the Lick Creek drainage will not increase detrimental disturbances, total resource commitments, or reduce long-term soil productivity. Encroaching conifers will be removed from an existing aspen stand and skidded over snow. Monitoring of soil disturbances on an aspen restoration project in the Moccasin Creek drainage showed that skidding over snow protected the soil from compaction and erosion, and protected the roots of the aspen clone from mechanical damage (Gallogly, 2001). Adequate coarse woody material will be retained on-site for long-term soil productivity.

When considering the cumulative effects of harvest on private land, the level of detrimental soil disturbances calculated within the project area for action alternatives B, C, and D are 6.76%, 5.97% and 5.35% respectively.

Table D-13. *Past Cumulative Effects to Soil Productivity for Alternatives B, C and D.*

Activities	Does Not Effect Soil Productivity	Effects to Soil Productivity
Past Activities		
Fires	X	
Timber Sales		Calculated level of detrimental soil disturbances from timber sales could be as much as 6.5% of activity area. Total soil resource commitments are 1.58% of activity area.
Mining Operations		Most on private land. Quantifiable estimates not available.
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter		Minor soil compaction in localized areas from motorized recreation during summer.

Table D-13, cont. ***Past Cumulative Effects to Soil Productivity for Alternatives B, C and D.***

Activities	Does Not Effect Soil Productivity	Effects to Soil Productivity
Noxious Weed Treatments	X	
Private Land Development		Increased total soil resource commitment.
Hunting	X	
Special Use Permits	X	

Table D-14. ***Present Cumulative Effects to Soil Productivity for Alternatives B, C and D.***

Activities	Does Not Effect Soil Productivity	Effects to Soil Productivity
Present Activities		
Fires	X	
Timber Sales		Increased detrimental soil disturbances and total soil resource commitment.
Mining Operations		Minor, temporary increases of detrimental soil disturbances and total resource commitments; will be mitigated by reclamation.
Livestock Grazing	X	
Firewood Harvest		Slight increase in detrimental soil disturbances.
Motorized Recreation, both Summer and Winter		Minor soil compaction in localized areas from motorized recreation during summer.
Noxious Weed Treatments	X	
Private Land Development		Temporary increases in detrimental soil disturbances. Increased total soil resource commitment.
Hunting	X	
Special Use Permits	X	

Table D-15. *Future* Cumulative Effects to Soil Productivity for Alternatives B, C and D.

Activities	Does Not Effect Soil Productivity	Effects to Soil Productivity
Future Activities		
Fires		Severe wildfire would increase erosion potential and soil displacement.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest		Minor localized soil disturbance.
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development		Potential to increase detrimental soil disturbances and total resource commitments.
Granite Peak Lookout Restoration	X	
Hunting	X	
Harvey Mill Site Highway Enhancement Project		Minor, temporary soil disturbance during construction.
Special Use Permits	X	
Lick Creek Aspen Restoration	X	

Forest Products

Ongoing and proposed projects and activities that could affect forest products include timber harvest, firewood gathering and aspen regeneration.

Forest vegetation changed substantially during the twentieth century. Tree numbers (stocking density) increased with a consequent decline in vigor and growth. Within the Douglas-fir habitat types, the more shade tolerant Douglas-fir is the dominant species in many of the largely natural stands where ponderosa pine is a major component in the overstory (District exam information). Endemic levels of insects and disease are observable throughout the area. In the absence of sizeable disturbances, current trends are expected to continue, with stocking levels increasing, vigor and growth declining, insect activity increasing, and Douglas-fir replacing ponderosa pine.

Ongoing and proposed projects and activities that could affect the availability of Forest Products include timber harvesting of Douglas fir and ponderosa pine from approximately 300 acres on private land in the vicinity of Keystone Gulch. An additional 40 acres of private land is currently being helicopter logged and another 400 acres of harvest on private land is expected to occur within the next year. On Forest Service land both down and standing dead trees have been, and will continue to be removed as personal use firewood from accessible areas along open roads. Some wood products may be removed from a proposed aspen restoration project in the Lick Creek drainage where encroaching conifers would be removed from an existing aspen stand.

Table D-16. *Past* Cumulative Effects to Forest Products for Alternatives B, C and D.

Activities	Does Not Effect Forest Products	Effects to Forest Products
Past Activities		
Fires		1130 acres burned since 1970.
Timber Sales		10,693 acres logged since 1972.
Mining Operations		Removal of 10 ccf Douglas fir from mine timbers.
Livestock Grazing	X	
Firewood Harvest		Removal of dead wood along roads.
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development	X	
Hunting	X	
Special Use Permits	X	

Table D-17. *Present* Cumulative Effects to Forest Products for Alternatives B, C and D.

Activities	Does Not Effect Forest Products	Effects to Forest Products
Present Activities		
Fires		Risk of stand destroying wildfire greater than historic.
Timber Sales	X	
Mining Operations	X	

Table D-17, cont. ***Present Cumulative Effects to Forest Products for Alternatives B, C and D.***

Activities	Does Not Effect Forest Products	Effects to Forest Products
Livestock Grazing	X	
Firewood Harvest		Removal of dead wood along roads.
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development	X	
Hunting	X	
Special Use Permits	X	

Table D-18. ***Future Cumulative Effects to Forest Products for Alternatives B, C and D.***

Activities	Does Not Effect Forest Products	Effects to Forest Products
Future Activities		
Fires		Probable major effect on forest health
Timber Sales		400 acres of logging on private ground.
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest		Removal of dead and down wood along roads.
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development	X	
Granite Peak Lookout Restoration	X	
Hunting	X	
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits	X	
Lick Creek Aspen Restoration		Remove conifers to increase aspen on 5 acres.

Air Quality

Ongoing and proposed activities that could affect air quality include wildfire, timber harvest, and private land development. Approximately 113 wildfires averaging less than 10 acres in size have occurred in the project area within the last 30 years. Most of these fires were non lethal and small in size due to aggressive fire management. Future wildfires will also affect air quality on a local and landscape level.

In the past 30 years, timber sales have harvested approximately 10, 693 acres within the project area. Along with these acres, and additional 3,345 acres have been cut at an unknown time. At the present time, approximately 40 acres is being harvested on private land in Johnson Gulch.

Future timber harvest is proposed on approximately 475 acres of private land. The proposed harvest is described as seed tree cuts where whole trees will be logged using tractor, skyline or helicopter logging systems. Slash will be burned at the landings. Future timber harvest on both private and federal lands will affect air quality.

Effects from mining, livestock grazing, cross country motorized use, noxious weed treatments, and aspen regeneration are of little or no influence on air quality.

Table D-19. ***Past Cumulative Effects to Air Quality for Alternatives B, C and D.***

Activities	Does Not Effect Air Quality	Effects to Air Quality
Past Activities		
Fires	X	
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development	X	
Hunting	X	
Special Use Permits	X	

Table D-19. *Present* Cumulative Effects to Air Quality for Alternatives B, C and D.

Activities	Does Not Effect Air Quality	Effects to Air Quality
Present Activities		
Fires	X	
Timber Sales		Dust from timber sales, smoke from prescribed burning has affected air quality.
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development		Burning on private land does affect air quality in the short term.
Hunting	X	
Special Use Permits	X	

Table D-20. *Future* Cumulative Effects to Air Quality for Alternatives B, C and D.

Activities	Does Not Effect Air Quality	Effects to Air Quality
Future Activities		
Fires		Suppression of wildfires will affect air quality in the future.
Timber Sales		Burning of logging slash will affect air quality.
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development		Burning on private land may affect air quality in the short term

Table D-20. *Future Cumulative Effects to Air Quality for Alternatives B, C and D.*

Activities	Does Not Effect Air Quality	Effects to Air Quality
Granite Peak Lookout Restoration	X	
Hunting	X	
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits	X	
Lick Creek Aspen Restoration	X	

Visual Quality

No indirect or cumulative effects on the visual resource related to management activities would occur under any of the action alternatives. The natural appearing, forested setting will be maintained in all of the action alternatives.

Table D-21. *Past Cumulative Effects to Visual Quality for Alternatives B, C and D.*

Activities	Does Not Effect Visual Quality	Effects to Visual Quality
Past Activities		
Fires	X	
Timber Sales		Past timber harvest has created a few unnatural openings.
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development		Past development of private land has converted natural appearing forest land to rural subdivisions.
Hunting	X	
Special Use Permits	X	

Table D-22. *Present* Cumulative Effects to Visual Quality for Alternatives B, C and D.

Activities	Does Not Effect Visual Quality	Effects to Visual Quality
Present Activities		
Fires	X	
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development		Present development of private land has converted natural appearing forest land to rural subdivisions.
Hunting	X	
Special Use Permits	X	

Table D-23. *Future* Cumulative Effects to Visual Quality for Alternatives B, C and D.

Activities	Does Not Effect Visual Quality	Effects to Visual Quality
Future Activities		
Fires	X	
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments	X	
Private Land Development		Future development of private land will converted natural appearing forest land to rural subdivisions.

Table D-23. *Future* Cumulative Effects to Visual Quality for Alternatives B, C and D.

Activities	Does Not Effect Visual Quality	Effects to Visual Quality
Granite Peak Lookout Restoration	X	
Hunting	X	
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits	X	
Lick Creek Aspen Restoration	X	

Inventory Roadless Area

The analysis area for cumulative effects is the 18,100 acre Anderson Mountain Roadless Area (IRA).

Past activities such as fires, timber harvest, firewood gathering, motorized recreation, and noxious weed treatment have contributed to the current condition in the roadless area.

There have been numerous small fires in the IRA since the early 1900s. Most of which have been less then 100 acres. One of the largest fires in the roadless area was in the 1930's, which burned approximately 2,500 acres in the Nez Perce Creek drainage.

A prescribed burn in the spring of 1978 was conducted in the West Fork of Nez Perce Creek. The objective of burn was to enhance wildlife forage.

Fire suppression activities since the early 1900's have altered the vegetative structure in the Roadless Area (USDA Forest Service, 1998). In some areas, ponderosa pine stands are being converted to Douglas fir. At the higher elevations, lodge pole and white bark pine stands are gradually being replaced with subalpine fir. The lack of fire is allowing trees to encroach into open shrublands. In some areas of the IRA, the lack of fire has left high accumulations of fuels on the ground as well as reduced forest health due to overstocking of tree stands (USDA Forest Service, 1998).

Timber harvest occurred on 296 acres prior to the area being designated as roadless. Harvest units consisted of clear-cuts or shelterwood-cuts.

About 2 miles of road are located within the roadless area. Approximately 1.5 miles of road are associated with old harvest units. Travel on the 1.5 miles of road is restricted from August 25 through June 15. Another .5 mile of road is located on Anderson Butte. This road was built to access a lookout on the butte.

The lookout no longer exists but the road is still open to public travel (motorize recreation, firewood gathering, etc.).

There are approximately 25 miles of trail within the IRA. Of the total miles in the IRA, ten are open to motorized use. Motorized trials include Trail # 122, 123, and 124. Trial #122 is on the ridge between the West Fork of Anderson Creek and the main stem of Anderson Creek. Trail #123 is on the ridge between Anderson Creek and Smitty Creek. Trail #124 is on the ridge between Three Mile Creek and the West Fork of Nez Perce Creek.

Much of the open shrublands in the IRA are infested with noxious weeds, primarily spotted knapweed (Haggas, 2002). Noxious weed treatment in the IRA occurred from 1998 through 2000. Treated areas included the lower elevations of the south facing slopes between Three Mile Creek, the West Fork of Nez Perce Creek and Nez Perce Creek.

Present and future activities that have the potential to affect the current condition of the IRA include fire, motorized use, and noxious weed treatments.

Suppression of wildfire will continue to have a cumulative effect on the species composition of timber stands. Fire resistant stands such as mature ponderosa pine will continue to be converted to less fire resistant stands of Douglas fir. Mature stands of fire resistant lodgepole pine and white bark will continue to be converted to subalpine fir. There will be a greater risk of uncharacteristic wildfire within the IRA due to the altered fire resistance of stands.

Motorized recreation will continue to occur on the existing travel routes within the IRA. Restrictions or additions of travel routes will require a Forest Plan Amendment or would need to be addressed in the future travel management planning efforts.

Noxious weeds, if not treated, will continue to have a cumulative effect through increased infestations and reduction of native vegetation. Treatments will not eliminate noxious weeds, but the rate of spread may be reduced and the weeds may be confined or contained to certain areas.

Table D-23. *Past* Cumulative Effects to Inventory Roadless Area (IRA) for Alternatives B, C and D.

Activities	Does Not Effect IRA	Effects to IRA
Past Activities		
Fires		Suppression of wildfires contributed to present condition
Timber Sales		In 1978, 142 acres were harvested as a shelterwood. Contributed to current condition.

Table D-23, cont. ***Past* Cumulative Effects to Inventory Roadless Area (IRA) for Alternatives B, C and D.**

Activities	Does Not Effect IRA	Effects to IRA
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest		Contributed to current condition.
Motorized Recreation, both Summer and Winter		Contributed to current condition.
Noxious Weed Treatments		Treatment of noxious weeds from 1998 to 2000.
Private Land Development	X	
Hunting	X	
Special Use Permits	X	

Table D-24. ***Present* Cumulative Effects to Inventory Roadless Area (IRA) for Alternatives B, C and D.**

Activities	Does Not Effect IRA	Effects to IRA
Present Activities		
Fires		Suppression of wildfires will continue to contribute to present condition.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter		Current motorized use will continue to affect the present condition.
Noxious Weed Treatments		Current treatments will continue to affect the present condition.
Private Land Development	X	
Hunting	X	
Special Use Permits	X	

Table D-25. *Future Cumulative Effects to Inventory Roadless Area (IRA) for Alternatives B, C and D.*

Activities	Does Not Effect IRA	Effects to IRA
Future Activities		
Fires		Wildfires could affect the roadless characteristics.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments		If not treated, infestation will increase.
Private Land Development	X	
Granite Peak Lookout Restoration	X	
Hunting	X	
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits	X	
Lick Creek Aspen Restoration	X	

Unroaded Areas

Past activities such as fires, fire suppression, motorized recreation, and noxious weed treatment have contributed to the current condition in the unroaded areas.

There have been numerous small fires within the Gibbonsville project area. Some of these fires no doubt occurred in the unroaded areas contiguous with the IRAs. These fires have contributed to the current vegetative conditions.

Fire suppression activities since the early 1900's have altered the vegetative structure. In some areas, ponderosa pine stands are being converted to Douglas fir. At the higher elevations, lodge pole and white bark pine stands are gradually being replaced with subalpine fir. The lack of fire is allowing trees to encroach into open shrublands. In some areas of the lack of fire has left high accumulations of fuels on the ground as well as reduced forest health due to overstocking of tree stands.

Although off road motorized recreation is allowed within the project area, use in the unroaded areas is virtually non-existent due to the steepness of the terrain.

Noxious weed infestations are limited to roadways surrounding the unroaded areas. Fire suppression activities have prevented high intensity fires from scarifying the surface, thus preventing the spread of noxious weeds. Past noxious weed treatment along roadways has reduced the potential for noxious weed spread into the unroaded areas.

Present and future activities that have the potential to affect the current condition of the unroaded areas include fire, fire suppression, motorized recreation and noxious weed treatments.

Suppression of wildfire will continue to have a cumulative effect on the species composition of timber stands. Fire resistant stands such as mature ponderosa pine will continue to be converted to less fire resistant stands of Douglas fir. Mature stands of fire resistant lodgepole pine and white bark will continue to be converted to subalpine fir. There will be a greater risk of uncharacteristic wildfire within the unroaded areas due to the altered fire resistance of stands.

Motorized recreation will continue to occur on the existing travel routes around the unroaded areas. Restrictions or additions of travel routes will require a Forest Plan Amendment or would need to be addressed in the future travel management planning efforts.

Noxious weeds, if not treated, will continue to have a cumulative effect through increased infestations and reduction of native vegetation. Treatments will not eliminate noxious weeds, but the rate of spread may be reduced and the weeds may be confined or contained to certain areas.

Table D-26. *Past Cumulative Effects to Unroaded Areas Alternatives B, C and D.*

Activities	Does Not Effect IRA	Effects to IRA
Past Activities		
Fires		Suppression of wildfires contributed to present condition
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter		Contributed to current condition.
Noxious Weed Treatments		Treatment of noxious weeds from 1998 to 2000.
Private Land Development	X	

Table D-26, cont. Past Cumulative Effects to Unroaded Areas Alternatives B, C and D.

Activities	Does Not Effect IRA	Effects to IRA
Past Activities		
Hunting	X	
Special Use Permits	X	

Table D-27. *Present Cumulative Effects to Unroaded Areas for Alternatives B, C and D.*

Activities	Does Not Effect IRA	Effects to IRA
Present Activities		
Fires		Suppression of wildfires will continue to contribute to present condition.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments		Current treatments will continue to affect the present condition.
Private Land Development	X	
Hunting	X	
Special Use Permits	X	

Table D-28. *Future Cumulative Effects to Unroaded Areas for Alternatives B, C and D.*

Activities	Does Not Effect IRA	Effects to IRA
Future Activities		
Fires		Wildfires could affect the unroaded areas.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	

Table D-28, cont. Future Cumulative Effects to Unroaded Areas for Alternatives B, C and D.

Motorized Recreation, both Summer and Winter	X	
Noxious Weed Treatments		If not treated, infestation will increase.
Private Land Development	X	
Granite Peak Lookout Restoration	X	
Hunting	X	
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits	X	
Lick Creek Aspen Restoration	X	

Noxious Weeds

The analysis area for noxious weeds is the project area. Spotted knapweed has been observed within the project area since the early 1980s. It is established on suitable sites within the entire project area, and particularly well established along most road and travelways, trails, and upland sites that have been subjected to disturbance.

Impacts of past wildfires on spotted knapweed in the proposed project area are unknown. However, spotted knapweed has demonstrated increases in cover and volume after spring and fall burns in timber harvest areas in western Montana (Rice and Sacco 1995). Data from Washington and Montana indicate that spotted knapweed increased in cover and density after low intensity, controlled burns (Sheley and Roche 1982; S. Arno, pers. comm., 1999). Because fire may create the type of disturbance that promotes knapweed colonization (Sheley and Petroff 1999), there is a high risk that these proposed fire activities coupled with the susceptibility of the vegetation types (Quigley et al 1996) will contribute to, and possibly enhance, the spread of existing, well-established populations of spotted knapweed.

Weed invasion and spread can be enhanced by fire and timber harvest operations. Noxious weeds and other invasive species can also be spread by mining activities (new road construction, poorly timed or inadequate reclamation, using contaminated equipment off road), livestock grazing (using contaminated equipment to install new developments, over utilization of forage species that can reduce competition between forage and weed species, seed transport from infested areas using contaminated equipment off road to weed-free areas), firewood cutting, hunting, summer/winter motorized recreation use, and dispersed camping (pioneering of new road/trails by contaminated vehicles, and/or seed transport from infested areas to weed-free areas, using

contaminated forage/straw for stock or camp use), private land development (new road construction, using contaminated equipment off road, importation of weed seed on building materials from infested areas), Forest projects including Harvey Mill Site, Granite Mountain. Lookout, Lick Creek aspen regeneration, and special use permits (using contaminated equipment off road, inadequate reclamation activities).

Table D-29. *Past* Cumulative Effects to Noxious Weeds for Alternatives B, C and D.

Activities	Does Not Effect Noxious Weeds	Effects to Noxious Weeds
Past Activities		
Fires		Has contributed to weed invasion and spread
Timber Sales		Has contributed to weed invasion and spread
Mining Operations		Has contributed to weed invasion and spread
Livestock Grazing		Has contributed to weed invasion and spread
Firewood Harvest		Has contributed to weed invasion and spread
Motorized Recreation, both Summer and Winter		Has contributed to weed invasion and spread
Noxious Weed Treatments		Infested acres have been reduced in areas where effective treatment control measures have been consistently applied
Private Land Development		Has contributed to weed invasion and spread
Hunting		Has contributed to weed invasion and spread
Special Use Permits		Has contributed to weed invasion and spread

Table D-30. *Present* Cumulative Effects to Noxious Weeds for Alternatives B, C and D.

Activities	Does Not Effect Noxious Weeds	Effects to Noxious Weeds
Present Activities		
Fires		Can contribute to weed invasion and spread.
Timber Sales		Can contribute to weed invasion and spread.
Mining Operations		Can contribute to weed invasion and spread.
Livestock Grazing		Can contribute to weed invasion and spread.
Firewood Harvest		Can contribute to weed invasion and spread.
Motorized Recreation, both Summer and Winter		Can contribute to weed invasion and spread.
Noxious Weed Treatments		Infested acres can be reduced in areas where effective treatment control measures are consistently applied.
Private Land Development		Can contribute to weed invasion and spread.
Hunting		Can contribute to weed invasion and spread.
Special Use Permits		Can contribute to weed invasion and spread.

Table D-31. *Future* Cumulative Effects to Noxious Weeds for Alternatives B, C and D.

Activities	Does Not Effect Noxious Weeds	Effects to Noxious Weeds
Future Activities		
Fires		Can contribute to weed invasion and spread.
Timber Sales		Can contribute to weed invasion and spread.
Mining Operations		Can contribute to weed invasion and spread.
Livestock Grazing		Can contribute to weed invasion and spread.

Table D-31, cont. *Future* Cumulative Effects to Noxious Weeds for Alternatives B, C and D.

Activities	Does Not Effect Noxious Weeds	Effects to Noxious Weeds
Firewood Harvest		Can contribute to weed invasion and spread.
Motorized Recreation, both Summer and Winter		Can contribute to weed invasion and spread.
Noxious Weed Treatments		Infested acres can be reduced in areas where effective treatment control measures are consistently applied.
Private Land Development		Can contribute to weed invasion and spread.
Granite Peak Lookout Restoration		Can contribute to weed invasion and spread.
Hunting		Can contribute to weed invasion and spread.
Harvey Mill Site Highway Enhancement Project		Can contribute to weed invasion and spread.
Special Use Permits		Can contribute to weed invasion and spread.
Lick Creek Aspen Restoration		Can contribute to weed invasion and spread.

Fisheries

Cumulative effects are those impacts on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless whether they are private, state, or other federal actions. The activities that will be considered cumulatively in this fisheries resource analysis are listed in Chapter 1 Table 1. The activities in the cumulative effects list that would be considered having a negative effect on the fisheries resource would be those activities adjacent (within one tree height) to fish bearing streams that remove overstory and understory vegetation. This overstory and understory vegetation would be providing future large woody debris, providing shade to maintain cool water temperatures and providing protection from stream bank erosion. Some of the private landowners have built fences along the fish bearing streams, like the North Fork Salmon River and Dahlonega Creek, to keep domestic animals of the stream banks. However, most of these fences are less than one tree height from the fish-bearing stream. There are from time to time private land activities associated with road construction and bridge construction to new and existing homes that may be introducing sediment into the fish-bearing stream. The amounts of sediment from each activity would be minimal but cumulatively would be considered a

negative impact. The other activity associated with private land that would be considered a negative impact to the fisheries resource would be the removal of large woody debris from the stream channels, because a tree falling into the stream is perceived to cause accelerated stream bank erosion and a loss of private land. The removal of this large woody debris has a negative impact to both the quantity and quality of spawning and rearing habitat in the fish bearing streams. Although the decline in quality spawning and rearing habitat has not be well documented quantitatively personal observations over the last 11 years, especially during the annual chinook salmon redd surveys where the Forest Service and IDF&G walk approximately 18 miles of the North Fork Salmon River, has shown an increase in large boulders and a decrease in quality spawning gravels and rearing pools.

It is impossible to predict the effects to fish populations from large stand replacing wildfires, within the analysis area. Too many factors directly or indirectly affect fish populations that would lead to too many "what if" scenarios. The worst-case scenario would be the immediate elimination of a local stream population. Over time, this stream would repopulate as long as the stream does not have any migration barriers to other fish bearing streams. The best-case scenario would be a short-term (1-2 years) increase in nutrients delivered to a stream, low quantities of additional sediment delivered from the burned hillsides and an increase in a streams large woody debris/100 m and pools/100 m component. This scenario could actually increase a streams local fish population.

R1/R4 Stream Habitat Inventory:
The project as designed and planned along with the list of projects to be considered cumulatively would maintain or restore the measurement indices: width-to-depth ratio, large woody debris, and pool frequency. Rationale: Because the activities associated with this alternative would not be degrading stream banks, would not be reducing existing or future large woody debris recruitment, and would not be decreasing pool frequency.

Fish Presence/Absence and Population:
The project as designed and planned along with the list of projects to be considered cumulatively would maintain or restore the measurement indices fish species presence and population tends. Rationale: There would be no activities degrading fish habitat parameters or having a negative impact directly or indirectly on the fish species.

Stream Sediment % Fines by Depth:
The project as designed and planned along with the list of projects to be considered cumulatively would maintain or restore the measurement indices stream sediment % fines by depth. Rationale: The road maintenance activities are designed to minimize and prevent road sediment delivery to stream channels.

Stream Temperature:
The project as designed and planned along with the list of projects to be considered cumulatively would maintain or restore the measurement indices stream temperature. Rationale: The road maintenance activities are designed to minimize and prevent road sediment delivery to stream channels. And there would be no overstory removal of trees providing shade to stream channels.

Stream Connectivity:
The project as designed and planned along with the list of projects to be considered cumulatively would maintain the measurement indices stream connectivity. Rationale: The road maintenance activities would not create any new fish migration barriers but at the same time will not be restoring fish migration at the seven identified fish migration barrier culverts within the analysis area.

Road Density:
Road density increases associated with the list of projects to be considered cumulatively would be minimal. These changes would have immeasurable effects to fish and fish habitat and would have NO change to the watershed risk ratings.

Percent of stands less than 30 years:
An increase in percent of stands less than 30 years associated with the list of projects to be considered cumulatively would be minimal. These changes would have immeasurable effects to fish and fish habitat and would have NO change to the watershed risk ratings.

Fisheries- Management Indicator Species
Cumulative effects for bull trout are the same as identified above.

Table D-32. *Past Cumulative Effects to Fisheries for Alternatives B, C and D.*

Activities	Does Not Effect Fisheries	Effects to Fisheries
Past Activities		
Fires	X	
Timber Sales		Trees were harvested in some riparian areas.
Mining Operations		Operations dredged the stream channels in the large streams causing degradation to fish habitat.
Livestock Grazing		Grazing in riparian areas.

Table D-32, cont. Past Cumulative Effects to Fisheries for Alternatives B, C and D.

Firewood Harvest		Harvest in riparian areas.
Motorized Recreation, both Summer and Winter		Dispersed camping and roads were located in riparian areas.
Noxious Weed Treatments		Some treatment along roads in riparian areas.
Private Land Development		Development in riparian areas.
Hunting	X	
Special Use Permits	X	

Table D-33. *Present Cumulative Effects to Fisheries for Alternatives B, C and D.*

Activities	Does Not Effect Fisheries	Effects to Fisheries
Present Activities		
Fires	X	
Timber Sales		40 acres of private land being harvested. Some trees may be taken along Johnson Gulch.
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest		Fuel wood is occasionally cut in riparian areas.
Motorized Recreation, both Summer and Winter		Dispersed camping and roads are located in riparian areas.
Noxious Weed Treatments	X	
Private Land Development		Some homes are constructed in riparian areas.
Hunting	X	
Special Use Permits	X	

Table D-34. *Future* Cumulative Effects to Fisheries for Alternatives B, C and D.

Activities	Does Not Effect Fisheries	Effects to Fisheries
Future Activities		
Fires	X	
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest	X	
Motorized Recreation, both Summer and Winter		Dispersed camping and roads in and along riparian areas may continue to be used.
Noxious Weed Treatments	X	
Private Land Development		Development will continue in and along the North Fork River.
Granite Peak Lookout Restoration	X	
Hunting	X	
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits	X	
Lick Creek Aspen Restoration	X	

Wildlife-
Management Indicator Species and Threatened and Endangered Species

Family 2 Broad Elevation, Old Forest Family - Pileated Woodpecker
Alternative A
Firewood gathering will continue to contribute to the loss of snags and downed logs. Fire exclusion will continue to increase the risk of uncharacteristic fire and possible loss of large diameter trees. Lack of fire will continue to contribute to the decline in aspen, a key habitat for pileated woodpeckers. These effects would be cumulative to those discussed in Chapter 3. They would not necessarily preclude use of the project area by any Family 2 species, including pileated woodpeckers, but would decrease quantity and quality of available habitats.

Action Alternatives
Past, present and future fire exclusion would continue the declining trend for ponderosa pine late-seral single-layer stands and subsequent changes towards dominance by Douglas-fir. Fuel wood gathering would continue to result in the loss of snags. Harvest practices on private land would continue to reduce late-seral multi- and single-layer stands. These effects would be cumulative to those discussed in Chapter 3. They would not preclude use of the project area for pileated woodpeckers.

Family 3 Forest Mosaic Family - Canada lynx
Alternative A
There are no cumulative effects.

Action Alternatives
Past fire exclusion has reduced the amount of available foraging habitat for lynx, while past harvests have created small patches of young trees in lynx habitat that may provide snowshoe hare habitat, the primary prey species for lynx. Continued fire exclusion may result in stand replacement fire on the landscape, which could create the early seral structure and abundance of logs and snags needed to improve lynx habitat. The past fires of 2000 on this Forest and neighboring Bitterroot Forest have created a new source of potential lynx foraging and denning habitat. These effects would be cumulative to those discussed above. They would not preclude use of the project area for any Family 2 species, Canada lynx included.

Family 5 Forest and Range Mosaic Family - Gray Wolf
Alternative A
The No Action alternative would not contribute any adverse effects to the current situation, neither would it improve the situation for the gray wolf.

Action Alternatives
Past harvest activities have reduced the amount of available thermal cover below natural potential. Current and future harvest on private land will contribute to further reduction of thermal cover within the project area. Since thermal cover is a limiting factor for key big game winter range and current habitat conditions are below objectives for cover:forage ratios, additional loss of thermal cover would be detrimental to source habitats for wolf prey species.

Family 7 Forest, Woodland, and Sagebrush Family - Columbia spotted frog and bald eagle
Alternative A
<u>Columbia spotted frog</u>
Continued fire exclusion has a negative effect on vegetation diversity and it also has a negative effect associated with increased risk of stand replacement fire that could affect large trees and riparian habitats. These effects would be cumulative to those discussed in Chapter 3.

Bald eagle
Continued fire exclusion has a negative effect on vegetation diversity and it also has a negative effect associated with increased risk of stand replacement fire that could affect large trees associated with riparian habitats. These effects would be cumulative to those discussed in Chapter 3.

Action Alternatives
Columbia spotted frog
Past harvest and fuel wood activities on Forest Service and private land have removed individual large trees associated with riparian habitats but have not resulted in losses of riparian source habitat acres. However, on private lands, riparian habitat has declined in some areas due to past human activities including agriculture, pastureland, recreation and residential developments. These effects would be cumulative to those discussed above. They would not preclude use of the project area for any Family 7 species, including Columbia spotted frog.

Bald eagle
Past harvest and fuel wood activities on Forest Service and private land have removed large trees and tall snags associated with both riparian habitat and adjacent uplands. Riparian habitat quality and quantity has declined due to past human activities including agriculture, pastureland, recreation and residential developments. However, potentially suitable habitat for this Family 7 species remains present in the project area and would be expected to remain in the foreseeable future.

Forest Service, Region 4 Sensitive Species

Family 2 Broad Elevation, Old Forest Family
Group 5 Northern goshawk (summer habitat), flammulated owl, fisher
Group 7 Boreal owl
Group 8 Great gray owl
Group 11 Three-toed woodpecker

Alternative A
Fire wood gathering will continue to contribute to the loss of snags and downed logs. Fire exclusion will continue to increase the risk of uncharacteristic fire and possible loss of large diameter trees. Lack of fire will continue to contribute to the decline in aspen, a key habitat for species in this family. These effects would be cumulative to those discussed in Chapter 3. They would not preclude use of the project area by any Family 2 species.

Action Alternatives
Past, present and future fire exclusion would continue the declining trend for ponderosa pine late-seral single-layer and subsequent change to dominance by Douglas-fir. Fuel wood gathering would continue to result in the loss of snags. Harvest practices on private land would continue to reduce late seral-multi- and single-layer stands. These effects would be cumulative to those discussed in

Chapter 3. They would not preclude use of the project area for any Family 2 species.

Family 3 Forest Mosaic Family
Group 15 Wolverine

Alternative A
There are no known cumulative effects.

Action Alternatives
Past fire exclusion has altered the characteristics of available foraging habitat for wolverine, while past harvests have created small openings that may favor populations of many potential prey species. Continued fire exclusion may result in stand replacement fire on the landscape and could create expanses of early seral conditions. These effects would be cumulative to those discussed in Chapter 3 but are not known to adversely affect foraging opportunities for wolverines and would not preclude use of the project area for this species or any Family 3 species.

Family 7 Forest, Woodland, and Sagebrush Family - Columbia spotted frog, Harlequin duck, peregrine falcon, spotted bat, and Townsend's big-eared bat.

Alternative A
Continued fire exclusion has a negative effect on vegetation diversity and it also has a negative effect associated with increased risk of stand replacement fire that could affect large trees associated with riparian habitats. These effects would be cumulative to those discussed in Chapter 3.

Action Alternatives
Past harvest and fuel wood activities on Forest Service and private land have removed large trees associated with riparian habitat and used by most species in Family 7. Riparian habitat suitability has declined due to past human activities including agriculture, pastureland, recreation and residential developments. Past mining activities have increased habitat availability (abandoned mine shafts) for the Townsend's big-eared bat. These effects would be cumulative to those discussed in Chapter 3. They would not preclude use of the project area for any Family 7 species.

Table D-35. *Past* Cumulative Effects to Source Habitats for Threatened, Endangered, and Sensitive Species for Alternatives B, C, and D.

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Past Activities		
Fires		The effect of fire exclusion has substantially altered wildlife habitat (vegetation structure and composition) of the dry and cold forest communities on the Forest and within the project area. Declines in early seral and late seral single layer in the dry forest types and the lack of early seral structure in the cold forest have resulted in a shift to mid seral and multi layer late seral. This shift in seral stages to multi layer mid and late seral increases the risk of uncharacteristic fire and atypically large patch size, and potential loss of special habitat features such as large diameter trees, snags, hollow logs and down wood. The small amount of acreage burned by wildland fire has not substantially benefited wildlife due to suppression activities.
Timber Sales		Timber sales in the past 30 years were not designed to mimic natural vegetation patterns and have resulted in habitat fragmentation, loss of large diameter trees, and increased road densities which all have negative effects to wildlife habitat.
Mining Operations		Mine addits and shafts may have increased habitat for cave dependent species. Past closures of mine addits for public safety measures may have resulted in loss of habitat for specialist species. Tailing piles caused direct loss of habitat and could have contaminated prey habitat in nearby aquatic systems. Old mining roads that were abandoned became the source of user-defined (non-system) roads that increased road densities and lowered habitat effectiveness in many areas.

Table D-35, cont. ***Past Cumulative Effects to Source Habitats for Threatened, Endangered, and Sensitive Species for Alternatives B, C, and D.***

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Livestock Grazing		Over use of riparian areas caused a decline of riparian plants and encouraged (along with other sources such as ORV) the spread of non-native plants in riparian and adjacent meadow habitats. Aspen decline in some areas may be related to grazing of young seedling and sapling aspens. Riparian and aspen dependent birds may have been negatively affected due to decline in habitat quality.
Firewood Harvest		Direct loss of snags to firewood harvest resulted in a decline in available nesting habitat for cavity dependent species.
Motorized Recreation, both Summer and Winter		Negative effects include displacement and stress during winter months or critical life periods (breeding). Winter snow compaction increases predator competition in lynx habitat
Noxious Weed Treatments		Where treatments are implemented and effective, noxious weed treatment restores native plant communities and benefits wildlife. Herbicide applications can have negative effects to wildlife if they are applied without mitigations (food chain side effects).
Private Land Development		Negative impacts to wildlife include direct loss of private land habitat to rural development and pastures primarily in the dry forest and riparian types along North Fork River; decline in old growth open ponderosa pine habitat (replaced by dense forest conditions around homes); fragmentation of habitat; increased unauthorized access and user created roads into previously undisturbed public land habitat (where private land is adjacent to public lands).
Hunting		Negative impacts include over harvesting, poaching, trapping and incidental take of protected species

Table D-35, cont. ***Past Cumulative Effects to Source Habitats for Threatened, Endangered, and Sensitive Species for Alternatives B, C, and D.***

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Special Use Permits		Recreation special use permits have increased and in some areas resulted in negative impacts to wildlife through displacement and user created trails. Non-recreation special use permits including transmission lines, utility structures and associated road access have similar negative effects including habitat modification.

Table D-36. ***Present Cumulative Effects to Source Habitats for Alternatives B, C, and D.***

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Present Activities		
Fires		Fire exclusion will continue to cause a decline in early seral and late seral single layer habitat, which negatively affects many wildlife species.
Timber Sales		The lack of timber modification designed to mimic natural disturbance regimes will continue to cause negative effects to wildlife for many of the same reasons as fire exclusion.
Mining Operations		Refer to existing NEPA analysis for the gold exploration and gravel pit.
Livestock Grazing	X	
Firewood Harvest		Negatively affects wildlife by removal of standing dead and down logs, has the potential to cause mortality in cavity nesting birds.

Table D-36, cont. *Present* Cumulative Effects to Source Habitats for Alternatives B, C, and D.

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Motorized Recreation, both Summer and Winter		Negative effects of motorized use in important wildlife habitat include displacement and stress, and increased predator competition.
Noxious Weed Treatments		Likely to benefit wildlife where restoration of native plant communities occurs.
Private Land Development		Direct loss of habitat, removal of special features such as snags and down logs, fragmentation of migration corridors.
Hunting		Permit levels are controlled by State game agencies, but hunting and trapping activities continue to cause displacement and mortality in big game species and occasionally result in incidental take of protected species.
Special Use Permits	Domestic water source cement spring box will not impact wildlife.	Snow grooming and outfitter guide permits for mountain lion hunting have negative effects on lynx due to increased densities of snow compacted routes in lynx habitat.

Table D-37. *Future* Cumulative Effects to Source Habitat for Alternatives B, C, and D.

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Future Activities		
Fires		Fire that is similar to historic regimes has the potential to benefit wildlife habitat by changing vegetation structure, species composition, and patch size. Uncharacteristic fire has the potential to negatively impact wildlife habitat by increased levels of fire severity and atypical patch size. Fire can cause stress, displacement, injury, abandonment of young, and mortality of individual species.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing		Competition for vegetation forage resources; removal of hiding cover; delay of successful regeneration of shrub and conifer; reduce aspen regeneration and sprouting.
Firewood Harvest		Will continue to have negative effects where removal of snags and down wood occurs.
Motorized Recreation, both Summer and Winter		An increased trend for trail vehicles is associated with negative declines in habitat effectiveness.
Noxious Weed Treatments		Continue to improve wildlife habitat where restoration objectives are achieved.

Table D-37, cont. *Future* Cumulative Effects to Source Habitat for Alternatives B, C, and D.

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Private Land Development		Continued harvest (clear cut) on remaining private land mining claims above in lynx habitat to the east of Gibbonsville may cause a further decline in suitable lynx habitat until the stands regenerate. Harvest in ponderosa pine and dry Douglas fir will decrease late seral multi and –single habitat which would have a negative effect on many old growth dependent species.
Granite Peak Lookout Restoration		Rental use during winter months may have negative effects to wildlife associated with increased levels of recreation and snowmobile use in lynx habitat.
Hunting		Same as current.
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits		Same as current
Lick Creek Aspen Restoration		Restoration objectives benefit wildlife.

Designated Old Growth

Alternative A

Past harvest activities have fragmented old growth and contiguous patch sizes are smaller than would occur with the historical fire regime. Private land harvest of old growth has contributed to fragmentation across the landscape. Fire exclusion, past, present and future, will continue to affect old growth by creating a situation where uncharacteristic stand replacement (crown) fires are more likely. These effects would be cumulative to those direct and indirect effects discussed in Chapter 3.

Action Alternatives

Fire exclusion will continue to increase the risk of uncharacteristic stand replacement (crown) fire in some designated old growth stands. Logging on private land will continue to fragment the landscape. These effects would be cumulative to those direct and indirect effects discussed in Chapter 3.

Table D-38. *Past* Cumulative Effects to Designated Old Growth for Alternatives B, C, and D.

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Past Activities		
Fires		Fire exclusion has reduced the amount of late seral single structure and increased the amount of late seral multi in some ponderosa pine and Douglas fir designated old growth stands. Prescribed fire has maintained late seral single structure in some designated old growth stands.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest		Direct loss of snags to firewood harvest has contributed to a decline of snags below natural potential in designated old growth stands.
Motorized Recreation, both Summer and Winter		Motorized use in some designated old growth stands has reduced habitat effectiveness for old growth dependent species.
Noxious Weed Treatments		Noxious weed treatments, particularly along roads and where restoration is effective, has improved habitat quality by maintaining native plants.
Private Land Development	X	
Hunting	X	
Special Use Permits	X	

Table D-38. *Present* Cumulative Effects to Designated Old Growth for Alternatives B, C, and D

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Present Activities		
Fires		Fire exclusion has placed some designated old growth stands at risk of stand replacement fire.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest		Firewood harvest contributes to the loss of snags particularly along roads that access designated old growth stands.
Motorized Recreation, both Summer and Winter		Motorized access contributes to reduced habitat effectiveness in designated old growth stands by increasing stress of old growth dependent species.
Noxious Weed Treatments		Benefits designated old growth stands where restoration of native plant communities occurs.
Private Land Development	X	
Hunting	X	
Special Use Permits	X	

Table D-39. *Future* Cumulative Effects to Designated Old Growth for Alternatives B, C, and D.

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Future Activities		
Fires		Fire that is similar to historic regimes has the potential to benefit designated old growth stands by creating snags and changing vegetation structure, and species composition. Uncharacteristic fire has the potential to negatively impact designated old growth by increased levels of fire severity and loss of old growth characteristic snags and down logs.
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	X	
Firewood Harvest		Will continue to have negative effects where removal of snags and down wood occurs in designated old growth stands.
Motorized Recreation, both Summer and Winter		An increased trend for trail vehicles is associated with negative declines in habitat effectiveness for old growth dependent species.
Noxious Weed Treatments		Continue to improve wildlife habitat where restoration objectives are achieved.
Private Land Development	X	
Granite Peak Lookout Restoration	X	
Hunting		Same as current.
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits	X	
Lick Creek Aspen Restoration	X	

Big Game Winter Range
Cover Forage Ratio
Alternative A
Past harvest, thinning, and prescribed fire have reduced cover below potential on much of MA 4A and other portions of the winter range. Decades of fire exclusion have encouraged understory trees to increase in areas that were not previously harvested, resulting in an increasing risk of uncharacteristic fires for that portion of the project area. Current and future harvest of private land timber within the project area will further reduce cover adjacent to MA 4A and other locations within the winter range. The No Action alternative will not contribute to additional loss of cover through harvest, reduce the risk of uncharacteristic fire, or improve the situation for elk and deer within the project area.

Action Alternatives
The cumulative effects of past, present, and reasonably foreseeable activities across MA 4A and winter range within the project area, including timber harvest and thinning on Forest Service and private lands, would continue to negatively affect the ability of elk and deer to use the area. Under the action alternatives, the direct and indirect effects described in Chapter 3 would be additive to the existing situation. Areas adjacent to the proposed fuel reduction areas that meet Forest Plan standards would continue to provide valuable cover. However, habitat use patterns may shift because of proposed management activity disturbance. Elk population numbers are at the low end of State objectives and deer herd numbers are below objectives.

Habitat Effectiveness
Alternative A
The cumulative effects of the past, including high road densities, motorized use and violation of road closures would continue to affect the ability of elk and deer to use the area. Current and future harvest of private land timber within the project area will further reduce cover on non-federal winter range. Future road construction on private land and residential development would cause additional negative affects to habitat quality. The No Action alternative would not contribute any adverse cumulative effects to the current situation; neither would it improve the situation for elk within the project area.

Action Alternatives
The cumulative effects of the past, including high road densities, motorized use and violation of road closures would continue to affect the ability of elk and deer to use the area. Future road construction on private land and residential development would cause additional negative affects to habitat quality. Closed roads that would be decommissioned after project completion would reduce road densities although the improvement would be negligible and would not improve habitat effectiveness unless they were roads where closures have not been effective.

Table D-40. *Past Cumulative Effects to Big Game Winter Range for Alternatives B, C, and D.*

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Past Activities		
Fires		Cover: Forage Ratios: Fire exclusion has contributed to an increase in the amount of thermal cover in unmanaged stands; and decreased the amount of available forage due to conifer encroachment. Habitat Effectiveness: Fire exclusion has contributed to a reduction in habitat effectiveness by creating a homogeneous vegetation pattern that is different from natural landscape patterns and patch size.
Timber Sales		Cover: Forage Ratios: Harvest activities have reduced thermal cover of managed stands below natural potential. Habitat Effectiveness: Road construction associated with timber sale activities has reduced habitat effectiveness 50 to 100 percent. Harvest activities fragmented hiding cover and created large openings, which further reduced habitat effectiveness.
Mining Operations		Cover: Forage Ratios: Removal of vegetation and construction of roads has reduced cover and forage. Habitat Effectiveness: Abandoned mine roads became the source of user-defined (non-system) roads that increased road densities, fragmented habitat and lowered habitat effectiveness in some areas.
Livestock Grazing	Habitat Effectiveness: No effect	Cover: Forage Ratios: Grazing activities contribute to the introduction and spread of noxious weeds on winter range, which has negative impacts on forage availability.
Firewood Harvest	Cover: Forage Ratios: No effect	Habitat Effectiveness: Motorized access associated with fuel wood harvest negatively affects wildlife.

Table D-40, cont. ***Past Cumulative Effects to Big Game Winter Range for Alternatives B, C, and D.***

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Motorized Recreation, both Summer and Winter		Cover: Forage Ratios: Motorized use has contributed to the spread of noxious weeds which reduces forage quality. Habitat Effectiveness: Negative effects include displacement and stress during winter months or critical life periods (breeding).
Noxious Weed Treatments	Habitat Effectiveness: No impact	Cover: Forage Ratios: Treatment of noxious weeds improves forage availability.
Private Land Development		Cover: Forage Ratios: Negative impacts to cover: forage include direct loss of private land habitat to rural development and pastures primarily in the dry forest and riparian types along North Fork River. Habitat Effectiveness: Private land development and associated roads increase road densities and contributes to reduction in habitat effectiveness.
Hunting	Cover: Forage Ratios: No effect	Habitat Effectiveness: Hunting activities associated with motorized use stresses animals on winter range; other negative impacts include harvesting and poaching.
Special Use Permits		Cover: Forage Ratios: No effect Habitat Effectiveness: Non-recreation special use permits including transmission lines, utility structures and associated road access have negative effects including habitat modification and increased road density.

Table D-41. *Present* Cumulative Effects to Big Game Winter Range for Alternatives B, C, and D.

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Present Activities		
Fires	X	
Timber Sales	X	
Mining Operations	X	
Livestock Grazing	Habitat Effectiveness: No effects	Cover: Forage Ratios: Present levels of grazing are compatible with wildlife except in riparian woodlands and aspen communities where negative effects to habitat occur.
Firewood Harvest	Cover: Forage Ratios: No effect	Habitat Effectiveness: Motorized access associated with fuel wood harvest negatively affects wildlife.
Motorized Recreation, both Summer and Winter		Cover: Forage Ratios: Motorized use increases the spread of noxious weeds and reduces quality of forage. Habitat Effectiveness: Negative effects of motorized recreation include displacement and stress.
Noxious Weed Treatments	Habitat Effectiveness: No effect	Cover: Forage Ratios: Benefit wildlife where restoration of native plant communities occurs.
Private Land Development	Cover: Forage Ratios: No effect	Habitat Effectiveness: Direct loss of habitat, removal of special features such as snags and down logs, fragmentation of migration corridors.
Hunting	Cover: Forage Ratios: No effect	Habitat Effectiveness: Permit levels are controlled by State game agencies, but hunting activities have cause displacement and mortality in big game species.
Special Use Permits	X	

Table D-42. *Future* Cumulative Effects to Big Game Winter Range for Alternatives B, C, and D.

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Future Activities		
Fires		Cover: Forage Ratios: Fire has the potential to affect cover and forage ratios by changing structure and species composition. Habitat Effectiveness: Uncharacteristic fire has the potential to negatively impact wildlife habitat by increased levels of fire severity and atypical patch size. Fire can cause stress, displacement, injury, abandonment of young, and mortality of individual species.
Timber Sales	Cover: Forage Ratios: No effect	Habitat Effectiveness: Has the same potential to modify habitat as fire with the exception that timber harvest is more flexible and can be tailored to specific outcome.
Mining Operations	X	
Livestock Grazing	Habitat Effectiveness: No effect	Cover: Forage Ratios: Negative effects include competition for vegetation forage resources; removal of hiding cover; delay of successful regeneration of shrub and conifer; reduction of aspen regeneration.
Firewood Harvest	Cover: Forage Ratios: No effect	Habitat Effectiveness: Motorized use associated with fuel wood harvest results in displacement and stress of big game species.
Motorized Recreation, both Summer and Winter	Cover: Forage Ratios: No effect	Habitat Effectiveness: Increasing trend in the use of all terrain vehicles and chronic violation of closed roads will further reduce habitat effectiveness.

Table D-42, cont. *Future* Cumulative Effects to Big Game Winter Range for Alternatives B, C, and D.

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Noxious Weed Treatments		Cover: Forage Ratios: Improve forage availability where restoration objectives are achieved. Habitat effectiveness: Motorized use associated with weed treatment activities would have minor short term negative effects due to temporary displacement of big game species.
Private Land Development		Cover: Forage Ratios: Future harvest of additional private land adjacent to Gibbonsville and key winter range will further reduce thermal cover. Habitat Effectiveness: Additional road construction on private land will further contributes to high road densities and fragmentation of habitat resulting in continued reduction of habitat effectiveness.
Granite Peak Lookout Restoration	Cover: Forage Ratios: No effect	Habitat Effectiveness: Rental use during winter months may have negative effects to wildlife associated with increased levels of recreation and snowmobile use in winter range resulting in continued reduction of habitat effectiveness.
Hunting	Cover: Forage Ratios: No effect	Habitat Effectiveness: Hunting activities displace and cause mortality of big game species.
Harvey Mill Site Highway Enhancement Project	X	
Special Use Permits	X	

Table D-42, cont. ***Future Cumulative Effects to Big Game Winter Range for Alternatives B, C, and D.***

Activities	Does Not Effect Terrestrial Wildlife	Effects to Terrestrial Wildlife
Lick Creek Aspen Restoration		Cover: Forage Ratios: Restoration of aspen would have a beneficial effect by increasing hiding cover and forage availability on winter range. Habitat Effectiveness: Larger aspen patch size would increase the amount of hiding cover and improve habitat effectiveness.

Appendix E

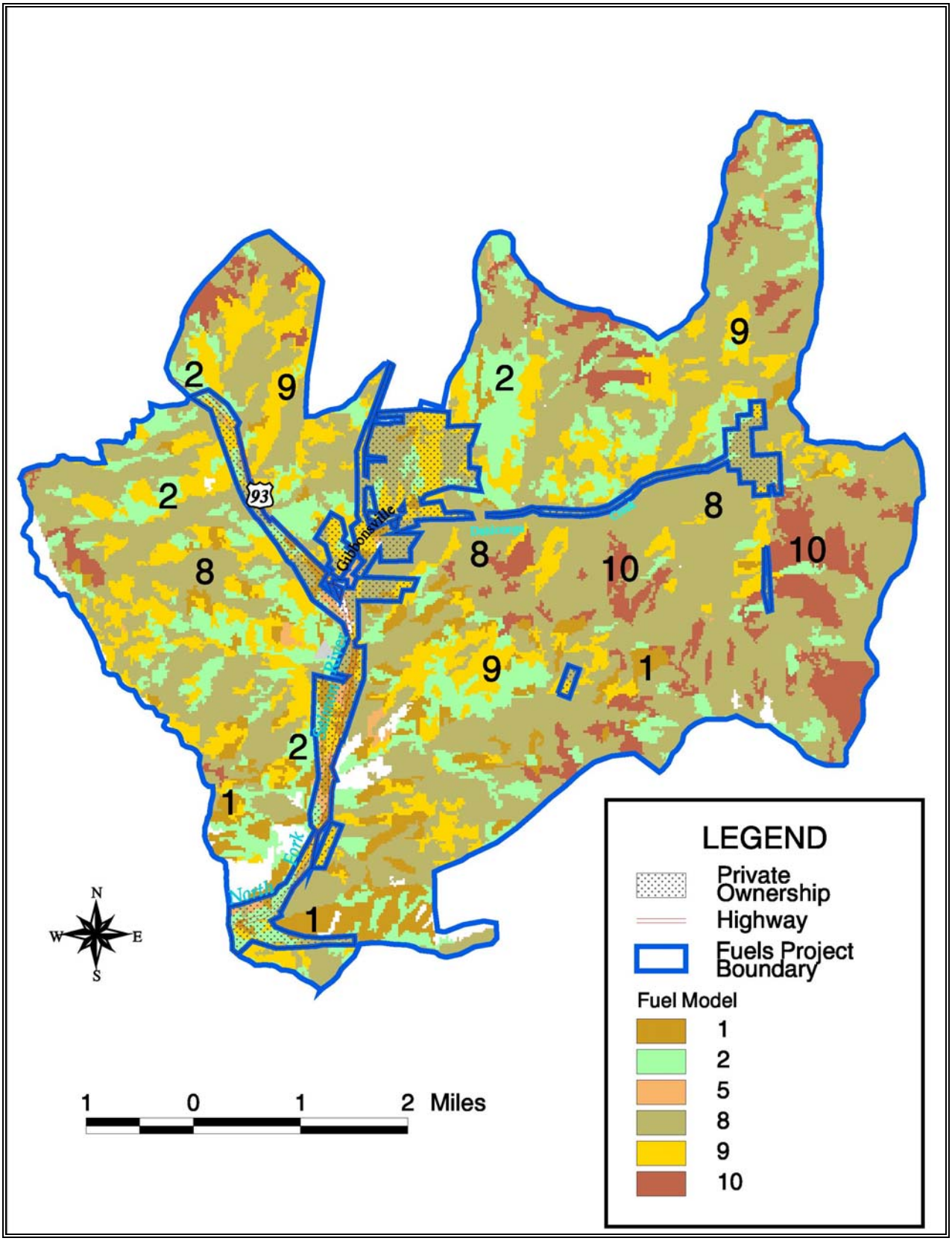
Fuel Model Distribution

Gibbonsville Wildland Urban Interface Fuels Reduction Project
November 2004

Appendix E

Fuel Model Distribution

Map 34. ***Fuel Models***



Appendix F

Glossary

Gibbonsville Wildland Urban Interface Fuels Reduction Project
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Appendix F

Glossary

Broadcast Burn. See prescribed burning.

Closed Road. A National Forest road or segment that is restricted from certain types of use during certain seasons of the year. The prohibited use and the time period of closure must be specified. The closure is legal when the Forest Supervisor has issued an order and posted it in accordance with Chapter 36 CFR section 261.

Commercial Thin. A thinning that includes the cutting of trees large enough (trees typically larger than 5 – 8 inches in diameter) to provide a commercial product. Actual size is dependent upon the desired product.

Crown Fire. Fire that burns in the crowns of trees and shrubs, usually ignited by a ground or surface fire.

Detrimental Soil Disturbance. The alteration of natural soil physical characteristics that result in immediate and/or prolonged violations of off-site resource quality standards. Soil displacement and compaction are examples of detrimental soil disturbance.

Duff. Partially decomposed organic matter lying beneath the litter layer and above the mineral soil.

Ephemeral Streams. Streams that flow water only as a direct response to rainfall or snowmelt events. These streams have no baseflow.

Filter Strips. Ground cover, including live plants and litter, of various widths from the stream channel, that can effectively dissipate the energy of raindrops before the drops hit the soil. Filter strip widths vary, depending on the percentage of vegetation ground cover, soil parent material, and steepness of the slope above the stream channel.

Fire Intensity. The rate of heat released for an entire fire at a specific point in time.

Fire Group 3. Warm, moist ponderosa pine habitat types and warm, dry Douglas-fir habitat types usually dominated by ponderosa pine. In the absence of fire, Douglas-fir regeneration beneath the ponderosa pine is capable of taking over the site on the Douglas-fir habitat types.

Fire Severity. Refers to soil impacts (BAER Handbook, FSH 2509.13):

> High Severity – More than 40 percent of the polygon exhibits soil features likely to significantly increase runoff and erosion (e.g., absence of duff layer, hydrophobic soils, and soil discoloration). High severity fires are lethal to conifers with all needles burned off the trees.
>
> Moderate Severity – Less than 40 percent of the polygon exhibits high severity indicators. Duff layers may be absent or mostly absent. Moderate severity fire kills the majority of conifers and needles on trees are scorched (brown).
>
> Low severity – Duff layers are burned but intact. Unburned areas are intermingled with lightly burned areas. Low severity fires cause some tree mortality (torching) but stands have a notable live tree component.

Fuel Loading. The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area, usually expressed in tons per acre.

Intermittent Streams. A stream, which flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow. An intermittent stream shows clear evidence of annual scour. Gullies that wash out during flood events are not considered intermittent streams.

Ladder Fuels. Small trees and understory shrubs that allow fire to burn into the canopy of larger trees.

Ladder Fuel Reduction. The elimination of shrubs, dead woody material and small diameter trees that provide a pathway for fire from the ground vegetation into the main forest canopy.

Lethal Fires. A descriptor of fire response and effect in forested ecosystems of high-severity or severe fire that burns through the overstory and understory, consumes large woody surface fuels, and may consume the entire duff layer.

Lynx Analysis Unit (LAU). An area of at least the size used by an individual lynx, about 25-30 square miles.

Mixed Lethal Fire. A descriptor of fire response and effect in forested ecosystems of moderate fire, which burn in surface fuels but may involve a tree understory. It consumes litter, upper duff, understory plants, and foliage on understory trees. Individuals and groups of overstory trees may torch out if fuel ladders exist. Enough of the stand's overstory survives to provide for the major portion of the regeneration that results.

Mixed Severity. Units that have a combination of high, moderate, and low degrees of severity, depending on fuel loading and placement.
Multi-Story. A forest stand or plant community having more than two main canopy layers.

Noxious Weeds. Rapidly spreading plants, which can cause a variety of major ecological impacts to both agricultural and wild lands. A plant species designated as possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or diseases; or non-native, new, or not common to the United States. According to the federal Noxious Weed Act (PL93-639), a noxious weed is one that causes disease or has other adverse effects on people or their environment, and is therefore detrimental to the agriculture and commerce of the United States and the public health.

Old Forest, Multi-Story (OFMS). Diverse horizontal and vertical distributions of tree sizes occur, with large trees also present and significant in the overstory.

Old Forest, Single Story (OFSS). Understory trees are generally absent; large trees are present and significant in the overstory.

Operational Maintenance Level. A formally established set of objectives which describes the conditions necessary to achieve the planned operation of a road.

> Level 1: Assigned to intermittent service roads during the time that they are closed to traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns.
>
> Level 2: Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed, recreation, or other specialized uses.
>
> Level 3: Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single-lane with turnouts and spot surfacing.
>
> Level 4: Assigned to roads that provided a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double-lane and aggregate surfaced; however, some roads may be paved or dust-abated.

Level 5: Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double-laned, paved facilities. Some may be aggregate-surfaced and dust abated.

Perennial Streams. Streams that flow continuously throughout the year.

Potential Vegetation Group (PVG). A group of potential vegetation types, grouped on the basis of similar general moisture or temperature environment and similar types of life forms.

Potential Vegetation Type (PVT). A physical and biological environment that produces a kind of vegetation; the species that might grow on a specific site in the absence of disturbance; can also refer to vegetation that would grow on a site in the presence of frequent disturbance, that is an integral part of the ecosystem and its evolution. PVTs are identified by and named for indicator species of similar environmental conditions; for example, the Douglas-fir PVT indicates a cooler and moister environment than the ponderosa pine PVT.

Precommercial Thinning. The cutting of trees in an immature stand to accelerate growth and, by suitable selection, to improve the average form of the remaining trees. Usually performed in crowded stands to give the remaining trees (a prescribed number per acre) a competitive advantage for full development.

Prescribed Burning (Prescribed Fire). The intentional application of fire to wildland fuels, in either their natural or modified state, under such conditions as to allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives (i.e., silvicultural, wildlife management, reduction of fuel hazard, etc.). A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition. Types of prescribed burns include:

Broadcast Burn -- Lighting the ground on fire and letting the fire burn woody debris (fuels) on the ground.

Pile Burn – Lighting piles of woody debris on fire.

Reach. A segment of stream that contains similar physical characteristics (e.g., gradient, width, stream bottom materials).

Recontour. A form of obliteration in which the road is eliminated by pulling back dirt, rocks, etc., located on the downward slope of the road. Recontouring removes the road and re-establishes the natural slope.

Riparian Area. Land where the vegetation and microclimate are influenced by perennial and/or intermittent water.

Riparian Habitat Conservation Area (RHCA). As established by *Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California* (PACFISH), RHCAs are portions of watersheds where riparian-dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. Examples of RHCAs include riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems.

Road. A motor vehicle travelway over 50 inches wide, unless designated and managed as a trail. A road may be classified, unclassified, or temporary.

Classified Roads. Roads wholly or partially within or adjacent to National Forest System lands, that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately-owned roads, National Forest System roads, and other roads authorized by the Forest Service.

- Arterial Road. A Forest road that provides service to a large land area and usually connects with other arterial roads or public highways.

- Collector Road. A Forest road that serves smaller land areas than an arterial road, and usually connects Forest arterial roads to local Forest roads or terminal facilities.

- Local Roads. A Forest road that connects terminal facilities with Forest collector, Forest arterial, or public highways. Usually Forest local roads are single purpose transportation facilities.

Temporary Roads. Roads authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be part of the Forest transportation system and not necessary for long-term resource management.

Unclassified Roads. Roads on National Forest System lands that are not managed as part of the Forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization.

Road Decommissioning. The closing of roads not needed for future use. Activities that result in the stabilization and restoration of unneeded roads to a more natural state.

Road Density. Number of miles of open road per square mile.

Road Maintenance. The ongoing upkeep of a road needed to retain or restore the road to the approved road management objective.

Road Management Objective. Defines the intended purpose of an individual road based on management area direction and access management objectives. Road management objectives contain design criteria, operation criteria, and maintenance criteria (FSM 7721.31 and FSH 7790.55-33).

Road Reconstruction. Activity that results in improvement of realignment of an existing classified road as defined below:

> Road Improvement: A road reconstruction activity that results in an increase of an existing road's traffic service level, expands its capacity, or changes its original design function.
>
> Road Realignment: A road reconstruction activity that results in a new location of an existing road or portions of an existing road and treatment of the old roadway.

Seed Tree Cutting. An even-aged regeneration method in which a new age class develops from seeds that germinate in fully-exposed micro-environments after removal of all the previous stand, except for a small number of trees left to provide seed.

Shaded Fuel Break. A strategically selected area where fuels are manipulated to provide a break in fuel continuity, which slows fire spread and aids in suppression activities. The fuel manipulation varies, but it primarily involves felling of ladder fuels and removing them from the site, usually by piling and burning. Healthy, larger diameter trees are left on the site to provide shade.

Sensitivity Level. A particular degree or measure of viewer interest in the scenic qualities of the landscape. Sensitivity levels are relative values.

> Level 1 – Highest sensitivity.
>
> Level 2 – Average sensitivity.
>
> Level 3 – Lowest sensitivity.

Slash. The residue left on the ground after felling and other silvicultural operations and/or accumulating as a result of storm, fire, or girdling.

Source Habitat. Vegetation characteristics that support long-term wildlife species persistence, or characteristics of vegetation that contribute to stable or positive population growth for a species in a specified area and time. Source habitats are described in Wisdom and others (2000) using dominant vegetation cover type and structural stage combinations that can be estimated reliably at the 247-acre (100 hectare) patch scale.

Stand Density Index (SDI). A measure of stand density expressed as the number of trees per acre, as if the average tree diameter were 10 inches.

Stand Initiation (SI). Forest growing space is reoccupied by young trees following a stand replacing disturbance (e.g., fire).

Stand Replacing Fire. A fire that kills most or all of a stand of trees.

Stem Exclusion, Open Canopy (SEOC). Occurrence of new trees is excluded (moisture-limited situation); the forest canopy is broken and tree crowns are open-growing.

Stem Exclusion, Closed Canopy (SECC). Occurrence of new trees is excluded (light-limited situation); the forest canopy is closed and tree crowns are abrading.

Stocking Levels. The degree to which trees occupy the land, measured by basal area and/or the number of trees by size and spacing, compared with a stocking standard. The basal area and/or number of trees required to fully utilize the land's growth potential.

Substrate. Mineral or organic material that forms the bottom of a stream channel.

Thinning. A cutting to reduce the stand density of trees, primarily to improve tree growth, enhance forest health, or reduce potential mortality.

Thinning from below (low thinning). The removal of trees from the lower crown classes to favor those in the upper crown classes.

Underburn. A fuel reduction/site preparation treatment in which surface fuels are ignited under controlled conditions and are allowed to burn within specified parameters. Underburns are usually conducted in areas where the fuel bed is fairly continuous and conditions are such that fire will spread in a predictable and consistent fashion. Underburning implies that there is a live overstory present and often a live understory as well. Prescriptions for underburning usually include an acceptable mortality level in the live component.

Understory Initiation (UI). The establishment of a new group of trees under the mortality-induced openings of the older overstory.

Visual Quality Objective (VQO). A system of indicating the potential expectations of the visual resource by considering how frequently an area is viewed and the type of landscape. VQOs are listed below:

> Maximum Modification: Human activities may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.
>
> Modification: Human activity may dominate the characteristic landscape, but must at the same time utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in the foreground or middle ground.
>
> Partial Retention: Human activity may be evident but must remain subordinate to the characteristic landscape.
>
> Retention: Human activities are not evident to the casual Forest visitor.
>
> Preservation: Provides for ecological change only.
>
> Variety Class: Diversity of the landscape character.
>
> Sensitivity Level: A particular degree or measure of viewer interest in the scenic qualities of the landscape.

Wildfire (Wildland Fire). An on-structure fire (not a prescribed fire) in the wildlands. May be ignited naturally or by arson.

Wildland Urban Interface. Includes those areas of resident human populations at imminent risk from wildland fire, and human developments. The areas encompass not only the residential sites themselves but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.

Young Forest, Multi-Story (YFMS). Several age groups are established; large trees are generally absent.

Appendix G

References

Gibbonsville Wildland Urban Interface Fuels Reduction Project
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Appendix G

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Appendix H

Response to Public Comments

Gibbonsville Wildland Urban Interface Fuels Reduction Project
November 2004

Appendix H

Gibbonsville Wildland/Urban Interface Fuels Reduction Project Environmental Assessment

This section contains responses to comments received during the 30-day public comment period on the Gibbonsville Wildland/Urban Interface Fuels Reduction Project Environmental Assessment issued May 8, 2003 and comments received during the 30-day public comment period on the proposed action issued July 22, 2004. Table H-1 below identifies those individuals who commented on the EA during the initial 30-day comment period and those individuals who commented on the proposed action.

The initial legal notice announcing the availability of the Environmental Assessment (EA) was published in the Recorder Herald, Salmon, Idaho on May 8, 2003. The 30-day comment period ended on June 9, 2003.

A Decision Notice (DN) was issued on October 2, 2003. This DN was appealed by the Ecology Center, Alliance for the Wild Rockies, and the Idaho Sporting Congress. The DN was withdrawn and further analysis was conducted. A second DN was issued on March 3, 2004. The DN was again appealed by the Ecology Center, Alliance for the Wild Rockies, and the Idaho Sporting Congress. The DN was again withdrawn.

A legal notice announcing the proposed action for the project was published in the Recorder Herald, Salmon, Idaho on July 22, 2004. The public was invited to provide substantive and timely comments on the proposed action by August 23, 2004. Comments were received from the Ecology Center, Alliance for the Wild Rockies, Idaho Sporting Congress, and the Idaho Conservation League.

Comments received from the Ecology Center, Alliance for the Wild Rockies, and the Idaho Sporting Congress during the appeal periods and the July 22, 2004 comment period were practically identical to their original comments received during the initial May 8, 2003 comment period. Comments received from the Idaho Conservation League during the July 22, 2004 comment period were also practically identical to their comments received during the initial May 8, 2003 comment period.

Table H-1. ***Comments received on the Gibbonsville Fuels Reduction Project during the 30-day comment period***

Respondent Letter	Date Received or Postmarked	Respondent and their Affiliation
A	June 9, 2003 [1]Dec. 18, 2003 [2]April 19, 2004 Aug. 23, 2004	Jeff Juel, The Ecology Center, Inc.
B	June 9, 2003 Aug. 20, 2004	John Robison, Idaho Conservation League
C	June 9, 2003	Dennis C. Bryant
D	June 6, 2003	David S. Richmond, Friends of the West
E	June 6, 2003	Rudy Mendoza, Tri Corp Logging Division
F	May 21, 2003	Bruce Barnes and Ann Casper
G	May 21, 2003	Rick Collignon, Idaho Department of Parks and Recreation
H	May 13, 2003	Stephen J. Flynn, Louisiana-Pacific Corporation

Responses to comments are addressed below. The Respondent is denoted in parentheses ( ) by the letter which corresponds to the Respondent letter in Table H-1. An asterisk "*" indicates the comment was also an appeal point. Following the identifying letter are the comments provided. Because some comments contain lengthy narratives, only that portion of those comments that capture the issue of the Respondent is provided. Comment correspondences are available for review at the North Fork Ranger District office. Comments are grouped by resource or issue.

Monitoring

Respondent (A): We ask that the following be included in the EA and/or project files:

1. A list of all past projects (completed or ongoing) implemented in the proposed project area watersheds.
2. The results of all monitoring done in the project area as committed to in the NEPA documents of those past projects.
3. The results of all monitoring done in the proposed project area as a part of the Forest Plan monitoring and evaluation effort.
4. A description of any monitoring, specified in those past project NEPA documents or the Forest Plan for proposed project area, which has yet to be gathered and/or reported.

[1] Appealed the Oct. 2, 2003 DN
[2] Appealed the Mar. 3, 2004 DN

Response (A):

1. A list of all past projects implemented in the proposed project area watersheds is identified in the EA in Appendix D, Cumulative Effects.
2. Records of past NEPA projects within the proposed project area do not revile any required monitoring.
3. Watershed and fisheries monitoring reports have been conducted. Data is currently being incorporated into our National Resource Inventory System data base, NRIS/FAUNA.
4. Records of past NEPA projects within the proposed project area do not revile any required monitoring.

Respondent (A) 5: The Salmon-Challis National Forest has also failed to adequately monitor wildlife populations as the Forest Plan requires. Annual Forest Plan Monitoring and Evaluation Reports have not been consistently produced. Since baseline amounts have never been established, population trends and habitat amounts for MIS, including old growth dependent species, have never been adequately monitored. The Salmon-Challis National Forest has not monitored populations nor maintained up-to-date inventories of habitat for the Management Indicator Species (MIS) selected by the Forest Plan (Forest Plan at IV-18 and IV-19), including those MIS needing habitat found especially in old growth forests. How can the Salmon-Challis National Forest credibly state that it understands the cumulative impacts of Forest Plan implementation, and the proposed activities if it has not monitored population numbers, trends, or even effective habitat for all these fish and wildlife species? It simply cannot.

Response (A) 5: The Salmon-Challis National Forest does produce an annual Forest Plan Monitoring Report and has each year since 1995, with the exception of 1997. We also produce an annual watershed and fisheries monitoring report and have accumulated a fairly good data bank of information for most Management Indicator Species, as per the current FLRMP. However, several decades of data are normally required before meaningful population trend statements can be made for any species. Available data are currently being incorporated into our National Resource Inventory System data bank, NRIS/FAUNA.

The fisheries analysis and supporting fisheries specialist's reports used measurement indices to analyze environmental consequences and compare alternatives and their effects on the fisheries resources. The measurement indices used included:

- R1/R4 stream habitat inventory data, as it relates to 3 of the habitat attributes for forested stream systems identified in the 2/24/95 PACFISH EA and 7/28/95 INFISH EA,
- width-to-depth ratios,
- large woody debris and pool frequency,
- fish species presence/absence and population densities,

- stream sediment % fines by depth,
- stream temperature,
- stream connectivity,
- road density,
- % of stands less than 30 years old.

These measurement indices are part of an aggressive and proactive fisheries monitoring program on the North Fork Ranger District that began in 1991 and continues today. The summaries of the monitoring data collected are disclosed in the supporting fisheries specialist's reports as listed above (Project File Fisheries Specialist's Reports and Fisheries BA/BE).

Natural Historic Range of Variability

Respondent *(A) 1: The EA makes many claims about the vegetative conditions being outside of some vaguely defined normal range. Such claims do not seem to be supported by available data. We don't understand why the FS claims that the post-treatment thinned or "improved" forest would better mimic the natural range of historical stand structures, since the EA does not really demonstrate that present conditions are significantly different from historic conditions.

Response (A) 1: The EA uses Historical Range of Variability (HRV) as a "baseline" or "reference condition" to establish trends in forest conditions. This approach is a widely accepted method to establish trends of ecological conditions (Forest Health Report, pg 9). The method used in this EA is a step-down approach for HRV to better define conditions for the landscapes of the EA. HRV conditions are documented for Interior Columbia River Basin; Central Idaho Ecological Reporting Unit; Northeastern portion of the Salmon-Challis National Forest (section M322E, Losensky 1994); research, studies, and reports from adjacent drainages/landscapes; and data from the Gibbonsville area (Forest Health Report, pg 10-51) .

Present forest vegetative conditions (forest structural stages) and trends are discussed throughout the Forest Health specialist report and displayed explicitly in charts 1 to 9 of that report. This information clearly demonstrates that there has been a trend of increased tree stocking and ladder fuels in the dry conifer type of the Gibbonsville Area.

Respondent *(A) 2: The EA fails to disclose the natural range of historical conditions for the indicator species and TES species that inhabit the area.

Response (A) 2: A discussion and comparison of the historic, current and future vegetation structure can be found in the Biological Evaluation and Specialist Report for this project. Tables in both reports provide comparisons of the historic percentages for the central Idaho ERU (Hann and others 1997) with the current

forest and project area percentages. The future (post-project) estimates are also include, by alternative.

Respondent (A) 3: Reliable information with which to justify thinning for fuels reduction, including site-specific information on historical conditions and changes is central to any management proposal purpose and need. The general frequency of past fires and the "natural" density of trees in various types of landscapes remain controversial. (Sierra Nevada Ecosystem Project, 1996, pp. 62-63.) The perception that lethal fire has greatly increased in frequency does not necessarily hold true for vast areas of the Western US. A FS assessment of changes in the Interior Columbia River Basin from pre-settlement to modern times, concludes, "Lethal fire regimes, that kill the upper layer of vegetation, increased 17 percent in the Basin." (Quigley et al, 1997, p. 856.) As a general matter, it is problematic to extrapolate just how dense or sparse forests actually were in pre-settlement times.

Response (A) 3: The EA on pages 3-12 through 3-17 discusses the current vegetation condition compared to historic conditions as well as the characteristics of the fire groups represented on the landscape. The current fire return interval is compared to the historic fire return interval indicating a much longer interval than historically occurred in this area (EA page 3-17). Historically, fires would have played more of a disturbance role on the landscape, shaping the vegetation types and structures.

Respondent *(A) 4: <u>And current FS-DOI estimations of "Condition Class" to show where conditions have changed most significantly from pre-settlement fire regimes, are completely inadequate for site-specific location of remedial efforts.</u> The agencies themselves note that: "While the coarse-scale assessment of Fire Condition Classes provides a useful first-approximation of national level risk, its analysis scale and resolution of data are not sufficient to estimate local and regional-levels of risk." (USDI & USDA 2002; Schmidt et al. 2002.) This government agency conclusion stands in stark contrast to what seems to be the policy of the Forest Service, which is to take high fuel conditions and high fire risk conditions on virtually all areas of the Forest for granted, without looking closely at site-specific conditions.

Response (A) 4: The national level "FS-DOI estimations of Condition Class" you referred to in your comment letter have been reviewed and considered by the Salmon-Challis National Forest, but were not used in this EA to identify potential treatments. The EA used data and information that has been gathered to address vegetative conditions and trends on a site specific scale. The data and information include: forest structural stage, vegetative cover type, potential vegetation types, forest inventory plot data, fuels plot data, and field review of units. This information is contained in the project file.

Respondent (B) 5: To protect the forests and communities from the effects of catastrophic wildfire, a plan that focuses on restoring a natural fire regime within the historic range of variability is necessary.

Response (B) 5: The EA addresses HRV at multiple scales and incorporates a step-down look at HRV information to better define landscape level HRV (see Forest Health report pg. 10-51). The EA proposes treatments that would work towards restoring the forest structure and disturbance process to make them more reflective of HRV. By reducing ladder fuels and treating surface fuels, post-treatment structures will more closely reflect HRV structures and result in lower risk of crown fire (see Forest Health report pg. 60-68, and pg 44-50).

Respondent (B) 6: The proposed project serves to perpetuate uncharacteristically severe wildfires. Through avoiding the natural process and cycles associated with fire that are essential to forest health, hazardous fuels will continue to accumulate and forest structure will develop to a point that severe crown fires are inevitable. Therefore the forests need to be constantly monitored beyond the scope of the project. Prescribed burning needs to be implemented continually with the intention of reintroducing the natural fire regime that has been suppressed over the last century. Wildland fire use should be considered in the future especially around areas that have been treated for hazardous fuels reduction.

Response (B) 6: We agree that continued fire suppression will eventually lead to areas with high fuels concentrations, posing a risk to high intensity fires in those areas. The Salmon National Forest Plan requires that we suppress all wildfires below 8000 feet outside the Frank Church Wilderness (page IV-69). Currently the fire suppression strategy will remain in effect until the Forest Plan is revised. Once the plan is revised, fire management plans will be written for specific areas including areas where fire use may occur. All treated areas will be monitored for fuel treatment effectiveness and timing of follow-up maintenance treatments. Currently fuel treatment areas are monitored the first, third, fifth and tenth year following treatment. This schedule is modified as needed.

Forest Plan Revision

Respondent *(A): Project-level decisions based upon an out-of-date Forest Plan and in an absence of adequate monitoring are inadequately informed, are likely illegal, and will result in more of the same kind of damage that has occurred continuously under the first Forest Plan.

Response (A): The Salmon-Challis Forest is scheduled to start the forest plan revision in 2005. Until the revision is complete, the Salmon-Challis Forests is legally obligated to implement the existing Forest Plan with existing plan amendments.

Empirical Studies

Respondent *(A): There is a gaping lack of empirical studies of the effectiveness of thinning for fuels reduction as applied in the field.

Response (A): There is information indicating that reducing crowns, ladder fuels and crown bulk density can modify fire behavior and reduce the potential for crown fire (EA pages 3-9 – 3-11). The purpose of this project is not to "alleviate future fires", but to modify fire behavior (EA page3-2). There are numerous research citations backing this concept.

- Graham, Russell T. et. al., 1999. The Effects of Thinning and Similar Stand Treatments on Fire Behavior in Western Forests. USDA Forest Service, PNW Research Station. USDI Bureau of Land Management. PNW-GTR-463.
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Thinning

Respondent (B) 1: Concern over the large volume of timber to be removed including the large diameter of trees to be removed, and the prescription for seed tree harvests. Concerned that the proposed actions emphasize commercial tree harvesting over removal of smaller and more flammable vegetation.

Respondent (B) 1: No ponderosa pine greater than 20 inches dbh or large snags will be removed. Generally, trees removed will be less than 12 inches dbh (EA page 2-4). The removal of the larger trees (8 to 12 inches) to facilitate the reduction in crown density will provide less fuel and crown continuity that could support a crown fire (EA page 3-9). More acres will be treated by removing

smaller diameter vegetation (5,690 acres) than removing larger trees to reduce the risk of crown fire (5,436 acres) (EA page 2-13).

Respondent (B) 2: The Proposed Action includes a large amount of commercial thinning, especially in areas not directly adjacent to municipal development where fire protection is most urgent. Commercial thinning of large trees (> 12" in. dbh) should only be utilized where the property and structures of the community are at stake. The Forest Service should adopt a more diverse silvicultural approach that provides a more complex and natural forest structure where appropriate. Instead of thinning ponderosa pines on all four sides around every leave tree, we suggest thinning clumps of trees on only three sides beyond the Wildland/urban interface. This prescription will result in patches of ponderosa pine that are occasionally separated on all four sides. This distribution will function more naturally and still serve the function of a fuel break.

Response (B) 2: Emphasis will be placed on thinning the stands from below, which will normally mean the removal of trees less than 12 inches in diameter. However, mature ponderosa pine and Douglas fir commonly exceed 30 inches in diameter when relatively free of competition. Our treatment objectives emphasize the retention and development of large diameter trees. In some areas, trees greater than 12 inches in diameter will be removed to free a larger diameter or healthier neighbor, when required to reduce competition to a stand density index (SDI) of 80. Current natural stocking will result in various levels of clumping after thinning. The clumping will be quite pronounced in areas receiving a ladder fuel reduction treatment.

Respondent (B) 3: Slope aspect is another factor that has been overlooked and not given sufficient detailed analysis. On south facing slopes, the Forest Service needs to describe specific canopy densities and reduce the number of shade tolerant species. On north facing slopes, canopies are historically more dense with a greater abundance of shade tolerant species. Thinning efforts in these areas should be concentrated around the wildland /urban interface so that natural mixed-lethal fires will not threaten structures.

Response (B) 3: In development of proposed treatments numerous factors were considered to insure specific stand needs were adequately considered; factors such elevation, slope, aspect, fire risk, current stand structure and stand composition. To accomplish the management objectives for the area a range of treatments were developed (see Chapter 2 Alternatives) and fitted to the individual treatment areas.

The dry forest type makes up 93% of the Gibbonsville Project Area (Forest Health Report, pg 2). Fire was historically the primary disturbance factor associated with tree stocking density control. Ponderosa pine habitat types are generally know to be under moisture stress, to the extent that tree establishment can be inhibited, but the HRV for Douglas-fir habitat types in the Gibbonsville

Area had tree stocking densities controlled predominately by frequent low severity fires. None of the proposed treatment units are a ponderosa pine habitat type series, the majority are in the Douglas-fir habitat series. Please refer to Appendix B of the EA, which lists the habitat types of the proposed treatment units.

The HRV fire regime for the dry forest types in the Gibbonsville Area were not "mixed-lethal" on a potential vegetation type/group scale, the majority of the fires were non-lethal with a typical frequency of less than 35 years (Forest Health report pg. 14-17). Due to fire exclusion, north slopes as well as south slopes have unnatural fuels accumulated and must be treated to reduce the risk of uncharacteristic wildfire. To address large crown fire behavior, north slopes of the dry forest type also need restoration treatments (please refer to the project file map of Wildfire Effects Risk Rating (reflecting EA Table 2-1).

Respondent (B) 4: The amount of acres treated with a seed tree prescription should be reconsidered and contrasted with alternative approaches such as pre-commercial and commercial thinning from below. A seed-tree prescription will not only fragment more wildlife habitat, but will also increase wind speeds and the risk of blow down, leading to increased fuels on the ground. An open canopy allows more radiation to reach the ground, which raises soil temperatures and aridity levels of fuels.

Response (B) 4: Within the Assessment Area a seed tree treatment was proposed on one 38 acre area (area 56). This area is dominated by a decadent and dwarf mistletoe diseased stand of Douglas fir. The dwarf mistletoe brooms and heavy fuels present in the understory make the stand highly flammable. The seed tree harvest followed by felling and broadcast burning of the understory fuels was proposed to control the dwarf mistletoe disease and reduce the hazardous fuels. However, this area has also been identified as important lynx habitat. Therefore, this area has been dropped from the Decision.

Respondent (B) 5: The EA fails to discuss the extreme flammability of young conifer plantations. If the Forest Service determines that natural regeneration will be insufficient for desired future conditions and plans to re-seed or replant thinned areas, stocking rates should reflect the hazardous fuels issue and be less dense than normal stocking prescriptions. The Forest Service should also describe the schedule for future thinning and maintenance burns to reduce fuel loads from new saplings.

Response (B) 5: Young conifer plantations have less biomass than mature stands so there is less to burn. The ladder fuel treatments in young conifer stands will create stands that are less susceptible to crown fire in the future because there will be less biomass in the crowns (EA page 3-9). The flammability of young conifer plantations following thinning is discussed on page 3-8, 3-9 and 3-10. Regeneration of thinned areas is not planned. The only

treatment requiring regeneration is the seedtree cut in unit 56. This unit will be dropped from consideration in the Decision Notice. On page 2-3 of the EA it states "periodic underburns are planned every five to fifteen years to maintain vegetative conditions." Monitoring and additional analysis would occur prior to this treatment to determine where and when these future treatments would occur.

Respondent (B) 6: The Forest Service needs to provide more quantified data on the current and target levels of crown densities in the project area. We believe that the Forest Service should place less emphasis on reducing crown bulk density, and instead focus on thinning from below and removing ladder and ground fuels.

Response (B) 6: With the exception of the seed tree removal area (area 56), thinning from below is prescribed for all areas where a commercial product is to be removed and all areas receiving a ladder fuel treatment (pages 3-46 and 3-47). The seed tree removal area has been dropped from the Decision.

Respondent (B) 7: Habitat loss is increased in areas thinned by seed tree or shelterwood harvests, prescriptions that produce adverse effects for species relying on more continuous canopies such as snowshoe hare, lynx, pine martin, and fisher.

Response (B) 7: Although one seed tree harvest unit was included in several of the proposed alternatives for the project, that particular unit was in mapped lynx habitat and has been dropped from consideration for treatment.

Respondent (B) 8: The Forest Service needs to explain why there is a difference in the acreage that "will remain untreated due to a relatively low risk of sever wildfire effects" in the different alternatives: (16,896 acres, 18,571 acres, and 20,088 acres). Presumably, the area in condition class 1 is quantifiable and should not change with each alternative. These different numbers seem to imply that the large volume harvest will remove commercially valuable trees from low risk areas where treatment is not needed. The smaller volume harvest leaves a larger acreage of this low priority area "untreated." This pattern suggests that the emphasis of this project is on what is taken away and not what is left behind.

Response (B) 8: Acres treated vary by alternative. More acres are proposed for treatment in Alternative B as opposed to Alternative D, thus the difference in untreated acres remaining. Each alternative focused on treating areas that responded to various issues, which is why there is a difference in the amount of area treated, and the location of the treatment units. Alternative B was developed to address fuels reduction and forest health (EA page 2-3), alternative C was developed to address sediment affects to water quality (EA page 2-5) and alternative D was developed to address risk of wildfire in the urban interface while emphasizing management of lynx and old growth habitat (EA page 2-6).

Respondent (H) 9: Please consider economics on any timber harvest proposal. Especially the economic effects of additional items attached to the timber sale contract. Items such as required roundwood removal, brush disposal requirements, utilization specs, road construction/reconstruction and season of operation. All of these items have large impacts n the cost of operating a timber sale.

Response (H) 9: A de-emphasis was placed on economic harvest removals. Emphasis was placed on Forest health and reduced fire hazard by targeting the removal of small diameter trees. As a result the value provided by commercial products will be inadequate to cover much of the planned treatment costs for the area. A Timber Sale Appraisal will be prepared for timber sales to determine their viability. In addition, much of the work will require congressionally appropriated funding and need to be completed with Service or Stewardship Contracts.

Respondent (H) 10: I urge you to please consider Stewardship Contracting to accomplish a portion of the work outlined in the EA.

Response (H) 10: Many of the proposed treatment areas contain marginal commercial volumes of inadequate value for removal using a conventional timber sale. Stewardship contracting is likely to be a viable tool for treating much of the area and will be considered.

<u>Increase Fuel Loading</u>

Respondent *(A) 1: The FS should admit that fuels reduction projects could increase, rather than decrease, subsequent fire effects. A series of studies from the scientific literature shows post-thinning increases fire intensity and/or spread.

Response (A) 1: A component of the alternatives are treatment of small woody material through broadcast burning and pile burning (EA page 2-3). The effects of these slash treatments are disclosed on pages 3-8 through 3-11 of the EA.

Respondent *(A) 2: (I)ntensive forest management annually produces high fuel loadings associated with logging residues. As a by-product of clearcutting, thinning, and other tree-removal activities, activity fuels create both short- and long-term fire hazards to ecosystems. The potential rate of spread and intensity of fires associated with recently cut logging residues is high (see for example, Anderson 1982, Maxwell and Ward 1976), especially the first year or two as the material decays.

Response (A) 2: The EA acknowledges the high fuel loadings and subsequent fire behavior associated with logging residues (EA pages 3-8 and 3-9). The reason for slash treatments (broadcast and/or pile burning) of the residual slash is to reduce the amount of logging residue and decrease the effect on future fire behavior (EA pages 3-8 and 3-10). Prescribed fires are used only when

conditions are favorable for achieving the objectives of the burns and when risk of an escape is low. We realized there is always the risk of an “escaped” fire when prescribe fire is used as a vegetation manipulation tool.

Respondent *(A) 3: Regeneration and seral development patterns can have a profound effect on potential fire behavior within landscapes by enhancing or diminishing its spread (Agee and Huff 1987, Saveland 1987). Spatially continuous fuels associated with thick regeneration in plantations can create high surface-fire potential during early successional stages. This was evident in most of the roughly 275 hectares of 1- to 25-year-old plantations burned in the 3500-hectare 1991 Warner Creek Fire in the Willamette National Forest (USDA 1993). The fire moved swiftly through the openings created by past harvests, killing nearly all the regeneration but usually missing adjacent stands >80 years old.

Response (A) 3: Only one regeneration treatment is proposed, 38 acres of dwarf mistletoe infested Douglas-fir in alternatives B and C and it will not be treated with this decision. Regeneration treatments create an open stand with low crown bulk densities that will not support crown fires as long as the regeneration is not tall (Graham, et. al. 1999). Precommercial thinning of young stands would reduce future susceptibility of crown fire because the remaining stand will grow into an open canopy, single storied forest (EA page 3-9 and 3-10).

Respondent *(A) 4: Logged areas generally showed a strong association with increased rate of spread and flame length, thereby suggesting that tree harvesting could affect the potential fire behavior within landscapes.

Response (A) 4: As stated in the EA on page 3-9, prior to slash treatment, a continuous fuelbed composed of small to large down woody material would be present increasing the intensity of a potential fire. Removal of down woody material through the various proposed slash treatments, decreases the resistance to fire control and allows fire suppression by hand crews (Fuels Specialist Report page 11). Removing larger trees to an SDI of 80 brings crown bulk density to less than 0.041 kilograms per cubic meter way below the crown fire threshold of 0.10 kilograms per cubic meter (Agee 1996). This is stated in the Fuels Specialist Report on page 12. The EA on pages 3-6 through 3-11 demonstrates the positive and negative effects logging has on future fire behavior.

Respondent *(A) 5: In general, rate of spread and flame length were positively correlated with the proportion of area logged in the sample watersheds.

Response (A) 5: Rate of spread, resistance to control and flame lengths all increase with an increase in logging slash. The reason for broadcast burning or pile burning the residual slash is to reduce these measures of fire behavior so that a potential fire can be suppressed by hand crews or allows a fire to lightly

burn through the area without causing a crown fire. (EA pages 3-9 through 3-11 and Fuels Specialist Report pages 12-14)

Respondent *(A) 6: Increased rate of spread means that the perimeter of the fire will grow much faster. Generally, a faster perimeter growth makes a wildfire harder to contain.

Response (A) 6: This statement is true. Suppression methods are dependent on the type of fire. A surface fire with flame lengths less than eight feet is easier to contain than a crown fire (EA page 3-5). The proposed fuel treatments will create conditions in which a fire would burn with lower flame lengths (EA page 3-11), remain as a surface fire with occasional torching, allowing firefighters safe, effective fire suppression methods.

Respondent *(A) 7: Scientific evidence does not support the hypothesis that intensive salvage, thinning, and other logging activities reduce the risk of catastrophic fires if applied at landscape scales ... At very local scales, the removal of fuels through salvage and thinning may hinder some fires. However, applying such measures at landscape scales removes natural fire breaks such as moist pockets of late-seral and riparian forests that dampen the spread and intensity of fire and has little effect on controlling fire spread, particularly during regional droughts. ... Bessie and Johnson (1995) found that surface fire intensity and crown fire initiation were strongly related to weather conditions and only weakly related to fuel loads in subalpine forest in the southern Canadian Rockies. . . . Observations of large forest fires during regional droughts such as the Yellowstone fires in 1988 (Turner, et al. 1994) and the inland northwest fires of 1994 . . . raise serious doubts about the effectiveness of intensive fuel reductions as “fire-proofing” measures

Response (A) 7: The purpose of this project is to reduce hazardous fuels in the project area and protect natural resources and private property from high severity fires (EA page 1-7); it is not to protect a landscape. As stated in the EA on page 3-1, fuels, weather, topography are the main contributors to fire behavior. There is only one element that land managers can affect, fuels. That is why this project focuses on reducing fire behavior in certain areas through fuel manipulation.

Respondent *(A) 8: More than any other human activity, logging has increased the risk and severity of fires by removing the cooling shade of trees and leaving flammable debris.” And, “Timber harvest, through its effects on forest structure, local microclimate, and fuel accumulation, has increased fire severity more than any other recent human activity. Although silvicultural treatments can mimic the effects of fire on structural patterns of woody vegetation, virtually no data exist on the ability to mimic ecological functions of natural fire.”

Response (A) 8: Slash treatments will remove flammable logging debris. The purpose of this project is not to mimic ecological functions but to to reduce

hazardous fuels in the project area, improve forest health and protect natural resources and private property from high severity fires (EA page 1-7). Follow-up maintenance treatments would occur to remove ladder fuels that grow into the openings created by the treatments (EA page 2-3 and 3-25).

Respondent (B) 9: By excluding outlying areas from the prescribed fire treatments, and continuing to suppress fires, fuels outside the treatment areas will accumulate and stand densities will increase, leading to an increase in the risk of high severity fire in these adjacent areas.

Response (B) 9: We agree that continued fire suppression will eventually lead to areas with high fuels concentrations, posing a risk to high intensity fires in those areas. The Salmon National Forest Plan requires that we suppress all wildfires below 8000 feet outside the Frank Church Wilderness (page IV-69). Currently the fire suppression strategy will remain in effect until the Forest Plan is revised.

Respondent (B) 10: The occurrence of clear-cuts and commercial thinning projects adjacent to the project area will also increase risk of high severity fire. Large amounts of slash and woody debris will increase hazardous fuels on the ground that could increase the risk of wildfire in the project area. Analysis of these adjacent landscapes needs to be inventoried.

Response (B) 10: There are no future clearcuts or commercial thinning projects planned on the National Forest adjacent to the proposed project. Previous clearcuts and commercial thinnings have removed most of the remaining slash to reduce the residual down fuels. The exceptions are some treatments on private land. Several landscape assessments were completed for this area, The Gibbonsville Fuels Assessment and Treatment Plan (Stewart Hoyt, 2000), North Fork Headwaters Watershed Analysis (USFS, 1998) and Lost Trail Pass – Gibbonsville (USFS, 1995). These assessments analyzed various components of the landscape including fuels, fire and vegetation.

Respondent (B) 11: The Forest Service needs to monitor the fuels and stands in adjacent areas in order to protect the project area. Prescribe burns outside of the project boundaries should be considered to decrease fuel loads and create a mosaic of varying age-classes and structures in outlying forest stands. The Forest Service needs to provide details of how and when these adjacent areas are to be treated.

Response (B) 11: As stated in the previous response, several assessments provided landscape information on fuels, fire and vegetation and describe the mosaic of varying age-classes and structures on the landscape. A discussion of criteria used for treatment unit selection is on page 2-1 of the EA. It was based on a risk assessment of the entire area and factored in types of vegetation and fuel models. The Forest has a five-year action plan for fuels treatments that

prioritize projects on the Forest; additional fuels reduction is planned in the vicinity of Lost Trail Ski Area in 2005.

Respondent (B) 12: It has been proposed that the fallen slash will be piled and burned. The EA gives no specific indications as to how or when these treatments will be implemented or funded.

Response (B) 12: The maps for each alternative in Appendix B of the EA indicate the type of slash treatment proposed for each unit. The slash treatments will not occur until all the thinning and ladder fuel reduction is complete in each unit. The slash needs to cure for one season prior to treatment so that it will burn because green slash does not burn very well. The slash may not be treated for one to two years following other treatments (Fuels Specialist Report page 10) and will be dependent on the timing of proper burn conditions (EA page 2-4).

Respondent (B) 13: It was stated that 1-4 tons per acre of down woody material will be left in "units adjacent to private land". A definition of the length of "adjacent to private land" needs to be included in each alternative.

Response (B) 13: The alternative tables in Appendix B for each alternative indicate the units where this will occur and alternative maps in Appendix B show their locations. The distance from private land was based on topography and existing fuel type.

Respondent (H) 14: The hand piling of slash seems to be way over-done in the EA. This is an extremely expensive method to address fuel reduction. Please reduce or eliminate the hand piling on the analysis area and utilize cheaper mechanical methods wherever possible.

Response (H) 14: Hand piling is proposed in response to other resource concerns such as mechanical damage to the residual stand, soil compaction, smaller piles that burn with less intensity and residual damage to the underlying soil and surrounding trees and maintaining water quality. We recognize that hand piling is expensive and will avoid doing it where we can meet our objectives and manage the fuels more efficiently using other method such as tractor piling or broadcast burning. Factors such as steep slopes, closely spaced trees, heavy fuel loadings and sensitive soils make it necessary to employ hand piling on many of the sites.

Fuel Breaks

Respondent *(A) 1: The effectiveness of fuelbreaks remains a subject of debate within and outside the fire management community. There are many reasons for this broad range of opinion, among them that objectives can vary widely, fuelbreak prescriptions (width, amount of fuel reduction, maintenance standards) may also vary, they can be placed in many different fuel conditions, and may be approached by wildland fires under a variety of normal to extreme weather

conditions. Furthermore, fuelbreaks are never designed to stop fires but to allow suppression forces a higher probability of successfully attacking a wildland fire. The amount of technology directed at the fire, and the requirement for firefighter safety, both affect the efficacy of fuelbreaks in the suppression effort.

Response (A) 1: Fuelbreaks are not a component of the proposal. The purpose of the proposed actions in Alternatives B, C and D is to modify fire behavior through vegetation manipulation in key areas enabling fire suppression crews and to provide for public and firefighter safety (EA pages 3-2 through 3-11). We agree that fuelbreaks are not designed to stop a fire, but to modify fire behavior.
Respondent (A) 2: Sustained alteration of fire behavior requires effective and frequent maintenance, so that the effectiveness of any fuel treatment, including fuelbreaks, will be not only a function of the initial prescription for creation, but also standards for maintenance that are applied. The efficacy of many past fuelbreaks has been largely lost because of inadequate or no maintenance. If a fuelbreak is to remain effective, permanent cover type must occur

Response *(A) 2: We agree that future maintenance of the treatments is required in order to maintain the efficacy of the treatments. This is discussed in the EA on page 3-9, "future maintenance treatments will be needed to remove newly established ladder fuels", EA page 3-11 discusses future treatments in the seedtree regeneration unit. The Fuels Specialist Report (page 11) discusses the need for future treatments when new seedlings and saplings establish in the understory of mature stands.

<u>Prescribed Fire</u>

Respondent *(A) 1: For most prescribed fire and fuels management activities in the Northern Rocky Mountains, land management agency personnel use as their model the ponderosa pine ecosystem. This might be called the ponderosa pine "poster child." It is the fire regime professionals utilize as a justification for increasing budgets for prescribed burning and as an example of how fire suppression has resulted in forests that are markedly different from pre-settlement times. Yet, this is one of the least extensive forest types in the region. Hutto (1995) states, "the origin of most Rocky Mountain forest stands can be traced to stand-replacement fires as opposed to mild understory burns" (internal citations omitted).

Response (A) 1: The Gibbonsville Project Area is made up mostly (93%) of the dry forest type, which historically was an ecosystem characterized by a nonlethal fire regime (frequent low severity fires). These frequent fires in conjunction with other ecosystem processes produced a landscape that was forested with large diameter trees on the majority of the area. Most of the forested area of large diameter trees, were in an old growth open forest condition, which is characterized by low numbers of small diameter trees per acre. The overstory trees were mostly ponderosa pine and/or Douglas-fir (Forest Health Report, pg. 2).

Respondent (A) 2: Today, current prescribed fire proposals are not simply targeting the low severity regime such as ponderosa pine and dry Douglas-fir forests. Many projects are being developed in lodgepole pine and whitebark pine, high elevation forests with high severity fire regimes. These are forested areas least affected by fire suppression activities in the last 50 years and are the most remote. There is very good evidence that these moderate (Barrett, et al., 1991) and severe fire regimes (Weir et al. 1995) have not been affected by fire suppression. Therefore, prescribed burning and fuels management in these areas is often not necessary. Wildfires in these mid- to high-elevation forests affect human safety and important or expensive structures the least. If the public is to be supportive of increased prescribed burning, taxpayers money should be spent targeting areas primarily in low-elevation, low-severity fire regimes or areas adjacent to important structures.

Response (A) 2: The boundary for the project area includes low and mid-elevation forests (EA, page 3-12). The project is directed at the dry forest, low severity fire regime of ponderosa pine and Douglas-fir.

Respondent *(A) 3: "Periodic underburns are planned every five to 15 years after treatments on most units to maintain vegetative conditions" (2-3). The EA does not analyze the cumulative effects of such future actions, nor does it consider the economics of such an ongoing scenario.

Respondent (A) 3: Following treatments, all units will be monitored for fuel loads (Fuels Specialist Report page 15). When fuels exceed desired conditions following treatments, an assessment will be done to determine the type of follow-up treatment needed and where those treatments will be applied. Since the type of future treatments and location of future treatments are not known at this time, analysis on the effects was not completed in this EA. Currently, fuel treatments are monitored the first, third, fifth and tenth year following treatment. The protocol is modified when needed.

Respondent (B) 4: We encourage the Forest Service to increase the use of prescribed burning at all elevations in both the project area and outside the boundaries. More broadcast burns should be implemented than what has been proposed to create a mosaic of fuels on the ground and to serve as fuel breaks for low intensity ground fires.

Response (B) 4: Treatment areas were chosen that reduced hazardous fuels, improved forest health and protected natural resources and private property from high severity wildfire. Every acre cannot be treated, so the Interdisciplinary Team developed unit selection criteria. A discussion of criteria used for treatment unit selection is on page 2-1 of the EA. It was based on a risk assessment of the entire area and factored in types of vegetation and fuel models.

Roads

Respondent (A) 1: The EA must include the Roads Analysis Process (RAP) as part of the NEPA process, so the public, decisionmaker, and ID team can be fully informed about the costs and the need for all transportation facilities in the project area.

Response (A) 1: Roads analysis has been completed and is located in the project files (EA page 2-4).

Respondent (A) 2: The EA doesn't tell us which segments of roads in the project area watersheds will NOT get maintenance and upgrading necessary to prevent those segments from continuing to be adverse impacts or high risk of sudden failure.

Response *(A) 2: The Roads Analysis Report (RAP) is located in the project files. Table 1, of RAP, pages 6 through 29 discloses the current condition of all roads within the project area and their disposition.

Respondent *(A) 3: The EA does not discuss the economic and ecological impacts of long-term, routine, necessary road maintenance.

Response (A) 3: Table 1 of the RAP, pages 6-29, discloses the ecological risks for all roads within the project area. Road issues are listed on page 31 of the RAP, and pages 32 through 35 disclose the effects of roads on resources; including socioeconomics, fisheries, hydrology and watershed, and wildlife. RAP, pages 36 and 37, describes the opportunities for addressing road issues and risks.

Respondent *(A) 4: Please disclose the amount of money needed to adequately meet all road maintenance needs, the amount of money used for road maintenance annually in each project area watershed over recent years, and in regards to the latter distinguish between how much was funded by timber receipts vs. how much was funded by funds in line items besides timber.

Response (A) 4: RAP, page 33, discusses the road maintenance budget and the amount of money needed for roads in the project area. The Forest doesn't track the amount spent on road maintenance for any individual watersheds on the Forest. Road maintenance is funded by appropriated dollars Forest wide. Timber receipts only fund necessary maintenance for roads that are used during commercial activities. The Forest doesn't depend on timber receipts to fund routine road maintenance.

Respondent (A) 5: The EA fails to adequately consider the effectiveness of road closures, choosing to merely assume that road closure means secure habitat.

Response (A) 5: The effectiveness of motorized travel restrictions in providing wildlife habitat security is well documented. Discussions of this important habitat component are included throughout the wildlife portions of the EA, especially in the habitat effectiveness sections in Chapter 3.

Respondent (B) 6: We encourage the Forest Service to significantly increase the number of proposed roads to be obliterated. The timing of decommissioning should be addressed. We suggest decommissioning roads prior to treatments to ensure that decommissioning is achieved and not overshadowed by the thinning and burning treatments. Culverts of obliterated roads should be removed and restored to reduce the effects these have on sedimentation, water quality, and soil productivity."

Response (B) 6: The decision was made to only treat (i.e., decommission) roads that were within the fuel treatment units for the action alternatives. Depending on the alternative, or mix of the alternatives, that's selected, the roads within those treatment units will be addressed. For Alternative B, this is approximately 15 miles of decommissioning (EA page 2-4); Alternative C, approximately 9 miles (EA page 2-6); and Alternative D, approximately 6 miles (EA page 2-6).

Some of the roads identified for decommissioning will be used to implement the fuels reduction project. Therefore, decommissioning won't occur until after the units are treated.

Part of decommissioning is removing culverts (Roads Analysis Report, page 7 shows decommission methods, and where culverts exist, they are removed to restore natural drainage patterns).

Respondent (E) 7: Tri Corp is one of the landowners up Dahlonega Creek and it was brought to Tri Corp's attention that the Forest Service has no easement or right of way through our property and at this point, Tri Corp cannot see how the project up Dahlonega Creek is going to work, because of the right of way problem.

Response (E) 7: The road along Dahlonega Creek is a public right of way.

Respondent (F) 8: Under none of the three action proposals is the logic for "decommissioning" roads made clear. It seems to be unrelated to the purpose of the proposed action. As a separate issue (where it belongs) we strongly believe in maintaining access to the forest. Even though the roads in question are currently closed they are still a part of the ability to move about within the forest by hikers, hunters, etc."

Response (F) 8: Forest Service policy, Forest Service Manual (FSM) 7712.1, requires us to do a roads analysis for all projects that involve any changes in road management. The Roads Analysis Report (RAP), in the project files, documents proposed changes to the Forest transportation system. Many unclassified roads that are needed for forest management and access, including public access, are being added to the transportation system. Other roads, that contribute to high road densities, and are not needed for access or management, have been identified for decommissioning. Table 1, of the RAP, pages 6 through 29, displays the effects that roads have on resources. Roads are identified for decommissioning primarily because of their effects on watershed condition and wildlife habitat effectiveness. This is also described in the EA as resource concerns. Examples are EA pages 3-27 through 29, Watershed Risk Rating; and page 3-108, Habitat Effectiveness.

Respondent (G) 9: The EA should be clearer on the uses of the roads in the EA proposed for decommissioning.

Response (G) 9: See response (A) 2 above under Roads.

Respondent (H) 10: I oppose decommissioning roads, by obliteration, that are within the suitable base on the Forest.

Response (H) 10: Forest Service policy, Forest Service Manual (FSM) 7712.1, requires us to do a roads analysis for all projects that involve any changes in road management. The Roads Analysis Report (RAP), in the project files, documents proposed changes to the Forest transportation system. Many unclassified roads that are needed for forest management and access, including public access, are being added to the transportation system. None of the roads identified for decommissioning in the RAP have prescriptions for obliteration.

Roadless

Respondent *(A) 1: The maps in the EA do not clarify the roadless boundary issues. It is not correct to merely accept previous, often arbitrary roadless inventories—unroaded areas adjacent to inventoried areas were often left out. Additionally, there is a lot of public support for adding unroaded areas as small as 1,000 acres in size to the roadless inventory.

Response (A) 1: Map 2 on page 1-4 in the EA identifies the Roadless boundaries. Land management allocation and boundaries will be reviewed when the Salmon-Challis National Forest begins the forest plan revision scheduled for 2005.

Respondent (B) 2: We recommend that the 1.5 miles of existing road in the roadless area be considered for decommissioning."

Response (B) 2: Although approximately 1.5 miles of existing road, within the roadless area, may be used to access Unit 51 for Alternative B, it is located outside the analysis area for the project and will not be decommissioned by implementing this project. The road doesn't require reconstruction or maintenance to use. Unit 51 is a hand treatment unit, so only hand crews will need to access the unit.

Aquatic Habitat

Respondent *(A) 1: If we are sincere about wanting to reduce risks to fisheries associated with future fires, we ought to be removing barriers, reducing road densities, reducing exotic fish populations, and re-assessing how we fight fires. At the same time, we should recognize the vital role that fires play in stream systems, and attempt to get to a point where we can let fire play a more natural role in these ecosystems.

Response (A) 1: The proposed Gibbonsville Wildland/Urban Interface Fuels Reduction Project Environmental Assessment's Chapter 1 Purpose and Need clearly defines the proposed action and the purpose and need for this action. This project was never proposed to "reduce fire as a way to reduce risks to native fish populations". This project as well as other ongoing and future projects on the Salmon-Challis National Forest are working to restore fisheries resources by removing barriers, reducing road densities, reducing exotic fish populations, and re-assessing how we fight fires.

Respondent *(A) 2: In addition to not addressing the true risks to aquatic systems, most proposals to reduce fire risk involve fuel reduction treatments that can, themselves, result in significant risks to fisheries.

Response (A) 2: The proposed Gibbonsville Wildland/Urban Interface Fuels Reduction Project's Environmental Assessment, specialist's reports and Biological Assessments/Biological Evaluations (BA/BE) within the project file analyzed the fuel reduction treatments risks to fisheries resources. The EA states for fisheries the predicted effects on management indicator species, sensitive species, listed species and/or their habitats is no change for Alternative A and a may impact but will not contribute to population or habitat declines for the three action Alternatives. This analysis and the BA/BE also show the proposed project as designed as having a May Effect but Not a Likely to Adversely Affect on the fisheries resources. (Project File Fisheries Specialist's Reports and Fisheries BA/BE).

Respondent *(A) 3: It is extremely important the project NEPA document disclose the environmental baseline for watersheds. Generally, this means their condition before development or resource exploitation was initiated. For example, the baseline condition of a stream means the habitat conditions for fish and other aquatic species prior to the impacts of road building, logging, livestock grazing, etc. Therefore, proper disclosure of baseline conditions would mean

estimates of stream stability, pool frequency conditions, water temperature range—essentially the values of Riparian Management Objectives along with such parameters as sediment levels. When such information is provided, comparison with the current conditions (after impacts of development) will aid in the assessment of cumulative effects of all alternatives.

Response (A) 3: Fisheries Resources (fish and fish habitat) baseline conditions were used, considered, and documented in the project file for the fisheries analysis. The fisheries analysis considered other specialist's reports and the fisheries specialist's reports and supporting Appendices such as *Affected Environment Fisheries Resources* – August 23, 2004, *Fisheries Cumulative Effects Table, Appendix K* – August 23, 2004, *Environmental Consequences – Fisheries Resources* – July 31, 2002, and *Fisheries Biological Assessment/Biological Evaluation* August 18, 2003 for ESA Threatened, Endangered, and Proposed listed fish species and the Region 4 Regional Forester's Sensitive Fish Species List. Also, considered in the fisheries analysis are previously completed ESA Section 7 Consultation Documents as listed in the *Affected Environment Fisheries Resources,* which includes additional baseline fish and fish habitat conditions.

The Lost Trail Pass- Gibbonsville Integrated Resource Analysis and the North Fork Headwaters Watershed Analysis can be found in the project file. Both of these documents contain a detailed description of the baseline conditions in the project watersheds and were used for reference. The measurement indices used to determine the risk of cumulative effects includes road density, percent of watershed in stands less than 30 years old, and watershed relief. Watershed relief will not have changed under the timeframes considered. The environmental baseline relating to roads and harvest in project watersheds is assumed to be zero. That is to say that before development and resource exploitation was initiated there were no roads and there were no harvested stands. This assumption is evident in the table used to calculate risk of cumulative effects where risk is evaluated using a graph with a y intercept of zero (USDA, 1993) *Determining the Risk of Cumulative Watershed Effects Resulting from Multiple Activities.*

Respondent *(A) 4: How can the EA assure consistency with the Forest Plan if it doesn't even compare present conditions with Riparian Management Objectives?

Response (A) 4: The Fisheries analysis and supporting fisheries specialist's reports used measurement indices to analyze environmental consequences and compare alternatives and their effects on the fisheries resources. The measurement indices used included: R1/R4 stream habitat inventory data, as it relates to 3 of the habitat attributes for forested stream systems identified in the 2/24/95 PACFISH EA and 7/28/95 INFISH EA: width-to-depth ratios, large woody debris and pool frequency, fish species presence/absence and population

densities, stream sediment % fines by depth (both shovel methodology and core sampling), stream temperature, stream connectivity, road density in the 6th field hydrologic unit code (HUC), and % of stands less than 30 years old in the 6th field (HUC). These measurement indices are part of an aggressive and proactive fisheries monitoring program on the North Fork Ranger District that began in 1991 and continues today. The fisheries monitoring conducted on the district since 1991 has been used in establishing baseline conditions. These baseline conditions have not only been described in the fisheries' section of the project file but also within other supporting documents discussed and referenced within the fisheries section of the project file. The summaries of the monitoring data collected are disclosed in the supporting fisheries specialist's reports as listed above (Project File Fisheries Specialist's Reports and Fisheries BA/BE).

The EA does not specifically recognize a numeric limit for water yield and sediment delivery because in both cases the limit established in the EA is for no measurable change. The meaning of chosen indices relative to cumulative effects is described on page 3-28 of the EA.

Respondent *(A) 5: The EA is extremely deficient in its description of aquatic habitat conditions, stream conditions, and water quality/ aquatic habitat trends in project area watersheds. One problem is that management and human-caused impacts have been ongoing and thus the environmental baseline is constantly shifting.

Response (A) 5: See response (A) 4 above under Aquatic Habitat.

Respondent *(A) 6: The EA fails to adequately compare baseline, pre-development watershed conditions and fish population numbers with current and foreseeable watershed conditions and fish population numbers.

Response (A) 6: See response (A) 4 above under Aquatic Habitat.

Respondent *(A) 7: The FS doesn't recognize any limits on water yield, sediment, or any risk factor and fails to interpret the meaning of the indices it does choose, in term of the significance of cumulative effects.

Response (A) 7: The EA does not specifically recognize a numeric limit for water yield and sediment delivery because in both cases the limit established in the EA is for no measurable change. The meaning of chosen indices relative to cumulative effects is described on page 3-28 of the EA.

Respondent (A) 8: The EA fails to cite the results of any monitoring that validates assumptions inherent in its use of certain threshold values of water yield increases.

Response *(A) 8: There are no site-specific monitoring results that validate assumptions of threshold water yield values used in the EA, however work done by others is cited. Both Troendle, 1982 and Stednick, 1996 were cited in the EA for their research which found that changes in water yield from basins with less than 20 percent forest cover reduction cannot be determined. They concluded that, approximately 20 percent of the watershed cover must be harvested for a measurable increase in annual water yield. Based on this research we set our water yield threshold to be below a 20 percent forest cover reduction.

Respondent *(A) 9: The EA fails to disclose that the water quality and fisheries monitoring, as required under the Forest Plan, has not been adequately undertaken.

Response (A) 9: See response (A) 4 above under Aquatic Habitat.
Ocular reporting of road slope failures can be found in the Roads Analysis. Sequential photo points were taken in conjunction with the R1/R4 survey to determine changes in riparian areas due to management. Peak crest flow as well as average and low flows for stream in the project area can be found in the hydrology specialist report. There are no potable water supplies recognized that would require bacteriological sampling. Water quality monitoring to record changes due to land management would be conducted following the project.

Respondent *(A) 10: Before implementing projects that could adversely affect Water Quality Limited Segments the FS must first, in cooperation with the state of Idaho and/or the EPA, develop a Total Maximum Daily Load (TMDL) as the Clean Water Act and state Water Quality regulations require.

Response (A) 10: This statement is true however; there are no Water Quality Limited Segments in the project area.

Respondent (B) 11: The effects of ladder fuel treatment in RHCAs needs to be assessed.

Response (B) 11: Ladder fuel treatment is analyzed within the fisheries specialist's reports and the Fisheries BA/BE which can be found within the project file. Within the EA ladder fuel treatment is considered on pages 3-62 and 3-63 under the Large Woody Debris analysis. In summary there will be no ladder fuel reduction within riparian areas (page 2-7). This will ensure maintenance and enhancement of all streambank vegetation, streambank stabilization, and streamside shading. The ladder fuel reduction that would occur within a stream's RHCA is designed not to adversely affect the streams Riparian Management Objectives, which include future large woody debris recruitment, water temperature, stream sedimentation, width to depth ratios, pool frequency and all of the fisheries resource measurement indices.

Respondent (B) 12: We are concerned with sediment delivery to streams may be higher than the predicted and estimated amounts. In addition to the estimated probabilities, there should be quantified estimates of the amounts of sediment that would be deposited to streams.

Response (B) 12: The project file contains WEPP sediment yield estimates as well as the probability of runoff, erosion and sediment delivery for a range of treatments and storm event scenarios. Treatments modeled include; no action, wildfire, fuels reduction treatment with hand piling and burning in RHCA's (riparian habitat conservation areas), and fuels reduction treatment with prescribed burning in RHCA's. Sediment yields and probabilities of runoff, erosion and sediment delivery were predicted for each treatment given six storm events based on thirty years of records (storm return periods included: an average, 1.5 year, 3 year, 6 year, 15 year, and 30 year). For this EA we chose to compare alternatives based on the modeled probability that sediment will be delivered to a stream given a storm with a thirty-year return interval. The Disturbed WEPP Technical Documentation supports this analysis with the following explanation: If the year is normal or dry, then it is unlikely for there to be any significant erosion or sediment yield. If the year has above average precipitation, however, then there could be significant soil erosion and sediment yield. With such variation from one year to the next, the concept of "average annual erosion" or "average annual sediment yield" is not appropriate as there is no such thing as an "average" year. The erosivity of a given year is either above average, or below average. A more appropriate analysis of soil erosion and sediment yield following a forest disturbance may be the probability of a given level of erosion or sediment yield occurring.

Respondent (C) 13: As identified in the Environmental Assessment report, all fuel treatment options will increase and accelerate erosion and runoff volume. Post fuel reduction (FR) treatment, fine particle sedimentation and the severity of the negative impact on aquatic biology and general stream health is highly dependent upon unknown factors such as the intensity of winter rainfall onset in any given year (of primary importance is the first year after FR treatment). Removal of living vegetation and the subsequent decay of soil stabilizing root densities further exacerbates the problem of erosion and subjects the watershed to an extended destabilizing period.

The removal and burning of soil surface plant biomass not only diminishes/eliminates the rainfall impact buffering potential increasing runoff volume but further serves to flush nutrients into streams. High phosphate and nitrate "flush" releases potentially contaminate streams with periodic high levels.

The steep slopes of the immediate North Fork Salmon River canyon, as well as that of major tributary creeks, should be treated only from the ridge line outward, thereby, not subjecting the immediate alluvial region and riparian habitat to

potentially devastating runoff, sedimentation and nutrient contaminants. As stated in the EA, this is a high risk area.

Response (C) 13: The identification of these areas as high risk as pointed out in the above comment is referring to the potential for erosion after a wildfire event. The characterization of these areas using a set of fire and soil risk factors supports our need for treatment of these areas to reduce the potential for a severe fire event and the risk of erosion following such an event. Areas proposed for treatment were identified by integrating the following risk factors; fire behavior fuel model classification (Anderson, 1982), vegetation structural stage (Hessberg, 1999) and moderate to high inherent erosion hazard ratings. Implementation of fuels treatments in these areas will minimize the risk of crown fires, reduce the rate of fire spread, and thus minimize soil damage and erosion potential.

Homes

Respondent *(A) (B) 1: The EA fails to address community preparedness.

Reponse (A) (B) 1: Approximately fifteen landowners have reduced fuels or are planning on reducing fuels on their land by removing ladder fuels, reducing crown closure, disposing of the slash and removing flammable materials from around their homes in Gibbonsville and Sheep Creek. This is accomplished through Lemhi County Fuels Reduction Program in cooperation with the National Fire Plan. (S. Thompson personal communication, 2003)

On page D-7 of the EA, there is a discussion of proposed timber sales on private land. It is not known if the landowners are removing the timber to reduce fuels, but the effects would be similar to the thinning effects on National Forest.

Respondent (B) 2: Much of the catastrophic effects of wildfire on private property can be eliminated through individual maintenance and alteration of structures. The Forest Service should relay information to community leaders and homeowners with the end result being that homeowners would take responsibility in protecting their personal property.

Response (B) 2: We agree that it is the homeowner's responsibility to reduce fuels on their property. Approximately fifteen landowners have reduced fuels or are planning on reducing fuels on their land by removing ladder fuels, reducing crown closure, disposing of the slash and removing flammable materials from around their homes in Gibbonsville and Sheep Creek. This is accomplished through Lemhi County Fuels Reduction Program in cooperation with the National Fire Plan (S. Thompson personal communication, 2003). The Forest offers technical assistance when needed to homeowners and County officials.

Respondent (D) 3: The intent of the National Fire Plan is to secure, as well as is feasible, private land from being involved in catastrophic Wildland infernos. We

support this intention, however, we feel that the Plan has gone awry, in that it promotes unnecessary and unhealthy timber harvest in areas that would have little, if any, beneficial effects on private lands and structures.

Response (D) 3: The purpose of this proposal is multi faceted, reduce hazardous fuels, improve forest health and protect natural resources and private property from high severity wildfire (EA page 1-7). The Interdisciplinary Team developed a risk rating process for identifying units for treatment. The process is described on page 2-1 of the EA.

Population Viability

Respondent *(A) 1: Forest Plan Wildlife Standard 2a requires "Habitat for each vertebrate wildlife species on the Forest will be managed to insure viable or target populations." We are unaware that the Salmon NF has set numbers for target or viable populations, or set minimum habitat requirements to assure such numbers. The EA doesn't contain any scientifically defensible viability analyses for wildlife, even though many species' populations have declined due to cumulative effects of roads, logging, and other factors.

Response (A) 1: On pages II-24 thru II-27 of the current Salmon National Forest Land and Resource Management Plan (FLRMP) estimates of the minimum viable populations, existing populations, Forest Service objective populations and potential populations and acres of suitable habitat necessary to support those populations are presented for all Management Indicator Species (MIS) for this forest. By definition, federally listed species are included in the MIS list. The information in this section of the FLRMP also includes definitions of applicable terms. Forest Service objective populations given for big game species reflects IDFG objectives in place at that time (1988) and no objectives were stated for non-game MIS. Also, the FLRMP was written well before wolf recovery efforts and during early peregrine falcon and bald eagle recovery efforts so given numbers do not reflect current numbers and/or objectives in all cases.

Respondent *(A) 2: The FS has failed to tier the viability analyses for Sensitive species that would be impacted by the Gibbonsville project to a landscape analysis of Sensitive species viability that would allow for some assurances to the public that species viability is currently being insured in spite of continued habitat destruction and/or alteration.

Response (A) 2: The Ninth Circuit Court (Seattle Audubon Society v. Mosely and Inland Empire Public Lands Council v. US Forest Service) has consistently made it clear that viability provisions belong in the forest planning process. Our cumulative effects analyses for this project proposal indicate that any habitat alterations due to this project would fall well within such goal and objectives stated in our current Forest Plan and would, in fact, help restore necessary habitats for most sensitive species found in this analysis area.

Respondent (A) 3: The EA admits that the action alternative would adversely impact ESA-listed and Sensitive fish species, yet fails to disclose minimum viable population numbers, nor how the populations must be distributed to maintain the connectivity necessary for viability.

Response (A) 3: Nowhere in the EA, the fisheries analysis or the fisheries specialist's reports does it ever state the action alternative would adversely impact ESA listed or Region 4 Sensitive fish species.

Wildlife Habitat

Respondent *(A) 1: The issue of providing for the larger landscape needs of far-ranging forest carnivores (including the grizzly bear, gray wolf, wolverine, fisher, pine marten, lynx, goshawk, etc.) reveals the need to utilize the principles of Conservation Biology on a landscape level. Core areas of relatively undisturbed habitats need to be maintained. Linkages with other core areas need to be established, providing sufficient habitat components so the linkages, or corridors, are functional for genetic interchange purposes. Both core areas and linkages should be the focus of the watershed rehabilitation and recovery discussed above (such as road removal). Buffer zones around core areas should also be recognized in their contribution to habitat needs for these wildlife species.

Response (A) 1: The analysis area for this proposed project does not include the large blocks of intact habitat located along the Continental Divide/Idaho-Montana Divide, an area that has been considered an important linkage area for many species including forest carnivores. This particular area also includes blocks of secure hiding cover for big game species that will not be impacted by this proposal.

Respondent (B) 2: The EA should consider the habitat benefits to wildlife that dwarf mistletoe offers. By increasing crown spacing and isolating individual cases or clumps of dwarf mistletoe, the Forest Service can manage the fuels and disease risk while retaining the wildlife benefits.

Response (B) 2: See comment (B) 4 under Thinning.

Respondent (C) 3: Further efforts to maintain the migratory routes and over wintering habitats for big game and sensitive species should be extended as necessary to reduce the potential threat to general animal health and survival.

Response (C) 3: The analysis area and proposed treatment areas for this project are confined to more moderate elevations and do not extend to the Continental Divide/ Idaho Montana Divide where topography constraints often dictate preferred migration routes for big game. Within the analysis area mule deer and elk are normally scattered in relatively small groups as they drift towards key winter ranges to the south and southwest (i.e. down the North Fork

of the Salmon River). Vegetative treatments included in this project will be designed to maintain adequate big game thermal cover on the key winter range areas (Prescription Area 4A in the FLRMP). In addition, such treatments should allow addition light to reach the forest floor, resulting in greater diversity and productivity of both herbaceous and woody forage species. The many mitigation measures, standards and guidelines included within all treatment prescriptions should alleviate any potential threats to general animal health and survival for all species present, including big game and sensitive species.

Old Growth

Respondent *(A) 1: Forest Plan Vegetative Diversity Standard 1.a. requires, "In forested area 10% or more should be in old growth…"(Forest Plan at IV-17). Wildlife and Fish Resource Management Standard 2.b. required, "A minimum of 10 percent of applicable forested ecosystems dispersed across the forest, will be managed and maintained (by timber class) as old growth." (Forest Plan at IV-19.) The EA fails to adequately demonstrate compliance with these Standards, by alternative. Table 3-27 is a model of ambiguity and vagueness.

Response (A) 1: The current Forest Land and Resource Management Plan (FLRMP) for the Salmon National Forest designated 10 percent of each forest community type as "old growth retention stands". Designated stands were mapped, by timber type, to help insure proper juxtaposition across the forest. These stands are not considered suitable for timber harvest. They were removed from the timber management base and are "to be retained as old growth" (US Forest Service 1988). Although timber management activities are not normally scheduled in the mapped and designated old growth stands, timber harvest is permitted where removal is compatible with old growth management objectives (US Forest Service 1988). Within the Gibbonsville analysis area, 27 stands totaling approximately 1,500 acres are designated as old growth retention stands. Vegetation (timber) types mapped in this area include Douglas-fir (70 percent or approx. 1,050 acres), lodgepole pine (7 percent or approx. 105 acres), subalpine fir (1 percent or approx. 15 acres) and ponderosa pine (17 percent or approx. 255 acres). The historic and current vegetative conditions of these designated stands are discussed in detail on pages 7-9 and 65-67 of the Biological Evaluation and Specialist Report and will not be repeated here. However, what the work of Hann and others (1997) clearly shows is that old growth forests in central Idaho historically contained approximately a much higher percentage of late-seral single layer stands than they do today and that those stands have been replaced by late-seral multi-layer stands. In the ponderosa pine, Douglas-fir and lodgepose pine types within the Gibbonsville analysis area, the historic condition contained approximately 12 percent late-seral multi-layer forests and 13 percent late-seral single layer stands. However, the current condition consists of approximately 42 percent late-seral multi-layer and only 4 percent late seral single layer stands. This is particularly noticeable in the ponderosa pine communities and is largely attributable to fire exclusion. Consequently, it is currently desirable to treat some of these ponderosa pine late

seral multi-layer stands in an effort to return them to single layer stand conditions that are much more fire resistant. Treatment prescriptions applied to such stands would be fully compatible with old growth management objectives stated in our current FLRMP. Vegetative treatments within designated old growth retention units in other habitat types have been dropped from consideration in this project proposal. Old forest stands in this analysis area, outside of the designated old growth retention stands, total 7500 acres and are included in the totals of 765,00 acres of old multi-strata forest and 109,000 acres of old single-strata forest for the entire Forest.

Respondent *(A) 2: The EA discloses that old growth, and therefore habitat old growth species, will be reduced by the proposed action alternatives. It also claims that some thinning will enhance some types of old growth (low elevation, southerly aspects). The EA fails to cite the results of monitoring performed on the Forest that shows such thinning will actually enhance old growth habitat and will result in habitat that is actually used by the species alleged to benefit from such thinning.

Response (A) 2: We do not have Forest specific monitoring or research results showing that "thinning will actually enhance old growth habitat and will result in habitat that is actually used by the species alleged to benefit from such thinning." However, we do have a clear understanding of what old growth stands in various habitat types consisted of, in terms of structural stages (Hann and others 1997, Wisdom and others 2000). From such studies, it is quite clear that old forest stands, especially in the ponderosa pine and dry Douglas-fir types, contained much higher percentages of late-seral single layer conditions than they do today. Thru fire exclusion we have allowed those stands to develop into late-seral multi-layer stands. We have designed treatment prescriptions for the ponderosa pine old forest (late-seral) multi-layer stands that will bring them back to single layer stands. However, this proposed project alone will not be able to treat all acres in need of such treatment. These prescriptions do not include removing old, large diameter ponderosa pine trees.

Respondent *(A) 3: The EA failed to cite any evidence that its "managing for old growth habitat" (i.e., logging old growth) strategy will improve old growth species habitat over the short-term or long-term. Pfister et al., 2000 state:

> (T)here is the question of the appropriateness of management manipulation of old-growth stands… Opinions of well-qualified experts vary in this regard. As long term results from active management lie in the future – likely quite far in the future – considering such manipulation as appropriate and relatively certain to yield anticipated results is an informed guess at best and, therefore, encompasses some unknown level of risk. **In other words, producing "old-growth" habitat through active management is an untested hypothesis.**

(pp. 11, 15 emphasis added). This is a clear indictment of the EA's methodology. Furthermore the EA fails to disclose that the areas "treated" will retain

characteristics meeting Regional or Forest Plan old growth criteria—and if they won't, how they will at some specified time in the future.

Response (A) 3: Under the section Features Common To All Alternatives, page 2-10 of the Environmental Assessment for this project proposal, one of the wildlife habitat features included states that "No special habitat features required for the maintenance of old growth will be modified, including snags, large diameter live trees and large woody debris suitable as wildlife habitat." Treatment prescriptions for application within the ponderosa pine designated old growth retention stands will be developed to ensure compliance with this goal.

Respondent *(A) 4: The EA also fails to indicate the amount of old growth that presently exists on the Forest. As a result, we have not seen either a forestwide inventory of old growth nor any simple disclosures of total acres that indicates there is enough old growth to meet Forest Plan Wildlife and Fish Standard 2b.

Response (A) 4: The amount of old growth that presently exists on the Forest is outside the scope of and not relevant to this proposal.

Respondent *(A) 5: The EA fails to discuss the significance of the spatial separation of the old growth blocks in the project area. The Forest Service has stated: "Well distributed habitat is the amount and location of required habitat which assure that individuals from demes, distributed throughout the population's existing range, can interact. Habitat should be located so that genetic exchange among all demes is possible." (Mealey, 1983.)

Response (A) 5: The Forest Plan does not contain specific language on spatial separation of old growth blocks. The percentage (10%) of old growth on the Forest was identified and selected based on vegetative community type such as lodgepole, Douglas-fir, ponderosa pine, etc. Not necessarily on spatial separtion.

Respondent *(A) 6: A big problem with the EA's analyses for old growth Sensitive and Management Indicator Species (MIS) is that the <u>connection</u> between the areas designated for old growth management and old growth species, i.e. how these acres contribute to old growth species' viability, is missing.

Response (A) 6: The information is displayed in Tables 8 and 9 of the Wildlife specialist report.

Respondent (B) 7: We urge that no old growth trees be cut. Old growth forests are underrepresented on Salmon-Challis National Forest. Overstory trees on the northerly aspects should be maintained and efforts should be made to retain the historic structure of these old growth stands.

Response (B) 7: One old growth unit (141) that was proposed for treatment will not be treated. The other old growth units will have a modified treatment. In order to protect the live and dead large diameter ponderosa pine and Douglas-fir trees from crown fire, ladder fuels will be removed from around the all trees greater than nine inches dbh. Clumps of trees less than nine inches dbh will be left if they pose no threat to larger trees. This will maintain old growth characteristics and provide hiding and thermal cover. Lop and scatter ladder fuels and use a light broadcast burn to reduce surface fuels and maintain old growth characteristics. No pile burning or burning of rotten down logs greater than 10 inches. Unit 128 is within a larger old growth unit. The original treatment will be implemented because it is adjacent to private property.

See response (A) 1 above under Old Growth.

Goshawk

Respondent *(A) 1: It is not clear from the EA whether goshawk viability is in fact being maintained or how goshawk viability is expected to be maintained into the future if this and other cumulative actions proceed. The FS has not incorporated up-to-date quantitative science into this analysis and has therefore not demonstrated that it is maintaining goshawk viability.

Response (A) 1: For about 5 years, starting in 1992, we put much time, effort and money into goshawk surveys across the Forest. We found that this species occurs throughout the Forest in a wide variety of forest cover types ranging from ponderosa pine to Engelmann Spruce, through all seasons of the year, in low densities as it does throughout its range. Mature to old growth forests, especially single strata stands, are thought to be preferred for nesting and that nesting preferences are based more on forest structure than tree species. Mature and old growth stands are abundant on this Forest, due largely to topography, and preferred prey species such as red squirrels and grouse are likewise abundant. Current habitat estimates on the Salmon portion of the S-C NF are slightly over 300,000 acres and the FLRMP estimate of habitat necessary to support a minimum viable population is 190,000 acres. At this time we have no viability concerns for goshawks on this Forest and projects such as the current proposal will actually help ensure the presence of late seral single strata stands over time thru removal of understory layers and thus helping to “fireproof” the mature and old growth trees preferred for nest locations.

Respondent *(A) 2: The issue of fragmentation should have been more thoroughly considered with respect to goshawks. Other edge-adapted species may compete with the goshawk and displace the goshawk if adequate amounts of forest interior habitat is not provided. Crocker-Bedford (1990) recommends that a foraging area of >5000 acres of dense forest, in which no logging is permitted, be designated for goshawks, with additional areas of 2500-5000 acres of more marginal habitat designated beyond this 5,000 acre foraging area.

Response (A) 2: With the exception of actions within ponderosa pine old growth retention stands that are designed to restore single strata conditions, all proposed activities under all alternatives would occur within previously harvested areas. Thus fragmentation of habitats is not an issue in this proposal.

Fisher

Respondent *(A) 1: The EA failed to disclose and analyze the uncertain and precarious population status of the fisher.

Response (A) 1: The fisher is not known to occur, with the possible exception of transient or dispersing individuals, on the Salmon NF. Historical data is sparse to nonexistent for this species and it is unknown if fisher ever occurred in viable numbers on this Forest. Only one track has been detected in the past decade on winter track surveys. A population analysis for this species is outside the scope of this proposal.

Snags

Respondent *(A) 1: Snags are another habitat feature maintaining old growth species and biodiversity. Forest Plan Vegetative Diversity Standard 1.b. requires: "Provide at a minimum, an average of 20-30 hard snags per 10 acres of the following minimum diameters…" (Forest Plan at IV-17). The EA does not demonstrate compliance with this standard.

Response (A) 1: On page IV-17 of our current FLRMP, the Vegetative Standard referred to above, 1.b. actually reads "Provide at a minimum, an average of 20-30 hard snags per 10 acres of the following minimum diameters (where feasible)." On page 2-10 of the EA for this project, two of the wildlife features common to all alternatives can be found to address this issue. The first reads "Snags will be identified and marked for retention except where there is a safety concern or fire risk. Snags in prescribed fire units will be allowed to remain standing if damaged by fire. No salvage of fire-killed trees will occur except for public fuelwood." The second goes on to say "Live trees with existing decay or damage features, including but not limited to fungi, soft wood decay, or broken tops, will be marked and retained in proposed treatment units unless they pose a safety concern or fire risk." These two standards will ensure that all available snags and replacement snags will be retained unless there is a safety (OSHA) concern.

Respondent (A) 2: The Idaho Panhandle National Forests' Forest Plan provides an example of better management directives for the pileated woodpecker.

Response (A) 2: Comment noted.

Respondent *(A) 3: Since the EA provides inadequate analysis regarding the size and quality of habitat blocks needed by the pileated woodpecker, the

analysis completely fails to disclose the quantitative or qualitative significance of cumulative effects due to past logging in the area.

Response (A) 3: Thanks for providing references to the IPNF Forest Plan direction for managing pileated woodpecker habitat. See responses (A) 1 under Fisher, and (A) 1 under Snags, for data relevant to habitat requirements for this species. Our current FLRMP, as noted, designates 10 percent of all forest community types for old growth retention and our current available old forest multi-strata and old forest single-strata habitats total over 20 times the estimated acreage needed to sustain minimum viable populations of this species. In addition, several units in the current proposal are designed to promote the presence and longevity of old forest single-strata stands that are preferred by this species. Consequently, habitats available to this species are not a constraint in this project area or on this forest.

Respondent (B) 4: A sufficient number of snags need to be left standing in each treatment area for cavity nesters until snags can be replaced by natural recruitment. Standing trees need to be overstocked to ensure sufficient habitat until new trees mature. In addition, an inventory of the types and sizes of down woody material should be included in the treatments. When planning to burn unnaturally high fuel loads, it is important to leave a range of down woody material on the ground in appropriate areas in order to preserve insect and wildlife species diversity.

Response (B) 4: Snag retention guidelines were developed on the Salmon NF to help ensure both existing and future replacement snags are retained (where naturally present) in all project treatment areas in sufficient numbers to provide habitat for at least minimum viable populations of all cavity-nesting species. In concert with these guidelines, Mitigation Measures 2, 3 and 4 on page 16 of the Biological Evaluation and Specialist Report for this project includes the following specific language: "2) Snags will be identified and marked for retention except where there is a safety concern. All snags in harvest units will be marked with paint; snags in prescribed fire units will be allowed to remain standing if damaged by fire. No salvage of fire-killed trees will occur except for public fuelwood. 3) Live trees with existing decay or damage features, including but not limited to fungi, soft wood decay, or broken tops, will be marked and retained in proposed treatment units unless they pose a safety concern. 4) No special habitat features required for the maintenance of old growth will be modified, including snags, large diameter live trees and large woody debris suitable as wildlife habitat." The FLRMP also includes specific language under General Forest Direction for Vegetative Diversity (page IV-17) to "provide at a minimum, an average of 20 to 30 hard snags per 10 acres" and to retain an "average of 50 linear feet/acre of 12 inch or greater down-dead logs in the ponderosa pine, Douglas-fir and spruce-fir and 33 linear feet/acre of 8 inch or greater down-dead logs in the aspen and lodgepole pine (where feasible)". Wildlife guidelines specifically included in all alternatives for this project call for retention of a minimum of two pieces of larger-

sized material per acre for woody debris habitat. Individual pieces will be at least 16 inches in diameter at the larger end, and a minimum of 50 feet in length where feasible (i.e. available). In addition, this forest also has soil and watershed guidelines for retaining varying amounts of coarse woody debris, post treatment, in all areas, by forest habitat type. Soils productivity guidelines for this project area call for retention of 4 to 10 tons/acre of slash, including large woody debris greater than three inches in diameter. These guidelines will help provide additional wildlife (insects included) habitat diversity.

Lynx

Respondent (D) 1: Your proposed alternative (B) would be seriously detrimental to the health and recovery of Canada Lynx.

Response (D) 1: In full compliance with the Lynx Conservation Assessment and Strategy (Rueidger and others 2000), all proposed vegetative treatments within mapped habitat for Canada lynx have been dropped from the Selected Alternative for this project.

Motorized Use

Respondent *(A) 1: The EA fails to adequately disclose the cumulative impacts of the ever-increasing motorized recreational use on wildlife species.

Response (A) 1: Cumulative impacts of motorized recreational use are outside the scope of a project of this nature where no new access will be constructed or provided. Such analyses will be included in the next revision of the Forest travel plan.

Respondent (B) 2: The Salmon-Challis Forest needs to monitor and control the use of ORVs on the Forest Service roads, obliterated roads, and trails in the project area. Areas that cannot be controlled should be off-limits to ORV use.

Response (B) 2: The project area contains roads for which travel restrictions apply for motorized use. Motorize use is controlled by the use of gates or other barriers. Roads are monitored for illegal use especially during fall hunting seasons.

Populations Trends

Respondent *(A): The EA states that population trends for birds is at a scale “several hundred times larger than the project area” (3-69). We question whether such studies are sensitive enough to determine habitat trends in response to management activities at the forestwide level.

Response (A): As discussed under “Analysis Methods” on page 3-76 of the EA, population trends for birds, especially migratory species, are best analyzed at scales larger than project areas due to the many variables that may affect such

trends. Hence the need for trend studies such as the national Breeding Bird Surveys and Christmas Bird Counts. Site specific information is generally of very limited use for such species as most habitat conditions are ephemeral.

Three-toed woopecker

Respondent *(A): The EA states that the "three-toed woodpecker is a burned area specialist and serious concerns exist for the future sustainability of breeding conditions at both the global and local scales" (3-95) however the Forest Service now chooses to further suppress habitat conditions for this species without an overall conservation strategy that addresses such problems.

Response (A): Although various individuals and groups have expressed concern over the status of three-toed woodpecker populations in some portions of its range, concerns have not reached the level necessary to precipitate development of a conservation assessment and strategy. The current proposal will strive to help protect the community of Gibbonsville from a catastrophic fire event. However, it will not affect the frequency of fire occurrence within the project area. In addition, fire will be used in treatment prescriptions for portions of the area, thus contributing to the available habitat for this species. If a conservation assessment and strategy is ever developed for this species, it will be considered in development of future forest management proposals.

Consultation

Respondent *(A): The U.S. Fish and Wildlife Service is, or soon will be designating critical habitat for bull trout and Canada lynx. Since habitat in the project area is likely, or ought to be, designated critical habitat, the FS must undergo formal consultation with the U.S. Fish and Wildlife Service as part of this project proposal.

Response (A): The Endangered Species Act does not require formal consultation unless there is an adverse modification to proposed or designated critical habitat or an adverse affect to an ESA listed or proposed species. This proposed project only requires informal consultation with NOAA Fisheries and the U.S Fish and Wildlife Service. Consultation with NOAA Fisheries and the U.S. Fish and Wildlife Service was completed on September 3 and September 9, 2003, respectively.

The Forest Service is required to complete Biological Evaluations of potential effects of all proposed actions on federally listed species. These evaluations culminate in a "determination of effects" for each such species pertinent to specific analysis areas. The results of the determination call are what determines the level of consultation with the U.S. Fish and Wildlife Service that is required for a specific proposed action. This proposed action will undergo the level of consultation dictated by the assessment, when completed.

Big Game

Respondent *(A): The EA does not demonstrate consistency with Forest Plan big-game habitat standards (for example cover standards for MA 4A), yet proposes to further lower cover value for big-game species.

Response (A): All proposed units that fall within mapped MA 4A, Key Big Game Winter Range, areas have been field reviewed. Units and/or portions of units that contained good quality winter thermal cover for deer and elk have either been dropped from the selected alternative or the prescriptions for such units have been modified to protect present and/or provide future thermal cover benefits. In the case of several long narrow proposed units that border private lands, the units would be treated and some acres that technically meet thermal cover definitions would be thinned to the point of not providing thermal benefits to wintering big game. However, the total number of acres so treated are low and, without exception, these areas are adjacent and parallel to US Highway 93 and do not provide useable thermal cover due to highway traffic and proximity to human dwellings. Altering these areas should help reduce the loss of wintering deer and elk to vehicle collisions and will not affect the availability of useable or important thermal cover in the project area. This approach is considered fully compatible with wildlife habitat management goals and objectives in the current FLRMP.

NEPA

Respondent (A): The EA's failure to consider a broader range of alternatives, including one that meets all Forest Plan Standards, does not comply with NEPA.

Response (A): The project proposal does consider a broad range of alternatives that meet the purpose and need of the project. The selected alternative does meet Forest Plan standards.

Noxious Weeds

Respondent (A) 1: The issue of noxious weeds is another the FS wants to mostly avoid, preferring to act largely in disregard until infestations require expensive, marginally effective, and hazardous herbicide treatments. Given the present management regime in the area (assuming present levels of staffing and funding), what will be the likely noxious weed scenario in the project area in five years? In ten years? In 20 years? In 50 years? The FS simply does not have enough monitoring of its noxious weed treatment strategies to assume anything but out-of-control weed populations over the long term.

Response (A) 1: Noxious weed management is an issue of national prominence, particularly on public lands, and is of great concern to the Salmon-Challis National Forest. This concern has been recognized by the development of a Forest EIS for program management, the establishment of a GPS database for inventory and monitoring, implementation of preventative practices, increased

funding directed toward noxious weed control and inventory efforts, additional permanent positions, and increased partnerships with other state and federal agencies, private organizations, and landowners within a county-wide Cooperative Weed Management Area. Monitoring has indicated areas where we can be most effective with control treatments. Given present levels of staff and funding, the scenario in the project area is very promising for weed management within the next 5 years. We anticipate these partnerships to continue for future years.

Respondent (B) 2: No discussion of mitigating the adverse effects of weed importation and non-native weed establishment were discussed. The entities described will disturb soils and spread noxious weeds throughout the project area. Consideration of treatment effects on noxious weeds should be emphasized with greater detail, particularly within Riparian Habitat Conservation Areas. Consultations with USFWS and NOAA Fisheries regarding the use of herbicides need to be included in the document.

Response (B) 2: Each alternative will include the treatment of all new noxious weed infestations associated with implementation of the decision (EA, page 2-9). Noxious weed treatment activities are described in the *Programmatic Biological Assessment of Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon–Challis National Forest (USDA Forest Service, 2002)* and *the 2002 Salmon-Challis National Forest Noxious Weed Treatment Program Design Criteria (Mitigation)*. A Biological Opinion from NOAA Fisheries entitled, *Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon–Challis National Forest,* dated 16 Sept 02, and a concurrence letter (12 Dec 02) for the 2003 Salmon-Challis Noxious Weed Program have been received from NOAA Fisheries. These documents are included in the project file. Concurrence letters for the 2002 and 2003 Salmon-Challis Noxious Weed Program have also been received from the USFWS (dated 25 June 02 and 20 Dec 02, respectively), and are included in the project file.

Respondent (C) 3: Proposed FR treatments and associated soil surface disturbances will potentially further “open the window” to accelerated invasion by the growing list of noxious weeds. The growth habits often associated with such invading species are generally conducive to disturbed environments where the populations of native plants have been reduced.

Substantial effort should be taken to reduce soil surface disturbance, particularly mechanical disruption. Timing is critical. All FR treatment should be conducted after seed set of native plant species and reseeding of natives (grasses & broadleaf) should be scheduled to take advantage of the first rainfall events of the season to facilitate maximum stand potential and over-wintering of spring emergence species. Essentially; growing a healthy “crop” of native plants serves to reduce the success of the invading species.

Response (C) 3: Comment and support of a noxious weed program goal of restoring native plant communities is acknowledged.

Respondent (D) 4: You admit that infestation of noxious weeds, already a serious problem, will become more severe, especially under your designated alternative.

Response (D) 4: Each alternative will include the treatment of all new noxious weed infestations associated with implementation of the decision (EA, page 2-9).

Soils

Respondent *(A) 1: The EA fails to demonstrate consistency with quantitative standards of the Forest Plan and Intermountain Region that are in place to protect the productivity of forest soils.

Response (A) 1: The Forest Plan requirements and Regional Guidelines for maintaining site-productivity and limiting detrimental soil disturbances are described on pages 3-38 and 3-39 of the EA. An analysis of the effects of the various alternatives and compliance with the Forest Plan and Regional Guidelines are provided on pages 3-42 and 3-43 of the EA.

Respondent *(A) 2: The discussion in the EA does not demonstrate consistency with these Forest Plan standards. The derivation of the figures given is suspect (such as Table 3-17). It appears that the Forest Service fails to apply the real definition of "activity area" and has not surveyed soil conditions in those activity areas of the proposed project.

Response (A) 2: The Forest Plan requirements and Regional Guidelines for maintaining site-productivity and limiting detrimental soil disturbances are described on pages 3-38 and 3-39 of the EA. An analysis of the effects of the various alternatives and compliance with the Forest Plan and Regional Guidelines are provided on pages 3-42 and 3-43. Landtypes, monitoring data from disturbed sites, site specific field observations, and literature review are identified on page 3-41 of the EA as the analysis methods for determining the effects of alternatives. The definition of "activity area" from the Region 4 Supplement to the Soil Management Handbook is provided on page 3-38 of the EA and the activity areas for determining detrimental soil disturbances and total soil resource commitments are described on pages 3-39 and 3-41. Soil disturbance monitoring has been collected on recently implemented projects and within the project area as stated on page 3-43 of the EA.

Respondent *(A) 3: Furthermore, the Salmon NF's Forest Plan in Chapter V sets monitoring requirements for timber sales and other land disturbing activities. Much of the land in the project area has been logged in the past, and yet the EA does not disclose the results of monitoring of soil productivity or impacts, nor

does it disclose that the Forest Plan's monitoring requirements have not been met.

Response (A) 3: Monitoring data for previously harvested areas within the Project Area is located in the project file.

Respondent *(A) 4: The Intermountain Region's soil protection policies, standards, guidelines, and monitoring measures are located in the FOREST SERVICE HANDBOOK at FSH 2509.18 - SOIL MANAGEMENT HANDBOOK Region 4 Supplement No. 2509.18-95-1, Effective November 29, 1995. The EA falls far short of demonstrating compliance with those policies, standards, guidelines, and monitoring measures.

Response (A) 4: Compliance with Forest Plan Standards and Regional Guidelines has been achieved as stated on pages 3-42 and 3-43 of the EA. Ground disturbing activities that have the potential to alter soil productivity have been monitored at the project level on sandy soils derived from the Idaho and/or Montana Batholith, and clayey soils derived from Challis volcanics by approved methods as described in Table V-1 of the Forest Plan.

Respondent *(A) 5: It is clear that the intent of the Regional Standards is that the Forest Service must, in each case, consider the cumulative effects of both past and proposed soil disturbances to assure the desired soil conditions are met. The EA also fails to disclose the amount of detrimental soil damage that has been caused by livestock grazing and off-road vehicles in the project area, ignoring other sources of cumulative impacts.

Response (A) 5: Appendix D (Cumulative Effects) of the EA discloses the effects of livestock grazing and ATV use within the project area. No detrimental soil disturbances from excessive grazing were observed during field reviews conducted during the fall of 2001 and in the spring of 2002 (page D-20). Off-road, all-terrain vehicle (ATV) use is expected to increase soil compaction and erosion on localized areas (page D-20). Much of the project area is open to ATV use.

Respondent (A) 6: Please disclose your inventory or monitoring of indicators, including lichens, fungi, insects, etc. since these can and do define existing and probable future forest conditions. Lichens in particular, while capturing atmospheric nitrogen for later release to higher plants and trees, are sensitive indicators of atmospheric and ground conditions and cannot be ignored in attempts at EM. Fungi and insects indicate and largely drive forest condition. Those that act as antagonists or parasites to destructive forms like root disease fungi or bark beetles should be recognized, as should tree pathogens and pests.

Response (A) 6: The Salmon Forest Land and Resource Management Plan does not require monitoring of lichens, fungi, and insects. Conditions for

maintaining long-term soil productivity are based on compliance with Forest Plan Standards and Regional Soil Quality Guidelines.

Respondent *(A) 7: The FS assumes that maintaining soil productivity is achieved simply by limiting detrimental disturbance to no more than a certain percent of an activity area (cutting unit). Unfortunately, the scientific adequacy of the FS's methodology for maintaining soil productivity on the Forest has never been demonstrated. The FS's determination that it may permanently damage the soil on a certain percent of an activity area and still meet NMFA and planning regulations is arbitrary. Neither the EA nor the Regional Standards cite any scientific basis for adopting their numerical limits.

Response (A) 7: An analysis to determine the scientific adequacy of the methodology for maintaining soil productivity is beyond the scope of this project. The alternatives analyzed in this EA comply with the Forest Plan Standard and Regional Guidelines for limiting detrimental soil disturbance.

Respondent (A) 8: The meaning of "soil productivity" in the terminology of NFMA is largely ignored. Even if the FS were to meet the percentage standards in all Activity Areas forestwide, and even if the soil conditions of land outside proposed activity areas could reasonably be ignored, the FS still cannot assume that there has been no "significant or permanent impairment of the productivity of the land" as NFMA requires.

Response (A) 8: The Forest Plan Standards and Regional Guidelines were developed for purpose of maintaining soil productivity as required by NFMA.

Respondent *(A) 9: Also, soil productivity can only be assumed to be maintained if it turns out that the soil Standards work. To determine if they work, the FS would have to undertake objective, scientifically sound measurements of what the soil produces (grows) following management activities. But the FS has never done this on the Forest.

Response (A) 9: The Salmon Forest Plan requires that ground disturbing activities that have the potential to alter soil productivity be monitored at the project level on sandy soils derived from the Idaho and/or Montana Batholith, and clayey soils derived from Challis volcanics by approved methods as described in Table V-1 of the Forest Plan.

Respondent *(A) 10: It is reasonable to expect that in order for the FS to assure that soil productivity is not or has not been significantly impaired, to assure that the forest is producing a sustained yield of timber, for one example, tree growth must not be significantly reduced by soil-disturbing management activities. Grier and others (1989), in a Forest Service General Technical Report, adopted as a measure of soil productivity: "the total amount of plant material produced by a forest per unit area per year" (P. 1). And they cite a study finding "a 43-percent

reduction in seedling height growth in the Pacific Northwest on primary skid trails relative to uncompacted areas" for example. And in another Forest Service report, Adams and Froehlich (1981) state:

> Measurements of reduced tree and seedling growth on compacted soils show that significant impacts can and do occur. Seedling height growth has been most often studied, with reported growth reductions on compacted soils from throughout the U.S. ranging from about 5 to 50 per cent.

Response (A) 10: The Salmon National Forest measures detrimental soil compaction according to the parameters described in the Forest Plan. Detrimental soil compaction is the condition where one or more of the following occur in relation to natural: A 50 percent reduction in macropore space, less than 15 percent macropore space, total; 15 percent increase in bulk density; or a 40 percent reduction in hydraulic conductivity (Forest Plan IV-60 and 61).

Respondent *(A) 11: Adams and Froehlich (1981) also provide reasons why impacts beyond the directly compacted area must be considered in any reasonable definition of soil productivity:

> Since tree roots extend not only in depth but also in area, the potential for growth impact also becomes greater as compaction affects more of the rooting area. In a thinned stand, for example, you can expect the greatest growth impacts in residual trees that closely border major skid trails or that have been subject to traffic on more than one side of the stem."

Response (A) 11: See response (A) 10 above under Soils.

Respondent *(A) 12: Four-wheel drive vehicles and machines designed for off-road use have been shown to damage soils (Alexander and Poff 1985). This is another cause of cumulative soil damage that the EA failed to analyze.

Response (A) 12: Much of the project area is open to ATV use. Appendix D (Cumulative Effects) of the EA states that "off-road, all-terrain vehicle use is expected to increase soil compaction and erosion on localized areas" (page D-20). Travel management decisions were not addressed in this project.

Respondent *(A) 13: The Alexander and Poff (1985) literature review clearly shows that tractor logging would disturb and compact much of an activity area.

Response (A) 13: The level of detrimental soil disturbance associated with tractor logging is analyzed on pages 3-41 to 3-44 of the EA.

Respondent (A) 14: The Northern Region recognizes that soil Standards must be validated. Their FSM 2500-99-1 requires that Forest Supervisors must:

- Assess … whether (soil quality standards) are effective in maintaining or improving soil quality;

- Evaluate the effectiveness of soil quality standards and recommend adjustments to the Regional Forester; and
- Consult with soil scientists to evaluate the need to adjust management practices or apply rehabilitation measures.

Response (A) 14: The Gibbonsville Urban Interface Fuels Reduction Project is within the Intermountain Region. Direction provided in the Forest Service Manual at 2554 is similar to the supplemental direction cited above. There are no Region 4 Supplements for the 2500 Series (Zero Code or 2550 Soil Management) to the Forest Service Manual.

Respondent (A) 15: This all implies that monitoring must be undertaken. Furthermore, FSM 2500-99-1 recognizes that soil productivity is defined not merely in terms of the absence of meeting the percentage limit standard. "Soil Function" is defined thus:

> Primary soil functions are: (1) the sustenance of biological activity, diversity, and productivity, (2) soil hydrologic function, (3) filtering, buffering, immobilizing, and detoxifying organic and inorganic materials, and (4) storing and cycling nutrients and other materials.

Response (A) 15: Soil quality and detrimental soil disturbance monitoring is conducted on the Salmon-Challis National Forest according to Forest Plan Standards and Intermountain Region Guidelines. FSM 2500-99-1 is a supplement to the Forest Service Manual issued by the Northern Region.

Respondent *(A) 16: Neither soil function nor soil quality have ever been monitored on the Forest following management activities.

Response (A) 16: Soil quality and detrimental soil disturbance monitoring is conducted on the Salmon-Challis National Forest according to Forest Plan Standards and Intermountain Region Guidelines.

Respondent *(A) 17: The Forest Management Handbook at FSH 2509.18 directs the FS to do validation monitoring to "Determine if coefficients, S&Gs, and requirements meet regulations, goals and policy" (2.1 – Exhibit 01). It asks what we are asking: "Are the threshold levels for soil compaction adequate for maintaining soil productivity? Is allowing 15% of an area to be impaired appropriate to meet planning goals?" The FS has no answers to these questions.

Response (A) 17: Supplement R4_2509.18-2002-1 states: "Validation monitoring answers the question "Are standards and guidelines appropriate for meeting Forest Plan objectives?" For soil productivity, the question is "Did compliance with standards and guidelines provide enough soil protection to assure the maintenance of long-term soil productivity?" The relationships between management induced changes in soil properties and productivity are not

well documented or understood. Improving our understanding of these relationships requires data intensive techniques, such as permanent growth and yield plots. These kinds of studies are a function of Research. The contribution of the National Forest System to validation monitoring of soil productivity is in support to Research projects. Soil quality standards and guidelines may be revised if validation monitoring indicates that adjustments are necessary.

Soil quality research results are distributed to National Forest System personnel mostly by publication. Research sponsored workshops and field days for National Forest System personnel are held to help incorporate research results into management prescriptions."

Respondent *(A) 18: The EA is unable to cite the results of any monitoring, required by the Standards, to provide a basis for assuming the Standards actually protect soil productivity.

Response (A) 18: To calculate a reasonable estimate of existing detrimental disturbances caused by past timber harvest, a detrimental soil disturbance factor of 10 percent per treated acre (for tractor logging) has been used. Professional judgment, literature review, monitoring data, and site-specific field observations were considered when determining this factor. Soil compaction has been monitored using visual observations, bulk density measurements, and soil penetrometer readings on various timber sales on the Forest.

Respondent *(A) 19: The FS's methodology might approach adequacy if the FS were to have actually validated it by performing objective, scientifically adequate measures of compaction such as measures of bulk density. Adams and Froehlich (1981) state: "While general field observations can be useful in recognizing severe compaction problems, measurement of actual changes in soil density permits the detection of less obvious levels of compaction." It is these "less obvious levels of compaction" that are missed by the kind of monitoring the FS has performed on the Forest.

Response (A) 19: Bulk density measurements have been collected both within and outside the proposed project area. Detrimental soil compaction, (which may correlate to "severe compaction problems"), is described in the Forest Plan as the condition where one or more of the following occur in relation to natural: A 50 percent reduction in macropore space, less than 15 percent macropore space, total; 15 percent increase in bulk density; or a 40 percent reduction in hydraulic conductivity (Forest Plan IV-60 and 61).

Respondent *(A) 20: There is simply no way that the FS has enough soil bulk density and other compaction monitoring data collected at the adequate soil depths and in enough sites to be able to assure that the use of heavy machinery, as prescribed by the Gibbonsville project, will not significantly or permanently impair the productivity of the soil.

Response (A) 20: The Forest Service has bulk density data, other soil compaction monitoring information, and trained personnel to ensure that the proposed project complies with Forest Plan Standards for limiting detrimental soil compaction.

Respondent *(A) 21: In interpreting the requirements of NEPA, the federal courts have evaluated the adequacy of mitigation measures that EISs and EAs rely upon. Relying upon inadequate mitigation measures to protect soils fails to meet this judicially specified test of compliance with NEPA regulations.

Response (A) 21: The mitigation measures cited on page 2-8 of the EA are adequate to minimize erosion and soil compaction, and maintain coarse woody debris for long-term soil productivity. For example, properly installed waterbars effectively minimize soil erosion from runoff, scarification effectively breaks up compacted soil, and slash retention provides coarse woody debris for long-term soil productivity. The effectiveness of these practices is well-documented in the literature.

Respondent *(A) 22: Following a study by Cullen and others (1991) which was carried out on the Kootenai NF and the adjacent Flathead NF, the authors concluded: "This result lends support to the general observation that most compaction occurs during the first and second passage of equipment." And Page-Dumroese (1993), in a Forest Service research report investigating logging impacts on volcanic ash-influenced soil in the IPNF, states, "Moderate compaction was achieved by driving a Grappler log carrier over the plots twice." She also cited other studies that indicated: "Large increases in bulk density have been reported to a depth of about 5 cm with the first vehicle pass over the soil." Williamson and Neilsen (2000) assessed change in soil bulk density with number of passes and found 62% of the compaction to the surface 10cm to come with the first pass of a logging machine. In fine textured soils Brais and Camire (1997) demonstrated that the first pass creates 80 percent of the total disturbance to the site.

Adams and Froehlich (1981) state, "Unfortunately, little research has yet been done to compare the compaction and related impacts caused by low-pressure and by conventional logging vehicles."

Another problem with the FS's soil monitoring is that it fails to measure soil productivity in terms of loss of soil nutrients due to logging activities, including removal of boles, branches, and from site preparation methods such as burning. DeLuca (2001) states:

> Organic matter is clearly lost from forest floor and often from the mineral soil following wildfire or prescribed fire. Organic matter is also lost from sites when net mineralization is stimulated by higher temperatures caused by

> opening of the canopy and removal of understory. (Internal citations omitted.)

From Grier and others (1989):

> The potential productivity of a site can be raised or lowered by management activities causing a permanent or long-term increase or decrease in the availability of nutrients essential for plant growth. (P. 27.)
>
> …Any time organic matter is removed from a site, a net loss of nutrients from that site also occurs. In timber harvesting or thinning, nutrient losses tend to be proportional to the volume removed. (P. 27.)
>
> …Slash burning is a common site preparation method that can affect soil chemical properties tremendously. A great deal of controversy is often associated with using fire because of the wide variety of effects, some of which are definitely detrimental to site quality and some of which are beneficial.

Response (A) 22: Your comments are acknowledged; however they are primarily a matter of scientific debate and not specific to the Gibbonsville Wildland/Urban Interface Fuels Reduction Project.

Respondent (A) 23: The EA fails to disclose how amounts of coarse woody debris left in logged or burned areas will adequately provide for future soil productivity.

Response (A) 23: Soil productivity will be maintained in each harvest unit by retaining four to 10 tons per acre of slash, including large woody debris greater than three inches in diameter, as microbial host material and smaller woody debris for nutrient reservoirs (EA page 2-8).

Organic matter is particularly important for water retention, cation exchange, nutrient cycling, and erosion control (Page-Dumroese and others, 1991). Coarse woody material (woody material larger than three inches in diameter) is important for maintaining long-term soil productivity (Graham, 1994). Based on the research publications, the Forest recommends retaining four to 15 tons of coarse woody material per acre depending on forest type and fire return interval for treatment units within the project area (EA page 3-39).

Fuel accumulations were calculated for 29 forested vegetation types in the project area. The total fuel accumulations for all vegetation types ranged from 2.01 tons per acre to 40.67 tons per acre. The mean for all vegetation types was 13.07 tons per acre (EA page 3-39).

Design features to retain coarse woody material would occur within the proposed treatment units for all action alternatives. One to four tons of woody debris per

acre would be retained in units within the urban interface and four to 15 tons of woody debris per acre would be retained in all other treatment units (EA 3-43).

Respondent (B) 24: An increase in hand thinning and a decrease in mechanized thinning would lower these soil disturbance factors even more. No tracked vehicles should be permitted to remove logs. Tracked vehicles destroy ground cover, expose mineral soil to erosion and compact soils from reduced absorption and increase runoff. All logs need to be removed by wheeled vehicles that carry the entire tree without dragging it and disturbing the soils.

Response: (B) 24: The effects analysis for this project was based on various harvest methods including hand-thinning and tractor logging systems (EA page 3-43). Your comments are acknowledged.

Sensitive Plants

Respondent (A): Please disclose the appropriate season for surveying each Sensitive plant that may occur in the road locations or treatment units, and for each of the units.

Response (A): The project area contains potential habitat for two Forest designated Sensitive plant species, Lemhi penstemon *(Penstemon lemhiensis)* and Flexible collomia *(Collomia debilis var camporum.)* Surveys may be completed from March through December, depending upon snow cover and plant condition.

Citations

Respondent (A): We requests that a copy of each document mentioned or cited in this comment letter be placed in the project file. Many of the documents are available on our website. Other documents may be obtained from Forest Service research stations. Please obtain copies of the documents from those FS sources. If you cannot get any of those references from FS sources, please let us know as soon as possible.

Response (A): Comment noted.