BLY MOUNTAIN FUELS REDUCTION AND RANGE IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT (EA) # OR-014-08-08

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAKEVIEW DISTRICT - Klamath Falls Resource Area

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FREEDOM OF INFORMATION ACT AND RESPONDENT'S PERSONAL PRIVACY INTERESTS:

The Bureau of Land Management is soliciting comments on this Environmental Assessment. Comments, including names and street addresses of respondents, will be available for public review at the above address during regular business hours. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

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CHAPTER 1 - INTRODUCTION

Proposed Action

The Klamath Falls Resource Area (KFRA) Resource Management Plan (RMP) provides direction for managing lands on the western part of the Bureau of Land Management (BLM) Lakeview District. This Environmental Assessment (EA) will analyze the effects from proposed vegetation treatments and other management actions in and adjacent to Bly Mountain area, also known as Klamath Forest Estates, on lands shown in Table 1. BLM lands are intermingled with private lands with many residences directly adjacent to the public land boundary. Many of the stands in the area are designated as the "Matrix" land use allocation and are multi-aged, multiple canopy stands. The predominant vegetative cover is Western juniper although many stands have a residual large tree overstory component of ponderosa pine and a dense understory component. Past management practices in the area have included timber harvesting, silvicultural treatments, fuels reduction including juniper pruning or removal, fire suppression, grazing, and recreation. The stands have changed over time and the BLM believes it is time consider additional treatments to implement the RMP direction and promote a more fire resilient landscape. The proposed actions include: cutting juniper; piling and burning cut juniper material; yarding juniper to a landing for utilization; pre-commercial or commercial thinning of pine stands; underburning pine stands; chipping or burning landing piles; and planting disturbed areas with bitterbrush, mountain mahogany, and grass. An objective of the project is to accomplish the stated purposes stated below while causing the least amount of disturbance to the existing desirable vegetation, soil and other resources as possible.

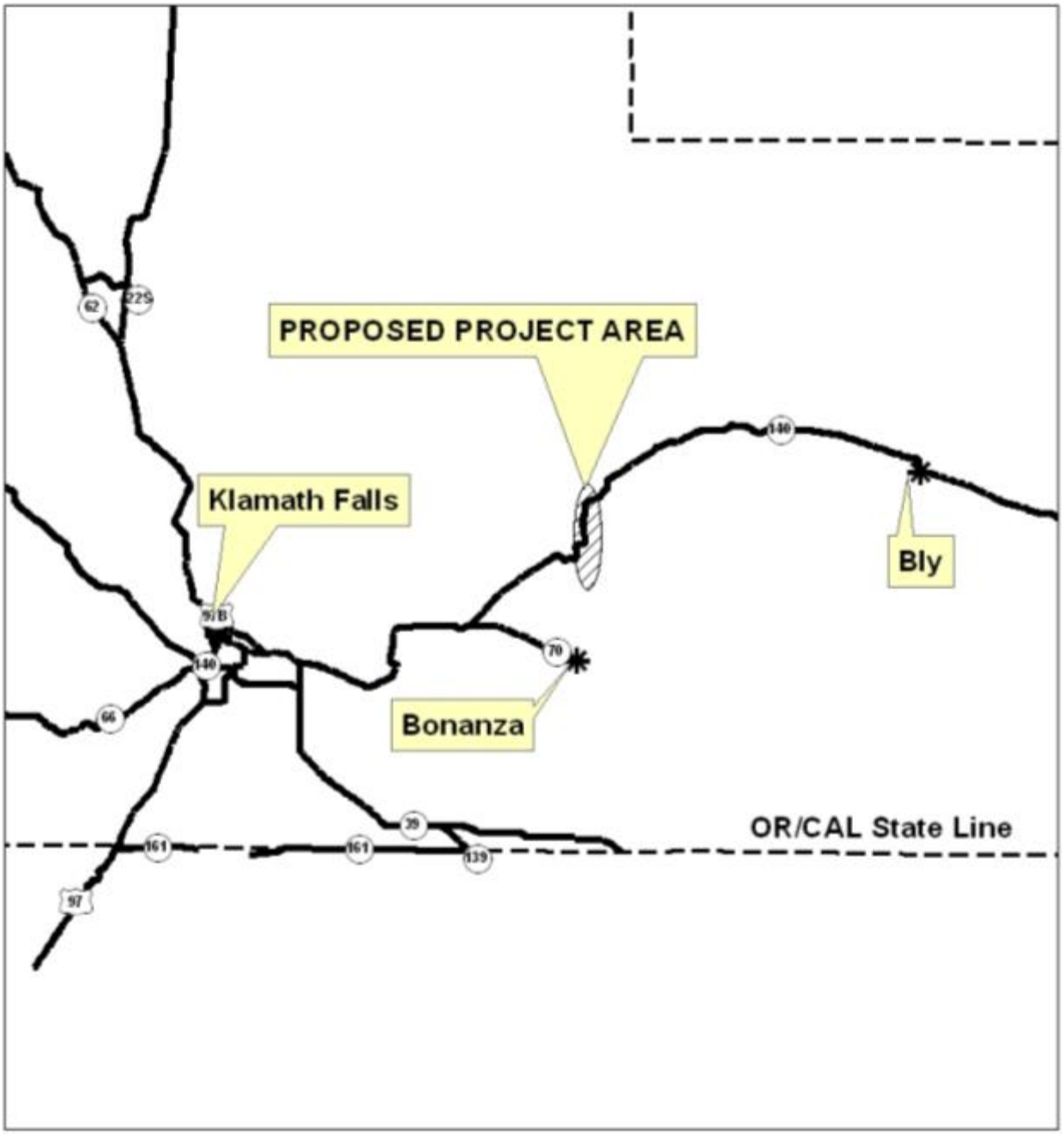
Location

The proposed project area is located approximately 20 miles east of Klamath Falls in the Bly Mountain area (Figure 1). Under the action alternatives management activity could occur on approximately 4,500 acres as described in Table 1 below. The actual acreage treated would vary depending on which alternative is selected. Figures 2 and 3 display the proposed treatments by alternative.

Table 1: Location of BLM-administered lands within the analysis area

Township	Range	Section	Subdivision
37S	11E	23	SW1/4 of SW1/4
37S	11E	33	W 1/2 of SE ¼ + SE 1/4 of NW 1/4
37S	11E	27	E 1/2 of SW ¼ + SE 1/4
37S	11E	26	SW 1/4
37S	11E	34	E ½ + NE 1/4 of NW ¼ + N 1/2 of SW ¼ + SE 1/4 of SW ¼
37S	11E	35	S ½ + NW ¼ + S 1/2 of NE 1/4
38S	11E	1	N ½ of SW ¼ + SW 1/4 of SW 1/4
38S	11E	2	SW1/4 + NE 1/4 of SE ¼ + SE ¼ of NW ¼ + W 1/2 of NW ¼
38S	11E	3	E ½ + E ½ of NW 1/4
38S	11E	12	SW1/4 + NW ¼ of NW ¼ + SW 1/4 of NE 1/4 + S 1/2 of NW 1/4 + W ½ of SE ¼
38S	11E	11	S ½ of SE ¼ + SW ¼ of SW ¼
38S	11E	10	E ½ + NE ¼ of SW ¼ + E ½ of NW ¼
38S	11E	13	NW ¼ + W ½ of NE ¼ + W ½ of SE ¼ + E ½ of SW 1/4
38S	11E	14	W ½ of NE ¼ + E ½ of NW ¼ + NW ¼ of NW ¼ + S ½ of SE ¼ + NW ¼ of SE1/4
38S	11E	23	E ½ + S1/2 of SW 1/4
38S	11E	22	S ½ of NE 1/4 + N ½ of SE ¼ + SE ¼ of SE ¼
38S	11E	26	N 1/2

Figure 1 – General Location Map of the Project Area



VICINITY MAP
PROPOSED BLY MOUNTAIN FUELS REDUCTION AND RANGE IMPROVEMENT PROJECT

0 3.75 7.5 15 22.5 30 Miles

N

Purpose and Need for Action

Purpose

The purposes of this project are to implement the Klamath Falls Resource Area Resource Management Plan (RMP) by specifically taking actions to: reduce the fuels hazard on BLM-managed lands in the wildland-urban interface (WUI) in the Bly Mountain area, improve the condition of rangelands in the project area for a variety of wildlife species including mule deer, reintroduce low intensity fire as a key natural ecological process in the pine stands in the project area, increase vigor and productivity of pine stands by removing competing junipers and thinning small pines from within pine stands, and utilize forest products produced from treatments whenever reasonable and accessible.

Need

According to the Klamath County Wildfire Protection Plan (CWPP), all of the BLM lands in the proposed project area are designated as Wildland-Urban Interface (WUI) lands. There are at least 358 structures (houses, outbuildings, etc.) on private lands within one mile of BLM lands in the proposed project area. Wildland fuels in the project area have accumulated due to lack of historically frequent, low intensity fires. Currently, uncharacteristically high fuel loads present a threat to improvements and resource values on private lands, and a variety of resource values on public lands. Reducing the fuels on BLM lands would reduce the potential for loss of structures and damage to private property by wildfire in the Bly Mountain area.

In the absence of periodic low intensity fire, ponderosa pine stands in our region have developed a deep duff layer that contributes to large tree mortality when fire eventually occurs in the stand. It has been almost ten years since the ponderosa pine stands in the project area have had any fire in them, some much longer. Periodic low intensity fire is a key ecological process in maintaining the health and function of ponderosa pine stands such as those found in the project area. Delay in the application of fire increases risk of tree mortality.

There is a need to increase vigor and productivity of pine stands by removing competing junipers and thinning small pines from within pine stands.

Additionally, the lack of frequent, low intensity fire, in concert with other factors, has allowed western juniper to encroach into the shrublands and grasslands where juniper was much less abundant historically. This encroachment process eventually leads to the loss of essentially all shrubs and grasses from under the developing juniper stand. This loss of shrubs and grasses negatively affects a wide variety of wildlife species and overall biological diversity, and is especially detrimental to deer, elk, and other species which consume grasses and shrubs. Much of the proposed project area is in the stage of juniper encroachment that if juniper is removed, the shrubs and grasses can re-establish healthy grasslands and shrublands without the need to re-seed or plant shrubs. If the juniper encroachment process is allowed to continue unchecked, it becomes much more difficult and costly to re-establish healthy shrubland and grassland plant communities once junipers dominate these sites.

The public scoping process identified firewood availability as an issue in this area. Accordingly, providing opportunities for firewood cutting was added to the objectives of the project.

Management Direction and Conformance with Existing Plans

This Environmental Assessment (EA) is tiered to the Klamath Falls Resource Area Resource Management Plan and Final Environmental Impact Statement (RMP/FEIS, September 1994) and Record of Decision (ROD, June 2, 1995). Management direction and recommendations for project design and implementation is contained in the RMP and a number of supporting documents listed below:

- Klamath Falls Resource Area Integrated Weed Control Plan EA (July 21, 1993).
- Range Reform FEIS (August 1995).
- Final Environmental Impact Statement, Vegetation Treatment on BLM Lands in Thirteen Western States (1991).
- 2004 Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests Within the Range of the Northern Spotted Owl – Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy.

Specific Management Direction from the 1995 Klamath Falls Resource Area RMP pertaining to the different resources being analyzed:

Air Quality

- Continue efforts to meet National Ambient Air Quality Standards, Prevention of Significant Deterioration goals, and the visibility protection plan. (RMP, pg. 27)
- Maintain and enhance air quality and visibility in a manner consistent with the Clean Air Act and the State Implementation Plan. (RMP, pg. 27)

Wildlife

- Enhance and maintain biological diversity and ecosystem health in order to contribute to healthy wildlife populations. (RMP, pg. 30)
- Conduct thinning of encroaching juniper to protect and improve forage areas for big game. (RMP, pg. 34)

Fire/Fuels Management

- Use prescribed fire to meet resource management objectives. This will include but not be limited to fuels management for wildfire hazard reduction, restoration of desired vegetation conditions, management of habitat, management of fire dependent/adapted species, and silvicultural treatments. (RMP, pg. 75)

Noxious Weeds

- Avoid introducing or spreading noxious weed infestations in any areas (RMP, pg. 73).
- Contain and/or reduce noxious weed infestations on BLM-administered land using an integrated pest management approach. (RMP, pg. 73)

Special Forest/Natural Products

- Manage for the production and sale of special forest/natural products when demand is present and where actions are consistent with primary objectives of the land use allocation. (RMP, pg. 57)

Timber

- Produce a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability. (RMP, pg. 26)
- Plan unscheduled harvest to manipulate stand density, composition, fuel loads or other features where the resulting stand will improve forest ecological condition, wildlife habitat, or other resource values. Specifically, plan harvest of marketable western juniper woodlands for improvement of forest or range land ecosystem or watershed conditions.
- Up to 1,000 acres per year of juniper woodland could be harvested for commercial forest products. (RMP, pg. 56)
- Exclude fragile non-suitable sites from timber production base to minimize soil erosion and the effects of land management activities on surface waters. (RMP, pg. 30)
- Manage uplands to maintain the following functions within site capabilities consistent with Appendix D and consistent with other management direction… Plant cover and litter protect the soil surface from the evaporative effects of sun and wind. Plants are vigorous and productive and consist of desirable species. (RMP pgs. 30-31)

Special Status Species

- Manage for the conservation of federal candidate and bureau sensitive species and their habitats so as not to contribute to the need to list and to recover the species. Protect and manage assessment species where possible so as to not elevate their status to any higher level of concern. Modify, relocate, or abandon a proposed action to avoid contributing to the need to list federal candidate species, state listed species, or Bureau sensitive species. (RMP, pgs. 36-37)

Public Input Summary and Issue Development

Public outreach for scoping included a mailing of over 800 copies of a letter soliciting issues for the planning team to consider. The mailing list for this effort included all known landowners (based on county tax lot records) within ¼ mile of the BLM lands proposed for treatment, as well as to the current KFRA public notice mailing list. This letter also included an invitation to a public meeting at the Bonanza High school to discuss the proposed project.

A total of two written public comments were received by the KFRA. The public meeting was attended by six members of the public and several comments were received and recorded at the meeting. However, only two

comments were project specific and had relevance for this planning effort. The comments and issues are summarized below.

Public Scoping Comments

Comment: Cutting down trees is not the only solution or the best solution to achieve the stated objectives [i.e., prevent or reduce fire hazards, conserve plants and animals that thrive in this area as their habitat, and improve the value of the lands.] "Clearing said area of dried leaves, dead woods, and creating buffer zones, reducing the density of foliage and bushes minimize fire hazards; this method prevents the collateral damage of obliterating the habitat of other animals and insects, which are no less important than the animals and insects that your office desire to protect and promote".
Status: This issue is addressed in Alternative 2 that reduces fire hazard through reducing the density of juniper and in the understory of pine stands, without cutting down the overstory pine trees.

Comment: The real principal purpose of this whole endeavor is: higher taxes and fees on real property.
"The other objective that of "improvements and resource values on private lands, and a variety of resource values on public lands" is the real principal purpose of this whole endeavor of your office. The bottom line is: higher taxes and fees on real property.
Status: This comment is not one that the ID Team can address. It appears that the commenter took a statement in the scoping letter out of context. The scoping letter stated, "Currently, uncharacteristically high fuel loads present a threat to improvements and resource values on private lands, and a variety of resource values on public lands. Reducing the fuels on BLM lands would reduce the potential for loss of structures and damage to private property by wildfire in the Bly Mountain area." In the scoping letter text BLM was stating that existing improvements (namely structures) and resources on both private and public lands are at a higher risk of loss by wildfire if the fuels loads are not reduced. The project has nothing to do with raising property values or taxes on private lands as the commenter believes.

One E-mail was received regarding the project and it was in favor of the proposed actions and raised no issues.

Review of project specific comments from Public Scoping meeting

Comment Summary: Concerns about BLM's ability to burn activity generated fuels given the new/increasing emphasis on air quality at the state and county levels.
Status: The BLM coordinates with the State to prevent smoke, resulting from burning on forest lands, from being carried to or accumulating in designated areas and other areas sensitive to smoke. BLM adheres to any restrictions on prescribed burning in situations where the air quality would likely become adversely affected by smoke.

Comment Summary: There are a number of old landing piles on BLM lands in the project area left over from the timber sale in the late 1990's. There is concern that these piles are a potential attractive nuisance in terms of arson and that the piles have the potential to be ignition points because firewood cutters are still working them occasionally.
Status: Treatment of these old landing piles, either by utilization and subsequent re-piling and burning of residue, or burning the piles in their current state, were added to the action alternatives.

CHAPTER 2 - ALTERNATIVES

Actions Common to All Action Alternatives:

- Underburn the identified pine stands (782 ac.).
- Burn or chip/grind approximately 10 existing large landing piles from previous operations/sale
- Maintain existing BLM roads and culverts and repair any damage to roads and culverts caused by operations regardless of ownership. There are no new permanent or temporary roads planned in any of the alternatives. There is no road obliteration planned to existing roads. Roads that are presently blocked with natural barriers will be re-blocked.
- Repair any fences damaged as a result of treatment operations.

- Plant and "tube" bitterbrush and mountain mahogany seedlings and seed with grass outside of the pine stands on up to 100% of the ground disturbed by machinery or burn pile scars (acreage varies by alternative).

The underburning of pine stands would require construction of hand and dozer lines as described below. The weather parameters prescribed in the burn plan would result in approximately two to three foot flame lengths and eight to fifteen foot scorch to raise the canopy base height. Approximately ten miles of fireline construction would be necessary to ensure that the fire remains within the targeted units. Fireline would primarily be hand-line and plow-line approximately 18-24" wide, along with a six foot high and twelve foot wide area cleared of limbs, shrubs, and accumulations of fuel. There would be up to one half mile of dozer line approximately nine feet wide built in critical holding areas, such as near residences.

Action Alternatives:

The two action alternatives include selectively cutting juniper trees. The junipers selected for cutting would be essentially all junipers smaller than 24 inches diameter at breast height (DBH). Junipers larger than 24 inch DBH would be retained. Additionally, smaller junipers that exhibit multiple characteristics that indicate that they are older than approximately 130-140 years old would be retained. See Appendix C for a description of characteristics that indicate older juniper trees regardless of diameter. In the treatment units, the majority of the juniper trees would be cut. Refer to Table 2 for a generalized comparison of proposed treatments by alternative.

Under both Alternative 1 and Alternative 2, the BLM would designate approximately ten percent of the treatment unit in no-treatment thermal clumps approximately one quarter acre to five acres in size in order to provide hiding cover, thermal cover, and nesting cover for a wide variety of wildlife species including mule deer. Additionally, the BLM would identify no-treatment visual screens along Keno Springs Road, Egret Road, and Highway 140 where those roads pass through proposed treatment units. These screens would be linear in shape, run parallel to the road, and be one to three trees in depth, depending on density of existing screening vegetation and terrain.

Alternative 1 – (cut juniper and thin young pine, yard some, pile burn some, commercial pine harvest in some stands, underburn all pine stands)

Under this alternative approximately 4,842 acres would be treated with juniper cutting and pine thinning. A portion of this treated acreage (approximately 3,756 ac) is in pine stands and/or within 1,300 feet of existing roads, and the cut pine and juniper material on those acres would be yarded to landings. Material cut within the pine stands would be yarded using conventional timber harvest methods (skidders, one end suspension). Material cut outside of the pine stands but within the yarding area would be yarded using full suspension methods. Commercial pine treatments (density management thinning) would occur on approximately 782 acres. Once at landings, this material would be disposed of in several ways including public use firewood, saw logs and/or chips to mills, or commercial firewood operations. Unusable material left on landings would be made available for personal firewood cutting. Material left on landings after firewood cutting would either be re-piled by machine if necessary and burned, or chipped/ground for utilization. Cut material outside the 3,760 acres identified to be yarded, would be piled and burned. Approximately 782 acres of the 4,842 acre project area is in pine stands that would be underburned after all other treatments were completed.

Treatments include thinning and yarding and underburning within riparian reserves (174 acres). Project Design Features (PDFs, appendix B) include no machine entry zones and fire ignition guidelines for working in riparian reserves that are designed to protect riparian values and meet RMP standards and guidelines including the Aquatic Conservation Strategy (ACS) objectives.

Alternative 2 – (cut and pile burn junipers, no tree yarding, underburn all pine stands)

Under this alternative approximately 4,060 acres would be treated with juniper cutting and piling and pile burning. There would be no yarding. The pine stands in the project area (782 ac.) would not be thinned or have any juniper cut within them, but would be underburned just as in Alternative 1. No material would be cut in the pine stands because without the ability to yard, the material would have to be piled and burned within the pine

stands and pile burning in pine stands can lead to undesirable levels of pine mortality. Firewood would be available for personal use wood cutters and possibly commercial cutters, but it would not be available at landings, it would be in scattered piles out in the treatment units.

Treatments include thinning pine and juniper (134 acres) and underburning in riparian reserves (174 acres). This acreage includes a small percentage of aspen stands within the riparian reserves. Project Design Features (PDFs, Appendix B) include no machine entry zones within 25 feet of a stream channel and fire ignition guidelines for working in riparian reserves that are designed to protect riparian values and meet RMP standards and guidelines including the Aquatic Conservation Strategy (ACS) objectives. Cutting of pine would not exceed 20" diameter in riparian reserves. The boles of cut trees would be left for coarse woody debris or firewood. Slash (limbs and tops < 6") would be hand piled and burned.

No Action Alternative

The Bureau of Land Management NEPA Handbook recommends the inclusion and analysis of a No Action Alternative. Under the No Action Alternative, management activities considered in this project would not occur. Activities proposed in and adjacent to the analysis area that have been analyzed and approved in other NEPA documents would still occur, such as fuel reduction treatments, routine road maintenance, forest inventory and surveys, and fire suppression. Selection of the No Action Alternative would not change land allocations or the direction the BLM has to manage these lands.

The No Action Alternative serves as a baseline or reference point for evaluating the environmental effects of the action alternatives. Inclusion of this alternative is done regardless of consistency with the RMP and without regard to meeting the purpose and need.

It should be pointed out the No Action Alternative is not a "static" alternative. It is implied that the present environmental conditions and trends will continue. This would include trends, such as vegetation succession and consequent terrestrial and aquatic habitat changes, increases in fire hazard, and deteriorating road conditions. Under the No Action Alternative, implementation of actions listed in Table 3 as cumulative actions would continue.

Table 2: Generalized comparison of proposed treatments by alternative

	Alternative 1	Alternative 2	No Action
Cut juniper in shrub/woodlands	yes 4,060 acres	yes 4,060 acres	no
Cut pine and juniper in pine stands	yes 782 acres	no	no
Thin pines outside main pine stands	yes Same 4,060 acres as above	yes, thin understory Same 4,060 acres as above	no
Yard cut material to landings and haul it away	yes between 782 and 3,756 acres depending on market and accessibility	no	no
Thin in riparian reserves in Juniper Woodland	yes	yes	no
Thin in riparian reserves in pine stands	yes	no	no
Burn in riparian reserves	yes	yes	no
Burn piles of cut material in the units	yes Between 1,086 and 4,060 acres depending on how much gets yarded.	All (except firewood use areas)	no
Burn or grind/chip residual landing piles from 1990's project	yes Approximately 10	yes Approximately 10	no
Burn landing piles from this current project	yes Number depends on amount yarded	no (no piles created)	no
Make firewood available at landings	yes	no (no landing piles created)	no
Make firewood available in designated areas scattered in units	no	yes	no
Underburn pine stands	yes 782 acres	yes 782 acres	no
Revegetate disturbed soil with planted shrubs and grasses	yes	yes	
Maintain roads to allow log/chip haul	yes	no (no hauling)	no
Designate approximately 10 % of each treatment unit as "no treat' areas for wildlife (including mule deer) hiding cover. Retain some visual screening along some roads.	yes	yes	no

Figure 2 – Proposed Treatment Units – Alternative 1

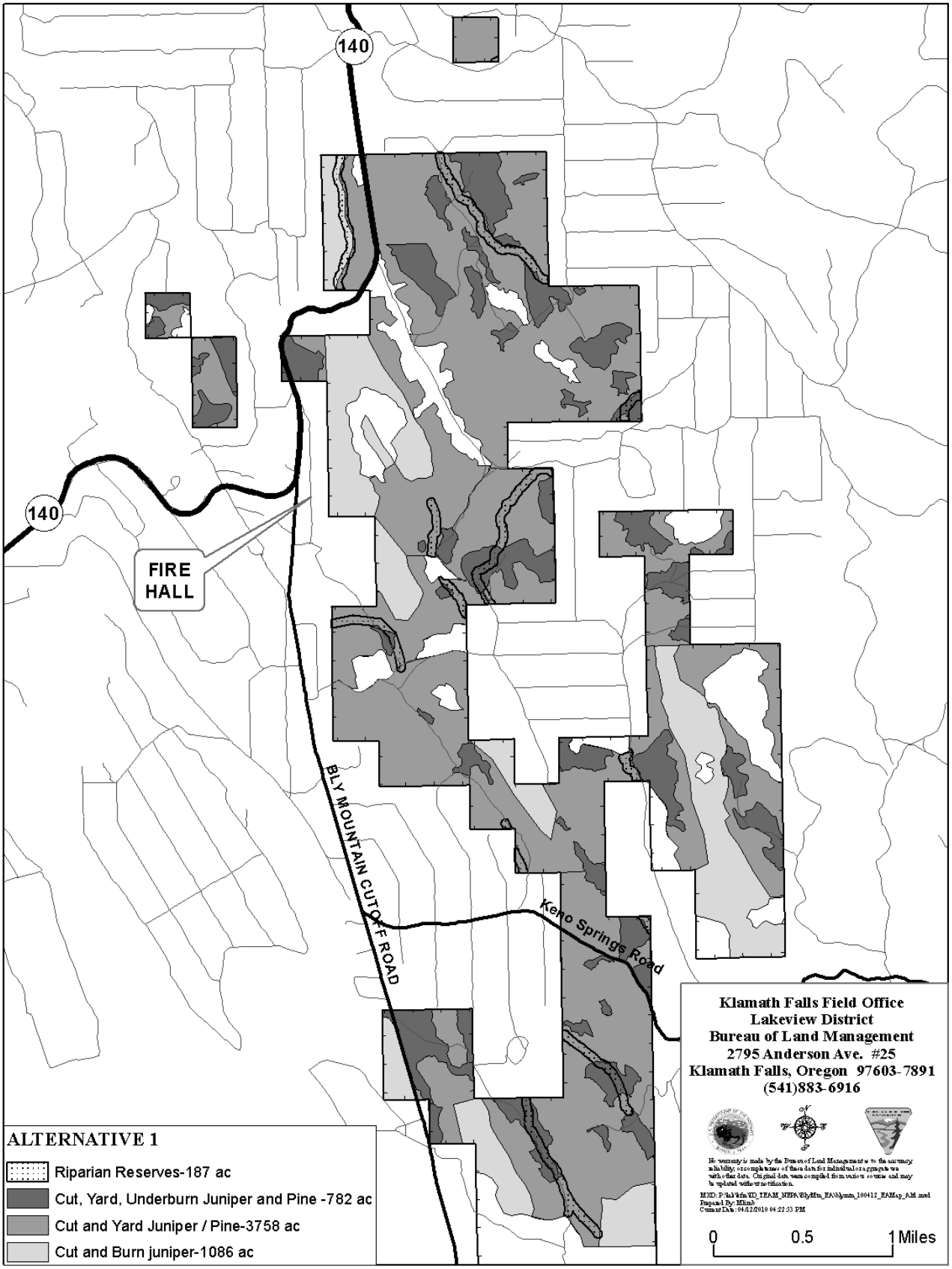
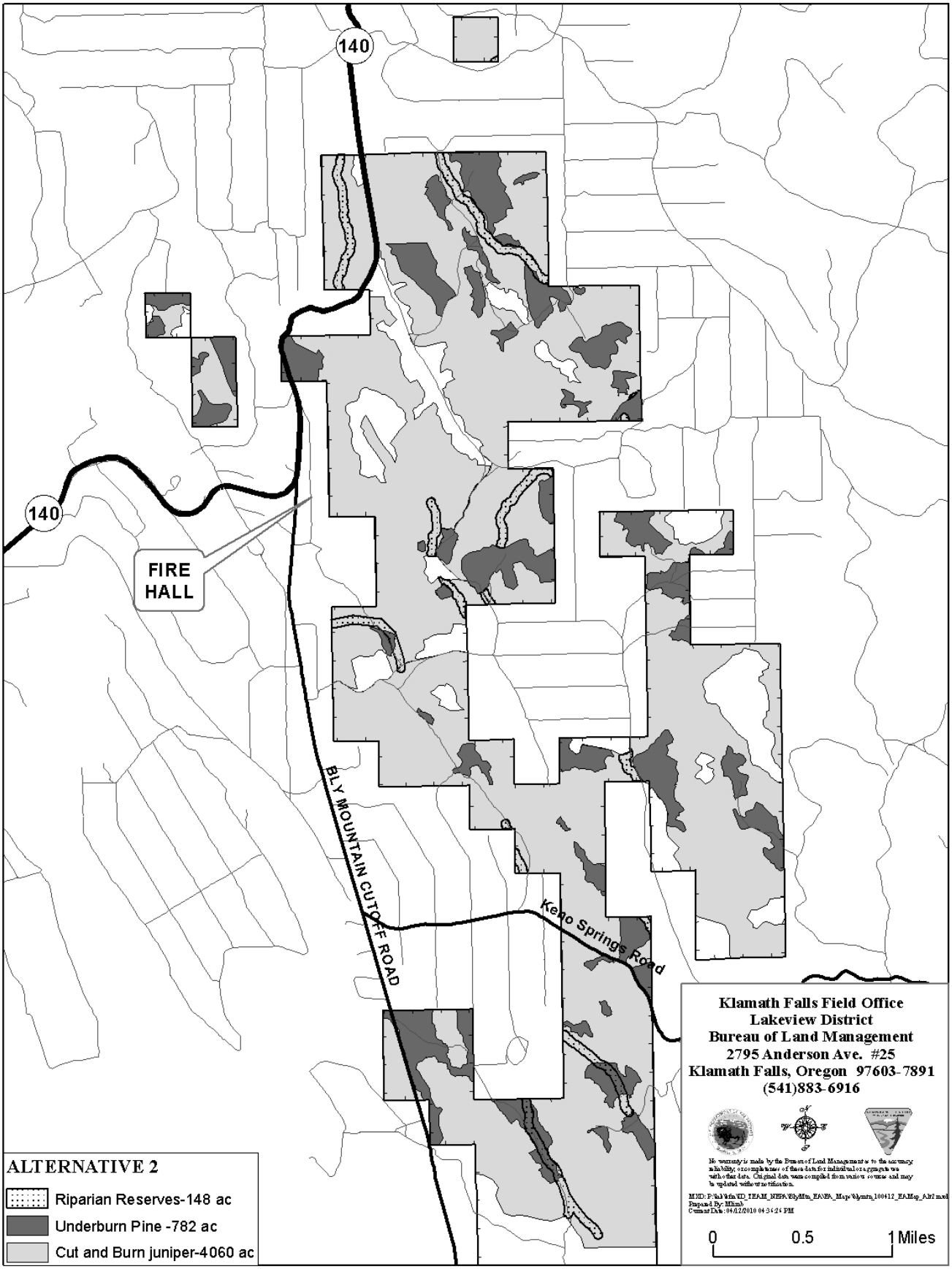


Figure 3 – Proposed Treatment Units – Alternative 2



Alternatives Considered but Eliminated from Detailed Analysis in this EA

Underburn Pine Stands Only

Under this alternative the only action taken would be to build appropriate firelines and underburn the 782 acres of pine stands within the project area, including underburning approximately 55 acres of Riparian Reserves. This alternative was eliminated because it would not meet the Purpose and Need. Under this alternative, none of the rangeland health, deer winter range improvement, or fuel reduction benefits expected to occur in the juniper woodland areas under Alternatives 1 and 2 would occur. Fire would be reintroduced to the pine stands and some fuels reduction and forest health benefits would occur within those stands, however, those benefits would be reduced due to the lack of thinning and juniper removal within the pine stands prior to the burning. The actions would only move towards implementation of the RMP on approximately 17% of the area. The action of underburning pine stands is considered in other alternatives.

CHAPTER 3 – AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

Introduction

The affected environment reflects the existing condition that has developed from all past natural events and management actions within the project area (and/or 5th field watershed). The current condition assessed for each affected resource is a combination of natural and human caused fires, fire suppression, road building, timber harvesting, grazing, fuel reduction treatments, and the effects of recreational use and therefore it is unnecessary to individually catalog all past actions in this EA. Such detail would be irrelevant to making a rational decision among alternatives. The important value of this EA is to assess and display for the deciding official the impacts of the alternatives on those resources as they exist today, to allow a determination if the resulting project effects and/or cumulative effects are either significant or are greater than those analyzed in the RMP EIS.

Resource values that are either not present in the project area, or would not be affected by any of the proposed alternatives are: floodplains, wilderness study areas (WSAs), areas of critical environmental concern (ACECs), research natural areas (RNAs), prime or unique farmlands, wild and scenic rivers, and minerals. There are no known hazardous waste sites in the analysis area. For any alternative, no direct or indirect disproportionately high or adverse human health or environmental effects to minority or low income populations are expected to result from implementation of the alternatives.

Cumulative Actions Considered

The description of alternatives, including the No Action Alternative, includes an analysis of cumulative effects anticipated regardless of implementing any actions. Cumulative actions specifically considered in the descriptions of cumulative impacts are the past cutting and treatments of pine and juniper from the Bly Mountain Timber Sale (1999 -2003) and the hundreds of acres of fuel hazard reductions treatments implemented from 2001 to 2003 under service contracts.

Table 3: Additional treatments currently proposed in the vicinity of the project area

Treatment/Action	Approximate Acres	Anticipated Year
Realignment of Highway 140	10	2012
Mortar-Coyote Project on National Forest System land		2002-2012

Highway 140 Realignment

The objective of the project is to eliminate the truck length restriction, provide better sight distance, and improve the overall safety of this section of OR 140. Actions proposed are: straighten roadway curves, widen roadway shoulders, realign the Bly Mountain Cutoff Road intersection, and repave the entire 9.4 mile segment of highway.

Mortar-Coyote Project

This project is entirely on National Forest System (NFS) land on the Fremont National Forest with the closest action about 1.5 miles from the Bly Mtn. planning area. Actions are mostly completed except a timber sale doing commercial thinning that is still on-going, and some underburning.

The cumulative effect of the Bly Mtn. actions when added to the past, present, and reasonably foreseeable future projects is minimal for most resources on BLM land. The highway realignment will only impact a few acres of BLM land and thus will only be discussed for resources where impacts could be measurable. Similarly, the actions on adjacent National Forest System land are far enough away that few BLM resources would be affected and will be discussed only in those sections that are relevant.

Vegetation - Affected Environment

Upland Forest

Forests occurring in the proposed treatment areas can be generally described as stringers of ponderosa pine growing in multi-aged, multiple canopy stands, many of which have encroaching juniper and a dense understory component of ponderosa pine. White fir may sometimes be found at higher elevations and aspen is found in some riparian areas. Ponderosa pine is the main commercial tree species. There are approximately 782 acres of commercial pine stands in the project area.

Vegetation within the proposed treatment areas has been modified by past management practices including logging, grazing, and exclusion of fire, resulting in high fuel loads and structural changes in the forest that increase the likelihood of stand replacement fires. Existing overcrowded stand conditions and competition for limited moisture with encroaching juniper reduces overall forest health in the pine stands. Crowded growing conditions stress the trees and make them more vulnerable to insects and disease. Bark beetles, including mountain pine bark beetles that can infest and kill pine trees, are present in the forested stands of the proposed project areas. Small (less than one acre) patches of ponderosa pine have been killed and are currently being attacked by bark beetles. No large areas of infestation have been identified at this time.

The majority of the 782 acres of ponderosa pine stands identified under “Common to All action Alternatives” were commercially harvested approximately 10 years ago. Ponderosa pine throughout the diameter range was thinned in order to maintain the existing uneven-aged, multi-strata stand structure and to reduce competition and improve forest health. Junipers in immediate competition with the pine were removed, however not all juniper within the stands was removed. Stringers of pine outside of the main pine stands were not harvested under this past forest treatment, and no junipers were cut within these stringers.

Root Diseases

There are some *Heterobasidion annosum* (Annosus root disease) infection centers in the proposed project areas. Ponderosa pine is the primary host in the proposed project area. One form of the disease infects and weakens or kills pines. Bark beetles often infest the root disease weakened pine trees and hasten their death. Root disease centers expand slowly, approximately one foot per year.

Juniper Woodlands and Meadows

The majority of the project area is juniper woodland and contains many shrub-steppe communities adjacent to or intermingled with the forested stands. There are approximately 4,060 acres of juniper woodland in the project area. However, most of this current woodland is the result of a major expansion of juniper over the last 140-150 years impacting native shrub and grass/forb communities. Through decades of fire suppression and other factors, the shrub communities have become older and decadent. Juniper and small pines have invaded many meadow and shrubland areas, reducing the size and quality of meadow and shrub areas in the proposed project area. These meadows and shrublands are important for wildlife including big game and neotropical migrant birds.

The project area was identified as Fire Regime I & III, Condition Class III through the Standard Landscape Process. The following Table 4 describes each Fire Regime and the associated fire frequency and severity.

Table 4: Fire regime condition classes expressed as fire return interval and severity

Fire Regime Class	Frequency (Fire Return Interval)	Severity
I	0-35 years	Low
II	0-35 years	Stand Replacement
III	35-100 + years	Mixed
IV	35-100 + years	Stand replacement
V	>200 years	Stand replacement

Condition Classes are a qualitative measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects or disease, or other management activities (Schmidt et al. 2000). The description for each condition class follows in Table 5.

Table 5: Fire Regime Condition Class descriptions

Condition Class	Fire Regime
1	Fire regimes are within a historical range and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functional within a historical range.
2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from historical range.
3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This result in dramatic changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.

The project area is an edaphic assemblage of plant communities. The primary Biophysical Settings (BpS) identified within the project area include Woodland California Montane Jeffrey Pine-Ponderosa Pine Woodland (BpS# 0710310) and Columbia Plateau Western Juniper Woodland and Savanna (BpS# 0710170). The Standard Fire Behavior Fuel Models represented include TL8 (long needle litter) (for the Ponderosa Pine stands) and GS2 (Moderate Load, Dry Climate Grass-Shrub). The GS2 Fuel Model best describes the Juniper Woodland vegetation type. Many of the ponderosa pine stands were thinned and underburned in the late 1990s, and those stands have lower fuel loads, higher canopy base height, and lower crown-bulk density. These factors mean that potential wildfire in these previously treated stands would likely be of lower severity and suppressed at a smaller size than the untreated stands. Typical afternoon fire season weather (3% fine dead fuel moisture & 7 mph eye-level wind) would result in fire behavior shown in Table 6.

Table 6: Current potential fire behavior under typical fire season conditions

Vegetation Type	Rate of Spread	Flame Length	Fire Type
pine stand: burned / thinned in 1990s	14 feet/minute	5 feet	surface fire
pine stand: not treated in 1990s	114 feet/minute	176 feet*	crown fire
juniper-sagebrush woodland	68 feet/minute	9 feet	Torching of scattered trees

*Flame height from crown fire estimated using SPOT module in BehavePlus 4 to yield steady state flame height from a group of 30 torching trees.

Vascular Plants
No special status plant species are known to occur within the project area. Vascular plant surveys on record for much of the project area occurred in 1983, 1989, 1991, and 1994.

Nonvascular Plants
No special status nonvascular plant species are known to occur within this project area.

Noxious Weeds
Noxious weeds are known to occur in a variety of locations within the project area. The most common noxious weed known in the area is *Carduus nutans* (musk thistle). Additional species which occur in this area and on adjacent privately owned land include *Onopordum acanthium* (Scotch thistle), *Cirsium arvense* (Canada thistle), *Euphorbia esula* (leafy spurge), *Hypericum perforatum* (St. Johnswort), *Centaurea biebersteinii* (spotted knapweed), *Salvia aetheopsis* (Mediterranean sage), *Linaria dalmatica* (Dalmatian toadflax), and *Cirsium vulgare* (bull thistle).

Vegetation - Environmental Consequences
Upland Forest and Juniper Woodlands
Alternative 1

Proposed treatments in what is now juniper woodland would cause these plant communities to return to a condition that more closely resembles pre-settlement vegetation communities. Shrub and grass layers would become more robust as light, water and nutrients are made more available. Individual shrub and grass plants currently on site would be expected to increase their growth and reproductive rates and new plants of desirable species would be expected to be established in growing spaces that become available through removal of trees. The thinning and underburning in the previously untreated ponderosa pine stands would lower fuel loads, raise the canopy base height, and lower crown-bulk density. These factors would increase wildfire suppression effectiveness and lower potential wildfire severity. In the ponderosa pine stands that had previously been treated (in the 1990's), the underburning would maintain and further enhance those characteristics. The thinning of western juniper would greatly open up the juniper-sagebrush woodland, reducing the potential for torching, resulting in increased effectiveness of fire suppression efforts in the event of a wildfire. In the period of time before skid trails have fully revegetated, they would act as potential fire breaks, further increasing suppression effectiveness. Typical afternoon fire season weather (3% fine dead fuel moisture & 7 mph eye-level wind) would result in the fire behavior shown in Table 7.

Table 7: Potential wildfire fire behavior following thinning and burning under Alternative 1 under typical fire season conditions

Vegetation Type	Rate of Spread	Flame Length	Fire Type
pine stand: burned / thinned in 1990s	14 feet/minute	5 feet	surface fire
pine stand: not treated in 1990s	14 feet/minute	5 feet	surface fire
juniper-sagebrush woodland	68 feet/minute	9 feet	surface fire

Thinning in the pine stands and removal of competing juniper trees would reduce competition for nutrients, water and light and promote growth and resiliency of the reserved pines. Ponderosa pine trees growing with less competition are generally in better health and less susceptible to attacks from insects and disease.

Underburning in pine stands whether previously treated or untreated would have variable effects depending upon the intensity of the underburn. If the underburn is accomplished with the desired intensities direct impacts to desirable ponderosa pine trees would be minimized. However, some mortality would be expected to pine trees of all sizes. Mortality is expected to be greater in the smaller diameter trees that are less resistant to fire effects, as shown in Table 8. Larger ponderosa pine trees often have duff and needle buildup around the base of the trees. Even cool prescribed burns can ignite these buildups and result in too much heat being generated at the base of the large trees resulting in mortality or excessive stress to the trees. If prescribed fire intensities/flame lengths are greater than those described in Alternative 1, pine stands can incur undesirable levels of mortality

related to direct effects of the fire and long term impacts to tree vigor that allow secondary mortality agents such as insects and disease to attack the trees.

Table 8: Fire-caused mortality of various size-classes of ponderosa pine under a range of fire intensities

	Flame Length (feet)				
DBH (inches)	**2**	**4**	**6**	**8**	**10**
4	73%	80%	80%	80%	80%
8	6%	79%	80%	80%	80%
12	6%	11%	80%	80%	80%
16	6%	6%	36%	80%	80%
20	6%	6%	8%	76%	80%
24	6%	6%	6%	31%	80%
36	6%	6%	6%	7%	65%

Mortality modeled using FOFEM 5.7. Model converts flame lengths based on Van Wagner's scorch height model, which assumes low wind speed and 77°F air temperature. Mortality predicted using equation from Hood et al 2007, which predicts all mortality occurring within three years of fire.

Alternative 2

Proposed treatments in what is now juniper woodland would cause these plant communities to return to a condition that more closely resembles pre-settlement vegetation communities. Shrub and grass layers would become more robust as light, water and nutrients are made more available. Individual shrub and grass plants currently on site would be expected to increase their growth and reproductive rates and new plants of desirable species would be expected to become established in growing spaces that become available through removal of trees. The underburning in the previously untreated ponderosa pine stands would lower fuel loads, raise the canopy base height, and lower crown-bulk density. These factors would increase suppression effectiveness and lower potential wildfire severity. In the ponderosa pine stands that had previously been treated (in the 1990's), the underburning would maintain those characteristics. The thinning of western juniper would greatly open up the juniper-sagebrush woodland, reducing the potential for torching, resulting in increased effectiveness of suppression. In the period of time before pile burn scars have fully revegetated, they would slow down fire spread by approximately 26%. This would further increase fire suppression effectiveness and tend to minimize acres burned by any wildfire. Typical afternoon fire season weather (3% fine dead fuel moisture & 7 mph eye-level wind) would result in the fire behavior shown in Table 9.

By not thinning pine stands, the potential advantages of removing competing juniper trees described in Environmental Consequences-Alternative 1 would be sacrificed. The juniper in these stands will continue to compete with the surrounding pine, weakening the pines and making them more susceptible to insects and disease. Likewise, underburning some stands of pine without thinning would leave a dense stand in place which is more likely to exhibit crown fire behavior and greater post-fire mortality in the event of a wildfire than stands that have been both thinned and burned. In previously thinned stands, underburning effects would be similar to those described in Alternative 1.

Table 9: Potential wildfire fire behavior following prescribed burning under Alternative 2 under typical fire season conditions

Vegetation Type	Rate of Spread	Flame Length	Fire Type
pine stand: burned, thinned in 1990s	14 feet/minute	5 feet	surface fire
pine stand: burned, but no thinning	14 feet/minute*	5 feet*	surface fire*
juniper-sagebrush woodland	50 feet/minute	9 feet	surface fire

*In unthinned pine stands (not thinned in 1990's) that are prescribed burned under Alternative 2 or 3, crown fire may occur under these wildfire weather conditions. If crowning were to occur, the wildfire rate of spread would increase to approximately 114 feet/minute with 176 foot flame lengths. Thinning reduces crown bulk density and thereby reduces the potential for wildfires to exhibit crown fire behavior. Under these typical summer weather conditions, these stands are right on the fire behavior transition zone between surface fire with individual tree torching and crown fire; under these conditions the models have a low confidence level.

No Action Alternative
Implementing the No Action Alternative would do nothing to lower potential wildfire severity. Fire would not be reintroduced to the pine stands and no fuels reduction and forest health benefits would occur within those stands. In the short term, fire behavior would remain similar that shown in Table 6. Over the next decade the previously treated stands would become similar to the untreated stands, with severity and crown fire potential increasing to that shown in Table 10. By not thinning pine stands, the potential advantages of removing competing juniper trees described in Environmental Consequences-Alternative One would be sacrificed. The juniper in these stands will continue to compete with the surrounding pine, weakening the pines and making them more susceptible to insects and disease. Under this alternative, none of the rangeland health, deer winter range improvement, or fuel reduction benefits expected to occur in the juniper woodland areas under Alternatives 1 and 2 would occur.

Table 10: Potential fire behavior following No Action under typical fire season conditions

Vegetation Type	Rate of Spread	Flame Length	Fire Type
pine stand: burned / thinned in 1990s	114 feet/minute	176 feet*	crown fire
pine stand: not treated in 1990s	114 feet/minute	176 feet*	crown fire
juniper-sagebrush woodland	68 feet/minute	9 feet	Torching of scattered trees

*Flame height from crown fire estimated using SPOT module in BehavePlus 4 to yield steady state flame height from a group of 30 torching trees.

Cumulative Effects
Vegetation treatments that decrease fuel loading and benefit forest health would likely make residual pine stands and grasslands more resilient to wildfire. The prior Bly Mtn. Timber Sale in 1999-2003, the fuel hazard reduction treatments from 2001-2003, and the previous prescribed underburn have all contributed to a decreased fuel loading and benefitting overall forest health.

The highway realignment will remove a minimal amount of shrubs and trees and have little to no effect on remaining vegetation. The underburning on National Forest lands would lower fuel loads, raise the canopy base height, and lower crown-bulk density in the treated stands. These factors would increase wildfire suppression effectiveness and lower potential wildfire severity, thus reducing the likelihood of a fire entering BLM lands from the National Forest lands to the east.

Special Status Plant Species

All Alternatives, including the No Action Alternative
No special status plant species are known to occur within the project area. The actions proposed in this project are not likely to affect any special status plant species.

Cumulative Effects
No special status plant species are known to occur within the project area. Cumulative effects of other projects in the area would not be likely to affect any special status species.

Noxious Weeds

Alternative 1
Alternative 1 would result in the greatest amount of soil disturbance and potential to increase noxious weeds. This alternative would involve cutting juniper and pine using machinery. Most of the cut materials would be yarded up to 1,300 feet to roads and landings. Soil disturbance and compaction from the weight and moving action of machinery would occur. Additional soil disturbance would occur in those areas where one-end suspension would result in dragging materials across the ground. Any soil disturbance could result in spreading noxious weed propagules, if weeds are present or in the seed bank. Propagules could also be spread throughout the project area if they become attached to machinery that passes through a weed infestation. Additionally, disturbed soil could easily be colonized by noxious weeds. This alternative would cut and remove juniper from the area. Previous juniper removal projects in these vegetation types have been associated with an increase in

annual non-native or noxious grasses, including downy brome (cheatgrass) and medusahead rye. These increases would also be expected to be temporary and dependent upon how quickly native grasses and shrubs respond to the release treatment and begin to increase in composition.

Under burning would occur in this alternative in pine stands. This alternative would also burn cut material in the units. A temporary flush of weeds would be expected from underburning and pile burning. Because of the low intensity of the planned burn, these areas would likely recover quickly so that very few long-term noxious weed populations would establish. The approximately ten miles of hand and mechanically constructed fireline would also be expected to result in some increase in annual non-native or noxious grasses, including downy brome (cheatgrass) and medusahead rye. These increases would be expected to be temporary.

Mitigation measures (see Appendix B) would decrease the likelihood of spreading noxious weeds propagules. Restoration efforts in disturbed areas would minimize the possibility of noxious weeds establishing.

Alternative 2

Alternative 2 would result in less soil disturbance than Alternative 1. This alternative would involve cutting only juniper using machinery. Soil disturbance by the machinery could result in spreading noxious weed propagules, if weeds are present or in the seed bank. Propagules could also be spread throughout the project area if they become attached to machinery that passes through a weed infestation. Additionally, disturbed soil could easily be colonized by noxious weeds. This alternative would cut, pile and burn juniper. Similar previous juniper removal projects in these vegetation types have been associated with an increase in annual non-native or noxious grasses, including downy brome (cheatgrass) and medusahead rye, particularly in the burn scars. These increases would be expected to be temporary.

Alternative 2 considers the option of allowing firewood cutters access to wood piled throughout the project area. By traveling throughout the project area in private vehicles, there is a possibility that firewood cutters would be able to distribute weed propagules from their vehicles. This could result in an increase in noxious weeds since it would be difficult to enforce weed prevention measures with private citizens. Any unknown or untreated noxious weed populations would be expected to increase under this and all other alternatives that firewood gathering is permitted.

Underburning would occur in this alternative in pine stands. This alternative would also burn cut material in the units. A temporary flush of weeds would be expected. Because of the low intensity of the planned burns, these areas would likely recover quickly so that very few long-term noxious weed populations would establish. The approximate ten miles of hand and mechanically constructed fireline would also be expected to result in some increase in annual non-native or noxious grasses, including downy brome (cheatgrass) and medusahead rye. These increases would be expected to be temporary.

Mitigation measures (see Appendix B) would decrease the likelihood of spreading noxious weeds propagules, and restoration efforts in disturbed areas would minimize the possibility of noxious weeds establishing.

No Action Alternative

The No Action Alternative would result in no planned soil disturbance. Under the No Action Alternative, it would be expected that any untreated noxious weed populations would continue to increase. In addition, the composition of native grasses and shrubs could decrease as western juniper continues to occupy, expand and capture critical site resources like water and nutrients.

Cumulative Effects

Cumulative effects from the highway 140 realignment project are not likely to cause an increase in noxious weed infestations. The highway and realignment portion travel through the northwest corner of one of the proposed treatment units. The highway project has specific weed mitigation measures which will minimize the introduction of noxious weeds to the area. The Forest Service treats weeds similar to the BLM so the actions on adjacent NFS lands should not increase the likelihood of spreading noxious weeds. Therefore cumulative effects, for weeds, of this project are expected to be minimal.

Terrestrial Wildlife Species – Affected Environment

This section focuses on the wildlife species that are considered special status species and would potentially be affected by management activities. Included are those species listed under the Endangered Species Act (ESA - listed, proposed and candidate species), those listed under the BLM special status species policy and considered to be Bureau Sensitive species, and land birds listed on the U.S. Fish and Wildlife Service's "Birds of Conservation Concern 2002" list for the Columbia Basin (BCR9 list). All of these species will be considered in this EA. Mule deer (a special emphasis species) will also be addressed. For a list of other species and a description of their habitat that may occur in the proposed project area, refer to the Klamath Falls Resource Area FEIS of 1994 (pgs. 3-37 to 3-41).

Threatened and Endangered Species

Threatened, Endangered, Proposed, or Candidate species are listed in Table 11 but none of those species are present.

Table 11: ESA Listed, Proposed and Candidate terrestrial wildlife species considered for this analysis

Species	Scientific Name	Status	Designated Critical Habitat within project area	Species or habitat occur within the project area	May be affected by project
Canada Lynx	*Lynx canadensis*	Threatened	No	No	No
Northern Spotted Owl	*Strix occidenatlis caurina*	Threatened	No	No	No
Pacific Fisher	*Martes pennanti pacifica*	Candidate	No	No	No
Yellow-Billed Cuckoo	*Coccyzus americanus*	Candidate	No	No	No
Oregon Spotted Frog	*Rana pretiosa*	Candidate	No	No	No
Mardon Skipper Butterfly	*Polites mardon*	Candidate	No	No	No

Non-Listed Special Status Species (Bureau Sensitive and Bureau Assessment)

The BLM national Special Status Species Policy describes a process by which species can be designated as Bureau Sensitive, Bureau Assessment, or Bureau Tracking, and delegates the authority to manage the sensitive species program to the various BLM State Directors. The BLM Oregon State Director issued IM #OR-2007-072 to BLM units in Oregon. This direction eliminated the Bureau Assessment and Bureau Tracking categories, changed the criteria for listing species as Bureau Sensitive, and added a new category ("Strategic") to the special status species program for Oregon BLM lands. Of the two current categories within Oregon BLM (Bureau Sensitive, and Strategic), only Bureau Sensitive species are addressed in NEPA documents. Strategic species are generally to be managed at the regional level and are the subject of conservation assessments and conservation strategies that are in the process of being drafted at the time of this writing. It is the policy of BLM to protect, manage, and conserve species and their habitats such that any Bureau action will not contribute to the need to list any species under the auspices of the Endangered Species Act. Table 12 (next page) displays the Bureau species that are addressed in this NEPA document.

Table 12: Bureau Sensitive vertebrate and invertebrate wildlife and fish species documented or suspected to occur on the Klamath Falls Resource Area. Source: IM# OR-2007-072.

Species	Scientific Name	Species or habitat occur within the project area	Project may affect the species
Aleutian Canada Goose	*Branta canadensis leucoparia*	No	No
Trumpeter Swan	*Cygnus buccinator*	No	No
White-tailed Kite	*Elanus leucurus*	No	No
Horned Grebe	*Podiceps auritus*	No	No
Red-necked Grebe	*Podiceps grisegena*	No	No
Inland Tailed Frog	*Ascaphus montanus*	No	No
Foot Hill Yellow-legged Frog	*Rana boylii*	No	No
Pygmy Rabbit *	*Brachylagus idahoensis*	No	No
Spotted Bat	*Euderma maculatum*	No	No
Fisher **	*Martes Pennanti*	No	No
Tricolored Blackbird	*Agelaius tricolor*	No	No
Bufflehead	*Bucephala albeola*	No	No
Greater Sage-grouse	*Centrocercus urophasianus*	No	No
Yellow Rail	*Coturnicops noveboracensis*	No	No
Snowy Egret	*Egretta thula*	No	No
American Peregrine Falcon	*Falco peregrinus anatum*	Winter foraging only	No
Bald eagle	*Haliaeetus leucocephalus*	Yes	No
Franklin's Gull	*Larus pipixcan*	No	No
Lewis Woodpecker	*Melanerpes lewis*	Yes	Yes
American White Pelican	*Pelecanus erythrorhynchos*	No	No
White-headed Woodpecker	*Picoides albolarvatus*	Yes	Yes
Oregon Vesper Sparrow	*Pooecetes gramineus affinis*	Yes	Yes
Oregon Spotted Frog	*Rana pretiosa*	No	No
Northwestern Pond Turtle	*Actinemys marmorata marmorata*	No	No
Pallid Bat	*Antrozous pallidus*	Yes	Yes
Townsend's Big-eared bat	*Corynorhinus townsendii*	No	No
Fringed Myotis (bat)	*Myotis thysanodes*	Yes	Yes
Miller Lake Lamprey (fish) (all populations)	*Lampetra minima*	No	No
Inland Redband Trout (All stocks)	*Oncorhynchus mykiss*	No	No
Nerite Pebble Snail	*Fluminicola Sp. Nov. 11*	No	No
Great Basin Ramshorn (snail)	*Helisoma newberryi newberryi*	No	No
Crater Lake Tight coil (snail)	*Pristiloma acticum Crateris*	No	No
Franklin's Bumblebee	*Bombus franklini*	No	No
Johnson's Hairstreak (butterfly)	*Callophrys johnsoni*	No	No
Yuma Skipper (butterfly)	*Ochlodes yuma*	No	No
Mardon Skipper (butterfly)	*Polites mardon*	No	No
Coronis Fritillary (butterfly)	*Speyeria coronis coronis*	No	No
Siskiyou Short-horned Grasshopper	*Chloealtis aspasma*	No	No
Evening Field Slug	*Deroceras hesperium*	No	No
Klamath Rim Pebblesnail	*Fluminicola Sp. Nov. 3*	No	No
Scale Lanx (snail)	*Lanx klamathensis*	No	No
Chase Sideband (snail)	*Monadenia chaceana*	No	No
Modoc Rim Sideband	*Monadenia fidelis Sp. Nov.*	No	No

Other Wildlife Species with Special Emphasis

Golden Eagle

There is a historic golden eagle nest within the project area. It has been active recently. This species is protected by the Eagle Protection Act of 1940 and is afforded some special protection measures in the Klamath Falls Resource Management Plan of 1995 as described in the environmental consequences section below.

Mule Deer

The project area includes summer range for resident deer and transitional range for deer that summer to the north and northeast, and winter to the south and southwest. The project area is also considered deer winter range. One of the objectives of this project is to improve habitat for big game by maintaining and increasing native forage shrub species and forbs.

Migratory Birds

The BLM has responsibilities to take actions to conserve migratory bird species under the Migratory Bird Treaty act of 1918 as amended (MBTA). Pursuant to meeting these responsibilities the BLM is currently engaged at the national level with the US Fish and Wildlife Service (the agency with primary responsibility for enforcement and administration of the MBTA) in efforts to develop a memorandum of understanding (MOU) as to how BLM will contribute to conservation of migratory birds. In the interim, guidance has been issued from the BLM Washington D.C. office to the field instructing field units to address the effects of BLM projects on specific sets of migratory birds in the NEPA documents associated with those projects. Table 13 (next page) displays the migratory birds that must be addressed in NEPA documents on the eastern portion of the Klamath Falls Resource Area.

Table 13: Birds of conservation concern for great basin portion of the Klamath Falls Resource Area

Species	Scientific Name	Species or habitat occur within the project area	Project may affect the species
Swainson's Hawk	*Buteo swainsoni*	No	No
Ferruginous Hawk	*Buteo regalis*	No	No
Golden Eagle	*Aquila chrysaetos*	Yes	Yes
Peregrine Falcon	*Falco peregrinus*	Winter foraging only	No
Prairie Falcon	*Falco mexicanus*	Winter foraging only	No
Flammulated Owl	*Otus flammeolus*	Yes	Yes
Lewis's Woodpecker	*Melanerpes lewis*	Yes	Yes
Williamson's Sapsucker	*Sphyrapicus thyroideus*	Yes	Yes
White-headed woodpecker	*Picoides albolarvatus*	Yes	Yes
Loggerhead Shrike	*Lanius ludovicianus*	Yes	Yes
Brewer's Sparrow	*Spizella breweri*	Yes	Yes
Sage Sparrow	*Amphispiza belli*	No	No
Gray Vireo	*Vireo vicinior*	No	No
Greater Sage Grouse (Columbia Basin population)	*Centrocercus urophasianus*	No	No
Yellow Rail	*Coturnicops noveboracensis*	No	No
American Golden-Plover	*Pluvialis dominica*	No	No
Snowy Plover	*Charadrius alexandrinus*	No	No
American Avocet	*Recurvirostra americana*	No	No
Solitary Sandpiper	*Tringa solitaria*	No	No
Whimbrel	*Numenius phaeopus*	No	No
Long-billed Curlew	*Numenius americanus*	No	No
Marbled Godwit	*Limosa fedoa*	No	No
Sanderling	*Calidris alba*	No	No
Wilson's Phalarope	*Phalaropus tricolor*	No	No
Yellow Billed Cuckoo	*Coccyzus americanus*	No	No
Burrowing Owl	*Athene cunicularia*	No	No
Black Swift	*Cypseloides niger*	No	No
Virginia's Warbler	*Vermivora virginiae*	No	No
Tricolored Blackbird	*Agelaius tricolor*	No	No
* List Source = Report by the USFWS-"Birds of Conservation Concern 2008". BCR9 (Great Basin) BCC 2008			

Terrestrial Wildlife Species – Environmental Consequences

Threatened and Endangered Species

No Endangered, Threatened, Proposed, or Candidate species are present and thus none of the alternatives would have an effect on any of these species.

Non-Listed Special Status Species (Bureau Sensitive)

Bald Eagle

The bald eagle was removed from the endangered species list in July 2007. However, it is still protected by the Bald and Golden Eagle Protection Act of 1940 and nest sites are afforded some special protection measures in the Klamath Falls Resource Management Plan of 1995. Bald eagles may occasionally be seen in the Bly Mountain area at any time of the year, the project area is not known to be occupied by the bald eagle for nesting, or roosting. Suitable nesting and roosting habitat (conifer forest) occurs within the project area; however, the high density of residential development and associated continuous noise disturbance from adjacent private lands reduces the likelihood that Bald eagles would nest or roost in the proposed project area. In the absence of bald eagle nests or roosts in the project area, none of the alternatives is likely to affect this species.

American Peregrine Falcon

The peregrine falcon was removed from the Endangered Species list in 1999. However, it is still considered a sensitive species by BLM. Individuals of this species may occasionally be seen in or around the proposed project area, especially during winter. There is no suitable nesting habitat for this species in the proposed project area. None of the alternatives, including the No Action Alternative, is expected to affect this species.

Lewis Woodpecker and White-headed Woodpecker

Alternatives 1 and 2

These species occur in variable densities throughout the open forest and woodland habitats in the Klamath Basin provided that those habitats contain medium to large snags. Although not documented to occur within the proposed project area, these species almost certainly occur there. Juniper removal, as proposed under Alternatives 1 and 2, is not likely to have any effect on either species. The Lewis woodpecker is a cavity nester, associated with medium to large snags in relatively open forest stands or savannahs for nesting and foraging. The pine stands within the project area are considered suitable nesting habitat and it is possible that this species could nest in large, decadent junipers with a significant component of dead wood in the bole. Because the project design feature restricting the size and types of junipers that may be cut under Alternatives 1 and 2 is intended to retain the type of junipers that this species could possibly use, juniper removal as proposed is not likely to have any effect on this species. The white-headed woodpecker is a cavity nester, associated with medium to large snags in forest stands, rather than juniper woodlands, for nesting and foraging. Thinning sub-merchantable and commercial sized pines and junipers from the pine stands could negatively affect the quality of the habitat for woodpeckers by reducing future density induced pine mortality within the stands and by removing weak pines that would otherwise die and become snag habitat.

Underburning in the pine stands under all the action alternatives could affect these species if snags containing active nests or potential future nest trees are lost to fire. One of the objectives with under-burning the pine stands is to retain existing snags. A standard operating procedure (SOP) while burning is to avoid direct ignition of any medium to large trees or snags and to attempt to extinguish any medium to large trees or snags that catch fire during burn operations. This SOP reduces the likelihood that nest trees would be lost. However it also reduces the likelihood that future nest trees (snags) would be created by fire kill. Even with this SOP in place, a few trees are likely to be killed (usually less than six percent of the trees over 12 inches in diameter). Thus burning in the pine stands could also benefit this species by creating some snags for future nesting.

Although under Alternatives 1 and 2 potential nest trees could be lost, none of the action alternatives is expected to have any effect on woodpecker populations in the Klamath Basin because the proposed project represents only a very small percentage of the suitable habitat in the Klamath Basin and the anticipated changes in the suitability of the habitat within the treated pine stands is expected to be small under any of the action alternatives.

No Action Alternative

The No Action Alternative is expected to have no effect on woodpecker species populations in the Klamath Basin.

Fringed Myotis (bat) and Pallid Bat

Alternatives 1 and 2

These species have not been documented in the proposed project area, but they undoubtedly occur there. These two species are common in undeveloped habitats in the Klamath Basin provided those habitats contain medium to large snags or other suitable roosting substrates. The proposed project's potential impact on these species is limited to the project's potential to change snag and decadent juniper tree density in treated units. The pine stands within the project area are considered suitable roosting and foraging habitat and it is possible that these species could roost in large, decadent junipers with hollow boles or wildlife cavities. Because the project design feature that restricts the size and types of junipers that may be cut is intended to retain the type of junipers that these species could possibly use, juniper removal as proposed under Alternatives 1 and 2 is not likely to have any effect on this species. Thinning sub merchantable and commercial sized pines from the pine stands could negatively affect the quality of the habitat for this species by reducing future density induced pine mortality within the stands and by removing weak pines that would otherwise die and become snag habitat.

Both pile burning (Alternatives 1 and 2) and yarding of juniper piles (Alternative 1) could affect these species if substantial numbers of bats are roosting in the piles when they are burned or yarded and those bats could not escape the piles. Juniper piles are usually burned in the winter and early spring. Yarding usually occurs in the late spring, summer and fall. Juniper piles are most likely to be used by bats as day roosts or night roosts during the late spring, summer and early fall. Suitable summer night and day roosts are generally abundant and not a limiting factor for bats, so the loss or creation of summer roosts is not likely to affect bat populations. Use of juniper piles by bats during this warmer time of the year would potentially place individual bats in piles at risk from yarding operations. Bat use of juniper piles for over-wintering hibernacula is unknown but considered unlikely due to the lack of thermal mass of the piles. Typical hibernation sites include large hollow snags and trees, rock outcrops, houses and outbuildings, bridge abutments, and caves. Individual bats of unknown species have occasionally been seen exiting piles being ignited in late spring. These bats are probably day roosting in the piles. Bats observed exiting piles usually do so as the pile is being approached by personnel and either just before or just after the pile has been lit, and well before the whole pile is ignited. Occasionally, individual bats have been seen exiting as yet unburned piles many yards from flames in a pile burn operation as smoke from burning piles impacts the unburned piles (M. Broyles, personal observation). Bats are unlikely to be in piles in the winter and any bats in piles in the spring will be out of deep torpor and thus should be able to escape pile burn operations and have been seen doing so (M. Broyles, personal observation). Presumably, pile roosting bats would also be able to escape from piles being yarded, having been alerted by vibrations generated by the approach of heavy equipment.

Underburning in the pine stands could affect this species if snags or “cat faced” trees containing active roosts, or trees that are potential future roost trees, are lost to fire. One of the objectives while under-burning the pine stands is to retain existing snags. A standard operating procedure (SOP) while burning is to avoid direct ignition of any medium to large trees or snags and to attempt to extinguish any medium to large trees or snags that catch fire during burn operations. This SOP reduces the likelihood that roost trees would be lost. However it also reduces the likelihood that future roost trees (snags) would be created by fire kill. Even with this SOP in place, a few trees are likely to be killed (usually less than six percent of the trees over 12 inches in diameter). Thus burning in the pine stands could also benefit this species by creating some snags for future roosting. Bats will leave roosts when disturbed by smoke, flames, or noise if the bats are not in a state of deep torpor. Fall burning usually occurs on warm, dry days in October, and bats in the area should not be in their winter torpor state that early in the year (Ormsby, pers. Comm.). By the time bats enter their deep winter torpor state the climatic window of opportunity for underburning has closed. By the time the underburning window opens in the spring, any bats in the area should be out of torpor and be able to escape smoke and fire. Thus, it is unlikely that substantial numbers of these two species of bats would be directly affected by the proposed underburning.

Although under the action alternatives potential roost sites could be lost or created, none of the action alternatives are expected to have any effect on these species populations in the Klamath basin because: 1) the proposed project represents only a very small percentage of the suitable habitat in the Klamath Basin, 2) the anticipated suitability of the habitat within the treated stands is expected to be small under any of the action alternatives, and 3) the direct killing of bats by yarding and/or burning is unlikely.

No Action Alternative
The No Action Alternative is expected to have no effect on bat species populations in the Klamath Basin.

<u>Oregon Vesper Sparrow</u>
Alternative 1 and 2
This species has not been documented in the proposed project area, but it undoubtedly occurs there. It is common in shrub and grassland habitats in the Klamath Basin. The proposed project’s potential impact on this species is limited to the project’s potential to change the density of shrubs and grasses in the treated units. Cutting junipers as proposed under both of the action alternatives would release the existing shrubs and grasses from competition with junipers for light, nutrients and water. Additional growing sites for grasses and shrubs would become available and the habitat would become more suitable for Vesper Sparrow.

Thinning sub merchantable and commercial sized pines and junipers from the pine stands is expected to have no effect on this species. Alternative 1 includes yarding of most of the cut juniper. Yarding of juniper with standard yarding equipment such as tracked or rubber tired skidders with arches results in varying degrees of shrub layer and grass layer vegetation loss. The degree of loss depends on, among other factors, the size of the yarded material, the amount of the material to be yarded, the species condition and height of the shrubs, and the attention to impacts on the part of the equipment operator. In general, observation of units that have been yarded and units that have been piled and burned indicates that piling and burning is less disruptive of the grass and shrub layer vegetation than yarding. Alternative 2 provides for piling and burning the cut juniper within the units. Burning the piles results in some shrub and grass loss directly beneath the piles, but also results in excellent micro sites for planting shrubs post-burn. Pile and burn operations do not require the construction of large, highly disturbed, landings that yarding operations require. Overall, Alternatives 1 and 2 should be at least neutral, if not beneficial for the vesper sparrow on a local level. To the extent that Alternative 2 provides for the retention of more intact vegetation in the grass and shrub layers and provides for excellent potential shrub planting sites, Alternative 2 would be better for this species than Alternative 1.

No Action Alternative
The No Action Alternative would allow the continuation of juniper encroachment and resultant loss of shrubland/grassland habitats favored by the Vesper Sparrow and would likely lead to reduced population numbers locally.

Other Terrestrial Wildlife Species including USFWS BCR 9 species

Golden Eagle

Alternative 1 and 2
The pine stands within the project area are suitable nesting habitat for this species and the non-forested lands are suitable for foraging. However, the encroachment of Juniper into the non-forested habitats has probably reduced the suitability of this habitat for foraging because of reduced sight distance from perches, and reduced visibility into the lower vegetative layers from the air. The golden eagle is a visual hunter and removal of most of the juniper from the project area would increase the visibility of prey in the grass/shrub layers and would probably benefit this species to a minor degree on a local level.

The historic golden eagle nest within the proposed project area would be protected by a seasonal restriction on disturbance causing activities within one quarter mile of the nest and on disturbance causing activities within one half mile of the nest if they are visible from the nest. This restriction would run from January 1 to August 15 in years that the nest status is “active” or “undetermined” by a BLM wildlife biologist. Restricted activities would include operation of mechanical equipment (other than normal levels of traffic on the existing roads), project related foot or ATV travel, and burning within the above specified distances or outside those distances if smoke would impact the nest site. This restriction would remain in place until a BLM biologist determines that the site is not active in a given year.

No Action Alternative
The No Action Alternative would forgo any benefits to this species that would be achieved by removing junipers as proposed in Alternatives 1 and 2.

Migratory birds

Flammulated Owl

Alternatives 1 and 2
Juniper removal under any action alternative is not expected to have any impact on this species because these owls are not associated with non-forested habitats. Thinning sub-merchantable and commercial sized pines from the pine stands could negatively affect the quality of the habitat for this species by reducing future density induced pine mortality within the stands and by removing weak pines that would otherwise die and become snag habitat. Although under the action alternatives potential nest trees could be lost or created, none of the action alternatives are expected to have any effect on the flammulated owl population in the Klamath basin because the proposed project represents only a very small percentage of the suitable habitat in the Klamath Basin and the anticipated changes in suitability of the habitat within the treated pine stands is expected to be small under any of the action alternatives.

Underburning and thinning in the pine stands could affect this species if snags or trees containing nest cavities, or that are potential future nest trees, are lost to fire. One of the objectives while under-burning the pine stands is to retain existing snags. A standard operating procedure (SOP) while burning is to avoid direct ignition of any medium to large trees or snags and to attempt to extinguish any medium to large trees or snags that catch fire during burn operations. This SOP reduces the likelihood that nest trees would be lost. However it also reduces the likelihood that future nest trees (snags) would be created by fire kill. Even with this SOP in place, a few trees are likely to be killed (usually less than six percent of the trees over 12 inches in diameter). Thus burning in the pine stands could also benefit this species by creating some snags for future nesting.

No Action Alternative
The No Action Alternative is expected to have no effect on the flammulated owl population in the Klamath Basin

Williamson's Sapsucker
Alternatives 1 and 2
This species is associated with ponderosa pine trees and snags. Juniper removal from rangelands or pine stands as proposed under Alternatives 1 and 2 is not likely to affect this species. Thinning sub-merchantable and commercial sized pines from the pine stands could negatively affect the quality of the habitat for this species by reducing future density induced pine mortality within the stands and by removing weak pines that would otherwise die and become snag habitat.

Underburning and thinning in the pine stands as proposed under both action alternatives could affect this species if snags or trees containing nest cavities, or that are potential future nest trees, are lost to fire. One of the objectives while under-burning the pine stands is to retain existing snags. A standard operating procedure (SOP) while burning is to avoid direct ignition of any medium to large trees or snags and to attempt to extinguish any medium to large trees or snags that catch fire during burn operations. This SOP reduces the likelihood that nest trees would be lost. However it also reduces the likelihood that future nest trees (snags) would be created by fire kill. Even with this SOP in place, a few trees are likely to be killed (usually less than six percent of the trees over 12 inches in diameter). Thus burning in the pine stands could also benefit this species by creating some snags for future nesting. Although under the action alternatives potential nest trees could be lost or created, none of the action alternatives are expected to have any effect on the Williamson's sapsucker population in the Klamath Basin because the proposed project represents only a very small percentage of the suitable habitat in the Klamath Basin and the anticipated changes in suitability of the habitat within the treated pine stands is expected to be small under any of the action alternatives.

No Action Alternative
The No Action Alternative is expected to have no effect on the Williamson's sapsucker population in the Klamath Basin.

Loggerhead Shrike
Alternatives 1 and 2
This species is associated with open shrub habitats. Removal of junipers from rangelands as proposed in Alternatives 1 and 2 would benefit this species, locally, by increasing the health and vigor of the shrub community, and reversing the loss of shrub habitat quality and coverage to juniper encroachment. Underburning (under all action alternatives) or thinning in the pine stands (under Alternative 1 only) is not expected to affect this species.

No Action Alternative
The No Action Alternative would allow the continued encroachment of juniper and resultant loss of open, shrub dominated habitat, and could result in reduced population numbers locally over time.

Brewer's Sparrow
Alternatives 1 and 2

This species is associated with open shrub habitats. Removal of junipers from rangelands as proposed in Alternatives 1 and 2 would benefit this species locally by increasing the health and vigor of the shrub community, and reversing the loss of shrub habitat quality and coverage to juniper encroachment. Underburning and thinning in the pine stands is not expected to affect this species. Overall, Alternatives 1 and 2 should be at least neutral if not beneficial for the Brewer's sparrow. To the extent that Alternative 2 provides for the retention of more intact vegetation in the grass and shrub layers, and provides for excellent potential shrub planting sites, Alternative 2 would be better for this species than Alternative 1.

No Action Alternative
The No Action Alternative would allow the continuation of juniper encroachment and resultant loss of shrubland/grassland habitats favored by this species and could result in reduced population numbers locally over time.

Mule Deer
Alternatives 1 and 2
Juniper removal from non-forested rangelands would be beneficial to mule deer due to increased forage production, but might increase the potential for legal and illegal harvest of deer by reducing screening vegetation near roads within the project area. In order to mitigate the potential increase in deer vulnerability under Alternatives 1 and 2, no-treatment buffers would be established along roads in areas where some visual screening benefit could be provided. Also, up to ten percent (450 acres) of the project area would be designated by the project team wildlife biologist to be left untreated for deer hiding and thermal cover. Yarding and/or burning juniper piles on non-forested range lands is expected to reduce the benefits achieved by killing the juniper to a small degree. Yarding disturbs the grass/forb/shrub layers and results in soil disturbance in the form of landings and skid roads. Burning juniper piles can also kill the grass/forb/shrub layers and result in areas of bare mineral soil directly under the piles. Due to these soil and vegetative disturbances, the benefits to rangeland health (and mule deer habitat values) of juniper disposal are variable depending upon type of treatment (yarding or burning) and juniper stocking levels. In areas of low to moderate juniper stocking, yarding the cut junipers would likely impact more of the area than piling and burning. In areas of unusually high juniper stocking, pile burning may impact as much or more of the area as yarding. Both Alternatives 1 and 2 are expected to greatly benefit mule deer because both alternatives remove juniper from rangeland sites. Given the existing juniper density on most of the area proposed for treatment, Alternative 2 would likely be less disturbing to desirable vegetation than Alternative 1. Also, under Alternative 2 there would be no skid roads or landings created. Thus Alternative 2 would be preferable to Alternative 1 from a mule deer perspective.

Removing juniper or thinning sub-merchantable and merchantable pines from pine stands is not expected to affect mule deer. Although thinning the tree canopy would allow additional sunlight to penetrate and stimulate grass, forbs, and shrub growth, this increase in forage is likely to be relatively small because of the shading effect of the residual tree canopy.

Underburning the pine stands would keep shrub production at low levels and adversely affect mule deer.

No Action Alternative
The No Action Alternative would allow the continued encroachment of juniper into shrub habitats and thus result in continued decreases in available forage quality and quantity. This would likely result in a continuation of the decline in the mule deer herd numbers in the ODFW Klamath Falls big game management unit.

Cumulative Effects - All Wildlife Species
The Mortar Coyote and Highway 140 Realignment projects discussed elsewhere in this document are either too small in scope (realignment) or too far away (Mortar Coyote) to be expected to have any detectable cumulative effect on the species addressed in this EA with the exception of mule deer.

Mule Deer
Treatments on the adjacent NFS lands were developed to address mule deer habitat needs and connectivity corridors between Old Growth and late old seral (LOS) stands. Stands that contain the best mule deer hiding cover on USFS lands have been removed from consideration for thinning treatments. Connectivity corridors

between Old Growth and LOS structured stands on USFS lands have been delineated. The retention of hiding cover on USFS lands and the improvements in forage on BLM lands will have a cumulative effect of benefiting the mule deer herd. The Highway realignment project could be either beneficial to mule deer or detrimental. The realigned roadway may allow drivers to comfortably travel at higher speeds that could result in more deer versus vehicle collisions on the winter range. However, the realigned highway may provide better sighting distance and visibility for deer in the roadway and may thus allow drivers to react in sufficient time to avoid collisions with deer. The overall combined effect of the highway project and any of the action alternatives in the BLM proposed Bly Mountain project is probably no greater than the effects of the proposed Bly Mountain project alone.

Soils - Affected Environment

Soils in the Bly Mountain area were derived primarily from basalt, diatomite, and tuff deposits. The landscape is dominated by structural benches, escarpments, and terraces. Elevations range from between 4,400 feet above mean sea level to 5,100 feet. The climate is characterized by mild, warm summers and cold, wet winters. Annual precipitation averages between 12 to 20 inches, with most of the precipitation falling as snow. The landscape in the area consists of gently sloping to steep slopes, and some very steep slopes.

In the treatment areas, the Natural Resource Conservation Service (NRCS) identified sixteen mapping units consisting of thirteen different soil series. The soil mapping units identified in the proposed treatment areas are summarized in Table 14 below.

Soils have been analyzed for potential effects resulting from the proposed management activities. The disturbance variables for which the soils in the Bly Mountain treatment area are currently analyzed include: compaction, rutting hazard, erosion, fire damage susceptibility, and displacement following site disturbance activities. These are site-specific criteria that are appropriate for measuring soil productivity.

Table 14: Soil types and interpretations within the project area

Mapping Unit & slope	Resistance to Compaction	Rutting Hazard	Erosion Hazard: off-road/off-trail	Fire Damage Susceptibility	Percent of Project Area* (approx)
50E Lorella very stony loam, 2-35% slopes	Low	Mod	Moderate	High (rocks)	36
65B Ponina-Rock Outcrop 1-8% slopes	Low	Mod	Slight	High (rocks)	23
59B Nuss-Royst, gently sloping	Low	Severe	Slight	Slight-mod	16
51E Lorella-Calimus, steep north slopes	Low	Mod	Moderate	High (rocks)	11
68E Royst stony loam, 5-40% north slopes	Low	Severe	Moderate	Moderate	3
66F Rock Outcrop-Dehlinger, 35-65% slopes	Low	Severe	Severe	Moderate	2.5
19A, 19C Fordney loamy fine sand, 0-20%	High	Mod	Slight-Mod	Moderate	3

*approximate acreage and percentage of project area under Alternative 1

The NRCS resistances to compaction ratings were used to assess characteristics of the soil that favor or resist the formation of a compacted layer. The ratings are “low”, “medium”, or ”high”, whereby those soils rated “low” have features that favor the formation of a compacted layer. Except for the Fordney loamy fine sand, all of the soils in the analysis area have a low resistance to compaction and characteristics that favor the formation of a compacted layer and deep soil ruts.

The ratings for erosion indicate the hazard of soil loss from off-road and off-trail areas after disturbance activities expose 50 to 75 percent of the soil surface. The ratings are based on soil erosion factor K and slope. The hazards are described as "slight," "moderate," or "severe." A rating of "slight" indicates that little or no erosion is likely; "moderate" indicates that some erosion is likely, and that erosion-control measures may be needed. “Severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed. Soil erosion hazard ratings specific to the treatment area are primarily slight to moderate.

To evaluate erosion caused by thinning treatments for project area soils, the WEPP FuME model was used (Elliot, b). The WEPP model was developed to predict soil erosion and sediment yield for agriculture, rangeland, and forest conditions. The WEPP FuME model was developed by the Forest Service to estimate background erosion rates and to predict erosion due to mechanical thinning, prescribed fire, wildland fire, and roads. All proposed thinning treatments are likely to leave approximately 85 percent cover. Hillslopes were delineated within the analysis area to show potential amounts of sediment that could reach a scoured watercourse following proposed thinning and prescribed burning, or wildfire.

Soils within the proposed treatment area have been evaluated for their susceptibility to damage following juniper and pine pile burning, underburning, and wildfire. Long-term soil productivity is maintained when soil porosity, soil organic matter, and soil depth are not significantly reduced. Juniper pile burning can damage organic matter and affect soil porosity depending on the duration and intensity of burning materials, and soil and fuel moisture content at the time of burning. Larger and wetter juniper piles will tend to burn longer and damage to organic matter will increase as the duration of soil heating increases (Pierson et. al, 2007).

Soils that have a high susceptibility to formation of a water repellant layer generally have high contents of sand and/or rock fragments. Both characteristics can increase the rate of heat transfer into the soil. Approximately 70 percent of the soils in the project area have a high fire damage susceptibility rating (Soil survey staff, NRCS).

Soils - Environmental Consequences

Alternative 1

This alternative calls for mechanical cutting of juniper and pine on approximately 4,842 acres. Mechanical yarding with partial suspension would occur on 782 acres (of ponderosa pine forest), and yarding with full suspension would occur on between 0 and 2,974 acres, depending on the market for juniper and accessibility of the material.

Compaction

Mechanical thinning and harvesting operations will directly result in increased compaction on soils where metal tracked harvesters and rubber tired skidders are used. During 2002 and 2003, bulk density monitoring on soils within the pine stand suggests detrimental compaction can occur on skid trails where more than 5 passes are made. Project design features limiting the use of heavy machinery on moist to wet soils will decrease the degree of compaction. Compaction is expected to be greater in areas where the equipment makes multiple passes, and where full suspension yarding is done. During full suspension yarding, the pressure on soil will be greater and more passes may be required to yard material when compared to one end suspension. Some off-road areas would be accessed by firewood cutters which could cause soil disturbance, compaction, and rutting depending on moisture conditions.

Soil displacement, erosion

In addition to compaction, some soil displacement is likely to occur during yarding activities on skid trails and landings. Fine textured soils have been identified as being susceptible to mechanical erosion. These soils occur

within 30 percent of the project area, and because they do not have high amounts of rock fragments, they will be more easily disturbed by mechanical equipment. Because these soils are fine textured, yarding will indirectly result in increased soil erosion from wind. The project design feature to cover skid trails with slash may decrease amounts of mechanical erosion depending on the exposed surface area of soil, the degree and frequency of wind events, and time before vegetation returns.

The WEPP model estimates average annual hillslope sedimentation will not greatly increase as a result of proposed thinning or prescribed burning activities. Following the completion of proposed activities, a wildfire would be less intense and could result in an average increase of between 1.25 to 3.75 tons per square mile annually.

Planting of bitterbrush and mountain mahogany seedlings and seeding with grass on disturbed ground could have a benefit of decreasing amounts of detrimental soil erosion. Increased ground cover would decrease amounts of detrimental disturbance depending on the area revegetated, and the effectiveness of revegetation. The past success of previous revegetation efforts on similar soils is varied (Personal communication, D. Eckard).

Soil productivity

This alternative calls for pile burning on between 1,086 and 4,060 acres. The amount of pile burning is inversely related to the amount of cut material that actually gets yarded. Pile burning will result in a direct long term decrease in soil productivity in areas directly beneath piles, due to the combustion of soil organic matter and a decrease in nitrogen. The decreased productivity under burn piles will likely favor more rapid growth of non-natives compared to native plants (Cassie et. al, 2009). To decrease the duration and intensity of soil heating, the recommended mitigation measure is for burning to occur on wet soils when fuels are dry. If mitigation measures are effectively implemented, it is expected that soil productivity should recover within 5 to 10 years. Soil temperatures have been found to rarely exceed 200°C when burning dry juniper on wet soils (Miller et. al, 2005) in southeastern Oregon.

Burning juniper on dry soils when ground litter water content is minimal has shown to result in surface soil temperatures exceeding 870°C and a near 100 percent loss of herbaceous perennials, especially bunchgrass. If recommended mitigation measures are not followed and if piles are greater than seven feet high or re-piled multiple times, detrimental soil damage could occur and it could take soils greater than 10 years to recover.

Alternative 2

Under this alternative mechanical cutting, piling, and pile burning would occur on 4,060 acres. There would be no yarding. The pine stands would be underburned just as in Alternatives 1 and 3. Under Alternative 2, mechanical thinning of juniper will likely result in some compaction and soil disturbance, although less soil will be detrimentally disturbed in comparison to thinning combined with yarding as proposed in Alternative 1. Depending on amounts of disturbance, mechanical thinning could indirectly result in wind erosion, especially on the 30 percent of fine textured soils with no rock fragments. It is estimated less than five percent of thinned juniper treatment areas will have detrimentally compacted or eroded soil. Firewood cutting could lead to a direct increase in short user created routes leading to juniper piles. This could be highly variable and would depend on the proximity of piles to existing roads. Total compacted soil resulting from firewood cutting will likely be minimal (less than one acre).

Potential effects from proposed pile burning under Alternative 2 would be the same as the effects of pile burning described in Alternative 1 above, except that pile burning could occur on a larger area under this alternative (4,060 acres) depending on how much material is yarded as opposed to piled and burned under Alternative 1. (See Table 2 for acres by treatment type for each alternative.) Depending on the effectiveness of mitigation measures to decrease soil heating, pile burning could directly result in between 5 to 10 percent detrimental soil damage. Overall, detrimental soil damage would be less extensive under Alternative 2 than Alternative 1.

Because pine stands would be underburned in this alternative just as in Alternatives 3, the effects to soils of underburning would be similar between Alternatives 2 and 3.

No Action

Most of the juniper woodland area has high amounts of brush and potential wildfire severity is expected to be high (E. Johnson, personal communication). The No Action Alternative will likely result in an increased risk of high intensity wildfire within the juniper woodland area.

Following an intense wildfire in the juniper woodland, the WEPP model estimates an average increase in between 12.6 and 37.8 tons per square mile sediment annually could result. This estimated sedimentation value is 10 times greater than values for a potential lower severity wildfire following treatment.

Under the No Action Alternative, erosion rates will continue to be elevated compared to rates prior to juniper encroachment. Sediment yield for similar juniper woodland sites has been found to be nearly 100 times higher compared to the cut treatment (Pierson et. al, 2007).

Cumulative Effects

This cumulative effects analysis considers the effects of both future projects expected to occur within the next 10 years and past projects within the project area.

To assess post harvest disturbance, soil compaction monitoring was conducted on the Bly Mountain Timber Sale in 2003. The study indicates 30 percent of the study area exhibited disturbance features (rutting, displacement, and compaction). Conclusions of that study, however, could not determine quantifiable results in terms of soil compaction.

The different treatments within the pine stands, proposed harvesting, thinning and burning, under Alternative 1 will result in cumulative amounts of detrimental soil disturbance. The RMP provides direction that the cumulative effects of detrimental soil conditions are not to exceed 20% of the total acreage within the activity area. However, any yarding conducted within the previously harvested pine stands would occur on existing skid trails, which should result in little increase in detrimental soil disturbance. Some additional impacts could be expected for new thinning in these stands as mechanical equipment will be performing the treatments. By effectively implementing BMPs in the juniper woodlands, it is anticipated that full suspension yarding would minimize cumulative effects of compaction, rutting, or displacement.

Underburning may occur again in 5 to 10 years on units that have been proposed on this Bly Mountain project. It is likely fuels will not have greatly accumulated within 5 to 10 years, the prescribed burning should be low intensity, and decreases to soil productivity should be minimal when added to effects of the action alternatives.

Roads - Affected Environment

Main roads that lead into project area are controlled by Klamath County and maintained by Klamath Forest Estates Road Association. BLM roads currently receive public vehicle traffic during wet weather. Some administrative access roads are blocked with barriers. There are no new permanent or temporary roads planned in any of the alternatives. In addition, there is no road obliteration planned to existing roads. BLM roads within the project area have little or no surfacing. There are many miles of roads that require maintenance and/or improvements. Maintenance or improvement concerns include: road rutting, stream crossings, culvert maintenance etc. These periodic activities are considered and covered under the KFRA's routine road maintenance program and will occur with or without implementation of any alternatives.

Roads – Environmental Consequences

Alternative 1

Because this alternative includes hauling of logs and/or chips, the need for maintenance will increase which will increase costs to the BLM. Roads will be assessed for road maintenance deficiencies and improvement needs. Culvert cleaning and replacement may be needed. Rock may be needed for road surfacing and creek crossings and will include up to 2 miles of rocking. These actions will help to stabilize the road and increase the longevity of the earlier investments.

Alternative 2
Maintenance needs are not likely to change from their current level. Road surfacing may be assessed to protect roads from wet weather travel. All BLM roads would be looked at for storm proofing needs.

No Action
Maintenance needs are not likely to change from their current level. All BLM roads would be assessed for storm proofing needs.

Cumulative Effects
Roads that receive periodic maintenance or upgrades will provide a safe travel way and reduce erosion.

Hydrology - Affected Environment
The project area includes proposed actions in two 5th field watersheds (Langell Valley-Lost River and Yonna Valley-Lost River. Both drainages start relatively steep in the project area, enter low gradient alluvial meadow areas and then subsequently drain into the agricultural areas of Langell and Yonna Valley before entering the Lost River via drain ditches. The proportion of the watersheds proposed for treatment is relatively low (2% or less) when compared to the size of the watersheds (Table 15). The area proposed for treatment is intermixed with an extensive road system on the adjacent private lands and it is likely that these roads are having current impacts on hydrologic processes including flow interception and routing to the stream system.

Table 15: Treatment alternatives and 5th field watershed acres

Watershed Name	Watershed Acres	Alternative	Treatment Acres	% of 5th field watershed proposed for mechanical treatment	Proposed Treatment Type
Langell Valley-Lost River	98,371	1	1,710	1.7%	Cut, pile, skid, and burn
		2	1,214	1.2%	Cut, pile burn
Yonna Valley-Lost River	144,640	1	2,352	1.6%	Cut, pile, skid, and burn
		2	1,763	1.2%	Cut, pile burn

There are approximately 3 miles of intermittent and ephemeral streams within the proposed project units. There are approximately 190 acres of riparian reserves in the project area. Riparian reserve treatment acres are summarized in Table 16.

Table 16: Riparian Reserves

Watershed Name	Alternative	RR Acres	Riparian Reserve Treatment
Langell Valley-Lost River	1	60	Cut, pile, skid, and burn
	2	45	Cut, pile burn only (see BMP/PDFs App B)
Yonna Valley-Lost River	1	114	Cut, pile, skid, and burn
	2	90	Cut, pile burn only (see BMP/PDFs App B)

Slopes in the project area are low to moderate, mostly ranging from 0 to 25%. Although soils in the area are generally classified as well-drained, much of the area has shallow and rocky soils underlain with duripan which is highly impermeable. Once these soils become saturated during wet conditions and or frozen, surface runoff may increase. However, field observations reveal that surface erosion is a relatively rare event due to high infiltration in most of forested and shrub dominated areas proposed for treatment. If soils are in a highly disturbed state, surface runoff is likely to transport soil particles which contain nutrients (nitrogen and phosphorus) bound to the soil particle. These nutrients can become dissolved in the water column and impact water quality conditions in downstream stream and reservoirs. There are no perennial streams in the project area, however there are several intermittent streams that drain the upper portion of Bly Mountain and enter the Lost River through a system of canal drains. Stream channels in the area are in relatively good ecological condition due to natural streambank armoring, and effective riparian vegetation.

Hydrology - Environmental Consequences

Alternative 1

In general, the removal of invasive and overstocked juniper and understory pine thinning will have positive effects on hydrologic processes. Although runoff and water yield may increase in the short-term (one to three years), the effects will be small due to the small percentage of the watersheds treated (Table 15 above) and the hydrologic conditions are currently adequate to absorb any modest increases in runoff. In the longer term (3-5 years), recovery of ground cover and canopy would be expected to result in a net improvement in the capacity to capture precipitation and facilitate groundwater recharge processes. It has been demonstrated that hydrologic processes such as rainfall infiltration are improved after the removal of juniper and the subsequent replacement of juniper canopy with shrubs and grasses (Peterson et al 2009). There would be modest disturbance under this alternative to soils including displacement, rutting and compaction due to the harvest machinery. Several best management practices have been incorporated into the project design features for yarding, that will reduce the sedimentation potential.

The proposed skidding of logs would involve the establishment of an extensive array of skid trails and landings in juniper and pine sites. Disturbances including compaction, rutting, soil displacement and invasion by annual grasses and weeds would have detrimental effects to hydrologic processes. These impacts would be expected to recover over a longer time-frame (5-10 years) than the changes in vegetation cover resulting from the cutting of juniper and pine trees. Many of the roads that would be used to access and haul material from the project area are unimproved and unsurfaced. The increased use and maintenance of unimproved and/or unsurfaced roads will temporarily increase the amount of sediment production from these roads. Some off-road areas would be accessed by firewood cutters which could cause soil disturbance, compaction, and rutting depending on moisture conditions.

The impacts of under-burning in pine stands on water quality and hydrologic processes such as infiltration are short-term in nature and would be expected to fully recover within one to three years. The soil and vegetation disturbance resulting from fire line building can be minimized by taking advantage of existing natural and man-made fire breaks and by constructing hand line versus using large tracked machines. Hand line construction in riparian reserves following project design features will reduce the likelihood of sediment entering waterbodies.

The reduction in groundcover and ground disturbance resulting from skidding, machine work, and increased road traffic on unsurfaced roads would likely have short-term effects on water quality due to increased exposure of soil to surface water and subsequent delivery to streams. This may also mobilize some soil bound phosphorus. Timely maintenance of road systems and rehabilitation and planting of the skid trails and landings following the activity would minimize these impacts but not eliminate them.

Under-burning has the potential to release a pulse of nutrients, especially nitrogen. However, the area is small relative to the watershed and vegetation recovery is expected to occur rapidly. Riparian vegetation and adjacent upland pine stands are is in relatively good condition which makes them resilient to natural disturbances such as fire. Under-burning will lower the risk high intensity fire events and thus lowers the risk of severe damage to riparian resources in the event of fire.

The project proposal contains a number of protective measures for operation of machinery and prescribed burning that protect and minimize the risk and ground disturbing impacts to riparian and hydrologic resources (Appendix B).

Approximately 175 acres of riparian reserves would be treated for conifer cutting and removal by skidding. PDFs and BMPs specific to riparian reserve treatments (Appendix B) would be followed to protect riparian vegetation, stream channels and reduce erosion potential. These include no-cut buffer widths and no machine entry buffer widths designed to minimize soil disturbance in or near stream channels and provide streambank protection. Additionally, riparian reserves in pine stands would be thinned to a higher basal area to maintain shading and large tree characteristics leading towards attainment of Aquatic Conservation Strategy (ACS) objectives. The effects of juniper removal within riparian reserves will benefit hydrologic processes by reducing water demand by invasive juniper in streamside areas, reducing excess fuel in riparian reserves, and allowing for desirable riparian plant communities to better compete for available resources such as light and water.

Alternative 2

The effects of Alternative 2 would be are similar to Alternative 1 with respect to the effects of vegetation cutting on hydrologic processes such as run-off and infiltration and disturbances associated with harvest machinery. There would be 4,060 acres treated versus 4,842 acres under Alternative 1. 134 acres of riparian reserves would be treated with thinning. Although there would be no skidding and the associated skid trail and landing network, some off-road areas would be accessed by firewood cutters which could cause soil disturbance, compaction, and rutting depending on moisture conditions. Limiting the access for firewood cutting to the dry season and within a specific distance to the existing road system would minimize the hydrologic impacts of off-road vehicle damage to soils and hydrology. Impacts to water quality under this alternative would be minimal and short-term in nature.

Alternatives 1 and 2

PDFs and BMPs specific to riparian reserve treatments (Appendix B) would be followed to protect riparian vegetation, stream channels and control erosion. These include no cut buffer widths and no machine entry buffer widths designed to minimize soil disturbance in near stream channels and streambank protection. The effects of juniper removal and pine thinning within riparian reserves would benefit hydrologic processes by reducing water demand by invasive juniper in streamside areas. This will have the effect of reducing excess fuel hazards in riparian reserves, and allowing for desirable understory and riparian plant communities to better compete for available resources such as light, nutrients, and water.

No Action

The positive effects of juniper removal and under-burning on long-term hydrologic processes would not be realized. The benefits of reduced risk of fire to upland and riparian areas would not be realized in the No Action Alternative. To the extent that the proposed actions would reduce the probability and severity of intense wildfire that damages vegetation cover, soil permeability, and erosion protection (rainfall interception), the no action increases that risk.

None of the potential negative impacts to water quality and hydrologic processes such as ground disturbance from machinery, hauling and burning and subsequent erosion would occur.

Cumulative Effects

Two additional projects were considered to have potential cumulative effects when considered along with the proposed projects. Cumulative effects from the highway 140 realignment project are not likely to cause measurable changes in hydrologic processes or impacts to riparian reserve areas. The highway and realignment portion travel through the northwest corner of the one of the proposed treatment units. The highway project has specific erosion control and mitigation measures to protect water quality and riparian habitat. The Forest Service project is primarily in the Gerber Reservoir watershed and includes actions that will reduce fire severity hazards, Additionally, erosion control BMPs and INFISH standards and guidelines will be followed. Therefore, cumulative impacts from these projects, when combined with the proposed projects are not expected to cause measurable impacts to water quality or riparian resources. Therefore cumulative effects for this project are expected to be minimal.

Aquatic Species and Habitat – Affected Environment and Environmental Consequences

There are no perennial or fish-bearing streams within or adjacent to the proposed treatment units. Therefore, there are no potential impacts to federally listed or BLM sensitive aquatic species. Aquatic species will not be discussed further in this environmental assessment.

Livestock Grazing Management - Affected Environment

There are three livestock grazing allotments within the proposed project area. These are Klamath Forest Estates (#0862), Yainax Butte (#0861), and Cheyne (#0811). The proposed treatment area covers approximately 98% of the Klamath Forest Estates Allotment, 51% of the Yainax Butte Allotment, and 55% of the Cheyne Allotment acres.

The Klamath Forest Estates Allotment has a grazing lease that authorizes cattle use of 47 AUMs from May 1 to May 31. The Yainax Butte Allotment has a grazing lease that authorizes cattle use of 120 AUMs from July1 to September 30. The Cheyne Allotment has a grazing lease that authorizes cattle use of 51 AUMs from May 1 to June 15.

Actual livestock grazing use on the Klamath Forest Estates and Cheyne allotments and the western portion of the Yainax Butte allotment has been very minor in the last five to ten years. This is due in part to the high concentration of homes that abut the grazing allotments, the fragmented private lands surrounding the allotments, and boundary fences that are in poor condition or nonexistent.

Rangeland Health Standards Assessments were completed on these three allotments during 2003 and 2004. The determinations from these assessments found that the existing grazing management practices and/or levels of grazing use promotes achievement of or significant progress towards meeting the Oregon Standards for Rangeland Health and conforms with the Guidelines for Livestock Grazing Management.

During the information gathering phase of these assessments, an abbreviated Ecological Site Inventory was completed on the allotments. This inventory resulted in the preparation of Rangeland Inventory Ecological Status Worksheets (Worksheets) covering multiple Site Write-up Areas (SWAs). These SWAs represent a distinct zone of vegetation that is relatively homogeneous within the SWA, but different than other SWAs. The Worksheets completed within the SWAs compare the current vegetation against the potential vegetation by ecological site. A rangeland ecological site is, according to the National Range and Pasture Handbook (USDA 1997), "…a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation". The potential vegetation for a given ecological site is described in an ecological site description.

The ESI vegetation information is based on an estimate of current year's growth by plant species and results in an ecological condition, or "seral stage", rating. The more the current vegetation resembles the potential vegetation from the ecological site description the higher the condition rating, and vice versa. The rating system is based on a scale of 0% to 100% similarity to the ecological site description. The seral stages are classified into four different levels, as follows: 0-25% similarity is early seral (or "poor") condition, 25-50% is mid seral (or "fair") condition, 51-75% is late seral (or "good") condition, and 76-100% is the Potential Natural Community (PNC or "excellent" condition). The ESI completed for these allotments found that the overall condition of the allotments by condition class and weighted by acres was as follows:

Klamath Forest Estates	Yainax Butte	Cheyne
PNC – 64%	PNC – 62%	PNC – 34%
Late Seral – 29%	Late Seral – 28%	Late Seral – 49%
Mid Seral – 7%	Mid Seral – 6%	Mid Seral – 17%
Early Seral – 0%	Early Seral – 0%	Early Seral – 0%
	Unclassified – 4%	

The assessments also gave recommendations for future management needs. Among these was the proposed reduction of young junipers in many of the SWAs in order to maintain or enhance the existing native vegetation communities.

Livestock Grazing Management – Environmental Consequences

Alternative 1

The timber harvest, juniper yarding, and prescribed fire treatments in Alternative 1 would have short term negative effects to the forage species available for livestock. The soil surface and vegetation disturbance from the timber harvest operations, the juniper cutting and yarding, and the burning would result in a short term (one to three years) loss of some palatable forage species. The greatest losses would occur in the landing areas and the skidding and yarding trails leading to the landings. Losses of vegetation in these areas would be from repeated crushing and uprooting of vegetation by the heavy machinery used to cut and transport the harvested materials. There would also be losses to forage where juniper is piled and burned. There would likely be high

levels of vegetation mortality in the area under the burn piles due to the high heat levels generated by the burning. The impacted areas would be within forested stands and juniper woodlands that comprise a high percentage of the total forage production area in the allotments. In the long term (3-10 years) the amount of palatable forage species should increase in the treatment areas due to the decreased competition from the harvested timber and juniper and the more open vegetation stands created by these treatments and the prescribed fire. This would provide a moderate positive impact to livestock grazing.

Alternative 2

The juniper treatments and prescribed fire treatments in Alternative 2 would have minor short term negative effects to the forage species available for livestock. The soil surface and vegetation disturbance from the juniper cutting and piling operations and the burning would result in a short term (one to three years) loss of some palatable forage species. The highest levels of forage losses would occur where the junipers are piled and burned. The surface disturbance from the heavy equipment used to cut and pile the juniper could result in crushing and uprooting of vegetation. However, the impacts associated with skidding/yarding trails and landings would not occur in this alternative and would, therefore, have less impact on soil and vegetation than Alternative 1. There would likely be high levels of vegetation mortality in the area under the burn piles due to the high heat levels generated by the burning. The impacted areas would be within and adjacent to forested stands and juniper woodlands that comprise a large percentage of the total forage production area in the allotments. In the long term (3-10 years) the amount of palatable forage species should increase in the treatment areas due to the decreased competition from the harvested juniper and the more open vegetation stands created by the juniper harvest and prescribed fire treatments. This would provide a moderate positive impact to livestock grazing.

No Action

The No Action Alternative would result in a minor long term (3-10 years) negative impact to livestock forage species. The increase in the size and amount of juniper trees adjacent to and within the forested stands and juniper woodlands and the increase in understory species and litter would have a negative effect upon the vigor and proliferation of perennial and annual grass species. This would result in a minor negative impact to livestock grazing.

Cumulative Effects

The implementation of any of the action alternatives would have a minor to moderate positive impact and the No Action Alternative would have minor negative impact to the level of palatable forage species in the portions of the three livestock grazing allotments that are within the proposed treatment areas.

Cultural Resources – Affected Environment

Native American use of the area spans many millennia. The region was most likely used by the Modoc and/or Klamath peoples. On a map showing Modoc territory, Ray (1963) shows the Modoc territory lying on the southern boundary of the project area with Klamath territory being on the northern portion of the project; the project area is in an area of territory overlapping which allowed for interaction between the Modoc and Klamath.

Unlike the Pacific Northwest coast, the Klamath Basin was not explored in the late 18th century by coastal explorers. Land-based exploration began with the Lewis and Clark Expedition (1805-06). Main trails such as the Oregon-California trail were heavily used, but only the Applegate Trail passed close to the region as the Klamath Basin was out of the way. Regular historic contact between the Native American tribes and Euro-Americans began around the 1820s and culminated with the Klamath Lake Treaty of 1864 in which lands around the project area were ceded to the United States by the Klamath Tribes (Minor et al. 1979). The Klamath Tribes consist of the closely related Klamath, Modoc, and Yahooskin peoples.

Euro-American exploration near the analysis area began in 1843 when a band of “free trappers” led by Old Bill Williams, explored the Lost River region. Euro-American settlement did not occur until 1875, soon after, homesteaders pursued sheep and cattle ranching.

Approximately 40 acres of the project area did not have inventory data. This 40 acre parcel was 100% inventoried summer 2009 and 2 new sites and 2 new isolated finds were located, recorded, and flagged for

avoidance. The remaining project area was previously inventoried and the 22 known sites were flagged for avoidance. All known sites will be avoided by project activities.

Additional information about cultural resources in the analysis area may be found in various overviews of the history and prehistory of the region (Anderson 1994, Beckham 2005, Follansbee and Pollack 1978, Minor 1979, Ray 1963, and Spier 1930).

Cultural Resources – Environmental Consequences

Alternatives 1 and 2

The project area has been culturally inventoried and cultural sites have been identified and flagged for avoidance from all activities within the project area; therefore no sites should be impacted. Reducing fuel loads within the project area reduce the likelihood of a catastrophic fire event, lending to the better management and protection of cultural resources in the long term.

No Action

There would be no change to cultural sites, and fuel loads within the project area would stay the same, this could lead to a catastrophic fire event that could have significant impacts on cultural sites.

Cumulative Impacts

The actions should have little to no cumulative impacts upon cultural resources.

Recreation Resources - Affected Environment

Recreational use of the proposed treatment/project area generally consists of dispersed motorized and non-motorized uses such as camping, hiking, hunting, mushroom picking, snowmobiling and wildlife viewing. No developed recreation sites are located in the project area. The Off-Highway vehicle (OHV) designation for the analysis area is OHV open.

Recreation Resources - Environmental Consequences

Alternatives 1 and 2

Only temporary, minimal disruption to recreation uses would occur during fuel treatment activities. Short term disturbances to recreationists and adjacent landowners from noise, dust and smoke associated with fuel treatment activities in the project area can be expected. A positive recreation benefit of fuel treatment activities could occur through increased availability of firewood and mushroom gathering opportunities for those living close to the Wildland-Urban Interface area. An impact of the treatment activities and firewood gathering would be an expected increase in OHV use through the creation of skid trails and new primitive routes. Alternative 2 would likely have more OHV use as the cut juniper would be scattered or in piles throughout the treatment units, as opposed to Alternative 1 where most juniper would be more accessible in landings along roads.

No Action

This alternative would have no effect on recreation resources or the public.

Cumulative Effects

The proposed project should have no cumulative impacts upon recreation resources.

Visual Resources - Affected Environment

The majority of the treatment area is in Visual Resource Management (VRM) class III. Class III objectives are to partially retain the existing character of the landscape. Some VRM class II areas exist outside a one quarter mile boundary, east of Highway 140. The RMP/ROD (page 44) states within one quarter mile of rural interface areas no less than VRM class III standards are to be used. VRM Class II objectives are to retain the existing character of the landscape.

Visual Resources - Environmental Consequences

Alternatives 1 and 2

For visual and scenic resources, VRM class objectives for the treatment area would be met. The alternatives propose fuel treatment activities through the removal of most junipers (and some pines in Alternative 1), piling and burning, and no new roads. The majority of the project area (as viewed from the primary travel routes and local Bly Mountain roads) is well screened due to understory vegetation and trees on adjacent private lands, and topography. Although a large percentage of junipers (and a small percentage of pines in Alternative 1) would be removed from the project area, most of this area will retain adequate understory vegetation, junipers and pine which will serve to reduce visual impacts from adjacent private lands. There would be no additional adverse effects to visual resources, than previously described in the RMP/ROD, pages 4-97 to 101. However, some additional project design features (see Appendix B) have been proposed to reduce the visual impact of fuel treatment activities along major roads, the VRM class II area and select areas within one quarter mile of Wildland-Urban Interface areas.

No Action

This alternative would maintain visual resource conditions; however, the likelihood of large, high intensity wildfire within the Wildland-Urban Interface area would be greatest under this alternative. A large wildfire would have long term negative effect on visual resources for rural residents, and associated loss of wildlife habitat for wildlife viewing.

Cumulative Effects

The proposed project should have no cumulative impacts upon visual resources.

Socioeconomics – Affected Environment

Grazing/Ranching

All the units are within approved and active allotments with approved grazing permits or leases. Grazing in the area is a long time and traditional occupation and provides positive socioeconomic benefits for the ranching industry. Use of these grazing allotments has been sporadic and minor in the recent past. Although there will be some impacts to rangeland vegetation and livestock grazing associated with the action alternatives, there should not be measurable impacts on the overall ranching industry and thus it will not be discussed further.

Forest Products

The project area includes woodlands and forested areas. The forested stands contain commercially valuable stands of ponderosa pine trees. The woodlands include scattered ponderosa pine trees and western juniper trees. The pine trees and juniper trees have been utilized for lumber, firewood, post/poles, chips and biomass during past management activities. Mills in the local area and regionally have utilized ponderosa pine and other conifers from BLM lands in the proposed project area contributing to local employment through logging operations, manufacturing and secondary employment.

Western Juniper Products Demand

New economic opportunity and demand has developed locally and regionally for western juniper. A number of local forest products manufacturing facilities have begun using western juniper in their production lines. A local hardboard and particleboard plant that historically utilized primarily pine chips has begun using other species including western juniper. In addition, a local sawmill continues to expand its western juniper product line including; fence boards, mining timbers, paneling, flooring, and numerous specialty products. Biomass plants in Oregon and California have started utilizing juniper for generation of electricity. With the increasing demand and use of western juniper come additional opportunities for employment. Additional job opportunities include; logging operations (skidding, processing, and hauling), manufacturing facilities, and secondary employment (equipment sales, repairs, fuel suppliers, retailers, etc.). For forest residue that is being used to fuel a biomass plant, approximately 4.9 jobs are created for each megawatt hour that is produced (Tad Mason, March 2008, Biomass Symposium, Medford, Oregon). It is estimated that 8,000 Bone Dry Tons (BDT) of fuel can generate one megawatt of electricity to power 750-1,000 homes (Tad Mason, March 2008, Biomass Symposium, Medford, Oregon). Over the past three seasons on KFRA juniper yarding and utilization projects, approximately four to eight jobs are created during the summer months (skidder, delimber, loader operator, three truck drivers

and foreman). This does not include the manufacturing industry or secondary employment opportunities. In addition, at the local REACH mill where western juniper is processed for multiple products, a number of job opportunities are made available for disabled individuals assisting on the production line.

Two new processing facilities are currently being proposed in the Klamath Basin. One is a biomass powered electricity generating plant in Klamath Falls and the other is a specialty sign board plant in Chiloquin. Both would utilize forest products including ponderosa pine and juniper.

Depending upon market prices for value added products or electricity, presently the end value of western juniper is variable and may not cover the costs of cutting, yarding, processing, and hauling to a manufacturing or biomass facility. This has been the case for most of the juniper yarding on KFRA lands. In the recent past, BLM has typically paid contractors more to yard cut juniper to a landing for processing than it costs to pile and burn it.

Socioeconomics – Environmental Consequences

Alternative 1

Ponderosa Pine

Limited amounts of commercial ponderosa pine would be harvested. Volumes anticipated would be less than 500 thousand board feet. Although this is a relatively small amount it would contribute to logging and manufacturing jobs in the Klamath Basin.

Juniper Woodlands

Utilizing juniper would increase employment opportunity overall; however, the full suspension yarding method proposed could limit the range of contractors to whom the yarding portion of the work would be available. Often smaller logging operations or commercial firewood cutters would not have the proper equipment to fully suspend the material to the landing. This would limit the potential contractor pool to only those in possession of, or with access to, the full suspension equipment. Fully suspending the material is harder on the equipment and the potential for more breakdowns and need for repair is greater, but not really measurable. Additional employment could result in three to seven jobs per 8,000 tons of biomass removed if it is utilized for energy production. Utilizing the material for hardboard or sawlogs would likely generate similar employment opportunities.

Cost of Juniper Disposal

Presently the KFRA is paying approximately two to four times more to yard biomass material than to pile and burn it in place. In addition, fully suspending the western juniper during yarding operations costs more than one-end suspension yarding. The additional costs per acre to yard the material versus burning it could result in fewer overall acres being treated with juniper cutting prescriptions based upon a steady funding scenario. However, as noted above and observed in an adjacent BLM district, as the local and surrounding infrastructure becomes more stable and the demand for western juniper continues to rise, it is possible that the need to subsidize the cutting and yarding operations would be reduced. If values of juniper for lumber and biomass remain similar to present, Alternative 1 would have a higher cost to implement than the other action alternatives. Without considerations for generation of energy from biomass, Alternative 1 would be the most expensive alternative to implement. Currently, it is not expected that the revenue generated by the sale of pine and juniper material under this alternative would appreciably offset the expenses incurred in implementing this alternative, although in a variable market, this assumption may change.

Long Term (>20 years) Supply of Western Juniper for Commercial Use

The long term strategy for managing western juniper in the KFRA is to maintain a composition of vegetation that is reflective of pre-settlement cover levels. Once the initial treatment of the encroaching western juniper is completed, follow-up maintenance treatments are anticipated when the regenerating juniper is relatively young and of a noncommercial size. As a result, the KFRA does not expect a long term sustainable and commercial supply of western juniper (beyond 20 years) to be available from KFRA lands. In contrast, because the KFRA has approximately 20,000 to 30,000+ acres of western juniper remaining and potentially available for treatment, a short term supply (<20 years) of juniper should be available from KFRA lands for commercial use. There are many thousands of acres of western juniper on private lands in the Klamath Basin and surrounding area. The

supply of western juniper on both private and public lands should result in positive socioeconomic benefits, at least in the short term, as long as demand continues or develops for its commercial use; whether for hog fuel or other forest products. Alternative 1 would make available for utilization biomass material that typically is not processed for lumber or veneer and would provide the greatest opportunity for increasing/maintaining local and regional employment associated with harvesting and processing forest products.

Alternative 2

Employment Opportunity

There would be some employment opportunities expected with this alternative but they would be lower than those expected under Alternative 1 because there would be no industrial utilization of the cut material. Equipment operators would still be needed to cut and pile juniper. Hand crews could also be employed to conduct manual brushing and piling operations. Burning the cut material could provide some short term employment because KFRA often uses contractors to assist with BLM managed pile burning operations.

Long Term (>20 years) Supply of Western Juniper for Commercial Use

Under Alternative 2, the primary use of western juniper would be for commercial or personal use firewood. The existing local and regional industries that are continuing to use western juniper for a variety of forest products and hog fuel would have to get their supply from other federal or private lands. There would be minimal incentive for the local manufacturing sector to invest money into expanding their existing facilities or increasing the number of people they employ. Alternative 2 would also provide the second best opportunity to employ local contractors.

Using the same implementation cost assumptions as discussed above, Alternative 2 would be the second most expensive to implement. It would cost less than Alternative 1 because there would be no yarding costs and there would be no need to maintain or repair haul roads.

No Action Alternative

Employment Opportunity

There would be no additional employment opportunities. No contractors would be needed to cut, burn, or remove the material.

Long Term (>20 years) Supply of Western Juniper for Commercial Use

Under the No Action Alternative, existing local and regional industries that are continuing to use western juniper for a variety of forest products and hog fuel would have to get their supply from other federal or private lands. There would be minimal incentive for the local manufacturing sector to invest any money into expanding their existing facilities or increasing their staffs.

This alternative would be the least expensive to implement because there are no implementation costs.

Cumulative Effects

Alternative 1

Alternative 1 would remove less than 500 thousand board feet (5 MBF) of ponderosa pine timber and result in the retention/creation of approximately five to ten related jobs. The local area processes a considerable amount of timber and the material produced under this alternative would constitute only a very small percentage of what is processed annually. Processing facilities are dependent upon a stable, sustainable, and reliable supply of timber. Continual litigation of timber sales on federal lands has decreased the stability of a sustainable supply. The cumulative effects of this instability are closures of processing facilities and the corresponding loss of jobs. Although private timberlands supply much of the present demand for timber, some of the present forest industrial infrastructure is dependent, at least in part, upon a sustainable supply of timber from federal lands. Timber Harvest from public lands in Klamath County has dropped from 312,149 MBF (67.6% of the total) in 1986 to 37,745 MBF (18.2% of the total) in 2002 (Continental Resource Solutions, Inc. 2004). The percentage has likely continued to decrease since 2002. Although Alternative 1 would not produce large volumes of timber, wood products (timber, chips, biomass and firewood) harvested from Alternative 1 and additional work involved in burning and other contracts, would contribute to local and regional industries and employment. In addition,

Alternative 1 could contribute up to approximately 34,400 tons of juniper products (biomass, chips, lumber) to local and regional wood product and biomass energy related facilities. This is a substantial amount of material that could create or maintain at least part time employment of truck drivers, equipment operators, wood products manufacturing employees, and related service employees for several years.

Alternative 2

Implementation of Alternative 2 would result in fewer employment benefits associated with forest or woodland product removal than Alternative 1. Equipment operators would be needed for cutting and piling juniper material, potentially part time, for several years. However, local logging and manufacturing employment would not be improved. Some potential would exist for short term commercial and public firewood use but all would have to be implemented without yarding. Not allowing yarding would limit the available firewood to those areas immediately adjacent to roads. Alternative 2 would not provide forest and woodland products to local and regional industries to support or maintain infrastructure.

No Action Alternative

The No Action Alternative would not create or retain any local or regional employment associated with forest and woodland products. In addition no short term employment benefits would be expected from burning or other contracts associated with the action alternatives. The No Action Alternative would not provide forest and woodland products to local and regional industries to support or maintain infrastructure.

Air Quality – Affected Environment

Air quality is a sensitive issue in the Upper Klamath Basin primarily because of the recent designation of part of the county as nonattainment for PM2.5. This area of non-attainment is located 15 miles west of the analysis area. Potential air quality consequences are important for the preservation of high quality visual values for the region. National Ambient Air Quality Standards (NAAQS) were established by the 1963 Clean Air Act and subsequent amendments to protect the public health and welfare from adverse effects associated with the presence of pollutants in the ambient air. In 2006, EPA revised the 24-hour NAAQS for PM2.5 downward from 65 to 35 μg/m3. If the particulate matter for NAAQS is exceeded, the EPA is required to designate the area as a "nonattainment" area. Air pollutants are emitted from a variety of sources in the Basin including woodstoves, open burning, industrial plants, and internal combustion engines. Woodstoves contribute greatly to particulate matter during the winter. Agricultural and forestry burning operations are significant sources in the spring & fall. With the emphasis on reducing risk of wildfire, fuels reduction projects using prescribed fire are also common source of pollutants that can contribute to reduced air quality. This is a Class II airshed, with the closest Class I airshed, Gearhart Wilderness, located 24 miles to the east. To comply with air quality standards and minimize impacts to either the non-attainment area of Klamath Falls or the Class I airshed, the KFRA reports to the Oregon Department of Forestry (ODF) an estimate of the tonnage it expects to consume for each proposed project. Burn days are selected in coordination with the ODF Smoke Management to minimize the probability of sending smoke into these smoke sensitive areas.

Air Quality – Environmental Consequences

The following assumptions are made for smoke emissions, based on FOFEM and CONSUME modeling:

Underburning: 585 lbs PM2.5 / acre
Wildfire: 868 lbs PM2.5 / acre
Pile burning: 95 lbs PM2.5 / acre
Biomass plant: 5 lbs PM2.5 / acre
Landing piles (14 tons each): 160 lbs PM2.5 / each

Firewood burned in a woodstove generally produces 25 lbs PM2.5 / ton of firewood burned, however the agency is unable to predict how much firewood would be gathered, where, when, nor how it would be burned. In addition, it is unlikely that significant portion of the total piled biomass would be gathered for firewood. Consequently, this air quality analysis has assumed that all firewood would be left in the piles and burned. This will result in an over-prediction of smoke production.

Alternative 1
This alternative would produce approximately 340 tons of PM2.5, all of which would occur during time periods selected for ideal dispersal of smoke away from smoke sensitive receptor areas. Consequently, no impact to Klamath Falls or the Gearhart wilderness is expected. There will be some residual smoke, particularly in the evening following burning that will remain within and near the project area, potentially impacting nearby residents for several hours. Due to the smoke dispersal conditions that are selected for burning and the topography of the analysis area, it is unlikely that the NAAQS would be exceeded in these residential areas. The potential for subsequent wildfires that would produce significant quantities of PM2.5 would be greatly reduced.

Alternative 2
This alternative would produce approximately 403 tons of PM2.5, all of which would occur during time periods selected for ideal dispersal of smoke away from smoke sensitive receptor areas. Consequently, no impact to Klamath Falls or the Gearhart wilderness is expected. There will be some residual smoke, particularly in the evening following burning that will remain within and near the project area, potentially impacting nearby residents for several hours. Due to the smoke dispersal conditions that are selected for burning and the topography of the analysis area, it is unlikely that the NAAQS would be exceeded in these residential areas. The potential for subsequent wildfires that would produce significant quantities of PM2.5 would be greatly reduced.

No Action
This alternative would not directly produce any PM2.5. However, the potential for subsequent wildfires that would produce significant quantities of PM2.5 would continue to increase as surface and ladder fuels accumulate. A single 2,000 acre wildfire would result in approximately 868 tons of PM2.5, which would occur under unknown dispersal conditions, and quite likely affect one or more smoke sensitive receptors.

Cumulative Effects
It is anticipated that regional emissions would remain at the current level, and that these actions would have a short-term additive effect, lasting for several days at a time. It is likely that other prescribed burning in the region would occur concurrently, which is mitigated through the smoke management process described in the Affected Environment section above.

Greenhouse Gases and Carbon Storage – Affected Environment
The following assumptions are made in assessing impact on greenhouse gases and carbon storage:

1 Gallon of Diesel = 22.2 lbs/gal of carbon dioxide omissions (ESA website)
14,500 lbs/acre of carbon dioxide omission from pile burning
37,098 lbs/acre of carbon dioxide omissions from underburning.

Approximately 782 acres of Ponderosa pine and 4,060 acres of juniper woodland could be treated within the planning area. The ponderosa pine stands average 15,000 board feet per acre and are estimated to store approximately nine tons of carbon per acre in merchantable standing trees (FVS output). Removal of biomass from juniper woodlands in the past has yielded between four and fifteen tons of biomass per acre (eight tons/acre will be used for calculations) which would store about four tons of carbon.

Greenhouse Gases and Carbon Storage – Environmental Consequences
All figures within this section are approximations calculated using estimates to be used only to compare the relative impact of the alternatives. All estimates were calculated based on the maximum acreage available for each treatment. It is unlikely that every acre will be treated based on accessibility.

Prescribed Underburn (Alternatives 1 and 2)
For all three action alternatives, 782 acres of (mostly) previously treated pine stands are proposed for underburning. For analysis purposes it is assumed that nearly all of the biomass in standing trees would be left intact and 53% of the biomass in understory vegetation, slash, and landing piles would be consumed. The biomass consumed by the proposed prescribed fire would result in the direct emission of approximately 14,505 tons of carbon dioxide, based on the FOFEM model. This does not take into account the equipment or vehicle

carbon dioxide emissions that would result from the construction of dozer line and the transport of people and equipment to the project area. It is assumed that every mile driven would emit approximately two pounds of CO2, which is an insignificant contribution to this project (fueleconomy.gov website).

Some temporary reductions of tree growth and increases in tree mortality would be expected during and after underburns. Reduced growth rates would be expected to reduce carbon storage levels but the amount is difficult to quantify depending upon variable burning conditions and fire effects to vegetation. In addition, the effects would be expected to be temporary. Growth and carbon storage rates would likely return to pre-burn levels within five to ten years. Some tree mortality would also occur from underburns and the dead trees would not continue to accumulate carbon, rather, carbon from the dead trees would be retained in a similar manner to forest products as the snags and down logs decompose over time.

Chipping the old landing piles prior to burning should provide a reduction in the emissions of PM10, CO, NMOC, CH4, NOx, SOx (Placer County Air Pollution Control District, TSS Consultants, Feb. 8, 2008). The reduced emission of carbon dioxide through carbon storage in wood products could be offset by the burning of the additional fossil fuels to yard, chip, transport, and process the material. However, utilizing biomass to produce electricity would potentially preclude the need to generate electricity with other fossil fuels and biomass.

Alternative 1

Greenhouse Gases

Fuel consumption associated with cutting and yarding trees to landings on 3,760 acres would result in carbon dioxide emissions. Approximately 75,000 gallons of diesel fuel would be used over the life of the project resulting in the emission of approximately 832 tons of carbon dioxide. It is estimated that approximately 27,200 tons of material would be yarded to the landings. If the material from the landings was used for saw logs or chips, commercial hauling would consume approximately 30,000 additional gallons of diesel fuel and emit approximately 330 tons of carbon dioxide. If the material in the landing piles was removed by private or commercial firewood cutters instead of as saw logs or chips, the amount of fuel consumed and carbon dioxide produced is expected to be less, but too difficult to estimate because of difference between vehicles, haul distances, tons per load, etc.

If 100% of the material yarded to landings was burned, a total of approximately 24,650 tons of carbon dioxide could be produced (Consume model). It is anticipated that approximately 90% of the yarded material would be utilized for logs, chips, and /or firewood. Therefore, approximately 2,500 tons of carbon dioxide would be released from burning the residual material (from burning the unutilized 10%). Another incremental amount of carbon dioxide would eventually be released as firewood is burned, but once again the amount is difficult to project. Another approximately 8,700 tons of material is expected to be cut and piled on approximately 1,086 acres outside the area proposed for yarding. These piles would be burned, generating approximately 7,900 tons of carbon dioxide emissions.

Carbon Storage

Proposed commercial thinning in the pine stands would remove approximately 3.5 tons of above ground live carbon. Most of the carbon would remain on site in live trees (60 % of standing pine trees would remain after thinning). The merchantable logs would be used to produce wood products that would continue to store carbon. If the non sawlog material is utilized as hog fuel as proposed, no carbon storage would occur, and approximately the same amount of carbon dioxide would be released. However, depending upon the biomass energy generating facility, the amount of PM10, CO, NMOC, CH4, NOx, SOx emissions would be substantially less than any open pile burning (Placer County Air Pollution Control District, TSS Consultants, Feb. 8, 2008).

Carbon storage in forest pools in other than live trees (e.g., understory vegetation, forest floor, soil carbon) and is assumed for the purpose of this analysis not to change as a result of thinning harvest. Continued forest growth in the pine stands following harvest would result in an annual increase in stand volume which in turn will sequester more carbon. It is expected that the pine stands will recover to their pre-harvest level of carbon sequestration in less than ten years. Forest growth 30 years following harvest would result in carbon storage which would exceed the carbon directly removed during harvest, resulting in a net storage of carbon compared to current conditions.

In juniper woodlands the majority of the standing biomass will be removed. Carbon storage then becomes a function of how the material is utilized after harvest. It is anticipated that approximately 90% of the yarded material will be utilized for logs, chips, and /or firewood. This means that approximately 24,500 tons of material would be utilized. The two most common means of utilizing juniper, as logs or chips used in hardboard, would allow the continued storage of carbon as forest products. If the material is burned as firewood or ground and burned as hog fuel, the subsequent storage of carbon as a chip board product or lumber would not occur. However, utilizing biomass to produce electricity would potentially preclude the need to generate electricity with other fossil fuels and biomass energy generally emits substantially less PM10, CO, NMOC, CH4, NOx, and SOx than open pile burning (Placer County Air Pollution Control District, TSS Consultants, Feb. 8, 2008).

Alternative 2

Greenhouse Gases

Cutting and piling trees on 4,300 acres would result in less diesel fuel consumption than cutting and yarding. Approximately 45,000 gallons of fuel would be used which would emit approximately 500 tons of carbon dioxide. The consumption of fuel associated with commercial hauling of logs and chips would not occur. Fuel consumption and resulting carbon dioxide emissions from firewood cutting activities is difficult to quantify, but is assumed to be less than commercial hauling. Approximately 34,400 tons of material is expected to be cut and piled. Assuming 10-15 % of the material is utilized by firewood cutters, a total of approximately 30,000 tons of residual material would be burned and approximately 31,000 tons of carbon dioxide would be emitted.

Carbon Storage

If the material is burned, either in piles or as firewood, none of the carbon would be stored as forest products.

No Action Alternative

Under the No Action Alternative, continued forest growth would result in an increase in stand volume, which equates to an increase in storage of carbon. Carbon dioxide emissions associated with proposed juniper woodland and pine stand treatments would not occur. However, continued forest growth can also result in excessive stocking levels which in turn could result in decreased growth rates and associated carbon storage. Excessive forest and woodland growth can also contribute to fuels build ups that make uncontrollable wildfires more likely. Wildfires could result in immediate emissions of carbon currently stored in living and dead biomass and the loss of the storage potential of all or most of the growing trees.

Table 17: Total anticipated carbon dioxide emissions by alternative over 2 to 5 years.

Action Proposed	Alternative 1 (tons/CO2 emitted)	Alternative 2 (tons/CO2 emitted)	No Action (tons/CO2 emitted)
Burn residual landing piles from 1990's and underburn pine stands (782 acres)	14,800	14,800	None unless there is a wildfire*
Cut material on 4,300 acres and Yard material on 3,400 acres	832	N/A	N/A
Commercially Haul Material	330	N/A	N/A
Cut and pile juniper on 4,300 acres	N/A	500	N/A
Burn cut and piled material in the units	10,300	31,000	N/A
TOTAL	26,262	46,300	0

*Accurately predicting the greenhouse gas release and carbon storage of wildfires is a science in its infancy and is beyond the capability of the KFRA at this time. There are too many variables to control for making the analysis extremely complex and potentially highly inaccurate. In general, larger fires burning heavier fuels produce more gases and release more carbon.

Cumulative Effects

The primary factors leading to the expectation of global warming are substantial increases in atmospheric carbon dioxide, nitrous oxide, methane, chlorofluorocarbons, and other trace gasses attributed to human activities. The BLM's land management activities in this analysis area would primarily only affect the amount of carbon

dioxide in the atmosphere. All of the alternatives would have some type of minor effects on the global climate. Greenhouse gas emissions from any of the action alternatives would be so small as to be negligible. The effects on global climate change would be in line with the assumptions in the KFRA RMP/EIS (pages 4-7 to 4-8).

CHAPTER 4 – CONSULTATION

Because none of the alternatives would have any effects on any Endangered, Threatened, Proposed, or Candidate species, Section 7 Endangered Species Act consultation with the U.S. Fish and wildlife service is not required for this project.

Tribal Consultation occurred with Perry Chocktoot, Director of Culture and Heritage for The Klamath Tribes on April 21, 2008.

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APPENDIX A – BIBLIOGRAPHY

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APPENDIX B – SUMMARY OF BEST MANAGEMENT PRACTICES AND PROJECT DESIGN FEATURES

Appendix D of the RMP (pages D1-D46) describes the Best Management Practices (BMPs) that are "designed to achieve the objectives of maintaining or improving water quality and soil productivity and the protection of riparian-wetland areas". Best management practices are defined as methods, measures, or practices selected on the basis of site-specific conditions to ensure that water quality will be maintained at its highest practicable level (D-1, Appendix D, RMP). In addition to BMPs that focus on water quality and soil production, the interdisciplinary team also develops Project Design Features (PDF) with the objective of meeting other resource goals. For instance, the PDFs listed below under Wildlife and Vegetation are designed to meet resource objectives associated with these resources and not necessarily water quality. In addition, the PDFs listed under Recreation and Visual Resources are designed to meet objectives stated in the RMP for these respective resources. The list below is not an exclusive list of BMPs or PDFs for the Bly Mountain fuels Treatment project. It is a list of the BMPs and PDFs that the interdisciplinary team found to be most pertinent for the action alternatives proposed. Specific BMPs/PDFs will depend on which alternative is chosen. All of Appendix D as well as the Annual Program Monitoring Reports are used when developing the final operational specifications for a treatment.

Upland Forest Vegetation – Harvest Prescription

Density Management Harvests-Pine Stand Only

- For uneven-aged stands, maintain a multi-strata stand structure. Thin around large old growth trees to improve vigor and reduce hazardous fuels risk.
- For stands with a basal area over 60 square feet/acre, thin to an average of 40-80 square feet/acre.
- Generally retain the most dominant or co-dominant tree that is full crowned, vigorous, and disease free.
- Retain ponderosa pine as the highest priority species. If any conifer species (besides juniper) is present, retain healthy trees as a minor component.
- In pine stands, approximately 2.4 snags per acre would be retained ,when present, for wildlife purposes (see "Special Status Species" section of BMPs/PDFs). The snags will have a minimum diameter at breast height (DBH) of 16 inches or would be the largest available if less than 16 inches DBH (RMP/ROD, page 26-27).
- No snags would be designated for cutting/removal except snags that are determined to be hazard trees along roads and in work areas.
- Approximately fifty (50) linear feet of down logs per acre would be retained in pine stands. Logs shall be greater than or equal to twelve (12) inches in diameter and eight (8) feet long (RMP/ROD, page 26).

Juniper Woodlands

- The junipers selected for cutting would be essentially all junipers smaller than 24 inches diameter at breast height (DBH). Junipers larger than 24 inch DBH would be retained.
- Smaller junipers that exhibit multiple characteristics that indicate that they are older than approximately 130-140 years old would be retained. In the treatment units, the majority of the juniper trees would be cut. See Appendix C for a description of characteristics that indicate older juniper trees regardless of diameter.
- Approximately 10% of the units will be designated as no treatment thermal/wildlife retention clumps.

Aspen Treatment Areas

Alternative 1 – Most conifers would be cut and yarded out of the aspen areas. All PDFs for tree cutting and yarding would be applied. There are no requirements for basal area to be retained, as the purpose is to remove conifers to promote aspen development.

Alternative 2 – Pine up to 20"DBH and junipers up to 24" DBH would be hand cut. Slash would be piled and burned. Firewood will be available in areas where collection will not be detrimental to the surrounding environment. There are no requirements for basal area to be retained, as the purpose is to remove conifers to promote aspen development.

Roads

The BMPs listed in Appendix D of the RMP provide standard management practices that are to be implemented.

- Seasonal restrictions apply to renovation and hauling activities to eliminate sediment transportation to streams.
- Install drainage dips in accordance with RMP BMPs to reduce surface and ditchline run-off .
- Apply spot surfacing as necessary to repair or prevent road damage and/or sedimentation.
- To maintain the existing ground cover and vegetation and to decrease sediment movement, minimal or no grading of the existing roads will be done unless needed to make the roads passable.
- Re-decommission roads that have been decommissioned but are opened for commercial treatments, non-commercial treatments, or prescribed fire use.
- Soil Resources
- Limit detrimental soil conditions to less than 20 percent of the total acreage within the activity area. Use current soil quality indicators to monitor soil impacts. Sites where the 20 percent standard is exceeded will require treatment, such as ripping, backblading or seeding.
- Limit mechanical cutting and yarding operations to periods when the soil moistures is below 20 percent at a six inch depth. Lower soil moisture levels are preferable on fragile soils.
- To protect riparian areas, soil resources, and water quality while limiting erosion and sedimentation to nearby streams and drainages, do not allow logging operations during the wet season (approximately October 15 to May 1).
- Permit logging activities during October 15 to May 1 if frozen ground or sufficient snow is present. This is normally when snow depths are in excess of twenty (20) inches in depth.
- To protect soil resources and water quality, close unsurfaced roads during the wet season (October 30 to June 1) unless waived by authorized personnel.
- Where deemed appropriate, residual slash will be placed upon skid trails upon completion of yarding.
- Designate skid trails prior to yarding operations and use existing skid trails where possible.
- Avoid placement of skid trails in areas with potential to collect and divert surface runoff, such as the bottom of draws and ephemeral drainages.
- Water bars would be installed on steeper skid trails to provide proper drainage and prevent accelerated erosion.
- Retain and establish adequate vegetative cover in accordance with RMP BMP's to reduce erosion.
- Retain enough small woody (dead and down) material to sustain soil nutrients, one ton per acre of duff and litter (approximately ½ inch deep) in ponderosa pine forest land. See RMP BMP's for specifications.
- Seed and/or mulch exposed and disturbed soil surfaces with native seed.
- Construct fireline by hand on slopes greater than 35 percent.

<u>Hydrology & Riparian Reserve Treatments</u>

Tree Cutting and Yarding

- Delineate Riparian Reserve widths as described in the RMP (pg F-8, ROD pgs C-30 to 31). Refer to Table B-1 below.
- For understory vegetation treatments within older, multi-age stands within Riparian Reserves, delineate "no-cut" buffers along stream channels and wetland areas. No-cut widths would be 20 foot on each side of intermittant non-fish bearing stream channels and wetlands.
- A no-mechanical-entry spacing for treatments would occur from the natural topographic break to the edge of the riparian area within the Riparian Reserve. In areas where a topographic break is not evident the following guidelines would be implemented: On perennial, intermittent, and/or fish bearing streams with slopes less than 20%, a 25-foot no entry buffer would be established from the edge of the riparian area and on slopes greater than 20%, a 50-foot no entry buffer would be established from the edge of the riparian area. In wetland areas, a 50-foot no entry buffer would be established from the edge of the riparian area.
- Existing landings and roads within Riparian Reserves would be used only if replacing them with landings and roads outside the Riparian Reserves would result in greater overall disturbance to the Riparian Reserve or water quality.
- Avoid placement of skid trails and landings in areas with potential to collect and divert surface runoff such as the bottom of draws and ephemeral drainages.

- Harvest/treatments methods that would disturb the least amount of soil and vegetation (yarding over snow or frozen ground, limiting activities to the dry season, pulling line to each tree, and minimizing skid trails) would be used in the Riparian Reserves. Use of the 20-foot radial arm on the mechanical harvester to reach toward the boundary line of Riparian Reserves would occur wherever possible.
- In pine stands, thin to a higher basal area (80-100 square feet per acre), favoring larger trees for shading and removing competing conifers around dominant pines.
- Yardning/skidding corridors that pass through Riparian Reserves will be designated prior to project implementation, will have a minimum spacing of 300 feet and be oriented perpendicular to streams, will have minimal relative slope, and will be revegetated following project implementation (as needed). Stream crossings will be selected at stable, naturally armored locations or will be armored with slash before being used as a corridor.
- Use of existing roads and landings within Riparian Reserves will be reviewed and approved by a Klamath Falls Resource Area interdisciplinary team.
- Mechanical treatments would be allowed in aspen stands only during periods when detrimental soil effects would be least likely to occur.

Table B-1: Riparian reserve types and widths from the KFRA RMP applicable to the Bly Mountain Fuels Treatment area

Riparian Reserve Type	Reserve Width (for each side of streams/wetlands)
Intermittent (seasonal) non-fish-bearing streams and Constructed ponds and reservoirs and Wetlands greater than one acre	At a minimum, the reserve width will include: ▪ Slope distance equal to the height of one site potential tree (120 feet); or, ▪ The stream channel (or waterbody/wetland) and the area extending to the top of the inner gorge; or, ▪ The area extending to the outer edges of riparian vegetation; or, ▪ The 100-year floodplain (for streams) or the extent of seasonally saturated soil (for waterbodies and wetlands); or, ▪ The extent of unstable or potentially unstable areas, whichever is greatest.
Wetlands less than one acre and Unstable or potentially unstable areas	At a minimum, the reserve width will include: ▪ The wetland and the extent of seasonally saturated soil; or, ▪ The area extending to the outer edges of riparian vegetation; or, ▪ The extent of stable or potentially unstable areas, whichever is greatest.
Lakes and natural ponds	At a minimum, the reserve width will include: ▪ Slope distance equal to the height of two site potential trees (240 feet); and, ▪ The body of water or wetland and the area to the edges of riparian vegetation; ▪ The extent of seasonally saturated soil; ▪ The extent of unstable or potentially unstable areas; whichever is greatest.
Springs	Reserve widths vary according to the size of the associated wetland (see above).
*A site-potential tree is defined as the average maximum height of the tallest dominant trees (200 years old or more) for a given site class. In the Bly Mtn. Treatments project area, the site potential tree height was determined to be 120 feet.	

Fuels Reduction (Post-harvest)

<u>Mechanical fuels treatments in Riparian Reserves:</u>

- Treatment methods that would disturb the least amount of soil (yarding over snow or frozen ground, limiting activities to the dry season, pulling line to each tree, and minimizing skid trails) would be used in the Riparian Reserves.
- No ripping, piling, or mechanical site preparation (except for designated skid trails crossings, roads, or yarding corridors) would occur in Riparian Reserves.
- A no-mechanical-entry spacing for treatments would occur from the natural topographic break to the edge of the riparian area within the Riparian Reserve. In areas where a topographic break is not evident the following guidelines would be implemented: On perennial, intermittent, and/or fish bearing streams with slopes less than 20%, a 25-foot no entry buffer would be established from the edge of the riparian area and

on slopes greater than 20%, a 50-foot no entry buffer would be established from the edge of the riparian area. In wetland areas, a 50-foot no entry buffer would be established from the edge of the riparian area.

- Stream crossings will be designated prior to project implementation, will have a minimum spacing of 300 feet and be oriented perpendicular to streams, will have minimal relative slope, and will be revegetated following project implementation (as needed). Stream crossings will be selected at stable, naturally armored locations or will be armored with slash before being used as a corridor.
- Hand treatments would be allowed within the no-mechanical-entry zones in order to meet fuel management objectives.

Ignitions within Riparian Reserves:

- Ignition of broadcast fires should not occur within a minimum of 50 feet from the stream channel within the Riparian Reserves. The specific distance for lighting fires within the RR will depend on topography, habitat, ignition methods, and fuel moisture.
- Ignition line location nearest the stream should be based on topography and ignition methods and should be sufficient to protect water quality, CWD, and stream overhead cover. No ignition of CWD directly touching the high water mark of the stream, or of CWD that may be affected by high flows, should occur. Where there is thick vegetative cover that extends out from the stream, ignition lines should be located in the forest stand, away from the stream.
- Ignition lines near large open meadows, associated with the stream channels should be located at the toeslope above the meadow elevation as much as possible to protect meadow vegetation.
- Increased ignition spacing from the stream should occur when igniting fuels on the lower end of the window of moisture content to protect CWD and overhead cover components.

Roads and temporary fire trail access in Riparian Reserves:
Use of existing roads and landings within the RR will be reviewed and approved by the resource advisor.

Streamside pumping sites:

- Pumping on small streams should not reduce the downstream flow of the stream by more than half the flow.
- If possible avoid the construction of temporary pump chances, when necessary use temporary plastic dams to create chances and remove these dams when not actively pumping.
- All pumping located on fish bearing streams must have a screen over the intake to avoid entrainment of small fish.
- Recommend that pump intake be suspended near the thalweg (deepest/highest quantity of flow) of the stream. Avoid placing pump intakes on the substrate or edges of the stream channel.

Post-fuels treatments for access roads and temporary fire trails:

- Install drainage dips, or water bars, in accordance with RMP BMPs to reduce surface run-off.
- A layer of duff (average of ½ inch after final burn) will be retained to protect soil from erosion during the wet season.
- Seeding or other equally effective methods of soil stabilization are to be applied to any exposed soil surfaces prior to the wet season to reduce surface erosion.
- Design blockages (close or decommission) upon completion of treatments to minimize non-authorized use of skid roads and trails within treatment areas.
- Place residual slash on trails upon completion of mechanical treatments.

Aspen Restoration

- Mechanical treatments would only be allowed in aspen stands during periods when detrimental soil effects would be least likely to occur.
- Consider leaving downed trees in aspen treatment areas as a natural exclosure for deer and elk and livestock.
- Leave conifers along cut banks from past logging activity for stability.

Wildlife Terrestrial Species

Coarse Woody Debris (CWD) (Pine Stands Only)

Approximately fifty (50) linear feet of down logs per acre would be retained in pine stands. Logs shall be greater than or equal to twelve (12) inches in diameter and eight (8) feet long. (RMP/ROD, pg.26)

Seasonal Restrictions

Seasonal restrictions will be required where the following wildlife species are actively nesting: bald eagle, northern goshawk, osprey, and special status species. Seasonal restrictions for specific species can be found on pages 231-240 of the KFRA FEIS.

Nesting Areas

Protect nesting areas as describe on page 38 of KFRA RMP.

Special Status Species

Snag Retention (Pine Stands Only)

In the ponderosa pine forested stands, provide snag mitigation measures for White-headed Woodpecker, Black-backed Woodpecker, Pygmy Nuthatch, and Flammulated Owl. Increase RMP snag retention requirements from 1.4 to 2.4 snags per acre. Approximately 2.4 snags per acre would be retained, where available, with a minimum diameter at breast height (DBH) of 16 inches, or largest available if less than 16 inches. (RMP/ROD, Pgs. 26-27)

Noxious Weeds

- Require cleaning of all equipment and vehicles prior to moving on-site to prevent spread of noxious weeds. Also, if the job site includes a noxious weed infestation, require cleaning of all logging and construction equipment and vehicles prior to leaving the job site or moving to another unit of the project. Removal of all dirt, grease, and plant parts that may carry noxious weed seeds or vegetative parts could be accomplished by using a pressure hose to clean the equipment.
- Mow noxious weeds in the immediate area of yarding operations to ground level prior to seed development.
- Treat any known noxious weed populations prior to operations.
- Conduct monitoring activities related to proposed treatments as described in the Klamath Falls ROD.
- Road graders used for road construction or maintenance would grade towards any known noxious weed infestations. If no good turn around area exists within one half mile that would allow the operator to grade towards the noxious weed infestation, then the operator would leave the material that is being moved within the boundaries of the noxious weed infestation.

Cultural Resources

- Follow procedures for cultural protection and management outlined in the KFRA ROD/RMP (page 43), and protect identified sites by buffering.
- In accordance with guidelines and directives in the Klamath Falls Resource Area RMP, BLM regulations, and the National Historic Preservation Act, areas not included in previous archaeological surveys will be surveyed before any ground-disturbing actions occur. If subsurface cultural resources are unearthed during operations, activity in the vicinity of the cultural resource will cease and a BLM representative notified immediately. Pursuant to 43 C.F.R. 10.4 the holder of this authorization must notify the authorized officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, the project leader/operator/permittee/etc., must stop activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the authorized officer. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures that are made by the authorized officer (BLM).
- The project leader/operator/permittee/etc., is responsible for informing all persons associated with this project that they will be subject to prosecution for knowingly disturbing Native American Indian shrines, historic and prehistoric archaeology sites, or for collecting artifacts of any kind, including historic items and/or arrowheads from Federal lands pursuant to the 1906 American Antiquities Act (P.L. 59-209; 34 Stat. 225; 16 U.S.C. 432, 433), the Archaeological Resources Protection Act of 1979 (P.L. 96-95; 93 Stat. 721; 16 U.S.C. 47Oee as amended), and/or other federal laws and regulations.

Visual Resources

- To reduce visual impacts from project activities, visual screening would be utilized in specific areas. Areas along major roads, (including Highway 140, Keno Springs Road, and the road through Section 10), within a portion of the VRM class II area, and within 1/4 mile of specific Wildland-Urban interface residences should receive a lighter juniper thinning. Alternatively, these areas could be included as a part of the wildlife thermal clumps. These areas will be identified and mapped out by the outdoor recreation planner and wildlife biologist prior to and during the unit layout phase of the project.
- By maintaining or enhancing stand diversity through leaving a variety of size classes of trees and saving Ponderosa pine and "old" juniper along roads, scenic quality will be maintained. Also, minimizing obvious skid trails by blocking and leaving residual slash and minimal ground disturbance near major roads would also help maintain scenic quality within the areas mentioned above.

Recreation Resources

- Ensure that operators sign haul routes to alert landowners and recreationists to truck traffic in the area. Highway flaggers may be needed to warn traffic along Highway 140 and Keno Springs road of operations. Ensure that dust abatement and grading occurs on haul routes as needed. During any winter harvesting operations, all subcontractors working in the Contract Area shall be advised of snowmobile traffic.
- Also, within one quarter mile of Wildland-Urban interface areas and within one quarter mile of existing dwellings, the BLM would reduce unauthorized public use of non-through or "local" roads. Gates and other types of traffic barriers such as guardrails, berms, ditches, and log barricades would be used as appropriate. These actions should be used to reduce public health and safety hazards, fire risk, vandalism to private property and would be used on an as needed basis.

Protection of Range Improvements

Fences

- During manual tree felling operations, trees will be directionally cut to fall away from fences. This includes allotment and pasture fences and exclosure fences around springs, water developments, and study sites. If trees do damage fence components, including wires, posts, stays, clips, rock cribs, gates, or brace structures, these will be repaired immediately.
- During mechanical tree cutting operations, trees will be directionally cut to fall away from fences. Cut trees will not be piled on or next to fence lines. Machinery will not physically contact fence components. If fences must be crossed to access cutting units, this would be done by cutting the wires between two posts and rolling the wire back. If livestock are present in the cutting areas these wires shall be temporarily reattached at the end of each days operation. At the completion of cutting operations, the wires will be detached from the two posts, the wires will then be stretched and spliced together and then reattached to the posts.
- During prescribed burning operations, slash shall not be piled on or next to fence lines. If fences have wood posts, all necessary measures will be taken to avoid burning the posts including not piling slash near posts and pulling any concentrations of flammable material away from the posts prior to ignition. If any wood posts are burned, they will be immediately replaced with steel posts and the fence wires will be attached to the new post. If prescribed burning operations damages fence wires, these will be replaced.
- During all juniper treatments, living junipers or juniper stumps that are being used as fence posts will not be cut down or "topped".

APPENDIX C – DEFINITION OF "OLD" JUNIPER

Old Juniper refers to juniper that likely originated in the "presettlement" period, before 1870. It is assumed that these trees are growing on sites that they are adapted to, since they began growing there under "natural conditions" when natural processes (including lightning fires) determined vegetation patterns. Older junipers are usually found in rocky areas where vegetation is sparse and natural fire frequency is low. Some typical characteristics of older juniper are:

- Crown is flat, rounded, broad at top, or irregular (as opposed to the more pointed tops of younger trees)
- Spike top
- Numerous dead branches
- Branches covered with a coarse, bright yellow-green lichen (Letharia, or wolf lichen)
- Large diameter lower branches
- Large diameter trunk relative to height
- Trunk has spirally-twisted bark, deep furrows
- Hollow trunk

It is rare for an older juniper to have all of the above features, but more commonly will have at least three or four. Also, older juniper is not always the largest trees; on drier, rocky sites, they can be short, stubby, gnarly trees.