ABSTRACT: The primary method of treating encroaching western juniper in the KFRA has been to cut, pile, and burn the material. There is an increasing demand from the public and forest industry sector to utilize western juniper for various products. This Environmental Assessment (EA) will analyze the environmental effects associated with burning, leaving, or removing and utilizing the existing piles of western juniper from fuel treatment units: FTZ 110, Schnipps, North Willow Valley Sage, Pine Creek, Smith Reservoir, Pitchlog Creek, Miller Creek, and Potholes. A total of approximately 3,200 acres will be analyzed. A previous EA was prepared in 2008 to analyze disposal effects to a separate 2,300 acres of cut and piled areas.

FOR FURTHER INFORMATION CONTACT:

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541-883-6916

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. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. 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

This 2009 Juniper Disposal Environmental Assessment (EA) will analyze the effects of potential treatments of previously cut and piled western juniper in fuel treatment units on approximately 3,200 acres in eight units: FTZ 110, Schnipps, North Willow Valley Sage, Pine Creek, Smith Reservoir, Pitchlog Creek, Miller Creek, and Potholes. The location of the project areas are shown in Table 1 and the General Location Map. The previously accomplished cutting and piling treatments were discussed and disclosed in documents prepared earlier in compliance with the National Environmental Policy Act (See Appendix C for a complete list).

There is an increasing demand from the public and forest industry sector to utilize western juniper for various products. In addition, there is a need to reduce the amount of smoke emissions locally, regionally, and nationally where feasible. Therefore, the BLM is considering utilization of the juniper and thus is analyzing the potential effects of yarding the piles. If analysis indicates that it is not appropriate to yard and utilize the material, then other treatments would include burning the piles or leaving them lay. Different alternatives may be applied to individual units based on accessibility, product quality and environmental impacts.

This EA will specifically address the effects and impacts of:
1. Removing the western juniper either by burning or by yarding and hauling the material off site.
2. Different yarding and removal methods including using full suspension or one-end suspension yarding techniques.
3. Different mitigation measures designed to reduce impacts associated with the different removal methods.
4. Leaving the cut and piled juniper on the treatment units.

This EA will analyze the effects and impacts to air quality, vegetation, rangeland health, grazing, soils, wildlife, socio-economics, hydrology, and fisheries.

The proposed actions in this EA are designed to comply with the Klamath Falls Resource Area Record of Decision and Resource Management Plan (1995 ROD/RMP).

Location

The Proposed Project Areas are located in various locations on Public Domain lands east of Klamath Falls, Oregon (See Table 1 and the General Location Map). All treatments proposed in this EA would occur exclusively on BLM-administered lands within the Klamath Falls Resource Area.

<table>
<thead>
<tr>
<th>Unit Name</th>
<th>Acres</th>
<th>Township</th>
<th>Range</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTZ 110</td>
<td>141</td>
<td>T39S</td>
<td>R14E</td>
<td>14,15,22,23</td>
</tr>
<tr>
<td>Smith Reservoir</td>
<td>786</td>
<td>T40S</td>
<td>R12E</td>
<td>12 &amp; 13</td>
</tr>
<tr>
<td>Pine Creek</td>
<td>990</td>
<td>T40S</td>
<td>R14E</td>
<td>3,4,10,11,14,15,22,23</td>
</tr>
<tr>
<td>Schnipps</td>
<td>89</td>
<td>T39S</td>
<td>R13E</td>
<td>24 &amp; 25</td>
</tr>
<tr>
<td>North Willow Valley Sage</td>
<td>970</td>
<td>T41S</td>
<td>R14E</td>
<td>12</td>
</tr>
<tr>
<td>Pitchlog</td>
<td>104</td>
<td>T39S</td>
<td>R14E</td>
<td>22,23,24,25</td>
</tr>
<tr>
<td>Miller Creek</td>
<td>71</td>
<td>T39S</td>
<td>R13E</td>
<td>12,13,14,23,26</td>
</tr>
<tr>
<td>Potholes</td>
<td>30</td>
<td>T39S</td>
<td>R13E</td>
<td>2,11</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>3,210</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Management Direction

Below is a list of specific management direction from the 1995 Klamath Falls Resource Area RMP pertaining to the different resources that are being analyzed.

1. **Livestock Grazing** - Provide for rangeland improvement projects and management practices, consistent with other objectives and land use allocations (RMP, pg. 62).
2. **Air Quality** – Continue efforts to meet National Ambient Air Quality Standards, Prevention of Significant Deterioration goals, and the visibility protection plan (RMP, pg. 27).
3. **Air Quality** – Maintain and enhance air quality and visibility in a manner consistent with the Clean Air Act and the State Implementation Plan (RMP, pg. 27).
4. **Wildlife** - Enhance and maintain biological diversity and ecosystem health in order to contribute to healthy wildlife populations (RMP, pg. 30).
5. **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).
6. **Noxious Weeds** - Avoid introducing or spreading noxious weed infestations in any areas (RMP, pg. 73).
7. **Noxious Weeds** - Contain and/or reduce noxious weed infestations on BLM-administered land using an integrated pest management approach (RMP, pg 73).
8. **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).
9. **Timber** - Produce a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability (RMP, pg. 26).
10. 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).
11. 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).
12. 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).
13. Conduct thinning of encroaching juniper to protect and improve forage areas for big game (RMP, pg. 34).
14. **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 [strategic?] 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).
15. **Miller Creek Area of Critical Environmental Concern (ACEC)** – Maintain, protect, or restore natural processes, wildlife, and scenic values. Not available for planned timber harvest; restrict grazing; mineral leasing subject to no surface occupancy; close area to off-highway vehicle use (except Round Valley Road area); provide for primitive and semi-primitive recreation opportunities, including a trail along Miller Creek (RMP, pg 41).
16. Minimize soil erosion and rehabilitate eroded areas, as an overall goal, to maintain and enhance watershed condition and soil productivity and reduce nonpoint source pollution that could result from management and land use activities. This involves including corrective measures and mitigation of activities that may contribute to soil erosion and degradation of watershed condition (RMP, pg. 30).
17. Implement treatment projects, such as juniper thinning to improve perennial grass cover conditions (RMP, pg. 30).
18. Apply best management practices during all ground and vegetation disturbing activities (RMP, pg. 30).

Purpose and Need for Action

Reduce Fuel Loading
There are 3,210 acres of previously cut and piled juniper in the project area. This juniper was originally cut in order to reduce hazardous fuels, decrease shading of desirable plant species, and increase water availability for other more ecologically appropriate species of native vegetation. There is a need to reduce the density of the piles of cut juniper to reduce the existing fuel load and wildfire hazard. Removal of the piled juniper, either by yarding and subsequent utilization by various means, or by burning, would help accomplish these objectives.

Increased Public Demand for Commercial Use
Within the KFRA, a need has been identified to analyze the effects and impacts of different disposal methods of western juniper once it has been cut and piled, including the yarding of the western juniper using standard ground based logging equipment. There is an increasing demand from the local public, forest industry sector, and biomass energy producers for western juniper lumber, clean chips and biomass. Juniper has historically been considered a non-commercial forest product with minimal demand other than firewood. There is an increasing emphasis within the BLM locally and nationally to utilize residual vegetative materials that are generated from an assortment of vegetative treatments for biomass and energy production. Within a 100 mile radius of Klamath Falls, western juniper use includes:

- Sawlogs for dimensional lumber production and other products.
- Finely ground particles for door skins
- Clean chips for hardboard production
- Hog fuel for biomass energy production
- Organic posts and poles for fencing
- Commercial and personal firewood
- An assortment of other products such as furniture, flooring, and absorbent shavings

Ecological and Socio-Economic Impacts
There is a need to analyze the ecological impacts of disposing of western juniper in a variety of ways once it is cut. Monitoring of past practices has raised questions of potential residual impacts from removal, particularly via yarding. Most of the units that are presently cut and piled are located on juniper woodlands and rangelands. Along with the KFRA RMP, the BLM’s Rangeland Health Standards provide guidance for managing these lands. There is a need to analyze where and how the KFRA can dispose of western juniper as well as meet the Rangeland Health Standards along with other management direction defined in the KFRA RMP pertaining to juniper woodlands and rangelands.

There is an increasing need locally, regionally, and nationally to reduce smoke emissions for a number of reasons. The Klamath County Commissioners have expressed concerns regarding BLM’s past disposal through burning and the recent tighter air quality restrictions in the Klamath Basin resulting in limited open burning opportunities. The Commissioners support the utilization of western juniper and the subsequent benefits of local employment opportunities as well as the reduction in smoke emissions (personal communication 2009).

Environmental Analysis and Decision Process
An interdisciplinary evaluation of the resources in the analysis area including range, wildlife, recreation, soils, fisheries, timber, cultural, hydrology, air quality, and hazardous fuels is documented in this EA. The analysis
is accomplished by examining the different resources in the analysis area and recommending a course of action that best meets the objectives outlined in the Klamath Falls Resource Area Resource Management Plan. The analysis area can vary in size depending on the different resources.

This Environmental Assessment is tiered to the 1995 Klamath Falls Resource Area Resource Management Plan and Environmental Impact Statement (1995 RMP/EIS). The purpose of this EA is to assess the effects of the proposed treatments and to determine if the environmental effects associated with the proposed site-specific treatments are significant and/or greater than those already analyzed in the KFRA RMP EIS. If the effects are not significant or greater than analyzed in the KFRA RMP EIS, a Finding of No Significant Impact (FONSI) will be documented upon the completion of the analysis. In addition to providing analysis to determine whether or not an environmental impact statement is necessary, this EA will provide the public and the decision maker with information about the proposed treatments, describe the alternatives and the associated effects of each alternative, and assist the decision maker in selecting an alternative.

The KFRA Field Manager, as the responsible official, will determine whether or not the proposed action is consistent with the RMP as well as other laws and regulations (i.e., the Endangered Species Act, Clean Water Act, Rangeland Health Standards, etc.) and will decide whether or not to implement the proposed action. Implementation of the proposed treatments or projects would span a 3 to 5 year period. Information obtained from biological surveys and consultation is included in the EA and will also be incorporated in the final Decision Record to this EA. Public Input Summary and Issue Development are presented in Appendix F.

Conformance with Existing Plans
This Environmental Assessment is tiered to 1995 Klamath Falls Resource Area Resource Management Plan (1995 RMP). This analysis is also in conformance with a number of other supporting documents including:

2. Range Reform FEIS (August 1995).
6. Migratory Bird Policy
7. Sage Grouse Management Policy

CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

Common to All Alternatives

1. Firewood could be removed from designated and accessible areas using standard pickup trucks subject to normal BLM seasonal restrictions on firewood cutting for wet soil conditions.
2. In some locations where firewood cutting is allowed, it may be necessary to facilitate pile burning by re-piling the scattered limbs using a small machine such as a tracked Bobcat once the firewood cutters have removed the main boles of the trees.
3. All cultural and sensitive sites would be protected. No yarding or burning would occur on identified cultural sites or other sensitive areas.
4. Restore the Gerber/Potholes trail by relocating existing piles and downed logs away from trail

Proposed Action – Utilize Juniper – Mechanically Yard – One-End Suspension

1. Mechanically yard western juniper currently lying on the ground or in piles, suspending one end of the trees during yarding.
2. Approximately 3035 acres would be yarded from units listed in Table 2.
3. Some piles in riparian reserve areas will be analyzed for burning piles only (See Table 2).
4. Juniper would be yarded using standard logging equipment; rubber tired grapple skidder, to transport the cut and piled wood to landings on permanent and temporary haul roads.
5. Construct approximately five miles of temporary roads to access piles and facilitate access for chip vans and grinders (See Table 2).
6. Obliterate all new temporary roads upon completion of the yarding and hauling.
7. Improve and maintain approximately 20 miles of existing haul roads including: grading, rocking, culvert cleaning, brushing, and water barring.
8. Seed and/or plant with native vegetation: disturbed areas (primarily skid trails and landings) and areas where native plants occur at low densities.
9. Some planted vegetation would also be fitted with protective plastic mesh tubes to protect the young plants from being browsed. (Assumption: Approximately 5-20% of the yarded areas would be planted and tubed.)
10. Residual landing material and piles in inaccessible areas would be burned in riparian areas and units around meadows, western juniper would be removed by using only full suspension removal methods.
11. Individual landing sizes would be limited to less than one acre and no more than 3% of the yarded area would be in landings.
12. Firewood cutting would not be allowed on the units until after the BLM has first offered them for commercial utilization. If no commercial demand exists or the analysis determines that yarding of the material is not appropriate, the area could be opened to firewood cutters. Firewood could be removed from accessible areas using standard pickup trucks subject to normal BLM seasonal restrictions on firewood cutting for wet soil conditions.

Table 2 – Proposed Action Treatments for Each Unit Analyzed

<table>
<thead>
<tr>
<th>Unit Name</th>
<th>Acres</th>
<th>Utilization</th>
<th>Pile Burning</th>
<th>No action</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTZ 110</td>
<td>141</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Existing piles are no longer feasible for burning. They may be burned as part of an underburn.</td>
</tr>
<tr>
<td>Smith Reservoir</td>
<td>786</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Invasive and noxious weeds</td>
</tr>
<tr>
<td>Pine Creek</td>
<td>990</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Existing piles are no longer feasible for burning.</td>
</tr>
<tr>
<td>Schnipps</td>
<td>89</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>North Willow Valley Sage</td>
<td>972</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>invasive and noxious weeds</td>
</tr>
<tr>
<td>Pitchlog</td>
<td>104</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Riparian Reserve, T&amp;E species habitat</td>
</tr>
<tr>
<td>Miller Creek</td>
<td>71</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Riparian Reserve, ACEC, T&amp;E species habitat</td>
</tr>
<tr>
<td>Potholes</td>
<td>30</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Riparian Reserve, Potential damage by firewood cutters, Recreational trail</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3,210</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Alternative 1 – Utilize Juniper - Mechanically Yard - Full Suspension**

1. Mechanically yard western juniper currently lying on the ground or in piles, fully suspending trees during yarding.
2. Approximately 3,200 acres would be yarded from units listed in Table 2.
3. Juniper would be yarded using standard logging equipment such as rubber tired grapple skidder, front-end loader, or rubber tired forwarder, to transport the cut and piled wood to landings on permanent and temporary haul roads.
4. Construct approximately five miles of temporary roads to access piles and facilitate access for chip vans and grinders.
5. Obliterate all new temporary roads upon completion of the yarding and hauling.
6. Improve and maintain approximately 20 miles of existing haul roads including; grading, rocking, culvert cleaning, brushing, and water barring.

7. Seed and/or plant with native vegetation disturbed areas (primarily skid trails and landings) and where native plants occur at low densities.

8. Some planted vegetation would also be fitted with protective plastic mesh tubes to protect the young plants from being browsed. (Assumption: Approximately 5-15% of the yarded areas would be planted and tubed.)

9. Landing material and piles in inaccessible areas would be burned

10. Individual landing sizes would be limited to less than one acre and no more than 3% of the yarded area would be in landings. Fire wood cutting would not be allowed on the units until after the BLM has first offered them for commercial utilization. If no commercial demand exists or the analysis determines that yarding of the material is not appropriate, the area could be opened to firewood cutters. Firewood could be removed from accessible areas using standard pickup trucks subject to normal BLM seasonal restrictions on firewood cutting for wet soil conditions.

**Alternative 2 – Burn and Firewood Cutting**

1. When feasible, burn all existing piles after firewood cutters have been given the opportunity (1-2 seasons after the initial cutting and piling) to remove designated, accessible wood. All burning would be in accordance with approved burn plans. If slash is scattered by firewood cutters, it may be re-piled with a small machine such as a tracked Bobcat to increase burning consumption and decrease burned area.

2. Seed and/or plant with native vegetation all disturbed areas and/or where native plants occur in low densities. Some planted vegetation would also be fitted with protective plastic mesh tubes to protect the young plants from browsing. (Assumption: Approximately 5-10% of the surface area of each unit would be affected by burn pile scars and some of these burn pile scars would then need to be seeded and/or planted and tubed.)

3. No temporary roads or landings would be constructed.

4. Some piles in sensitive riparian areas or near cultural sites would be left unburned or relocated prior to burning using low impact transporting methods or manual transport to reduce ground disturbance.

**No Action Alternative**

This alternative proposes no new management activities in the project area.

The No Action Alternative would:

1. Leave all existing piles – no burning or yarding would occur.

2. Allow firewood to be removed from designated, accessible areas using standard pickups.

3. No temporary road construction.

4. Some seeding and planting and tubing would occur under existing CX’s.
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Proposed Action</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>No Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yarding (Acres)</td>
<td>Approximately 3200 acres</td>
<td>Approximately 3200 acres</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Burning (Acres)</td>
<td>150 - 350 acres</td>
<td>150 - 350 acres</td>
<td>Approximately 3200 acres</td>
<td>None</td>
</tr>
<tr>
<td>*Firewood Cutting (Where Accessible)</td>
<td>*Approximately 3200 acres</td>
<td>*Approximately 3200 acres</td>
<td>*Approximately 3200 acres</td>
<td>*Approximately 3200 acres</td>
</tr>
<tr>
<td>Miles of Temporary Road Construction</td>
<td>Up to 5.0 Miles</td>
<td>Up to 5.0 Miles</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Planting (Acres)**</td>
<td>Up to 2,000 acres</td>
<td>Up to 2,000 acres</td>
<td>Up to 2,000 acres</td>
<td>0</td>
</tr>
<tr>
<td>Seeding (Acres)**</td>
<td>Approximately 3200 acres</td>
<td>Approximately 3200 acres</td>
<td>Approximately 3200 acres</td>
<td>Approximately 3200 acres</td>
</tr>
<tr>
<td>Piles In Riparian Reserves</td>
<td>No Yarding</td>
<td>No Yarding</td>
<td>Some burning allowed</td>
<td>No burning or yarding</td>
</tr>
<tr>
<td>Fence Repair/Construction</td>
<td>Up to 3 Miles</td>
<td>Up to 3 Miles</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Riparian Areas and Dry Meadows</td>
<td>Full suspension only</td>
<td>Full suspension only</td>
<td>Piles may be relocated using low impact methods</td>
<td>No removal in riparian areas</td>
</tr>
</tbody>
</table>

* Firewood cutting would be allowed under all alternatives where designated by the BLM and where Public Access is available
** Under the existing categorical exclusions, some seeding and/or planting would be done to restore native vegetation
Figure 2 – Project Area Map of Showing Location of Proposed Treatments

<table>
<thead>
<tr>
<th>Unit Name</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTZ 110</td>
<td>141</td>
</tr>
<tr>
<td>Smith Reservoir</td>
<td>786</td>
</tr>
<tr>
<td>Pine Creek</td>
<td>990</td>
</tr>
<tr>
<td>Schnipps</td>
<td>89</td>
</tr>
<tr>
<td>North Willow Valley Sage</td>
<td>999</td>
</tr>
<tr>
<td>Pitchlog</td>
<td>104</td>
</tr>
<tr>
<td>Miller Creek</td>
<td>71</td>
</tr>
<tr>
<td>Potholes</td>
<td>30</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3210</td>
</tr>
</tbody>
</table>

Legend:
- Project Area
- Road
- Highway
- 2009 Juniper EA Units

T.39S.-T.41S., R.11E.-R.14.5E.
CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Introduction

This chapter describes the physical, biological, and socioeconomic environment of the 2009 Juniper Disposal EA area and the consequences of the proposed action and alternatives, and addresses the issues raised both through public scoping and internal discussions. The affected environment reflects the existing condition that has developed from all past natural events and management actions within the project area. It is a combination of natural and human caused fires, fire suppression, road building, grazing, fuel reduction treatments, and the effects of recreational use. The current condition assessed for each affected resource is a result of all past natural events and management actions. It is therefore 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 impacts 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), research natural areas (RNAs), paleontological resources, prime or unique farmlands, wild and scenic rivers, lands, and minerals. There are no known hazardous waste sites in the analysis area. Minority and low income populations would not be affected. The RMP does not identify any mineral energy sources in the vicinity.

Cumulative Impacts and Cumulative Actions

The following discussion of Environmental Consequences of each alternative will include an analysis of the environmental effects of past actions when they describe the cumulative environmental effect of a proposed action in accordance with Section 102 of the National Environmental Policy Act (NEPA), 42 U.S.C. § 4332, and the CEQ Regulations for Implementing the Procedural Provisions of NEPA, 40 C.F.R. parts 1500-1508. CEQ's interpretation of NEPA is entitled to deference. Andrus v. Sierra Club, 442 U.S. 347, 358(1979.

"Cumulative impact" is defined in CEQ's NEPA regulations as the "impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions…” 40 CFR 1508.7. Agencies are not required to list or analyze the effects of individual past actions unless such information is necessary to describe the cumulative impact of all past actions combined. This analysis focuses on the current aggregate effects of past actions without delving into the historical details of individual past actions.

For the No Action Alternative, the discussion includes an analysis of cumulative effects anticipated regardless of implementing any juniper disposal actions. Cumulative actions specifically considered in the descriptions of cumulative impacts is the past cutting and disposal of juniper. This specifically includes the FTZ 95-71, Dog Hollow, and Copeland project areas included in the original scoping letter but analyzed in the separate 2008 Juniper Disposal EA (EA #OR-014-08-06).

Rangeland Vegetation - Affected Environment

An Ecological Site Inventory (ESI) was completed during 1997 and 1998 for areas within the Gerber Block portion of the Klamath Falls Resource Area which classified all of the BLM lands into an array of ecologically distinct vegetation communities. The following edited excerpts from the Gerber – Willow Valley Watershed Analysis, July 2003 provide a brief description of the ESI process.

A major aspect of the ESI survey, in addition to an Order 3 soils survey, was a vegetation survey and mapping that compares 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).

Data from the Gerber Block ESI will be used to help describe the rangeland vegetation conditions for the different proposed treatment units in that area. Figures 3-5 (Appendix E) show the delineated ecological sites and write-up locations from the 1997-1998 ESI surveys. Qualitative observations from recent field visits to the units will also be used as the areas have had recent mechanical juniper cutting treatments that were not completed at the time of the ESI survey.

For the treatment areas outside of the Gerber Block, an abbreviated ESI survey (no soils information) was done during data gathering for Rangeland Health Standards Assessments. This information will be used to describe the current vegetation conditions for those areas. Figure 6 (Appendix E) shows the delineated ecological sites and write-up locations from the ESI done in those areas.

**FTZ 110** – This treatment area was classified as being a mix of the Pine-Sedge-Fescue and Deep Loamy ecological sites. The potential native plant community for the Pine-Sedge-Fescue ecological site would be dominated by ponderosa pine with the midstory dominated by pine reproduction, curleaf mountain mahogany and traces of small shrubs such as choke cherry and bitter cherry. The herbaceous species would include Ross sedge, Idaho fescue, mountain brome, bluegrass species, and numerous forb species. The ESI write-up done here (BJL97006) rated the area as being in Late seral ecological status and having a Fair condition class rating. The Fair condition rating was attributed to the low production of herbaceous species from recent prescribed burns, heavy pine needle cover, and past logging activities.

The potential native plant community for the Deep Loamy ecological site would be an open stand of ponderosa pine with western juniper where the soil has more coarse fragments. Antelope bitterbrush would be found in the understory along with scattered curleaf mountain mahogany, serviceberry, and other shrubs. The herbaceous layer would be dominated by Idaho fescue with bluebunch wheatgrass, Ross sedge, needlegrass, and bluegrass species also present along with various forb species. The ESI write-up done here (BJL97014) rated the area as being in Late seral ecological status and having a Good condition class rating.

**Pine Creek** – This treatment area has a mix of ecological sites. On the very north end there is a small area of South Slope ecological site which would have an herbaceous component dominated by bluebunch wheatgrass and Idaho fescue with a shrub layer containing mountain big sagebrush and antelope bitterbrush along with scattered western juniper in a potential native plant community. The ESI write-up done here (BJL98028) rated the area as being in Late ecological status with a Fair condition rating. The Fair condition rating was attributed to low production, the presence of weedy grass and forb species, and a high level of junipers.

The rest of the proposed treatment unit is classified as a mixture of Juniper Claypan and Shallow Stony ecological sites. The Juniper Claypan site’s potential natural community would be an open stand of western juniper with sparse juniper reproduction. Low sagebrush would be prominent along with buckwheat and an occasional bitterbrush. Idaho fescue would dominate the understory along with Sandberg bluegrass as a secondary species and one spike oatgrass, especially in low areas or swales. Small amounts of squirreltail, junegrass and occasional bluebunch wheatgrass would be present. There were three different Juniper Claypan write-ups done that cover the proposed treatment area (BJL98027, BJL98029, and DLE98024). Write-up BJL98029 covers the ecological site for the north quarter of the treatment area. This area, along with the two-track road that bisects it, was identified as the main fall trailing corridor for livestock returning to the base ranch.
from BLM and Forest Service grazing permits. The area was rated as being in Mid seral ecological status with a Fair condition class rating. The Fair condition class was attributed to the low production and a high level of weedy grass and forb species. Annual brome grass species accounted for about 19% of the total vegetation production and medusahead, an exotic annual grass, accounted for about 4%. Fireweed (Epilobium species), an early seral forb, was about 8% of the total production. Juniper was also noted to be at high levels in most size classes.

Write-up BJL90027 represented the ecological site for the middle portion of the proposed treatment unit. The area was rated as being in Late seral ecological status with a Fair condition class rating due to the low production level, downward trend, and the high level of weedy species. Annual exotic grasses (cheatgrass, Japanese brome, and medusahead) comprised about 21% of the total vegetation production.

Write-up DLE98024 represented the Juniper Claypan ecological site for the south portion of the proposed treatment unit. This area was rated as being in PNC ecological status with a Good condition class rating. The area had a good component of native perennial grasses although the total production was low for the ecological site. A high level of junipers was present with the highest levels being in the 20-foot and taller and the old growth categories.

A small percentage of the treatment unit has the Shallow stony ecological site interspersed throughout the Juniper Claypan. The representative write-up for this was DLE98017. These areas were rated as being in Mid seral ecological status and Fair condition class rating.

A small area of Juniper-Mahogany-Fescue ecological site is also present in the south end of the unit. Write-up DLE98025 was done in this area and rated the area as being in Late seral ecological status with a Good condition class rating. The site had a good level of native grasses and a variety of shrub species under an overstory of tall, straight junipers.

Qualitative observations of the proposed treatment area in the fall of 2008 included the presence of an area of dense medusahead patches along the main access road in T40S, R14E, Sections 10 and 11. Scattered patches of this exotic, annual grass were observed throughout the NE ¼ of Section 10 and into the S½ of Section 3. Vegetation conditions improved in the south portion of the unit.

Schnippers – This proposed treatment area is within an ESI Site Write-up Area (SWA) that is a mix of three ecological sites. These three sites are Deep Loamy, Pine-Sedge-Fescue, and Juniper Claypan. The proposed treatment area appears to be within the Juniper Claypan and Deep Loamy portions of the SWA.

The Juniper Claypan site’s potential natural community would be an open stand of western juniper with sparse juniper reproduction. Low sagebrush would be prominent along with buckwheat and an occasional bitterbrush. Idaho fescue would dominate the understory along with Sandberg bluegrass as a secondary species and onespike oatgrass, especially in low areas or swales. Small amounts of squirreltail, junegrass and occasional bluebunch wheatgrass would be present. Write-up BJL97024 represents the Juniper Claypan within the proposed treatment site and rated the area as being in PNC ecological status with a Good condition class rating.

The potential native plant community for the Deep Loamy ecological site would be an open stand of ponderosa pine with western juniper where the soil has more coarse fragments. Antelope bitterbrush would be found in the understory along with scattered currleaf mountain mahogany, serviceberry, and other shrubs. The herbaceous layer would be dominated by Idaho fescue with bluebunch wheatgrass, Ross sedge, needlegrass, and bluegrass species also present along with various forb species. Write-up BJL97042 represents the Deep Loamy in this area and rated it as being in Late seral ecological status with a Good condition class rating.

North Willow Valley Sage – This proposed treatment area is within two different Site Write-up Areas (SWAs), both which are a mix of Juniper Claypan and Shallow Stony ecological sites. A Juniper Claypan potential natural community is described above under the Pine Creek section. Write-up DLE98002 represents the Juniper Claypan in this area and rated it as being in Late ecological status with a Good condition class rating. The total
production for this site was low, however, with a high percentage of stones and cobble-sized rocks on the soil surface. The amount of junipers at the time of the write-up was high with the 3-12’ and 12-20’ size classes having 10-30 trees/acre.

Another Juniper Claypan write-up, DLE97028, was done just to the east of the proposed treatment area boundary. This area was heavily infested with exotic annual grasses and early seral forb species. The total production was very low with the annual grasses making up about 48% of the total. At the time of the write-up, this area had a high level of junipers in most size classes. The amount of low sagebrush was also diminished here with many dead ones noted. This area provides a good example of how the vigor and diversity of the native vegetation community can decline when the exotic annual grasses and juniper increase.

A Shallow stony potential natural community would be dominated by low sagebrush and Sandberg bluegrass with other perennial grasses like bluebunch wheatgrass and Idaho fescue occurring in deeper soil areas. Antelope bitterbrush and slender buckwheat would also be scattered throughout. Junipers can invade the site but tend to be smaller and sparse in number. Write-up DLE98029 represents the Shallow Stony ecological site for this area. It was rated in Late ecological status with a Good condition class rating. Sandberg bluegrass was the dominant grass species with low levels of Idaho fescue, squirreltail, and onespike oatgrass also present. The exotic annual grasses medusahead, cheatgrass, and Japanese brome were also present in low numbers. Juniper levels were one to five trees/acre in all size classes.

Qualitative observations of the proposed treatment area, after the recent juniper cutting and piling operations, have shown increased levels and vigor of cheatgrass in the former juniper canopy areas. Some of these former canopy zones also had Idaho fescue present on the north side of the juniper stumps which would have been the more shady locations under the trees. There were also scattered patches of medusahead throughout the treatment area.

Smith Reservoir – The Smith Reservoir proposed treatment area is almost entirely within a Juniper Claypan ecological site. Writeup BL05018 represents this area and rated it as being in PNC ecological status with a Good condition class rating due to the variable production levels. There were scattered junipers of varying densities throughout the ecological site. Qualitative observations during 2008 showed that the perennial grasses within the cut and piled juniper areas were responding positively to the juniper removal.

Pitchlog – The portions of the Pitchlog unit that are being analyzed are primarily riparian vegetation communities. Descriptions of these sites can be found in the Hydrology and Water Quality and the Aquatic Species sections of this document.

Miller Creek – The portions of the Miller Creek unit that are being analyzed are primarily riparian vegetation communities. Descriptions of these sites can be found in the Hydrology and Water Quality and the Aquatic Species sections of this document.

Potholes – The Potholes proposed treatment area contains three different ecological sites. The area that is seasonally inundated by water is classified as an Ephemeral Lakebed ecological site and the surrounding lands are classified as predominately Shallow Stony with some areas of Stony Claypan ecological site.

An Ephemeral Lakebed potential natural community would be dominated by spikerush with smaller populations of rushes and sedges and various forbs associated with the varying degrees of wetness at the site. The Ephemeral Lakebed is represented by Writeup BJL98025 which rated the area as being in Late ecological status with an Excellent condition class rating.

A Shallow Stony potential natural community would be as described above under the North Willow Valley Sage section. Writeup BJL98005 represents this ecological site and rated the area as Late ecological status with a Good condition class rating. A Stony Claypan potential natural community would have the shrub component dominated by low sagebrush with buckwheat common and occasional bitterbrush present. Idaho fescue would be the dominant grass with Sandberg’s bluegrass as a secondary species and scattered bluebunch wheatgrass
and onespike oatgrass. A variety of forb species would also be present. The Stony Claypan is represented by
Writeup BJL98007 which rated the area as being in PNC ecological status with an Excellent condition class
rating.

**Rangeland Vegetation – Environmental Consequences**

**Proposed Action and Alternative 1**

An environmental impact of juniper utilization through yarding, either by full suspension or partial suspension,
is the mechanical disturbance to vegetation from heavy machinery. This can result in the crushing and/or
uprooting of grasses, forbs, shrubs and small trees. The highest level of vegetation disturbance would occur on
the main skid trails and landings. Controlled research designs assessing plant response to western juniper
removal by heavy machinery are limited to two studies which looked at the use of bulldozers and chaining
(Miller et al. 2005). Normal chaining operations entail dragging a large chain across the landscape between two
bulldozers. The intent is to uproot the western juniper and leave the other vegetation intact. Neither of these
studies can offer much data for the impacts of the proposed actions that involve the mechanical yarding of
juniper (Proposed Action and Alternative 1). However, both study sites did experience a high level of exotic
annual grass response after the treatment.

In areas where exotic annual grasses are present, the soil disturbance caused by heavy machinery provides a
substrate that may favor the establishment of these species. Past work suggests that weed response following
treatment projects will be site specific and will depend heavily on the composition of the pretreatment plant
community (Everett and Ward 1984, Koniak 1985). The composition and speed of plant community response
depends on several integrated factors, including site characteristics, pretreatment floristics, post treatment
management, and weather (Bates et al. 2005).

Most of the juniper control research studies have been done on ecological sites with big sagebrush and
associated grasses in the understory. The sites being evaluated for this proposed action and alternatives are
predominately low sagebrush and associated bunchgrass dominated sites. Qualitative observations from
mechanical juniper cutting on these types of sites have shown variable responses, but there has been a large
initial increase in cheatgrass on sites where it was a component prior to the treatments. A subsequent decrease
in cheatgrass, as noted in some studies, has been observed on sites where a high level of perennial grasses was
present before treatment. On sites with low levels of perennial grasses present before treatment, there has not
been a subsequent decrease in cheatgrass levels observed. Most of these treatments are 2-8 years old.

In areas where medusahead was a component before treatment there have been qualitative observations of an
increase in both the amount and distribution of this grass, especially where mechanical shearing methods were
used. Medusahead is a rapidly spreading exotic annual grass that exhibits characteristics that allow it to
suppress native perennial species. It germinates in late winter and begins growth before the perennial species,
thus using available moisture in the upper soil layers. Medusahead litter is also high in silica and has a slow
decomposition rate that allows it to build up over time and suppress native plants (Bovey et al. 1961). This
buildup of litter also increases the potential fire frequency to the detriment of native perennials (Torell et al.
1961; Young 1992). The result is often a dense monoculture of medusahead (George 1992). A study by Davies
(2008) found that medusahead has a relatively long period of seed dispersal, from July to October. He
suggested that livestock, humans, and vehicles should be kept out of medusahead infested areas during this time
period to limit the spread of medusahead seeds.

The environmental impacts to rangeland vegetation from yarding the existing juniper piles can likely be inferred
from a thorough inventory of the vegetation conditions currently present. Some studies done in big sagebrush
ecological sites have shown that 1-2 perennial grasses per 10ft² (Eddlemann 2002) and 2-3 perennial
bunchgrasses per m² (Bates et al 2005) was sufficient to permit natural recovery after juniper cutting using
chainsaws. Areas that are in Late or PNC seral status and in Good or Excellent condition will likely have the
resiliency to respond positively over time to the juniper removal by yarding. The recovery time of the
vegetation after yarding with partial suspension (Proposed Action) would likely be longer than the recovery
time after yarding by full suspension (Alternative 1). This would be due to the higher levels of soil and
vegetation disturbance from the dragging of the cut junipers across the ground with partial suspension. The
dragging of the junipers by partial suspension would create a wider disturbance path from the site of the existing pile to the skid trail than would be created by full suspension. The juniper branches would be “raking” the surface of the soil which could result in disturbance to cryptobiotic crusts on the soil surface and possible uprooting of shallow rooted perennial and annual grass and forb species. Areas that are in Mid or Early seral ecological status and/or Fair or Poor condition could improve, but positive results are less likely, especially if there is a component of exotic annual grasses or forbs present pretreatment. Areas that have medusahead as a pretreatment component, regardless of the seral stage or condition level would likely have an increased amount and distribution of this grass after treatment. The partial suspension yarding alternative (Proposed Action) could likely cause a greater increase due to the soil disturbance from the dragging of the junipers. The raking effect described above could also incorporate any existing seeds of medusahead and/or cheatgrass that are present on the soil surface. The dragging would also likely spread the medusahead seeds throughout the yarding area. The full suspension yarding alternative (Alternative 1) would result in less soil surface disturbance than the Proposed Action because the juniper is not being dragged across the soil surface. This would result in a lower chance of spreading the medusahead seeds throughout the treatment unit. However, both alternatives could result in the spreading of the medusahead from the soil surface disturbance and potential seed transport associated with the operation of the yarding equipment. Firewood cutting activities could also result in the spreading of medusahead from soil surface disturbance and seed transport by vehicles. Any increase in medusahead could lead to reduced ecological conditions over time. The recovery period would be dependent upon additional factors including weather and post treatment management.

The foregoing discussion would apply mainly to the area where the piled juniper would be mechanically yarded from the pile sites to the designated skid trails. The areas in skid trails, landings, and temporary roads would be subjected to a proportionately higher level of impact due to repeated travel by the heavy machinery. Qualitative observations of skid trails, landings, and temporary roads from previous juniper yarding operations indicate that very little vegetation remains after treatment on these disturbed areas. Natural vegetation recovery on these areas would likely take much longer and would be influenced by the surrounding vegetation conditions, post treatment management, and weather conditions. As noted above, any areas that have medusahead as a component of the plant community would likely have increased amounts following yarding treatments. The skid trails, landings, and temporary roads would be susceptible to invasion by medusahead due to the high levels of soil surface disturbance and the low levels of competing vegetation found on these areas following treatment. The potential for increased levels of medusahead from each alternative is discussed in the preceding paragraph. In summary, the partial suspension yarding would result in more soil surface and vegetation disturbance than the full suspension yarding. This greater level of disturbance could result in a greater chance of invasion by exotic vegetation species and a potential longer recovery time.

Alternative 2 – Burn Only

There has been limited research done on the effects to vegetation from juniper pile burning. Qualitative observations of previous small juniper piles that have been burned on low sagebrush ecological sites in the Gerber Block have shown that most of the piles burned hot enough to eliminate almost all of the existing vegetation directly under the piles. Observations of burn sites after several years have shown the growth of only a few early seral forb species within the burn pile scar. A small percentage of the burn pile sites have been planted with bitterbrush seedlings and these have responded well due to the lack of competition.

The environmental conditions present at the time of burning could influence the vegetation response after the burn. One study suggested that to minimize the negative effects of fire to herbaceous plants under scattered juniper debris, soils and juniper needle litter contacting the ground should be wet and preferably frozen (Bates and Svejcar, 2009). Other work by these researchers has shown that burning when soils are dry and ground litter water content is low will result in a near 100% loss of herbaceous perennials, especially bunchgrasses, and could permit cheatgrass or other nonnative weeds to dominate the site (Bates et al 2007b). These studies involved burning of scattered juniper debris, not piles like those being analyzed in this document. The total acreage of burned vegetation would be lower from the burning of scattered piles versus the broadcast burning done in the study. The potential higher heat levels generated by the amount of fuels in the piles could be expected to have a greater detrimental effect to any vegetation under the piles.
The burn pile scars would re-vegetate at some point in the future with a vegetation composition likely composed of species from the surrounding area. Areas with a component of cheatgrass and/or medusahead could experience an increase in these species.

In most of the proposed treatment area, burning the existing juniper piles would likely result in less vegetation disturbance, lower levels of exotic annual grass increases and potentially a shorter vegetation recovery time when compared to juniper removal by yarding. The total amount of soil and vegetation disturbance from burning the existing piles on most areas would likely be lower than the disturbance from yarding the juniper. The yarding treatment results in soil surface disturbance when the heavy machinery travels to each juniper pile and then transports the juniper to a landing. The yarding alternatives would also require the construction of up to five miles of temporary roads along with skid trails and landings. As noted above, these areas typically have very little vegetation remaining on them following treatment but like the burn scars, would re-vegetate at some point in the future with a vegetation composition likely composed of species from the surrounding area.

**No Action Alternative**

The No Action Alternative would not directly affect any rangeland vegetation. However, existing condition and trend in vegetation would continue with minor changes or impacts due to livestock grazing, wildlife use and human impacts, typically from vehicle use. Under this alternative the majority of the existing piles of juniper would remain on the ground. A small percentage of juniper piles could be utilized by wood cutters. Most of the piles are of an individual density that likely has resulted in the smothering of any vegetation that is under them. Studies have also shown that debris left on the ground can smother perennial grasses and cheatgrass cover can increase and persist compared to burned piles. After about 13 years, however, perennial grasses had largely replaced cheatgrass on these study sites (Bates et al 2005, 2007a). These studies also involved scattered juniper debris, not large piles like those being analyzed in this document. The density of the individual juniper piles would also likely result in the smothering of any vegetation beneath them. Any increase in native perennials under the piles would likely take many years.

**Cumulative Impacts for Rangeland Vegetation**

**Proposed Action and Alternative 1**

The existing piles of juniper were created by juniper treatments involving mechanized and hand cutting and piling of standing juniper. Research studies have shown an increase in the productivity of forage species following juniper removal (Young et al. 1985; Vaitkus and Eddleman 1987; Bates et al 2000). No studies have been established on any of the proposed units to monitor the changes in the vegetation following these initial treatments. Qualitative observations have shown an increase in desired perennial grass species in many areas of these treatment units that have been mechanically cut and piled. Qualitative observations have also shown that an increase in the exotic annual grasses cheatgrass and medusahead has occurred in some areas following these initial mechanically cutting and piling treatments. Additional mechanical disturbance from the Proposed Action and Alternative 1 could result in an increase in these exotic species due to their present population levels. The increase would likely be lower using full suspension yarding (Alternative 1) due to the lower levels of soil surface disturbance.

Livestock grazing would continue on these areas following any of the treatment alternatives. The combined treatment units total approximately 3,200 acres. The approximate acres and percent of each pasture and/or grazing allotment affected by the treatments in the proposed units are as follows:
Table 4 – Allotments Affected by Treatment Units

<table>
<thead>
<tr>
<th>Proposed Unit</th>
<th>Allotment</th>
<th>Pasture</th>
<th>Treatment Acres</th>
<th>Percent of Pasture</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTZ 110</td>
<td>Horsefly</td>
<td>Norcross</td>
<td>133</td>
<td>1.7%</td>
</tr>
<tr>
<td>FTZ 110</td>
<td>Horsefly</td>
<td>Barnes Valley Riparian</td>
<td>8.2</td>
<td>1.0%</td>
</tr>
<tr>
<td>Pine Creek</td>
<td>Horsefly</td>
<td>Adobe</td>
<td>239.1</td>
<td>6.4%</td>
</tr>
<tr>
<td>Pine Creek</td>
<td>Horsefly</td>
<td>Copeland</td>
<td>647.0</td>
<td>12.1%</td>
</tr>
<tr>
<td>Pine Creek</td>
<td>Bumpheads</td>
<td>North</td>
<td>103.9</td>
<td>2.6%</td>
</tr>
<tr>
<td>Schnipps</td>
<td>Horsefly</td>
<td>Schnipps</td>
<td>89</td>
<td>2.3%</td>
</tr>
<tr>
<td>Willow Valley Sage</td>
<td>Willow Valley</td>
<td>Woolen Canyon</td>
<td>998.7</td>
<td>14.2%</td>
</tr>
<tr>
<td>Willow Valley Sage</td>
<td>Willow Valley</td>
<td>Duncan Exclosure</td>
<td>.62</td>
<td>0.5%</td>
</tr>
<tr>
<td>Smith Reservoir</td>
<td>Horton</td>
<td>N/A</td>
<td>292.3</td>
<td>38.5%</td>
</tr>
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<td>Smith Reservoir</td>
<td>Smith</td>
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<td>493</td>
<td>39.2%</td>
</tr>
<tr>
<td>Pitchlog</td>
<td>Pitchlog</td>
<td>Northeast</td>
<td>33.0</td>
<td>1.4%</td>
</tr>
<tr>
<td>Pitchlog</td>
<td>Horsefly</td>
<td>Norcross</td>
<td>7.0</td>
<td>.09%</td>
</tr>
<tr>
<td>Pitchlog</td>
<td>Horsefly</td>
<td>Barnes Valley Riparian</td>
<td>64.0</td>
<td>6.6%</td>
</tr>
<tr>
<td>Miller Creek</td>
<td>Horsefly</td>
<td>Schnipps</td>
<td>13.4</td>
<td>0.3%</td>
</tr>
<tr>
<td>Miller Creek</td>
<td>Dry Prairie</td>
<td>Miller Creek</td>
<td>13.1</td>
<td>0.6%</td>
</tr>
<tr>
<td>Miller Creek</td>
<td>Dry Prairie</td>
<td>Gerber Lakes</td>
<td>44.6</td>
<td>2.5%</td>
</tr>
<tr>
<td>Potholes</td>
<td>Dry Prairie</td>
<td>Campground</td>
<td>10.0</td>
<td>1.5%</td>
</tr>
<tr>
<td>Potholes</td>
<td>Dry Prairie</td>
<td>Gerber Lakes</td>
<td>20.5</td>
<td>1.2%</td>
</tr>
</tbody>
</table>

Negative impacts from continued livestock grazing in most of the pastures should be minimal due to the small percentage of the acres impacted (15% or less). The two allotments that would be affected by the Smith Reservoir treatment unit, the Horton and Smith Allotments, would have almost 40% of their acres impacted. These two allotments should be rested from livestock grazing for 1-2 years following the yarding treatments to allow for regrowth of the native perennial species and to allow any seeded areas to become established.

If there is a component of exotic annual grasses present in the treatment areas, livestock grazing after the treatments could result in an increase in these species and a subsequent extended time period for perennial grass recovery.

Alternative 1 – Burn Only
The effects of livestock grazing after burning of juniper piles would depend upon several factors including pre-burn vegetation conditions, timing and intensity of the livestock use, and weather. As noted above, the amount of land acreage affected by the treatments varies by pasture. The actual amount of land affected by burning would likely be less than the total acreage analyzed due to the scattered nature of the piles. Timing of the burning may influence the response of the vegetation as described above under the Environmental Impacts – Alternative 2.

The results from postfire defoliation and grazing studies suggest that timing, use, and duration of grazing of burned rangelands are more important than a specific period of rest after fire (Bates et al. 2009). In most of the pastures the low acreage of disturbance from the burning should not result in detrimental impacts to the recovery of the vegetation community. In the Horton and Smith allotments the acreage burned would be a higher percentage of the total pastures. Immediate reintroduction of livestock grazing after the burning may have a detrimental impact on the existing vegetation in these two allotments.

Mitigation
Proposed Action and Alternative 2
The proposed utilization areas should be inventoried for the presence of medusahead prior to yarding. Areas where it is found in “concentrated patches” or where it is present throughout the understory should be avoided.
for yarding. In addition, all equipment and vehicles should avoid these areas, including the closing of these areas to public firewood cutting.

In areas that are yarded, full suspension yarding (Alternative 1) should be used when transporting the juniper piles to the main skid trails to decrease the amount of soil surface and vegetation disturbance. Use of full suspension yarding on skid trails would also decrease the level of soil and vegetation disturbance on these areas.

The areas in skid trails and landings will likely have little vegetation remaining following yarding. The Proposed Action and Alternative 1 would seed all disturbed areas with native grass seed following treatment. This would help accelerate recovery and inhibit the establishment of invasive annual species. These areas should be monitored following the seedings to determine their success. Any areas where seedlings fail to establish should be replanted. The design of the seeding process and the monitoring program should be based upon established methods.

The Horton and Smith allotments should be rested from livestock grazing for one to two years following treatment to allow for recovery of the native perennial grasses and to allow seedling establishment in the seeded areas.

Alternative 2 – Burn Only
Burning of the juniper piles should be done when soils and juniper needle litter contacting the ground are wet and preferably frozen to lessen the affects to the vegetation below and surrounding the piles and to lessen the spread of fire to the interspaces.

The Horton and Smith allotments should be rested from livestock grazing for one to two years following treatment to allow for recovery of the native perennial grasses.

Livestock Grazing - Affected Environment
The location of the proposed treatment units and the acres and percentage of the affected livestock grazing allotments is shown above in Table 4. A description of the livestock grazing within each proposed unit is as follows.

FTZ 110 – This proposed treatment unit is within the Norcross and Barnes Valley Riparian pastures of the Horsefly Allotment. The treatment area comprises about 1.7% of the Norcross pasture and 1.0% of the Barnes Valley riparian pasture (see Table 4). The Norcross pasture is utilized by livestock during the last two to three weeks of June. The current authorized active use for the Horsefly Allotment is 2656 Animal Unit Months (AUMs). Actual use of the Norcross pasture is between 350-400 AUMs. The Barnes Valley Riparian pasture is utilized by livestock one year out of every three years for 5-7 days in mid June. The authorized active use is 150 AUMs.

A Rangeland Health Standards Assessment was completed for the Horsefly Allotment in 1999 and found that the overall current grazing use was within the sustained yield capacity of the allotment and appropriate for maintaining the current overall good vegetation conditions (USDI BLM et al. 2003).

Pine Creek – This proposed treatment unit is within the Copeland and Adobe pastures of the Horsefly Allotment and the North pasture of the Bumpheads Allotment. The treatment area comprises about 12.1% of the Copeland pasture and 6.4% of the Adobe pasture. About 2.6% of the North pasture would be affected (see Table 4). The Copeland pasture is utilized by livestock for a maximum of 20 days during mid April through mid May. Actual use in the Copeland pasture is 350-400 AUMs. The Adobe pasture is utilized by livestock for a maximum of 20 days during mid April through mid May. Actual use in the Copeland pasture is 350-400 AUMs. The current authorized active use for the Bumpheads Allotment is 420 AUMs. The North pasture is utilized by livestock in a three pasture deferred use rotation. The North pasture is utilized for the month of May during one year and during the month of June the following year and this is repeated. Actual use in the North pasture is 150-200 AUMs.
A Rangeland Health Standards Assessment was completed for the Bumpheads allotment in conjunction with the Gerber-Willow Valley Watershed Analysis in June, 2003. It was determined that Standards 1, 3, and 5 were being fully met, but Standards 2 (Riparian/Wetland) and 4 (Water Quality) were not met and livestock grazing was a contributing factor for Standard 2. Appropriate management changes have been implemented in the allotment to allow for progress in meeting the Standard.

**Schnipps** – The Schnipps unit is within the Schnipps pasture of the Horsefly Allotment and makes up a total of about 2.3% of that pasture (see Table 4). The Schnipps pasture is utilized by livestock three out of every four years for a maximum of 20 days during mid May through early June. The actual use for the Schnipps pasture is 350-400 AUMs.

**Willow Valley Sage** – This unit is within the Woolen Canyon pasture of the Willow Valley Allotment and makes up a total of about 14.2% of that pasture (see Table 4). The current authorized active use for the Willow Valley Allotment is 1225 AUMs. The Woolen Canyon pasture is utilized by livestock every three out of four years. The use period is for 25-40 days during a period in mid April though the end of June. The actual use for the pasture is 290-325 AUMs.

A Rangeland Health Standards Assessment was completed for the Willow Valley Allotment during 2000. It was determined that Standards 1 (Watershed Function – Uplands), 2 (Riparian/Wetlands), and 3 (Ecological Processes) were not being fully met. Management changes and vegetation treatments have been implemented in the allotment to allow for progress in meeting these Standards.

**Smith Reservoir** – This proposed treatment unit is within the Horton and Smith Allotments. The treatment area comprises about 38.5% of the Horton allotment and 39.2% of the Smith allotment (see Table 4). The Horton allotment is utilized by livestock from the beginning of June through early July. The current authorized active use is 130 AUMs. The Smith Allotment is utilized by livestock from mid May until the end of August. The current authorized active use is 109 AUMs.

A Rangeland Health Standards Assessment was completed for these allotments in 2006. For both allotments the existing grazing management and/or levels of grazing use were found to be meeting the Oregon Standards for Rangeland Health and were in conformance with the Guidelines for Livestock Grazing Management.

**Pitchlog** – This treatment unit consists of portions of three different creeks, Long Branch, Pitchlog, and Barnes Valley. The Long Branch Creek portion is within the Norcross and Barnes Valley Riparian pastures and the treatment units would comprise about 0.09% and 6.6% respectively (see Table 4). This unit is also within the Long Branch Exclosure of the Horsefly Allotment. The Norcross pasture is utilized by livestock during the last two to three weeks of June. The current authorized active use for the Horsefly Allotment is 2656 AUMs. Actual use of the Norcross pasture is between 350-400 AUMs. The Barnes Valley Riparian pasture is utilized by livestock one time out of every three years for 5-7 days in mid June. The authorized active use is 150 AUMs. The Long Branch Exclosure is excluded from livestock grazing. A Rangeland Health Standards Assessment was completed for the Horsefly Allotment in 1999 and found that the overall current grazing use was within the sustained yield capacity of the allotment and appropriate for maintaining the current overall good vegetation conditions (USDI BLM et al. 2003).

The Barnes Valley Creek portion of the Pitchlog unit is within the Barnes Valley Riparian Pasture of the Horsefly Allotment and the Northeast Pasture of the Pitchlog Allotment. The livestock grazing parameters for the Barnes Valley Riparian Pasture are as noted two paragraphs above. The Northeast Pasture of the Pitchlog Allotment is utilized by livestock three years out of every four years for a maximum of 20 days in mid June. The current authorized active use for the Pitchlog Allotment is 434 AUMs. The actual use of the Northeast pasture is 150-160 AUMs. The Pitchlog Creek portion of this unit is within the Northeast pasture of the Pitchlog allotment. The livestock use parameters for the Northeast pasture are as noted in the preceding paragraph. A Rangeland Health Standards Assessment was completed for the Pitchlog Allotment in 1999 and
found that the overall current grazing use was within the sustained yield capacity of the allotment and appropriate for maintaining the current overall good vegetation conditions (USDI BLM et al. 2003).

**Miller Creek** – The Miller Creek unit is within the Schnipps pasture of the Horsefly Allotment and the Miller Creek and Gerber Lakes pastures of the Dry Prairie allotment. The unit comprises about 0.3% of the Schnipps pasture, 0.6% of the Miller Creek pasture, and 2.5% of the Gerber Lakes pasture (see Table 4). The Schnipps pasture is utilized by livestock three out of every four years for a maximum of 20 days during mid May through early June. The actual use for the Schnipps pasture is 350-400 AUMs. The Miller Creek pasture of the Dry Prairie Allotment is utilized by livestock two out of every three years for a 45-56 day period in early May through the end of May or early June. The Dry Prairie Allotment has a current authorized active use of 640 AUMs. The actual use in the Miller Creek pasture is 200-250 AUMs. The Gerber Lakes pasture is utilized by livestock two out of every three years for a 45-51 day period during May or mid June through mid July. The actual use for the pasture is 125-295 AUMs.

A Rangeland Health Standards Assessment was completed for the Dry Prairie Allotment in 1999 and found that the overall current grazing use was within the sustained yield capacity of the allotment and appropriate for maintaining the current overall good vegetation conditions (USDI BLM et al. 2003).

**Potholes** – This unit is within the Gerber Lakes and Campground pastures of the Dry Prairie Allotment and comprises about 1.2% and 1.5% of the pastures respectively (see Table 4). The Gerber Lakes pasture is utilized by livestock two out of every three years for a 45-51 day period during May or mid June through mid July. The actual use for the pasture is 125-295 AUMs. The Campground pasture is utilized by livestock two out of every three years for a 45-56 day period during May through early June.

**Livestock Grazing – Environmental Consequences**

**Proposed Action and Alternative 1**

The determination of effects of the proposed action and alternatives to livestock grazing will be mainly based upon the effects to palatable livestock forage species. The baseline comparison point will be the vegetation conditions present after the initial juniper cutting treatments occurred. These cutting treatments occurred after the ESI survey. As noted under the Rangeland Vegetation section above, qualitative observations of the vegetation conditions will be used to supplement the ESI survey data. No formal monitoring studies to analyze vegetation response to the juniper cutting have been established in any of the treatment units.

The long term impacts would be dependent upon several factors including the site specific pre-treatment vegetation conditions, post treatment management (including livestock grazing), and weather conditions. The ecological sites within the treatment areas in these pastures that were in Late Seral or PNC ecological status at the time of the ESI survey (1997-98) should have the necessary vegetation components that will result in a long term (5-10 years) increase in palatable forage. The areas that were in Mid or Early seral ecological status or in Fair or Poor condition will likely take longer to recover from the disturbances. As noted in the Rangeland Vegetation section above, past monitoring of the effected grazing allotments have shown that the seasons of livestock use along with low to moderate levels of forage utilization should not have a negative long term effect on the available forage species. However, if yarding occurs in areas of the units where medusahead is present in patches or scattered throughout the vegetation community there could be a long term decrease in palatable livestock forage. This is also discussed below under Cumulative Impacts.

The mitigation measures under the Rangeland Vegetation section above recommend the resting of the Horton and Smith allotments for 1-2 years following the proposed yarding treatments. Resting these pastures would have a short term negative effect to livestock grazing as the forage in these pastures would not be available for use. There should be an increase in palatable forage in the long term (5-10 years) due to the removal of the juniper and the piles of cut juniper. The BLM grazing lessees for these allotments could be negatively impacted financially by this required rest period as they may need to find alternate forage sources for their livestock.
Alternative 2 – Burn Only
As noted above, the amount of land acreage affected by the treatments varies by pasture. The actual amount of land affected by burning would likely consist of less disturbed acres, when compared to the total area analyzed, due to the scattered nature of the piles. Timing of the burning may influence the response of the vegetation as noted above under Rangeland Vegetation, Environmental Impacts – Alternative 2. Under drier conditions, the fire may spread to the interspaces between piles with possible detrimental effects to this vegetation. Typically two years of grazing rest is prescribed following wildfires and broadcast burning although this requirement has never been tested experimentally (Miller et al. 2005). Wildfires and broadcast burning also typically result in greater disturbance to the soil and vegetation than pile burning. The results from postfire defoliation and grazing studies suggest that timing, use, and duration of grazing of burned rangelands are more important than a specific period of rest after fire (Bates et al. 2009). In most of the pastures the low proportion of total land acres disturbed by burning piles should not result in detrimental impacts to the recovery of the vegetation community due to livestock grazing. In the Horton and Smith allotments the acreage burned would be a higher percentage of the total allotment due to the higher levels of juniper piles. Immediate reintroduction of livestock after burning could result in negative impacts to the vegetation, especially where annual exotic grasses and weedy forbs are present. Resting these pastures would have a short term negative effect to livestock grazing as the forage in these pastures would not be available for use. There should be an increase in palatable forage in the long term (5-10 years) due to the removal of the juniper and the piles of cut juniper. The BLM grazing lessees for these allotments could be negatively impacted financially by this required rest period as they may need to find alternate forage sources for their livestock.

No Action Alternative
The No Action Alternative would not directly affect livestock grazing. However, existing condition and availability of forage would continue to be impacted due to the presence of the piles. Typically a pile makes the ground underneath unavailable for growing forage. Under this alternative the majority of the existing piles of juniper would remain on the ground. A small percentage could be utilized by wood cutters. Most of the piles are of an individual density that would likely result in the smothering of any vegetation that is under them. Studies have also shown that debris left on the ground can smother perennial grasses and cheatgrass cover can increase and persist compared to burned piles (Bates and Svejcar, unpublished data). These studies also involved scattered juniper debris, not large piles like those being analyzed in this document. The density of the individual juniper piles would also likely result in the smothering of any vegetation beneath them. This would result in a minor negative impact to livestock grazing in both the short and long terms as the vegetation beneath the piles would be unavailable as forage and a possible increase in cheatgrass could displace native perennial grasses.

Cumulative Impacts for Livestock Grazing
Proposed Action and Alternative 1
The existing piles of juniper were created by juniper treatments involving mechanized cutting and piling of standing juniper. Research studies have shown an increase in the productivity of forage species following juniper cutting (Young et al. 1985; Vaitkus and Eddleman 1987; Bates et al 2000). In these three studies different studies, the juniper was cut with chainsaws with some areas left and some areas broadcast burned. Qualitative observations of the proposed treatment areas following the initial mechanized cutting treatments have shown an increase in perennial forage species. Qualitative observations have also shown that an increase in the exotic annual grasses - cheatgrass and medusahead has occurred in some areas following these initial mechanical cutting and piling treatments. Additional mechanical disturbance from the Proposed Action and Alternative 1 could likely result in a further increase in these exotic species. This could result in a short term and possible long term negative impact to the amount of palatable forage species present for livestock use. It could also increase the time period required for recovery of the vegetation community to a late or PNC ecological condition.

As noted above, the Rangeland Health Standards Assessments completed for the grazing allotments found that the Standards were being met on most of the allotments. The assessment for the Willow Valley allotment found that Standards1 (Watershed Function – Uplands), 2 (Riparian/Wetlands), and 3 (Ecological Processes) were not
being fully met. The failure to meet Standard 1 was due in part to the vegetative conditions in the Woolen Canyon pasture. The Willow Valley Sage proposed treatment unit is within this pasture. If negative impacts, as described above, occur to the vegetation in this pasture due to the proposed treatments the objective of meeting this Standard could be compromised. Changes were made to the livestock grazing management in this pasture following the assessment as required by Title 43 of the Code of Federal Regulations. If future monitoring studies show that vegetation conditions have declined in the pasture then additional management changes will need to be made. This could result in negative impacts to the livestock permittees for the Willow Valley allotment if the changes require a reduction in the AUMs for the allotment.

Alternative 2 – Burn Only
The cumulative impacts to livestock grazing and forage after burning are discussed above under Rangeland Vegetation, Cumulative Impacts, Alternative 2 - Burn Only.

Mitigation

Proposed Action and Alternative 1
The proposed treatment areas should be inventoried for the presence of medusahead prior to yarding. Areas where it is found in “patches” or where it is present throughout the understory should be avoided for treatment. In addition, all equipment and vehicles should avoid these areas and they should not be included as areas open to firewood cutting.

In areas that are yarded, full suspension yarding (Alternative 1) should be used when transporting the juniper piles to the main skid trails to decrease the amount of soil surface and vegetation disturbance. Use of full suspension yarding on skid trails would also decrease the level of soil and vegetation disturbance on these areas.

The areas in skid trails and landings will likely have little vegetation remaining following yarding. The Proposed Action and Alternative 1 would seed all disturbed areas with native grass seed following yarding. This would help accelerate recovery and inhibit the establishment of invasive annual species. These areas should be monitored following seeding to determine their success. Any areas where seedlings fail to establish should be replanted. The design of the seeding process and the monitoring program will be based upon established methods.

The Horton and Smith Allotments should be rested from livestock grazing for one to two years following yarding to allow for recovery of the native perennial grasses and to allow for the establishment of grass seedlings in areas that are seeded after yarding.

Alternative 2 – Burn Only
Burning of the juniper piles should be done when soils and juniper needle litter contacting the ground are wet and preferably frozen to lessen the affects to the vegetation below and surrounding the piles and to lessen the spread of fire to the interspaces.

The Horton and Smith Allotments should be rested for one to two years following treatment to allow for recovery of the native perennial grasses in the burned areas.

Terrestrial Wildlife Species - Affected Environment
This section focuses on the wildlife species that are considered special status species and/or special emphasis species that would potentially be affected by the proposed 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 2008” list for the Columbia Basin (BCR9 list). Mule deer (A special emphasis species) will also be addressed. The habitat within the proposed units is non-forest and consists of shrublands and grasslands with scattered live junipers and ponderosa pine which were left during the cutting operations, and scattered piles of previously cut juniper trees at variable densities. Disposal of the piles does not have the potential to affect the adjacent forested habitats or forest associated
wildlife with the exception of disturbance of sensitive, forest-using species such as eagles. For a list of other species (those not addressed below) and a description of their habitats that may occur in the proposed project area, refer to the Klamath Falls Resource Area FEIS of 1994 (pages 3-37 to 3-41).

**Threatened, Endangered, and Candidate Species**

*Table 5 – Listed, Proposed and Candidate Terrestrial Wildlife Species considered for this Analysis*

<table>
<thead>
<tr>
<th>Species</th>
<th>Scientific Name</th>
<th>Status</th>
<th>Designated Critical Habitat within project area</th>
<th>Species or habitat occur within the project area</th>
<th>May be affected by project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada Lynx</td>
<td><em>Lynx canadensis</em></td>
<td>Threatened</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Northern Spotted Owl</td>
<td><em>Strix occidentalis caurina</em></td>
<td>Threatened</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Pacific Fisher</td>
<td><em>Martes pennanti pacifica</em></td>
<td>Candidate</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Yellow-Billed Cuckoo</td>
<td><em>Coccyzus americanus</em></td>
<td>Candidate</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Oregon Spotted Frog</td>
<td><em>Rana pretiosa</em></td>
<td>Candidate</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Mardon Skipper Butterfly</td>
<td><em>Polites mardon</em></td>
<td>Candidate</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

Species list derived from list issued by the U.S. Fish and Wildlife Service to the Klamath Falls BLM Office.

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

The BLM national Special Status Species Policy (BLM Manual 6840) describes a process by which species are 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 2 currently valid categories within Oregon BLM (Bureau Sensitive, and Strategic), only Bureau Sensitive species are addressed in project level 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.

**Other Wildlife Species with Special Emphasis**

**Bald Eagle**

There is a bald eagle nest in the vicinity of the access road to the southern portion of the Smith Reservoir unit. The unit itself is outside the seasonally restricted area, but the access road passes through the restricted area between the nest and the reservoir.

**Golden Eagle**

This species is protected by the Bald Eagle Protection Act of 1940, and is afforded some special protection measures in the Klamath Falls Resource Management Plan of 1995. There are no known golden eagle nests within or adjacent to the project area.
### Table 6 – Bureau Sensitive Vertebrate and Invertebrate Wildlife and Fish Species documented or suspected to occur on the Klamath Falls Resource Area.

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

Source: IM# IM-OR-2007-072.

**Mule Deer**

All of the project units are within summer, winter, or transitional range for mule deer.

**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 DC 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 7 below displays the migratory birds that must be addressed in NEPA documents on the eastern portion of the Klamath Falls Resource Area.

**Table 7 – Birds of Conservation Concern in Great Basin Portion of Klamath Falls Resource Area.**

<table>
<thead>
<tr>
<th>Species</th>
<th>Scientific Name</th>
<th>Species or habitat occur within the project area</th>
<th>Project may affect the species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferruginous Hawk</td>
<td>Buteo regalis</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Golden Eagle</td>
<td>Aquila chrysaetos</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Peregrine Falcon</td>
<td>Falco peregrinus</td>
<td>Winter foraging only</td>
<td>No</td>
</tr>
<tr>
<td>Flammulated Owl</td>
<td>Otus flammmeolus</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Lewis’s Woodpecker</td>
<td>Melanerpes lewis</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Williamson’s Sapsucker</td>
<td>Sphyrapicus thyroideus</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>White-headed woodpecker</td>
<td>Picoides albolarvatus</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Loggerhead Shrike</td>
<td>Lanius ludovicianus</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Brewer’s Sparrow</td>
<td>Spizella brevari</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sage Sparrow</td>
<td>Amphipiza belli</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Greater Sage Grouse (Columbia Basin population)</td>
<td>Centrocercus urophasianus</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Yellow Rail</td>
<td>Coturnicops noveboracensis</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Snowy Plover</td>
<td>Charadrius alexandrinus</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Long-billed Curlew</td>
<td>Numenius americanus</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Marbled Godwit</td>
<td>Limosa fedoa</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Yellow Billed Cuckoo</td>
<td>Coccystus americanus</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Black Swift</td>
<td>Cypseloides niger</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Virginia’s Warbler</td>
<td>Vermivora virginiae</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Tricolored Blackbird</td>
<td>Agelaius tricolor</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Eared Grebe</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Bald Eagle</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Calliope Hummingbird</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Willow Flycatcher</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Pinion Jay</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sage Thrasher</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Green-tailed Towhee</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Black-chinned Sparrow</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Black Rosy-Finch</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

| BCR9 (Great Basin) BCC 2002 List Source = Report by the USFWS- “Birds of Conservation Concern 2008” |

**Terrestrial Wildlife Species – Environmental Consequences**

**All Action Alternatives-General Discussion**

The effects of juniper yarding and pile burning on wildlife can be categorized as either direct effects or habitat alteration effects. Direct effects include noise disturbance which results in displacement of wildlife from occupied habitat or home ranges, and crushing and or killing of individuals by equipment or by the juniper trees being carried or dragged by the equipment. Burning piles of juniper can also have direct effects. Animals can be killed if they are sheltering in piles that are burned. However, on numerous occasions, wildlife has been seen exiting piles as the piles are lit (personal observation – Broyles, 2009). Pile burn operations move fast and can result in juniper piles being removed from several hundred acres per day. Yarding operations take much longer and thus the period of sound and visual disturbance associated with yarding operations is longer than for pile burning for any given treatment. The time of year that an operation occurs can also influence the potential for direct effects on wildlife. Pile burning typically occurs in the fall, winter or very early spring when most...
wildlife are either out of the area, or dormant/hibernating. Yarding operations typically occur during the dry season between late spring and fall including the spring/summer reproductive period for wildlife in this area.

Indirect effects include changes in the physical attributes of the vegetative structure resulting from crushing, uprooting, burning or killing of desirable vegetation important for forage or cover, increase in bare and/or disturbed soil which facilitates invasion and spread of non-native and/or undesirable vegetation (weeds).

The discussion of the effects on wildlife of juniper yarding and pile burning on rangeland sites below is limited to effects on designated special status species, certain migratory birds of conservation concern, and big game (deer, elk, pronghorn) species which are special emphasis species. Tables 6 and 7 (above) list Oregon BLM special status species and birds of conservation concern and indicate their documented or suspected presence in the proposed juniper disposal units. Tables 6 and 7 also indicate whether or not the proposed project has the potential to affect the population of each of the affected species. For each potentially affected species of concern a species by species discussion of the effects of each alternative can be found below.

The main impact to wildlife of the action alternatives is the physical disturbance of the existing herbaceous and shrub vegetation. This disturbance not only changes the physical structure of these habitat layers but also changes their floristic composition over time. Yarding juniper either by full or partial suspension results in disturbance and damage by crushing and uprooting of the plants. Burning piles of juniper damages and kills vegetation immediately under the piles and in a small zone around each pile. The zone of damage around an individual burned pile varies according to several factors related to how hot the pile burns, and if the fire creeps around in the ground fuels adjacent to the pile.

Killing and damaging plants whether by burning or yarding creates open growing sites for invasion by, or increases in existing populations of, early seral species and undesirable plants including noxious weeds which negatively affect wildlife habitat quality in several ways. Based on observations of various juniper disposal projects (FTZ 9571-full suspension yarding, Norcross- partial suspension yarding, East fork, Norcross, 21, Seven Little Stukels- pile burning) using a variety of methods including all those being analyzed in this EA it is clear that the action alternatives vary in the amount of disturbance they cause.

No Action Alternative- General Discussion
The effects of the No Action Alternative (leaving the existing piles in place) on wildlife and wildlife habitat vary by species. The existing piles are taking up growing space that would otherwise be occupied by plants of various species that occur in the units. It is estimated that between 1-10% of the surface of the proposed units is occupied by piles, however in unusually dense units piles may occupy up to 20 % of the unit. Piles serve a perches for raptors and can result in increased predation on shrub and grass layer nesting birds as discussed below. Piles can function as hiding cover and shady bedding sites for big game species. Piles can serve as denning substrate and cover for a variety of mammals including mice, woodrats, squirrels, coyotes and foxes. Not removing the piles would allow the piles to continue to function as they currently do for as long as it takes for them to decompose. This could be up to a century, based on observed juniper decay rates in the Gerber Block. As the piles decompose the surrounding vegetation would occupy the ground made available by pile decomposition.

Threatened and Endangered Species impacts

Proposed Action, Alternative 1, Alternative 2, and No Action
There would be no anticipated effect on any Endangered, Threatened, Proposed, or Candidate species under the proposed action or any of the alternatives.

Threatened and Endangered Species Cumulative Impacts
There would be no anticipated cumulative impacts to Threatened, Endangered, Proposed, or Candidate species under the proposed action or any of the alternatives.
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 special protection measures in the Klamath Falls Resource Management Plan of 1995. Bald eagles may occasionally be seen in the project area, and there is bald eagle nest in the vicinity of the access road to the southern portion of the Smith Reservoir unit. The unit itself is outside the seasonally restricted area, but the access road passes through the restricted area between the nest and the reservoir. Activities, including traffic above normal levels (very low use) on this road would be restricted annually from Jan. 1 through Aug. 31 unless the Resource Area wildlife biologist determines that the nest is not active in a given year or that the young have fledged and left the area. With the seasonal restriction in place, no affect to this species is anticipated under the proposed action or any of the alternatives.

**American Peregrine Falcon**
The peregrine falcon was removed from the Endangered Species list in 1999. However, it is still considered a sensitive species by Oregon 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. Neither the proposed action nor any of the alternatives is likely to affect this species.

**Lewis Woodpecker**
This species occurs 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, this species almost certainly occurs there. 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 adjacent to 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. Neither the proposed action nor any of the alternatives would affect this species. Thus, there would likely be no affect to this species under the proposed action or any of the alternatives.

**White-headed Woodpecker**
This species occurs in variable densities throughout the Ponderosa pine and mixed conifer forest habitats in the Klamath Basin provided that those habitats contain medium to large snags. Neither the proposed action nor any of the alternatives would affect snag habitat within pine or mixed conifer stands. Thus there would likely be no affect to this species under the proposed action or any of the alternatives.

**Fringed Myotis (bat) and Pallid Bat**
These species have not been documented in the proposed project area, but they undoubtedly occur there for at least the warmer parts of the year. 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 to these species is limited to the project’s potential to kill or injure individual bats that may be sheltering in juniper piles that are either burned or yarded. Juniper piles are most likely to be used as day roosts, or night roosts during the late spring, summer and early fall. 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 which are usually conducted during dry and warm months. Bat use of juniper piles for over-wintering hibernacula is unknown but considered unlikely due to the lack of thermal mass of the piles. 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). The climatic window for pile burning falls generally in the winter and into spring. 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. Some have been seen doing so. Presumably, pile roosting bats would also be able to escape from piles being...
yarded, having being warned by the approach of heavy equipment. Roosting habitat would be reduced under the preferred action and the other action alternatives. However, alternate roosting structure would still be present in the units in the form of live junipers, stumps, rock outcrops and any residual piles, and there is no indication that bat populations in the area are controlled by rooting substrate availability. Still, for bats, the no action alternative would be preferable to the action alternatives.

Oregon Vesper Sparrow
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. Disposal of juniper piles by yarding with only partial suspension (proposed action) would be the most impacting disposal option for this species due to the higher levels of shrub and grass layer disturbance. Burning the piles would probably be the least impacting because shrub and grass layer disturbance is minimized, (compared to yarding) and the juniper debris is removed (as opposed to being left in place) freeing up growing space for shrubs and grass.

Leaving the juniper piles on site (No Action Alternative) would slightly impact this species by reducing the growing space available for shrubs within the units, and might increase predation on this species by retaining elevated raptor perches (piles) above the shrub layer.

Green-tailed towhee
This species has not been documented in the proposed project area, but it undoubtedly occurs there. It is somewhat common in shrub 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. Disposal of juniper piles by yarding with only partial suspension (proposed action) would be the most impacting disposal option for this species due to the higher levels of shrub and grass layer disturbance. Burning the piles would probably be the least impacting because shrub and grass layer disturbance is minimized, (compared to yarding) and the juniper debris is removed (as opposed to being left in place) freeing up growing space for shrubs and grass.

Leaving the juniper piles on site (No Action Alternative) would slightly impact this species by reducing the growing space available for shrubs within the units, and might increase predation on this species by retaining elevated raptor perches (piles) above the shrub layer.

Sage Thrasher
This species has not been documented in the proposed project area, but it may occur there. It occupies shrub and grassland habitats east of the project area and may occasionally occur in the project area. 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. Disposal of juniper piles by yarding with only partial suspension (proposed action) would be the most impacting disposal option for this species due to the higher levels of shrub and grass layer disturbance. Burning the piles would probably be the least impacting because shrub and grass layer disturbance is minimized, (compared to yarding) and the juniper debris is removed (as opposed to being left in place) freeing up growing space for shrubs and grass.

Leaving the juniper piles on site (No Action Alternative) would slightly impact this species by reducing the growing space available for shrubs within the units, and might increase predation on this species by retaining elevated raptor perches (piles) above the shrub layer.

Other Terrestrial Wildlife Species Including USFWS BCR 9 Species

Golden Eagle
Pine stands adjacent to the proposed units are suitable nesting habitat for this species and the non forested lands are suitable for foraging. There are no known nests within or adjacent to the proposed units. Neither the proposed action nor any of the alternatives is expected to affect this species.
Flammulated Owl
Pine stands adjacent to the proposed units are suitable nesting habitat for this species. Because this species is not known to use juniper piles for nesting or foraging, neither the proposed action nor any of the alternatives is expected to affect this species.

Williamson’s Sapsucker
This species has not been documented in the proposed project area, but it may occur there. This species is closely associated with ponderosa pine trees and snags. Pine stands adjacent to the proposed units are suitable nesting habitat for this species. Because this species is not known to use juniper piles for nesting or foraging, neither the proposed action nor any of the alternatives is expected to affect this species.

Loggerhead Shrike
This species is associated with open, non-forested, shrub habitats. This species has not been documented in the proposed project area, but it likely occurs there. Leaving the juniper piles on site could potentially benefit this species because it hunts from elevated perches and piles provide perches above the shrub layer. Conversely, removing the piles either by burning or yarding would free up growing space for shrubs and grasses. Yarding juniper piles using one-end suspension would impact the treatment area the most, due to the high level of shrub and grass layer disturbance. In areas of average pile densities, burning the piles would generally have less impact on this species because shrub and grass layer disturbance in the treatment area is minimized.

Brewer’s Sparrow
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. Yarding juniper piles using one-end suspension would impact the treatment area the most, due to the high level of shrub and grass layer disturbance. In areas of average pile densities, burning the piles could have less impact on the treatment area because shrub and grass layer disturbance is minimized, and the juniper debris is removed freeing up growing space for shrubs and grass. Leaving the juniper piles on site would impact this species by reducing the growing space available for shrubs within the units, and might increase predation on this species by providing additional elevated raptor perches above the shrub layer.

Big game species
All of the project units are within winter or transitional range for mule deer, year round range for pronghorn, and there has been increase in winter use by elk. Mule deer and pronghorn are primarily browsers, but their diets shift seasonally to include more grasses and forbs when those plants are in succulent growth stages in the spring and early summer. Elk are primarily grazers, but will increase their intake of forbs and shrubs when those species are succulent. Native shrubs such as bitterbrush, mountain mahogany species, Klamath plum and other Prunus species and sage species are key forages for big game species.

The majority of the junipers have already been cut and piled on units proposed for treatment by either pile burning or juniper yarding. The cutting of the junipers has set these units on a trajectory for increased shrub survival and establishment, and a flush of both desirable perennial grasses and undesirable annual grasses. Under all the alternatives (including the No Action) the open growing space, nutrients, and water made available by cutting the junipers will be used to increase the size of the residual shrubs and grasses as well as recruitment of new plants, mostly of the same species occupying the units prior to juniper cutting. Where the alternatives differ with regards to effects on big game habitat is in the degree, amount and pattern of disturbance of the residual desirable vegetation that will result from each alternative. The range management/vegetation response discussion elsewhere in this document describes the likely effects each alternative on vegetation within the proposed pile disposal units. For mule deer, pronghorn, and elk, the alternatives that result in less vegetative disturbance are more beneficial than those that result in more vegetation disturbance. The alternatives that result in lower likelihood of invasion by weedy annual grasses such as cheatgrass are more beneficial than those that result in a higher likelihood of invasion. The No Action Alternative would probably be the most beneficial for
big game species because the existing piles provide visual screening from hunters and predators, and provide shady spots for bedding and thermal regulation. The piles are estimated to occupy approximately 3-10% of the ground surface of most of the units, (with up to 20% in extreme cases). Therefore, the current impact of existing piles on growing space for grass, shrubs and forbs is generally low.

Pile burning on winter range during the seasonal restriction period would be compatible with deer winter range objectives because pile burn operations are limited in duration, usually one to five days per unit, and often the burn days are not consecutive. Thus any disturbance/displacement to wintering deer would be minimal.

**Cumulative Impacts**
The cumulative impacts of the alternatives on wildlife habitat would be the same as described in the rangeland vegetation section.

**Mitigation**
Proposed mitigation would be the same as proposed in the rangeland vegetation section. It should be noted that the likelihood of success for mitigation measures applied for rehabilitation of rangeland vegetation damaged by disposal activities under any of the action alternatives would be expected to vary based on the degree of disturbance. As a general rule, sites with more disturbed ground and where the disturbance is more intense are generally more difficult to rehabilitate. This translates into greater costs of rehabilitation, longer recovery periods, and greater risk of rehabilitation failures.

**Hydrology and Water Quality– Affected Environment**
The project area contains juniper cutting units in four 5th field watersheds. The proportion of the watersheds treated is low (1% or less) relative to the size of the watersheds (Table 8).

**Table 8 – Treatment units and 5th field watershed acres**

<table>
<thead>
<tr>
<th>Watershed Name</th>
<th>Treatment Acres</th>
<th>Watershed Acres</th>
<th>% of 5th field watershed treated</th>
<th>Treatment units in watershed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gerber Reservoir-Miller Creek</td>
<td>1355</td>
<td>176272</td>
<td>0.8</td>
<td>FTZ 110, Schnipps, Pitchlog, Miller Creek, Potholes, Pine Creek</td>
</tr>
<tr>
<td>Langell Valley-Lost River</td>
<td>694</td>
<td>98371</td>
<td>0.7</td>
<td>Pine Creek, Smith Reservoir</td>
</tr>
<tr>
<td>Rock Creek-Lost River</td>
<td>995</td>
<td>92879</td>
<td>1.0</td>
<td>Willow Valley Sage</td>
</tr>
<tr>
<td>Yonna Valley-Lost River</td>
<td>166</td>
<td>144640</td>
<td>0.1</td>
<td>Smith Reservoir</td>
</tr>
</tbody>
</table>

Slopes in the project area are low to moderate, mostly ranging from 0 to 15%. Although soils in the area are generally classified as well-drained, much of the area has shallow soils underlain with duripan which is highly impermeable. Once these soils become saturated during wet conditions and or frozen, surface runoff becomes extensive. 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.

**Hydrology and Water Quality– Environmental Consequences**

**Direct and Indirect Effects of Proposed Action**
Areas with high percentages of perennial shrubs and grasses generally have the capacity to induce higher rates of water infiltration and reduce erosion potential relative to areas with dense juniper or annual grass and forbs.
Management actions that increase the amount of bare soil or induce the spread and colonization of annual plants such as invasive grasses, reduce hydrologic functions such as infiltration. Disturbed areas with little or no grass and shrub cover are especially vulnerable to compaction and erosion. Areas with increased runoff due to compaction and poor soil cover could lead to localized erosion and increases in peak flows in localized portions of the stream network.

The direct effects of yarding on hydrologic function include the potential to increase surface runoff and erosion due to compaction and disturbance especially if rutting and compaction result in the formation of new surface drainage networks within the skid trail network.

The dragging of juniper will result in the removal of grass and forb cover thus increasing erosion potential. If the disturbance and removal results in spread and colonization of invasive grasses and forbs, this will exacerbate the long-term erosion potential. If the spread and colonization of annual plants is persistent, this would likely cause long-term impacts to hydrologic function due to lack of infiltration.

In units with low ecological status increases in bare soil areas or increase in extent of annual grasses (portions of Willow Valley Sage and Pine Creek), one end suspension skidding is likely to lead to persistent reductions in hydrologic functions due to reduced infiltration and increased runoff.

The flatness (0-15%) of most of the areas within cutting units suggests that erosion and surface runoff potential is low. However, rutting that is not addressed thorough water barring and other mitigations could result in substantial surface runoff erosion regardless of slope. The short-term increase in exposed soil conditions in combination with increases in compaction, rutting or other disturbances that increase surface run-off will lead to temporary increases in transport of soil based nutrients. Smaller areas of disturbance and compaction are less likely to produce surface runoff and erosion than larger areas.

**FTZ 110** – This unit has moderately deep soils and good to fair ecological status. The “fair” status was attributed to past logging of the pine stands. Invasive annual plants do not appear to be a major problem in this unit. For these reasons, it is unlikely that persistent hydrologic function impairment would result from one-end suspension yarding in this unit. Erosion potential could be managed in this unit by avoiding linking the skid trail network with the ephemeral and intermittent stream network and by avoiding slopes greater than 25%.

**Pine Creek** – This unit has a mix of soil, ecological types, and condition ratings. Additionally, portions of the unit have high cut juniper densities and large areas of annual invasive grasses. Areas within this unit that have all three of these factors (high juniper density, poor ecological condition, and existing annual grasses) are likely to experience persistent and possible long-term impacts to hydrologic functions. Conversely, areas that have good ecological status and low amount of annual plants and cut juniper would likely be more resilient to one-end suspension yarding, provided that mitigation measures are applied.

**Schnipps** – This unit has deep soils and shallow soils and good ecological status. Invasive annual plants do not appear to be a major problem in this unit. For these reasons, it is unlikely that persistent hydrologic function impairment would result from one-end suspension yarding in this unit. Short-term erosion and compaction on skid trails could occur but they are not expected to cause substantial erosion or impacts to water quality to nearby waterbodies.

**Willow Valley Sage** – This unit has a combination of shallow soils and abundant invasive annual grasses. One-end suspension yarding is likely to exacerbate these problems and lead to long-term impacts in soil infiltration capacity and increase erosional runoff.

**Smith Reservoir** – This unit is above 5000 feet elevation where invasive annual grasses do not appear to persist after disturbances. The ecological condition is rated as good to excellent for most of the unit area. Therefore, no long-term hydrologic impacts related to compaction and infiltration are expected from one-end suspension yarding.
**Potholes** – The potholes units consist of a narrow ring of hand cut juniper around intermittent lakes. Relatively high density of juniper limb piles is present throughout these units except within the pine dominated stands. All piles are limbs separated from whole tree boles. The juniper in the surrounding area was previously removed by machines and primarily pile burned 5 to seven years ago. The ecological status of the units within the previously cut areas is generally good with low amounts of invasive annuals and moderately deep loamy soils. Due to the close proximately to the lake edges and the linear nature of the units, there is the potential for one-end suspension skidding to affect the hydrologic functions of the area due to repeated travel on the same skid road resulting in rutting and compaction.

**Mitigation**

For areas where one-end suspension skidding would occur, several measures could be employed to mitigate for these impacts. Seeding with native perennial grasses could provide for improved hydrologic response as well as provide a seed source for competition with non-native annual grasses. Loosening compacted soil of skid trails and landings (if present) could reduce erosion potential and increase seeding success. For areas where skid trails have the potential to route water and increase the drainage network, water barring and spreading slash to prevent increase could mitigate for erosion and peak flow effects. Obliteration of temporary roads could be done to limit future OHV use and reduce compacted areas. The skid trail network should be designed to limit skidding to horizontal or angled skidding to reduce erosion and sediment transport potential. It is important to limit operations to when soils are very dry or frozen in order to reduce the potential for rutting and compaction and subsequent development of surface water drainage channels (See BMP & Project Design Features in Appendix A for Soil Resources). Minimize size of landings to less than one acre in order to reduce compaction. Manage erosion potential in the FTZ 110 unit by avoiding linking the skid trail network with the ephemeral and intermittent stream network and by avoiding slopes greater than 25%.

**Direct and Indirect Effects of Alternative 1**

Full suspension yarding would be expected to have the similar effects as one end suspension with the exception that there would be relatively less vegetation disturbance, soil disturbance and compaction from not dragging junipers. According to the project description, approximately 5-10% of the area would be disturbed by skid trails and landings if full suspension is applied. The potential for spread and colonization of invasive annual plants would be less and thus the potential for reduced hydrologic function due to poor ground cover conditions.

**FTZ 110** – This unit has moderately deep soils and good to fair ecological status. The “fair” status was attributed to past logging of the pine stands. Invasive annual plants do not appear to be a major problem in this unit. For these reasons, it is unlikely that persistent hydrologic function impairment would result from full suspension yarding in this unit. Erosion potential could be managed in this unit by avoiding linking the skid trail network with the ephemeral and intermittent stream network and by avoiding slopes greater than 25%.

**Pine Creek** – This unit has a mix of soil, ecological types, and condition ratings. Additionally, portions of the unit have high cut juniper densities and large areas of annual invasive grasses. Areas within this unit that have all three of these factors (high juniper density, poor ecological condition, and existing annual grasses) are likely to experience persistent and possible long-term impacts to hydrologic functions. Conversely, areas within the unit that have good ecological status and low amount of annual plants and cut juniper would likely be resilient to full suspension yarding providing that mitigation measures are applied and areas with invasive grasses are avoided.

**Schnipps** – This unit has deep soils and shallow soils and good ecological status. Invasive annual plants do not appear to be a major problem in this unit. For these reasons, it is unlikely that persistent hydrologic function impairment would result from full suspension yarding in this unit. Short-term erosion and compaction on skid trails could occur but they are not expected to cause substantial erosion or impacts to water quality to nearby waterbodies.

**Willow Valley Sage** – This unit has a combination of shallow soils and abundant invasive annual grasses. Full suspension yarding would have less impact to vegetation cover and spread of invasive plants but is still likely to
exacerbate these problems and lead to long-term impacts in soil infiltration capacity and increase erosional runoff.

**Smith Reservoir** – This unit is above 5,000 feet elevation where invasive annual grasses do not appear to persist after disturbances. The ecological condition is rated as good to excellent for most of the unit area. Therefore, no long-term hydrologic impacts related to compaction and infiltration are expected from full suspension yarding.

**Potholes** – The potholes units consist of a narrow ring of hand cut juniper around intermittent lakes. A relatively high density of juniper limb piles are present throughout these units except within the pine dominated stands. All piles are limbs separated from whole tree boles. The juniper in the surrounding area was previously removed by machines and primarily pile burned 5 to 7 years ago. The ecological status of the units within the previously cut areas is generally good with low amounts of invasive annuals and moderately deep loamy soils. Due to the close proximity to the lake edges and the linear nature of the units, there is the potential for full suspension skidding to affect the hydrologic functions of the area due to repeated travel on the same skid trail resulting in rutting and compaction.

**Mitigation**
For areas where full suspension skidding would occur, several measures could be employed to mitigate for these impacts. Seeding with native perennial grasses could provide for improved hydrologic response as well as provide a seed source for competition with non-native annual grasses. Loosening compacted soil of skid trails and landings (if present) could reduce erosion potential and increase seeding success. For areas where skid trails have the potential to route water and increase the drainage network, water barring and spreading slash could mitigate for erosion and peak flow effects. Obliteration of temporary roads could be done to limit future OHV use and reduce compacted areas. The skid trail network should be designed to limit skidding to horizontal or angled skidding to reduce erosion and sediment transport potential. It is important to limit operations to when soils are very dry in order to reduce the potential for rutting and compaction and subsequent development of surface water drainage channels (See BMP & Project Design Features in Appendix A for Soil Resources). For the Potholes Units, it is recommended that if the cut logs are removed from this unit, a self-loader or forwarder loader be used to minimize the number of travel trips on the skid or temporary roads. Manage erosion potential in the FTZ 110 unit by avoiding linking the skid trail network with the ephemeral and intermittent stream network and by avoiding slopes greater than 25%.

**Direct and Indirect Effects of Alternative 2 – Burn Only**

**FTZ 110, Pine Creek. Schnipps, Willow Valley Sage, Smith Reservoir** – Burning the juniper to remove juniper piles has little potential to influence hydrologic processes since the potential to increase surface erosion is low. In the long-term, the area currently covered with juniper piles is likely to colonize with shrubs and grasses which will aid in the interception and infiltration of rain and snowfall. In the short-term, burn piles where pile density is high or there is high burn intensity, there could be temporary loss of soil fertility leading to lack of vegetation regrowth, causing localized erosion and loss of soil infiltration capacity.

**Potholes** – The potholes units consist of a narrow ring of hand cut juniper around intermittent lakes. A relatively high density of juniper limb piles is present throughout these units except within the pine dominated stands. All piles are composed of limbs separated from whole tree boles. The juniper in the surrounding area was previously removed by machines and primarily pile burned five to seven years ago. The ecological status of the units within the previously cut areas is generally good with low amounts of invasive annuals and moderately deep loamy soils. The effects of pile burning in the current units adjacent to the lakes would be expected to be similar, with excellent recovery of native grasses and shrubs.

**Pitchlog** – This unit is a combination of riparian treatments including cutting and piling of invasive pine and juniper and cutting and leaving whole juniper (Barnes Valley Creek and Longbranch Creek). In all cases the density of piles and whole trees is very low such that no hydrologic impacts would be expected from pile burning or broadcast underburning.
Miller Creek – This unit is adjacent to Miller Creek, a perennial stream controlled by Gerber Reservoir Dam operations. Juniper limbs were hand cut and limbs piled separately from tree boles. Due to the low density of tree boles and piles, no hydrologic impacts would be expected from pile burning or broadcast underburning.

Mitigation
Planting a combination of shrubs and native grasses in burn scars would lessen the hydrologic impact in the short term and increase the competitive advantage for native species over invasion by annual grasses and forbs such as thistle. Burning when conditions promote lower intensity burn would minimize soil damage. Burning when soils are wet or frozen would reduce the likelihood of formation of hydrophobic soils thus decreasing erosion potential and reducing the likelihood of colonization by weed and invasive annual grasses.

Direct and Indirect Effects of No Action Alternative
The no action would have no ground disturbance other than the mulching effects of decomposing piles and therefore would be the least likely alternative to have hydrologic impacts. A potential indirect effect of the no action alternative could occur if piles accidentally burned due to wildfire. In the event of a wildfire, it is anticipated that the impacts to hydrologic processes would be similar in nature to the Burn only alternative except that the effects of burn intensity on the soil could be greater due to expected dryer conditions at the time of burning.

Mitigation
No mitigation is proposed for the no-action alternative

Cumulative Impacts All Action Alternatives
Previous and ongoing impacts that may be affecting hydrology in the analysis area include soil compaction and soil disturbance from grazing, extensive areas of invasive annual grasses, and the disturbance and compaction resulting from the mechanical ground based treatments used to cut the juniper proposed for disposal. Most hydrologic alteration due to changes in canopy cover occurred when the juniper was cut. There is expected to be a short-term effect of decreasing rain and snow interception from the juniper canopy removal, however, conversion of juniper woodlands to predominantly shrub and grass communities is not expected to increase runoff or erosion in the long-term. Rather, juniper cutting should increase infiltration and reduce erosion due to effects of expected increased shrub/grass ground cover (Pierson et al 2007; Peterson and Stringham 2008). Compaction, soil disturbance, and expansion of bare soil and invasive annual grasses are the potential causal mechanisms for increased surface runoff and erosion and poor infiltration of precipitation. These hydrologic processes are increasingly impacted in proportion to the level of ground disturbance.

Due to the small acreages within subwatersheds affected by the project, the relatively low slopes, and the proposed mitigation measures, it is not anticipated that the full suspension skidding alternative, the burn only alternative, and the no action alternative would have any significant or persistent impacts to water resources including effects on peak or base flows, groundwater infiltration, or water quality. Due to the higher potential for one-end suspension skidding to increase the spread and persistence of annual grasses and the overall higher soil impacts resulting from the disturbance of tree dragging, this alternative could have longer-lasting impacts to hydrologic function within the project areas and subwatersheds. The mitigation measures listed for the Proposed Action and Alternative 1 would lessen these impacts but would not eliminate or entirely ameliorate watershed level impacts to infiltration and erosion in the short term. None of the alternatives are expected to cause any increases in peak flows at the project unit scale and would not be measurable at the watershed or subwatershed scale (5th or 6th field watersheds). There are no perennial streams or streams higher than 2nd order intermittent near treatment units such that sediment impacts would be expected to reach nearby water bodies and impact the ability to meet water quality standards.

Aquatic Species – Affected Environment
Pitchlog Creek – Barnes Valley, Pitchlog and Long Branch Creeks are all fish-bearing tributaries that flow into Gerber Reservoir. Low to moderate gradients, low summer base flows, and high peak flows during snowmelt and rain on snow events characterize these stream environments for aquatic species. These streams are best
described as “interrupted perennial”, that is, some sections of the streams run subsurface during dry periods. Surveys conducted by Department of Interior personnel have documented shortnose sucker, Klamath largescale sucker, redband trout, Klamath speckled dace, tui chub, lamprey, sculpin (Table 9), and a suite of non-native fish in these streams. Some fish actively or passively move (migrate) out to Gerber reservoir before the dry period of the year. Others over-summer in the streams by seeking refugia in one of many perennial pools.

Table 9 – Native fish species potentially affected by the proposed action within the Pitchlog, Miller Creek and FTZ 110 units.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>BLM Status</th>
<th>Stream Documented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortnose Sucker</td>
<td><em>Chasmistes brevirostris</em></td>
<td>Federally Endangered*</td>
<td>Barnes Valley, Pitchlog, Long Branch and Miller Creeks</td>
</tr>
<tr>
<td>Klamath Largescale Sucker</td>
<td><em>Catostomus snyderi</em></td>
<td>None</td>
<td>Barnes Valley, Pitchlog, Long Branch and Miller Creeks</td>
</tr>
<tr>
<td>Inland Redband Trout</td>
<td><em>Oncorhynchus mykiss</em></td>
<td>BLM Sensitive</td>
<td>Barnes Valley and Miller Creeks</td>
</tr>
<tr>
<td>Klamath Speckled Dace</td>
<td><em>Rhynchithys osculus klamathensis</em></td>
<td>None</td>
<td>Barnes Valley, Pitchlog, Long Branch and Miller Creeks</td>
</tr>
<tr>
<td>Tui Chub</td>
<td><em>Gila bicolor</em></td>
<td>None</td>
<td>Barnes Valley, Pitchlog, Long Branch and Miller Creeks</td>
</tr>
<tr>
<td>Lamprey</td>
<td><em>Lampetra sp.</em></td>
<td>None</td>
<td>Miller Creek</td>
</tr>
<tr>
<td>Sculpin</td>
<td><em>Cottus sp.</em></td>
<td>None</td>
<td>Miller Creek</td>
</tr>
</tbody>
</table>

*Federally Endangered or Threatened – Those species listed under the Endangered Species Act as Endangered or Threatened

During 2004-2005 the US Geological Survey, US Bureau of Reclamation, and US Fish and Wildlife Service (USFWS) documented a high level of hybridization between shortnose and Klamath largescale suckers in Gerber Reservoir (USGS, 2006). The USFWS has determined that protection under the Endangered Species Act (ESA) should extend to hybrid shortnose sucker/Klamath largescale sucker populations in the Lost River system (including Gerber Reservoir) and that these hybrids should be considered shortnose suckers for conservation purposes (USFWS, 2008). Therefore, for the remainder of this document and for ESA consultation purposes, the hybrid shortnose sucker/Klamath largescale sucker will be considered the federally endangered shortnose sucker (*Chasmistes brevirostris*).

The shortnose sucker was listed as endangered in 1988 under the ESA (USDI-FWS, 1988). This species inhabits lakes and streams in the Klamath Basin and were once abundant in the Lost River watershed, Upper Klamath Lake, and its tributaries. Gerber Reservoir and its watershed was identified as unit 6 in the proposed critical habitat determination rule for shortnose suckers and is the only major habitat area inhabited by shortnose suckers but not Lost River suckers (USDI-FWS, 1994). Proposed critical habitat unit 6 includes the waters of Gerber Reservoir below the high water line and a large portion of the Ben Hall, Barnes, Barnes Valley, Pitchlog, Long Branch and Wildhorse Creek watersheds (within 100-year floodplain of designated stream segments) (USDI-FWS, 1995).

FTZ 110 – The FTZ 110 unit is upslope of Barnes Valley Creek (see previous section), on a fairly gentle slope and is approximately 0.25 miles from the creek. Barnes Valley is best described as “interrupted perennial”. Shortnose sucker (*Chasmistes brevirostris*), Klamath largescale sucker (*Catostomus snyderi*), redband trout (*Oncorhynchus mykiss*), Klamath speckled dace (*Rhynchithys osculus klamathensis*), tui chub (*Gila bicolor*), and a suite of non-native fish species have been documented in this stream. The shortnose sucker is listed as endangered under the Endangered Species Act (ESA). Additionally, Barnes Valley Creek and its associated 100-year floodplain are within Proposed Critical Habitat Unit #6 for the shortnose sucker.
Miller Creek – Miller Creek can be described as having low to moderate gradient, confined in steeper canyon, rocky substrate with little gravel due to reservoir controlled flows. Miller Creek is the outlet from Gerber Reservoir and its flows are subject to the storage and release of waters for irrigation purposes. Therefore, this stream typically has its high flows in the summer and is cut off in the winter and spring except for dam leakage and some ground water accretion within the canyon area. The outlet at Gerber dam is opened in the spring (approx April 15) to provide irrigation water to the Langell Valley Irrigation District lands. The outlet is shut off on or about October 1. Toward the lower end of the creek, the flow is diverted into irrigation canals. Only in periods of spring runoff, when Gerber Reservoir is full, does Miller Creek reach the Lost River. Because of low winter flow, complete freezing or ice related anoxia during cold spells might be a problem for fish in Miller Creek (Bill Tinniswood, ODFW, pers comm. 2008). Shortnose and Klamath largescale suckers, redband trout, Klamath speckled dace, lamprey, tui chub, and a suite of non-native fish species have been documented in Miller Creek.

Schnipps – The Schnipps units are approximately 0.1 - 0.2 miles from Tillie and Schnipps Valley Springs and their associated unnamed drainages. These drainages are both considered intermittent upstream of the springs and interrupted perennial downstream of the springs. Both of the drainages are considered to be non-fishbearing. From the proposed units, these drainages run approximately 0.8 to 1.1 miles to Miller Creek, the closest fish-bearing waterway. Due to the distance and intermittent nature of these tributaries between the unit and Miller Creek, no impacts to federally listed or BLM sensitive fish species are expected to occur. The Schnipps Unit will not be discussed further in this analysis in regards to fisheries.

North Willow Valley Sage – The North Willow Valley Sage Unit is adjacent to Willow Valley Reservoir and Antelope Creek. Willow Valley Reservoir was formed by the construction of a dam on East Fork of the Lost River also known as Antelope Creek in about 1920 to provide storage for agriculture irrigation (ODFW 1997). At elevation 4526, Willow Valley Reservoir has a surface area of 588 acres; depth averages 12 feet with a maximum of 25 feet. The reservoir is classified as eutrophic with high levels of phosphorus. Water transparency is low because of algae and suspended sediments. Low light penetration retards growth of aquatic vegetation. Flooded juniper trees and rocks provide the primary cover elements. Irrigation and maintenance can virtually dry up the reservoir leaving only the small inflow from East Fork Lost River to provide refugial habitat for aquatic species.

Willow Valley Reservoir is managed by ODFW as a warm water fishery and has a variety of introduced gamefish species including; stocked Lahontan cutthroat trout (Onchyrhynchus clarki henshawi), largemouth bass (Micropterus salmoides), bluegill sunfish (Lepomis macrochirus) brown bullhead (Ameiurus nebulosus), and white crappie (Pomoxis annularis)

Antelope Creek drains a rocky plateau during spring runoff but perennial flow is limited to a 2 mile section fed by Duncan Springs. That perennial segment lies within a rim rock canyon and generally has good cover provided by boulders, shrubs, and trees. This stream flows into Willow Valley reservoir where its waters are stored for irrigation purposes.

Western junipers were cut, piled and burned in the past as part of the Antelope Creek (upstream of Willow Valley Reservoir) riparian thin project, There are no piles in the North Willow Valley Sage Unit within the riparian zone (below the canyon rim) of Antelope Creek or within the high water mark riparian buffer of Willow Valley Reservoir. Therefore, no foreseeable effects on fish or water quality in Willow Valley Reservoir or Antelope Creek are anticipated. The North Willow Valley Sage Unit will not be discussed further in this analysis in regards to fisheries.

Pine Creek Unit – Parts of the Pine Creek unit boundaries are adjacent to Pine Creek. It is considered an intermittent, non-fishbearing stream. Water from Copeland Reservoir flows seasonally down Pine Creek toward Miller Creek, which is the closest fish-bearing waterway. From the furthest downstream edge of the unit adjacent to the drainage, Pine Creek flows approximately 2.1 miles to the confluence of Miller Creek. On private land downstream of the unit, most of the Pine Creek flow is diverted for irrigation. Due to these
diversions, distance from the proposed unit, and the intermittent nature of Pine Creek, no impacts to federally listed or BLM sensitive fish species are expected to occur. The Pine Creek Unit will not be discussed further in this analysis in regards to fisheries.

**Smith Reservoir** – Parts of the Smith Reservoir unit boundaries are adjacent to Smith and Harpold Reservoirs on Bryant Mountain.

When full, Smith Reservoir has approximately 75 – 90 surface acres and is considered a fish-bearing perennial impoundment. It is subject to summer drawdown due to irrigation releases, but is not typically subject to complete dewatering. Although Smith Reservoir is not managed by ODFW as a warm water fishery, it has a variety of warm water gamefish species including; largemouth bass (*Micropterus salmoides*), pumpkinseed sunfish (*Lepomis gibbosus*) brown bullhead (*Ameiurus nebulosus*), and white crappie (*Pomoxis annularis*) (Bill Tinniswood, ODFW, 2008, pers. com.). This reservoir does not contain any federally listed or BLM sensitive fish species and is not reasonably hydrologically connected to any waterways that contain these fish species. Smith Reservoir will not be discussed further in this analysis in regards to listed or sensitive fisheries. Riparian buffers were utilized during juniper treatments.

When full, Harpold Reservoir has approximately 74 - 118 surface acres and is considered a non-fishbearing, intermittent impoundment. This reservoir is subject to complete annual dewatering for downstream irrigation purposes. This reservoir is not reasonably hydrologically connected to any waterways that contain federally listed or BLM sensitive fish species. Therefore, no impacts to federally listed or BLM sensitive fish species are expected to occur. Harpold Reservoir will not be discussed further in this analysis in regards to fisheries.

**Potholes** – The Potholes units are adjacent to the Potholes, which are non-fishbearing, small lakes that are considered intermittent. They are likely never hydrologically connected with Ben Hall Creek or Gerber Reservoir, which are the closest fish-bearing waterways. Because of this lack of hydrologic connection, and intermittent nature, no impacts to federally listed or BLM sensitive fish species are expected to occur. The Potholes Unit will not be discussed further in this analysis in regards to fisheries.

**Aquatic Species – Environmental Consequences**

**Effects of Proposed Action and Alternative 1**

**Pitchlog** – The Pitchlog Creek unit is not being considered for utilization under this analysis.

**FTZ 110** – The quarter mile wide zone between the unit and the creek is very rocky and heavily vegetated. There are two ephemeral drainages that originate within the unit and pass into/through the area between the unit and the creek. Although it is unlikely to occur, these drainages may route sediment toward Barnes Valley Creek during peak flow conditions and high flow events. The amount of sediment that would likely enter the creek would likely be nearly undetectable since peak flow events are generally associated with higher turbidity levels. However, in order to protect Barnes Valley Creek, the shortnose sucker, and Proposed Critical Habitat for the shortnose sucker, from any additional sedimentation from FTZ 110, parts of the unit around the described drainages were removed from the action area (see unit map). By excluding mechanical yarding and traffic from machinery from these drainage areas, the proposed action within FTZ 110 will have no effect on fish, water quality or aquatic habitat in Barnes Valley Creek (see Endangered Species Act Consultation Section).

**Miller Creek** – The Miller Creek unit is not being considered for utilization under this analysis.

**Effects of Alternative 2**

**Pitchlog** – The Pitchlog Creek unit, containing portions of Barnes Valley, Pitchlog and Long Branch Creeks was treated (cut and piled) as a riparian thin under the Gerber Tributaries Riparian Thinning CX (CX-08-09). Project Design Features (PDF’s) were followed and stated that no piles shall be constructed within or directly adjacent to any active stream channel and no vehicle use or refueling within 100 ft of riparian or spring areas.
Even with the PDF’s in place and pile burning likely occurring in winter, a small amount of sediment could enter the streams before riparian vegetation can reestablish the variably scorched soil area under the pile.

Effects to shortnose sucker, Proposed Critical Habitat and redband trout would likely be minimal and short term in duration (see Endangered Species Act Consultation Section). The long-term result of riparian thinning and pile burning will likely be beneficial to native fish and aquatic habitat.

**FTZ 110** – The FTZ 110 unit is not being considered for pile burning under this analysis.

**Miller Creek** – The Miller Creek unit was treated (cut and piled) as a riparian thin under the Gerber Tributaries Riparian Thinning CX (CX-08-09). Project Design Features (PDF’s) were followed and stated that no piles shall be constructed within or directly adjacent to any active stream channel and no vehicle use or refueling within 100 ft of riparian or spring areas. Even with the PDF’s in place and pile burning likely occurring in winter, a small amount of sediment could enter the streams before riparian vegetation can reestablish the variably scorched soil area under the piles.

Effects to shortnose sucker, Proposed Critical Habitat and redband trout would likely be minimal and short term in duration (see Endangered Species Act Consultation Section). The long-term result of riparian thinning and pile burning will likely be beneficial to native fish and aquatic habitat.

**Effects of the No Action Alternative**

**Pitchlog** – The effects of the no action alternative on water quality and therefore fish are described in the Hydrology section.

**FTZ 110** – The no action alternative would not have any foreseeable effects on fish or water quality in Barnes Valley Creek.

**Miller Creek** – The effects of the no action alternative on water quality and therefore fish are described in the Hydrology section.

**Soils - Affected Environment**

The U.S.D.A. Natural Resources Conservation Service (NRCS) classifies soils into map units including one or more dominant soil map unit components and inclusions. Soil map unit components may be designated based on the soil series, slope, aspect and texture modifier. Soil series are soils grouped together with similar pedogenesis (soil formation), soil chemistry, and physical properties. Thirteen different map units have been identified in the treatment area consisting of 18 different soil series designations. (Refer to Table 10 and the Soils Map in the Project Record.) Twenty-five percent of the proposed treatment area is on Norcross soils, 17 percent on Wollencanyon soils, 14 percent on Merlin soils, 9 percent on Wonser soils, and 9 percent of Yancy soils (Table 11). These soils are classified as Mollisols because they have deep, high organic nutrient-enriched surface layers typically 60 to 80 cm thick. Many of the soils within the project area formed in volcanic ash over residuum derived from basalt. Generally these soils have a high to very high runoff potential. Approximately a third of project area soils are soft or slightly hard which refers to the soils resistance to rupture when dry.

**Norcross Series** – Soils of the Norcross series are shallow, fine-textured Mollisols with very high surface runoff. The surface layer is very cobbly ashy loam and is typically underlain by hard vesicular basalt at depths of 18-46 inches below the soil surface. Permeability is slow and soils of the Norcross series typically occur on slopes with gradients of 0 to 10 percent.

**Wollencanyon Series** – Wollencanyon soils are shallow fine textured Mollisols. They are underlain by an impervious layer of duripan and surface runoff is high. The surface layer has a very stony clay loam texture and the surface is covered with about 15 percent pebbles, 15 percent cobbles, 15 percent stones, and 2 percent boulders.

**Merlin** – Soils of the Merlin series are shallow Mollisols with extremely stony clay loam surface textures. They are underlain by basalt 18 inches below the soil surface and the surface runoff potential is high.
**Yancy** – The Yancy series consists of shallow, well drained soils that formed in gravelly sediments weathered from basalt, tuff, and felsites. These soils are Mollisols with clay loam surface textures and they are slightly hard. The runoff potential of these soils varies from moderate to rapid.

**Notchcorral Series** – These soils are deep fine textured Mollisols underlain by an impervious layer of duripan. The surface texture is very cobbly loam and surface runoff is high.

**Wonser Series** – Wonser soils are shallow to a duripan and formed in volcanic ash derived from dacite and residuum derived from basalt. The surface texture is extremely cobbly loam and surface runoff is high.

Soils in the project area have been rated for their potential to erode and compact following disturbance activities using rubber tired machinery, and their susceptibility to damage from fire following juniper pile burning activities.

**Table 10 – Physical properties of soils within the proposed treatment units**

<table>
<thead>
<tr>
<th>Soil series</th>
<th>Textures</th>
<th>Depth of A Horizon (inches)</th>
<th>Resistance to Rupture (when dry)</th>
<th>Runoff Potential</th>
<th>Total acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norcross</td>
<td>Extremely cobbly ashy loam, very cobbly ashy loam</td>
<td>6</td>
<td>Hard</td>
<td>High</td>
<td>752</td>
</tr>
<tr>
<td>Woolencanyon</td>
<td>Very stony clay loam</td>
<td>2</td>
<td>Hard</td>
<td>High</td>
<td>508</td>
</tr>
<tr>
<td>Merlin</td>
<td>Extremely stony clay loam</td>
<td>4</td>
<td>Hard</td>
<td>High</td>
<td>452</td>
</tr>
<tr>
<td>Yancy</td>
<td>Clay loam</td>
<td>2</td>
<td>Slightly hard</td>
<td>Medium to rapid</td>
<td>301</td>
</tr>
<tr>
<td>Notchcorral</td>
<td>Very cobbly loam</td>
<td>3</td>
<td>Soft</td>
<td>High</td>
<td>281</td>
</tr>
<tr>
<td>Wonser</td>
<td>Extremely cobbly loam</td>
<td>2</td>
<td>Hard</td>
<td>High</td>
<td>225</td>
</tr>
<tr>
<td>Dranket</td>
<td>Very cobbly ashy loam, very cobbly loam, very stony loam</td>
<td>8</td>
<td>Slightly hard</td>
<td>High</td>
<td>159</td>
</tr>
<tr>
<td>Rock Outcrop</td>
<td>Unweathered bedrock</td>
<td>0</td>
<td>Hard</td>
<td>High</td>
<td>74</td>
</tr>
<tr>
<td>Mound</td>
<td>Very stony loam</td>
<td>15</td>
<td>Soft</td>
<td>Low to high</td>
<td>70</td>
</tr>
<tr>
<td>Schnipps</td>
<td>Cobbly loam</td>
<td>14</td>
<td>Soft</td>
<td>High to very high</td>
<td>47</td>
</tr>
<tr>
<td>Royst</td>
<td>Cobbly loam</td>
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<td>High</td>
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Table 11 – Distribution of soil types within proposed treatment units

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<th>Soil series</th>
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<th>FTZ-110</th>
<th>Long Branch Creek</th>
<th>Miller Creek</th>
<th>North Schnipps</th>
<th>North Willow Valley Sage</th>
<th>Pine Creek</th>
<th>Potholes</th>
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**Fire Damage Potential**

Soils within the proposed treatment area have been evaluated for their susceptibility to damage following juniper pile burning activities 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).

As soil organic matter is destroyed by fire, soil productivity can decrease. Organic matter is important to the health and productivity of grasslands because of its nutrient and water content, its influence on physical, chemical, and biological characteristics; and its ability to support root and microbial growth. At 220°C, 37 percent of carbon (organic matter) can be lost and at soil temperatures of 350°C, 90 percent of carbon can be lost (Gaylor, 1974). 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. Water repellency or hydrophobicity is a soil physical property limiting water infiltration in which water will “ball up” on the soil surface rather than infiltrate into the soil (Debano, 1981). Soil porosity can decrease following juniper pile burning or wildfires when soil temperatures are between 175°C-200°C.

The burning of soil organic matter can cause chemical changes in soils that can have both positive and negative effects on nutrient availability and plant growth. The potash (calcium, magnesium, and potassium) created by burning organic matter can make the soil more alkaline, which in turn makes calcium, magnesium, and potassium more available to plants. The majority of Nitrogen stored in organic matter, however, can be lost through burning (Debell and Ralston, 1970). Above 200°C, nitrogen may be lost through volatilization when it is converted to a gas. The loss of nitrogen is partially compensated by the increased availability of the nitrogen remaining after the fire, yet nitrogen and other nutrients can be lost from the site in smoke, by erosion or leached through the soil before they can be used.

The potential damage to soil by fire is rated based on the texture, content of rock fragments, and organic matter in the surface layer, thickness of the surface layer, and slope. Based on this criteria, the fire damage potential of soils within the treatment area is low (Forest Encyclopedia, 2008) indicating fire damage is unlikely, little or no maintenance is needed, and soil physical and chemical properties are expected to remain in good condition.

**Soil Erosion**

Soils within the proposed treatment area have been evaluated for their susceptibility to erode resulting from soil disturbance. Puddling is the destruction of soil structure usually by churning or kneading action of wheeled equipment, and invariably results in soil compaction. Displacement is the act of moving soil laterally from narrow ruts or wider areas. Soils are considered detrimentally disturbed if more than half of the surface A horizon over a 100 sq. ft. area has been removed. Treatment area soils have A horizons varying from 2 to 17 inches deep. The dragging of juniper material on skid trails and landings can result in the removal of vegetative cover. When soil cover is removed, soil particles are more easily detached from falling rain and can be removed from the site. Soil sealing refers to the phenomenon in which the energy of falling rain drops displaces soil particles and causes the soil surface to develop a thin crust due to the clogging of soil micropores. This leads to decreased infiltration and increased soil runoff. Erosion potential within the treatment sites should be low as most of the precipitation within the proposed treatment area is snow and the slope on most of the treatment area is less than 10 percent.

Based on field observations, there is little evidence of significant erosion in the project area. Soils are fine grained and mostly have high percentages of cobble and stone rock fragments indicating there is not a high potential for erosion. However, the steeper slopes are likely to be subject to erosion and transport if the vegetative cover is removed over a large area.
Soil Compaction
Soil compaction is the process by which the soil grains are rearranged to decrease void space (particularly large pores) and bring them into closer contact with one another. Soil compaction and rutting has been evaluated for soils within the proposed treatment area. Compaction is detrimental if there is an increase in soil bulk density of 20 percent, or more, over the undisturbed level. Soil compaction negatively affects physical and chemical properties thereby decreasing soil fertility. Compaction can increase soil bulk density and reduce plant root penetration, soil water holding capacity, and plant growth. Decreasing the soil pore space can decrease the size, reach, and extent of root systems. Destroying the soil structure can decrease water infiltration and increase runoff rates. As oxygen decreases in the soil, microbial respiration may be limited and severe compaction may disrupt root metabolism and cause the soil to become anaerobic. Soils with a range of soil particle sizes (i.e. fine sandy loam) are generally more susceptible to compaction than soils with a more uniform particle size distribution.

Soils within the treatment area mostly have a uniform fine texture composed of coarse silt, fine sand, and clay. Finer textured soils have a higher susceptibility to compaction and generally, the risk of compaction tends to increase with increasing moisture content and the greatest sensitivity to compaction occurs at moisture contents near but below field capacity (O’Neill 2005). Compaction is more likely to occur when bare ground is driven over. Other forest management practices using heavy metal tracked machinery has been found to cause detrimental levels of soil compaction.

Ruts can form as a result of the operation of forestland equipment, begin to concentrate soil runoff, and increase soil erosion. Criteria used to evaluate the soil rutting hazard includes the depth to the water table, the percent of rock fragments on or below the surface, the soil texture, depth to a restrictive layer, and slope. Only 15 percent of the area within the treatment area contains soft soils (Table 10), and nearly all soils in the treatment area contain at least 20 percent rock fragments (with the exception of the Hippyjim silty clay loam).

Overall, dry soils are not expected to be highly compactable and susceptible to ruts because of their uniform fine texture and high percentage of stones, boulder, and cobble rock fragments. These soils with higher percentages of large rock fragments have a smaller percentage of bare ground and should be less susceptible to compaction. If soils are moist to wet they will be very susceptible to compaction. The Hippyjim silty clay loam soil has no rock fragments, is wet for longer periods of time, and is more susceptible to compaction and rutting. This soil is found on six acres within the Pothole treatment units and has a strong very fine and fine granular structure.

Soils – Environmental Consequences
Direct and Indirect Effects of All Action Alternatives
Grazing
All the juniper utilization treatment units are within approved and active allotments with approved grazing permits. Reintroducing livestock too quickly after treatment may inhibit the return of vegetation. On sites with fewer perennials, grazing may promote the dominance of undesirable exotic grasses and forbs (Pierson et. al, 2007). However, it’s likely the interference of juniper on the site has a greater impact on herbaceous dynamics than does grazing (Miller et. al, 2005). Impacts from grazing could be lessened (especially on sites with understory less than 5 perennial bunchgrasses per yd²) by deferring grazing until after seed shatter the first few growing seasons after juniper removal. This would allow for enhanced seedling establishment. Within the North Willow Valley Sage treatment unit, the incremental effects of juniper yarding, grazing, and damage from a previous wildfire, may result in greater than 20 percent detrimental soil disturbance. The extent of detrimental soil disturbance in this unit could be decreased with proper rehabilitation, and best management practices.
Roads

Road use to implement the proposed treatments under the Proposed Action and Alternative 1 would include increased use by large trucks and equipment. Alternative 2 would include increased use by fire equipment. Proposed road improvements for all action alternatives includes grading, rocking, culvert cleaning, brushing, and water barring will help minimize increased rutting and erosion.

Direct and Indirect Effects of Proposed Action

Fire Damage Potential

On areas where juniper will be burned, it is estimated 5-10 percent of the ground surface will be affected by burn piles (depending on juniper pile density). It is anticipated burning treatments will occur on wet soils during the winter and soils within the proposed treatment area are expected to revegetate within a few years. Burning of dry juniper on wet soils is not expected to exceed 200°C and soil productivity may increase if potash remains onsite. In southeastern Oregon burned juniper piles resulted in a more rapid recovery of perennial grass cover and density compared to piles that were not burned. It is unlikely that damage to soil productivity on similar juniper removal treatments on similar soils has been great enough as to negatively affect vegetation regrowth in the long term. On sites with similar soils to the west of the proposed treatment units, soils under burned piles have revegetated with early seral forb species within two years (N. Hunner personal observation, 2008). Planting bitterbrush on burn pile scars has been successful. This indicates that although some decrease in soil productivity and burning of organic matter occurs during pile burning, it is unlikely soil damage is enough to prevent the return of native vegetation in the long term.

Soils in the proposed treatment area have a low NRCS fire damage potential rating and fire damage is unlikely, minimal to no maintenance is needed, and soil physical and chemical properties are expected to remain in good condition. Early seral forbs species are expected to recover within 1-2 years and long term damage to the soil is not expected. Damage to soil from burning juniper can be mitigated by burning dry juniper when the soil is moist to wet. Under these conditions soil productivity under burned piles may increase. Under dry soil conditions, organic matter could burn and it may take more than 10 years for soil productivity to recover in localized areas.

Compaction and Erosion

One end suspension of material would result in the dragging of juniper material on skid trails. Three types of disturbances may occur including compaction, puddling, or displacement. The degree to which disturbance affects a given area will depend on equipment, methods, and harvest layout; and operator knowledge and skill. Softer soils that are less resistant to rupture, such as the Notchcorral, Mound, and Schnipps, will be more easily disturbed during yarding. While juniper is yarded, tree particles and seeds are cultivated into the soil and this soil cover may help to limit soil erosion. Qualitative observations to date indicate vegetation on the skid trails is often damaged or uprooted after multiple repetitive passes on the trails. Based on past monitoring of juniper removal projects and timber sales, it is anticipated 5 to 10 percent of a unit would be impacted from skid trails and landings. When possible, steeper slopes should be avoided or skid trails should be perpendicular to the slope. Because the proposed treatment area receives very little precipitation as actual rainfall (~5"/year), accelerated erosion due to precipitation will be very minimal, yet, erosion caused by wind could contribute to increased erosion over a long period of time. Accelerated erosion could occur on bare ground on steeper slopes yet most of the treatment area is on slopes less than 10 percent and potential surface runoff should be minimal on most of the treatment units.

Depending on the soil moisture, pressure exerted by yarding equipment, and number of passes, the severity of soil compaction will vary. Generally, it is expected compaction on skid trails will be low to moderate. Skid trails with high amounts of passes could have severe compaction. Areas with severe compaction could be ameliorated with a brush rake, and rehabilitated areas should be covered with chips or slash to decrease the possibility of erosion due to wind or water. Tillage under non-optimum conditions (e.g., wet soil), however, can cause additional soil compaction and/or puddling, and create further risk to long-term
productivity. If soil compaction is high or the majority of vegetation is removed, erosion is more likely to increase. Skid trails on steeper slopes are more likely to erode and waterbars should be installed.

The return of vegetation to disturbed soil areas is expected to vary depending on the magnitude of soil disturbance, slope, and rehabilitation methods. Five years after juniper was yarded from the Windy Ridge treatment area (about 15 miles west of the proposed project area), 95% of the vegetation has completely recovered (N. Hunner personal observation, 2008). Other skid trails in the Upper Midway units have been seeded and the growth of native grasses has been unsuccessful.

It is expected compaction will not be detrimental on most skid trails. Yarding will mostly occur when soils are dry. The Hippyjim silty clay loam (on about six acres of proposed treatment area) is poorly drained and does not have rock fragments. Because of the seasonal high water table the Hippyjim silty clay loam has a higher potential of rutting and compaction, may remain wet for longer periods of time, and is more susceptible to erosion from wind. Mechanical treatments should be avoided on this soil unless approved by a Soil or Watershed specialist.

Soil Productivity

Long-term soil productivity is maintained when soil porosity, soil organic matter, and soil depth are not detrimentally reduced. Softer soils with shallow A horizons, such as the Yancy and Notchcorral soils, are more susceptible to detrimental decreases in soil productivity resulting from one-end suspension yarding. Pile burns generating higher ground temperatures can cause localized reductions in soil nitrogen content. These losses are not likely to be extensive enough to substantially affect nitrogen availability or soil quality in the proposed treatment areas. Potential damage to the soil from burning juniper piles can be mitigated by burning dry juniper when soils are moist to wet. Under these conditions soil productivity under burned juniper piles may increase.

Summary

The proposed action could result in long term degradation of soil productivity on 5 to 10 percent of the treatment units. The removal of vegetation cover over large areas on steeper hillslopes will contribute most to a loss in soil productivity. Best management practices used to limit amounts of bare soil could decrease amounts of detrimentally disturbed soil to less than 5 percent of treatment units. Generally, compaction is expected to be minimal, yet, detrimental compaction could occur on moist to wet soils, or in areas with high numbers of passes.

Decreases to soil productivity can be most successfully mitigated by revegetating disturbed areas or by covering them with slash or wood chips. At most, 5 to 10 percent of a treatment unit will have a detrimental decrease in soil productivity. Successfully implemented Best Management Practices could limit detrimental decreases of soil productivity to less than 5 percent of a treatment unit.

Mitigation

Best Management Practices and Mitigations for all Action Alternatives in Appendix A.

Direct and Indirect Effects of Alternative 1

Fire Damage Potential

This alternative will not substantially change the percentage of juniper piles to be burned. Potential damage to soils from burned juniper piles will not differ between Alternative 1 and the proposed action.

Compaction and Erosion

Full suspension of material to the landing would result in less overall soil disturbance because the material would not be dragged and less uprooting of existing vegetation would occur. Fully suspending juniper may require more passes on skid trails using heavier machinery to remove juniper, and resulting compaction
could be more severe than from one end suspension yarding. As less ground cover is removed in this alternative, accelerated soil erosion will be less than for one end suspension yarding.

**Soil Productivity**
Less soil area should be affected by fully suspending yarded juniper as less existing vegetation will be removed. Although soil compaction could be more severe under Alternative 1, it’s likely less of the soil surface will be removed, (in comparison to the proposed action) and soil productivity will remain higher. Detriment soil compaction could be mitigated by ripping and revegetating skid trails and landings.

**Summary**
Under Alternative 1, less soil would be disturbed thereby decreasing the potential for accelerated erosion and a resulting decrease in soil productivity. Decreased soil porosity resulting from compaction under Alternative 1 will probably take longer to ameliorate than compaction resulting from the Proposed Action. At most, 5 to 10 percent of the proposed treatment area could be affected by severe compaction. Amounts of severe soil compaction could be mitigated by ripping skid trails and landings, and yarding should occur when soil is dry. Overall, soil productivity is expected to decrease less, and recover more quickly due to affects from full suspension yarding.

**Mitigation**
Best Management Practices and Mitigations for all action alternatives are in Appendix A.

**Direct and Indirect Effects of Alternative 2**

**Fire Damage Potential**
A greater overall area would be treated by only burning piles in this alternative and it is estimated 5 to 10 percent of the ground surface will be affected by burn piles (depending on juniper pile density).

**Compaction and Erosion**
Alternative 2 will not cause an increase in soil compaction because there would be no disturbed soil or destroyed vegetation associated with skid trails and landings. Instead, the piles are sporadic with desirable vegetation in between piles. As a result, pile burning should have less effect on soils that could to accelerated erosion.

**Soil Productivity**
Alternative 2 should result in less degradation of soil productivity compared to Alternative 1 and the Proposed Action. Yarding would not occur under Alternative 2 and less of a decrease to soil productivity would occur from erosion and compaction. Under dry soil conditions, organic matter could burn and it may take more than 10 years for soil productivity to recover under larger juniper piles. Damage to soil from burning juniper can be mitigated by burning smaller piles of dry juniper when the soil is wet. Under these conditions the addition of potash from burned juniper may cause an overall increase in soil productivity. Similar burned treatment areas were found to revegetate in a few years (N. Hunner personal observation, 2008) and if smaller, dry juniper is burned on moist to wet soil, it is expected detrimental decreases to soil productivity will not last more than 5 years.

**Summary**
Overall, soil productivity will be affected to a lesser degree by the burning only treatment and it is expected soil productivity will recover more quickly.

**Mitigation**
Best Management Practices and Mitigations for all action alternatives are in Appendix A.
**Direct and Indirect Effects of No Action Alternative**

Under the No Action Alternative, juniper piles would be left in place and there would be no short term impacts to the soil as there would be no yarding or burning and thereby less overall ground disturbance.

Soil productivity could be more severely affected under the No Action Alternative if juniper debris burns during a wildfire. Leaving the juniper piles and not allowing removal of firewood results in an increased fuel loading that could eventually burn in a wildfire under hotter conditions. During a wildfire, soil moisture would likely be low and more severe and widespread damage to soil organic matter may occur than under controlled lower intensity burning.

Under the No Action Alternative, existing roads would not be utilized to remove juniper for firewood. Erosion would still occur on these existing roads, yet tread wear would increase less as vehicle traffic would be less.

Overall, the No Action Alternative would cause less soil erosion, compaction, and degradation of soil productivity as skid trails, landings, and juniper pile burning would not occur.

**Cumulative Impacts**

**Grazing**

The incremental effects of grazing on the other proposed treatment units are not expected to increase amounts of detrimental soil disturbance, however, grazing could decrease the effectiveness of rehabilitation measures on detrimentally disturbed areas.

**Roads**

Incremental effects of road use and proposed treatments are expected to be insignificant. Roads throughout the project area will continue to be a source of erosion, yet, proposed road improvements including grading, rocking, culvert cleaning, brushing, and water barring will help minimize increased rutting and erosion. If road maintenance continues and wet season use is minimal, they will continue to be a minor source of erosion. Unauthorized OHV activity could create routes that would be a source of erosion. Currently there are no user created routes and illegal OHV use is expected to be very minimal as law enforcement continues, and temporary roads are obliterated.

**Juniper Cutting**

Most juniper areas were mechanically cut and minor amounts of soil disturbance occurred. Because these areas of disturbed soil are small and dispersed, the incremental effect on soil from the proposed action and previous juniper cutting are not expected to cause more than 20 percent detrimental disturbance with in a treatment unit.

**Air Quality – Affected Environment**

**Estimated tonnage in existing piles**

To comply with air quality standards and prior to burning, the KFRA reports to the Oregon Department of Forestry (ODF) an estimate on the amount of tons it expects to burn for each proposed project.

Approximately 26,400 tons of biomass is presently cut and piled within the 3,300 acre analysis area. The KFRA has been tracking removal of western juniper for biomass purposes since 2005 and tons/acre removed has varied from four to 15 tons/acre. In the assessment of environmental consequences below, the following assumptions are made:

1. One acre with 8 tons of piled whole junipers openly burned emits 95 lbs of PM$_{2.5}$. This same quantity of material (8 tons) burned in a biomass plant equipped with an electrostatic precipitator equates to 5 lbs of PM$_{2.5}$ (Burke 1994 & AP-42 1992). It should be noted that open burning of an acre of piled junipers does not typically consume all 8 tons of material.
2. One ton of juniper firewood burned in a wood stove emits 20-31 lbs of PM$_{10}$ (particle sizes less than 10 microns in diameter) depending on burning practices and wood stove type (AP-42 1992). Of the 20-31 lbs of PM$_{10}$, nearly all of this particulate matter is PM$_{2.5}$ (less than 2.5 microns in diameter) (Rau & Huntzicker 1984).

3. Burning would be done in compliance with the Oregon Smoke Management Plan (OAR 629-048-0010) to minimize smoke impacts to populated areas.

4. Juniper processed as clean chips, posts, poles, or saw logs and utilized in hardboard or some other forest product can result in carbon sequestration and less contribution to greenhouse gases compared to burning. It is recognized that some fossil fuels are being burned in order to transport any biomass from the woods to the manufacturing and/or energy facilities. This EA does not speculate nor analyze the trade-offs of the amount of fossil fuels burned to transport the biomass in lieu of burning it.

Air Quality – Environmental Consequences

Proposed Action and Alternative 1
Under the Proposed Action and Alternative 1, the impacts to air quality would be similar. Those impacts would be:

- A reduction of wood smoke emissions as a result of utilizing the juniper as opposed to open burning. Juniper utilized in a biomass plant would result in a reduction of approximately 95% of the particulate matter (less than 2.5 microns in diameter) into the atmosphere. Juniper processed as clean chips or sawlogs and used in hardboard board production or other forest products can result in carbon sequestration and lower contributions of carbon dioxide to the atmosphere as well.

- Some burning of residual landing material would still occur but it is anticipated that 90+% of the juniper material would be utilized.

- There would be less dust generated under Alternative 1 compared to the Proposed Action because the material would be fully suspended and not dragged along the surface. The difference in dust generated from the two operations would be minimal.

- Under both the Proposed Action and Alternative 1, there would be more additional emissions of dust and diesel exhaust into the air from the yarding, chipping, and hauling operations.

- Combustion of biomass for power generation would contribute to overall greenhouse gasses, but effects are immeasurable at the level of this analysis.

Alternative 2
Under Alternative 2:

- More smoke emissions and particulate matter would occur than under any of the other alternatives.

- Burning would be implemented under approved conditions so local impact to populated areas would be minimal.

- Burning would contribute to overall greenhouse gasses, but effects are immeasurable at the level of this analysis.

- Smoke emissions from firewood use vary considerably depending upon burning practices and stove types.

- Firewood utilization could result in more total emissions of carbon dioxide than yarding and hardboard manufacturing.

No Action
Under the No Action Alternative:

- There would be no smoke emissions from scheduled activities. Piles could eventually burn under a wildfire, but those emissions would be unplanned.

- Smoke emissions from firewood use vary considerably depending upon burning practices and stove types. Under the No Action Alternative, more firewood might be utilized than under any of the other alternatives because the juniper would remain in place over a much longer time period, allowing greater potential for firewood use.
• There would be no dust generated as the material would not be yarded, chipped, and hauled away except that some would be hauled by firewood cutters. The carbon would remain as part of the slash, if not used for firewood, and released slowly via decomposition, as long as wildfire was excluded.

**Areas of Critical Environmental Concern – Affected Environment**

One of the proposed units, Miller Creek, is a designated Area of Critical Environmental Concern (ACEC). The relevant and important values of Miller Creek are the scenic features, in that it is a deep canyon within a high desert plateau. The riparian areas in Miller Creek provide migratory habitat for songbirds and raptors. And finally, Miller Creek contains a unique natural system, with an old growth ponderosa pine community and a perennial stream within a high desert environment. Recreationally Miller Creek ACEC is closed to off-highway vehicle use but open to primitive and semi-primitive recreational use via foot traffic. Timber harvest in the ACEC is not allowed, and grazing is restricted under the RMP.

**Areas of Critical Environmental Concern – Environmental Consequences**

The actions taken previously to thin invading juniper from the riparian zone of Miller Creek have positively affected the scenic qualities of this ACEC. Alternative 2 or the No Action Alternative is recommended for this unit. From the wildlife perspective, the juniper piles may provide new habitat for small mammals and birds, so leaving a few un-burned piles may be beneficial. Burning the piles closest to the creek and leaving the remaining un-burnt would still allow anglers and hikers to access the riparian areas of Miller Creek.

**Socioeconomics – Affected Environment**

**Existing Uses**

- **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. Although there will be some impacts to rangeland vegetation and livestock grazing, there should not be measurable impacts on the overall Ranching “industry”, and thus it will not be discussed further.

- **Recreation**
  The area is popular for recreational and hunting purposes.

- **Western Juniper Demand**
  A new economic opportunity and demand has developed locally 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. 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 1 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 projects, approximately 4-8 jobs are created during the summer months (skidder, delimer, 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 the mentally handicapped individuals assisting with the production line.
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. In the case of the KFRA stewardship contract, the government presently pays to yard the material to a loading point (landing). The value of the western juniper once yarded to a landing, may cover the processing and hauling costs to local facilities. On surrounding federal lands, sometimes the logging costs do not have to be subsidized in order to get the material removed (Personal Communication 2008 – Peter Hall - Alturas BLM Forester). This may be the result of the biomass infrastructure and subsequent higher demand for hog fuel in the Northern California region including; Alturas, Burney, and Susanville.

Socioeconomics – Environmental Consequences

Proposed Action and Alternative 1

Employment Opportunity

Employment opportunity would increase overall, however the yarding method required by the decision record could limit the range of contractors to whom the projects 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 the full suspension equipment. One end suspension would allow greater employment opportunities.

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 3-7 jobs per 8,000 tons removed if utilized for energy production. Utilizing the material for hardboard or sawlogs would likely generate similar employment opportunities.

Cost of Disposal

Presently the KFRA is paying approximately $20-$50/acre to burn western juniper piles and approximately $80-$100/acre to yard the material. Fully suspending the western juniper during yarding operations generally costs about $20/acre more than one-end suspension yarding. The additional cost per acre to yard the material versus burning it could result in less 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 expected that the need to subsidize the cutting and yarding operations will be reduced.

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 historic cover levels. Once the initial treatment of the encroaching western juniper is completed, follow-up maintenance treatments are anticipated when the juniper is relatively young and non-commercial. 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, only 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 land 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 2

Employment Opportunity

There would be some employment opportunities with this alternative but they would be lower than the Proposed Action and Alternative 1. It is common for the KFRA to contract out the burning to surrounding
contractors under a service contract. This provides employment for the contractors for a short period. Depending upon the location of the units, costs/acre and associated risks can be higher. However, the overall risk of escaped fire on the three proposed units is low to moderate and well outside any WUI areas.

**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 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.

**No Action Alternative**

**Employment Opportunity**
There would be no employment opportunities with the exception of some commercial firewood cutters. No contractors would be needed to either burn or remove the material.

**Long Term (>20 years) Supply of Western Juniper for Commercial Use**
Under the No Action Alternative, the primary use of western juniper would be for commercial or personal use firewood. The existing local 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.

**Cultural Resources and Native American Concerns – 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 the Modoc territory, Ray (1963) shows the Modoc encompassing the project area. Ray (1963) notes that the Modoc territory was divided into three geographic areas that were named after those who lived in those areas. Of these three areas, the Kokiwas’ (people of the far out country) lived within the project area.

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 the lands around the project area were ceded to the United States by the Klamath Tribes (Minor et al. 1979). The Klamath Tribes consists of the closely related Klamath, Modoc, and Yahooskin peoples.

Euro-American exploration within 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. Homesteaders pursued sheep and cattle ranching. The Gerber family was the first to establish a ranch at the northern end of the Gerber Block in 1880, hence the name of the area (Beckham 200).

The Civilian Conservation Corp (CCC) improved the landscape within the analysis area for grazing in the 1930s. The CCC built roads, spring developments, stock ponds, corrals and even telephone lines. In 1935, the Gerber block became the first grazing district in Oregon and the United States (Bonanza Grazing District No. 1) under the 1933 Taylor Grazing Act. In 1946, the General Land Office was merged with the Grazing Service to create the Bureau of Land Management (Beckham 2000). The BLM has managed the area ever since.

**Cultural Resources and Native American Concerns – Environmental Consequences**
The proposed juniper disposal units have all been previously inventoried for cultural sites as part of the planning process for previous fuels reduction projects which resulted in the existing juniper piles. Each proposed juniper disposal unit has had a records review completed for known cultural sites from previous
inventories. Most units include some level of road construction, road renovation, or the use of equipment for accessing existing piles. Sites in these units will be flagged for avoidance from such activities prior to project implementation.

**Table 12 – Cultural Sites Within Each Unit.**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Sites Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTZ 110 Unit</td>
<td>No sites in unit boundary</td>
</tr>
<tr>
<td>Smith Reservoir Unit</td>
<td>12 sites will be flagged for avoidance</td>
</tr>
<tr>
<td>Pine Creek Unit</td>
<td>14 sites will be flagged for avoidance</td>
</tr>
<tr>
<td>Schnipps Unit</td>
<td>1 site on unit boundary to be flagged for avoidance</td>
</tr>
<tr>
<td>North Willow Valley Sage Unit</td>
<td>17 sites will be flagged for avoidance</td>
</tr>
<tr>
<td>Pitchlog Unit</td>
<td>1 site outside unit boundary to be flagged for avoidance</td>
</tr>
<tr>
<td>Miller Creek Unit</td>
<td>1 site outside unit boundary to be flagged for avoidance</td>
</tr>
<tr>
<td>Potholes Unit</td>
<td>No sites in unit boundary</td>
</tr>
</tbody>
</table>

**Noxious Weeds – Affected Environment**

Many noxious weed species have a competitive advantage over native species in areas where existing vegetation is disturbed. Within the proposed project areas, human activities including timber harvest, prescribed fire, grazing, recent machine cutting & piling of western juniper and past road construction, have created disturbed conditions. Consequently, noxious weeds have become established in a wide range of habitats, including riparian areas and wetlands, roadsides, campgrounds, rock pits, trails, forested and non-forested areas. These unwanted, introduced species have the potential to adversely affect plant and animal species diversity, special status plant/animal species, range condition and forage production.

Botanical surveys were conducted in all project areas between 1999 and 2008. Several species of noxious weeds were documented on BLM lands within the analysis area. See Table 13 for sectional descriptions of noxious weed locations. Bull thistle (*Cirsium vulgare*) was also observed within the analysis area.

Musk thistle (*Carduus nutans*) and Scotch thistle (*Onopordum acnatherum*) are biennial plants that aggressively invade disturbed sites and can form dense stands which eventually crowd out desirable plants. Both of these thistles are generally found in forested areas that have been logged or can be found in other areas associated with ground disturbance. Canada thistle (*Cirsium arvense*) has the capability to remain in relatively small populations for a number of years then increase exponentially. It is an aggressive colony forming perennial that reproduces by seed and by rhizomes that enable this plant to spread rapidly over large areas. This weed commonly invades riparian areas and has the capability to crowd out the native riparian flora, forming extensive underground rhizomes that are currently controllable only by translocated herbicides. Medusahead rye (*Taeniatherum caput-medusae*) is an annual invasive grass that has been increasing on BLM lands in the Gerber area. Please refer to the discussion in the Rangeland Vegetation Environmental Consequences section for more medusahead information. Bull thistle (*Cirsium vulgare*) is a biennial that is closely associated with physical disturbance, and can be the dominant species on extremely disturbed sites, such as landings and cut juniper piles, where it persists for approximately 5-10 years following disturbance. Leafy spurge (*Euphorbia esula*) is a perennial plant that can invade grazing lands and decrease native plant diversity. This plant grows in dense patches, and is deep rooted, reproducing vegetatively and by seed. St. Johnswort or Klamath weed (*Hypericum perforatum*) is a perennial herbaceous weed that invades grazing lands. This weed may be poisonous to some livestock and displaces both livestock and desirable wildlife forage. Dalmatian toadflax (*Linaria dalmatica*) is a highly aggressive weed introduced for its attractive snapdragon flowers and drought tolerance. However, this plant is very difficult to control and actively displaces native plants and livestock forage.
<table>
<thead>
<tr>
<th>Project Area</th>
<th>Township/Range</th>
<th>Section</th>
<th>Noxious Weed Populations</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTZ 110</td>
<td>T39S, R14E,</td>
<td>14</td>
<td>Canada thistle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>Canada thistle, Musk thistle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22</td>
<td>None known</td>
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<td></td>
<td></td>
<td>23</td>
<td>Canada thistle, Musk thistle</td>
</tr>
<tr>
<td>Smith Reservoir</td>
<td>T40S R12E</td>
<td>12</td>
<td>Canada thistle, Musk thistle, Leafy spurge</td>
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<td>T40S R13E</td>
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<td>Canada thistle, Leafy spurge, Scotch thistle</td>
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<td></td>
<td></td>
<td>8</td>
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<td></td>
<td>18</td>
<td>Canada thistle, Musk thistle, Leafy spurge</td>
</tr>
<tr>
<td>Pine Creek</td>
<td>T40S R14E</td>
<td>3</td>
<td>Medusahead rye</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
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<tr>
<td></td>
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<td>15</td>
<td>Medusahead rye</td>
</tr>
<tr>
<td></td>
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<td>22</td>
<td>Medusahead rye</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23</td>
<td>Medusahead rye</td>
</tr>
<tr>
<td>Schnipps</td>
<td>T39S R13E</td>
<td>24</td>
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<td></td>
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<td>North Willow Valley</td>
<td>T41S R14E</td>
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<td>Sage</td>
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<td>6</td>
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<tr>
<td></td>
<td></td>
<td>7</td>
<td>Medusahead rye</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>St. Johnswort, Medusahead rye</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17</td>
<td>Musk thistle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18</td>
<td>Medusahead rye</td>
</tr>
<tr>
<td>Pitchlog</td>
<td>T39S R14E</td>
<td>22</td>
<td>Canada thistle, Leafy spurge, Russian knapweed, Musk thistle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23</td>
<td>Musk thistle, Canada thistle, Medusahead rye</td>
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<td></td>
<td></td>
<td>24</td>
<td>St. Johnswort, Musk thistle, Medusahead rye</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>Canada thistle, Musk thistle, Mediterranean sage</td>
</tr>
<tr>
<td>Miller Creek</td>
<td>T39S R15E</td>
<td>31</td>
<td>Canada thistle, Musk thistle</td>
</tr>
<tr>
<td>Potholes</td>
<td>T39S R13E</td>
<td>2</td>
<td>Canada thistle, Musk thistle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>Canada thistle</td>
</tr>
</tbody>
</table>

1 Although all areas have been surveyed within 10 years, new weed populations may have emerged or previously known populations may have been controlled,
2 FTZ 110 – 2000 East Gerber survey,
3 Smith Reservoir – 2005 North Bryant survey,
4 Pine Creek – 2006 Pine Creek / 2003 Copeland / 2004 Woolen surveys,
5 Schnipps – 1999 West Gerber / 2001 Round Valley surveys,
6 North Willow Valley Sage – 2003 Copeland / 2003 Duncan Bumpheads / 2004 Woolen surveys,
8 Pitchlog – 2000 and 2001 East Gerber surveys,
9 Miller Creek – 1999 West Gerber / 2008 Miller Creek surveys,
10 Potholes – 1999 West Gerber survey
FTZ 110 – This area was surveyed in 2000 for noxious weeds and special status plants, and visited again in 2009. Populations of Canada and musk thistle occur nearby, north of the unit.

Smith Reservoir – The Smith Reservoir area was surveyed for noxious weeds and special status plant species in 2005. The Smith Reservoir unit is located on Bryant mountain, which is an area with many infestations of noxious weeds. Known populations of leafy spurge, Canada thistle, musk thistle, and scotch thistle occur along many of the roads that border the juniper units. All of these noxious weeds were also located within the units in 2009 field surveys.

Pine Creek – The Pine Creek area was surveyed in 2006 for noxious weeds and special status plant species, and visited in 2009 again. Small and large patches of Medusahead rye occurs within the Pine Creek unit, and adjacent to the north end of the unit along and within the BLM road. Survey data from 2006 found Medusahead rye in all but one section of this unit. (See Table 13 above.)

Schnipps – The Schnipps unit area was surveyed for noxious weeds and special status plants in 1999 and 2001. This area was also visited in 2009, and has a healthy understory of native plants such as perennial bunchgrasses, bitterbrush, currant, and forbs. Musk thistle occurs in the southwestern most juniper unit, and Canada and musk thistle occur nearby the other units. A recent visit to the units found scattered populations of cheatgrass and Japanese brome, but no medusahead rye was found. Small populations of bull thistle were also found.

North Willow Valley Sage – Willow Valley unit was visited on 2009 and surveyed in 2004. This unit contains large areas of medusahead rye (*Taeniatherum caput-medusae*). Other annual non-native grasses in abundance in this unit are cheatgrass (*Bromus tectorum*), Japanese brome (*Bromus japonicas*) and bulbous bluegrass (*Poa bulbosa*). These affected areas are interspersed with relatively intact areas containing native bunchgrasses & forbs, but also with areas of bare soil which could easily be invaded by annual grasses.

Pitchlog – The area including the Pitchlog Creek unit was surveyed in 2001 for noxious weeds and special status species. It was also visited in 2009. Noxious weeds have been located within the project boundary in the past. Previous known populations of Canada thistle, Musk thistle, St Johnswort and Mediterranean sage occurred within or nearby the proposed area.

Miller Creek – The Miller Creek project area was surveyed in 1999 and 2008 for noxious weeds and special status plants. St Johnswort, Canada thistle, Musk thistle, Leafy spurge, Dalmatian toadflax have been located within or near this project area in past surveys.

Potholes – The Potholes unit was visited on 2009 and surveyed in 1999. No noxious weeds are known to occur in this unit. However, nearby populations of Canada thistle, musk thistle, and leafy spurge do exist.

**Noxious Weeds – Environmental Consequences**

**Transport of Noxious Weed Propagules**

Any vehicular traffic in the project areas has the potential to introduce noxious weed seeds and propagules. Project design features for the prevention of the introduction of noxious weed seeds and plant parts would reduce the potential for the dispersal of these species into the project area (See Appendix A.). The potential exists to spread known populations of noxious weeds as a result of project activities. Flagging and avoidance of these populations would reduce the potential to spread these noxious weeds. Additionally, project design features to avoid known noxious weed populations completely and wash vehicles before leaving these areas would reduce the potential to spread noxious weeds (See Appendix A.).
Soil Disturbance
Vehicles and heavy machinery traveling in project areas would cause soil disturbance. This could result in colonization or an increase of noxious weeds in the project areas. However, seeding and planting native species would provide competition against noxious weed invasion.

Fire Damage
Fire damage would be minimal under the Proposed Action and Alternative 1 since only debris remaining after yarding would be burned. However, burning has increased noxious weed populations located in or next to burn piles in similar habitats in this resource area.

Direct and Indirect Effects of Proposed Action
Transport of Noxious Weed Propagules
The vehicles and machinery entering the project area to implement these treatments would increase the potential for the introduction of noxious weeds into the area from sources outside the project area.

Ground Disturbance
The effects of using one end suspension methods would result in ground disturbance to 5-10% of the project area. The use of the mechanical equipment in the Proposed Action would create the disturbed conditions under which many noxious weeds have a competitive advantage.

Fire Damage
Fire damage would be minimal in the Proposed Action since only landing debris and inaccessible piles remaining after yarding would be burned. Additionally, juniper will be removed from the unit, reducing wildfire fuels. However, burning has increased noxious weed populations located in or next to burn piles in similar habitats in this resource area.

Mitigation
Flagging noxious weed populations near roads and within project areas will aid in avoiding these populations. Treating known noxious weed populations with herbicides or mowing to prevent seed heads prior to yarding work would reduce the spread of plants. Yarding through concentrated areas of noxious weeds should be avoided to limit spread. Pressure washing or otherwise cleaning equipment and vehicles prior to arrival on BLM land and the project area would reduce the risk of transporting noxious weeds to the site. Seeding disturbed ground with native grass seed and planting native shrubs in burned areas would colonize bare areas, improve habitat, and limit noxious weed invasion. Following ground disturbance, returning to the project area to survey for and treat noxious weeds with herbicide will be necessary.

Direct and Indirect Effects of Alternative 1
Transport of Noxious Weed Propagules
The vehicles and machinery entering the project area to implement these treatments would increase the potential for the introduction of noxious weeds into the area from sources outside the project area.

Ground Disturbance
The effects of using full suspension methods would decrease ground disturbance of the project area when compared to one-end suspension. The use of the mechanical equipment in Alternative 1 would create the disturbed conditions under which many noxious weeds have a competitive advantage.

Fire Damage
Fire damage would be minimal in the Proposed Action since only landing debris and inaccessible piles remaining after yarding would be burned. Additionally, juniper will be removed from the unit, reducing wildfire fuels. However, burning has increased noxious weed populations located in or next to burn piles in similar habitats in this resource area.
Mitigation
Flagging noxious weed populations near roads and within project areas will aid in avoiding these populations. Treating known noxious weed populations with herbicides or mowing to prevent seed heads prior to yarding work would reduce the spread of plants. Yarding through concentrated areas of noxious weeds should be avoided to limit spread. Pressure washing or otherwise cleaning equipment and vehicles prior to arrival on BLM land and the project area would reduce the risk of transporting noxious weeds to the site. Seeding disturbed ground with native grass seed and planting native shrubs in burned areas would colonize bare areas, improve habitat, and limit noxious weed invasion. Following ground disturbance, returning to the project area to survey for and treat noxious weeds with herbicide will be necessary.

Direct and Indirect Effects of Alternative 2
Transport of Noxious Weed Propagules
The vehicles entering the project area to implement these treatments would increase the potential for the introduction of noxious weeds into the area from sources outside the project area. This effect would be less than under the Proposed Action and Alternative 1 because only BLM fire vehicles and public woodcutters would be entering the project area, resulting in minor propagule introduction. The potential exists to spread known populations of noxious weeds as a result of project activities. Flagging and avoidance of these populations would reduce the potential to spread these noxious weeds. Additionally, project design features to avoid known noxious weed populations completely and wash vehicles before leaving these areas would further reduce the potential to spread noxious weeds (See Appendix A.).

Ground Disturbance
Ground disturbance would occur in Alternative 2 to a lesser level than in the Proposed Alternative and Alternative 1. Some ground disturbance will occur from BLM fire vehicles, BLM skidsteer tractors used for re-piling the wood for burning, and wood cutter vehicles. Yarding and construction of landings and temporary roads would not occur under this alternative.

Fire Damage
The area impacted by burning piles would increase under this alternative as compared to the Proposed Action. Burning has increased noxious weed populations located in or next to burn piles in similar habitats in this resource area. Approximately 5 to 20% of the area would be covered with burn piles and after burning is completed, burn scars.

Mitigation
Flagging noxious weed populations within project areas near juniper piles would aid in avoiding these populations. Treating known noxious weed populations with herbicides or mowing to prevent seed heads prior to wood cutting and burn work would reduce the spread of plants. Traveling through concentrated areas of noxious weeds should be avoided to limit spread. Pressure washing or otherwise cleaning fire equipment and vehicles prior to arrival at the project area would reduce the risk of transporting noxious weeds to the site. Seeding disturbed ground with native grass seed and planting native shrubs where juniper piles have been burned would colonize bare areas, improve habitat, and limit noxious weed invasion. Surveying for and treating new noxious weed populations associated with the burn piles and ground disturbance in the first few years after burning would curb spread.

No Action Alternative
Transport of Noxious Weed Propagules
Any vehicles entering the project area for firewood cutting would have only a minor effect of an increase in the potential for the introduction of noxious weeds into the area from sources outside the project area. Firewood permittees would be encouraged to clean their vehicles prior to traveling into the project areas.
Ground Disturbance
Litter and debris accumulation favor the establishment of squirreltail, the persistence of cheatgrass, and the slow recovery of other perennial grasses (Bates, 2007). The No Action Alternative could depress the recovery and introduction of desirable species, which could lead to site degradation and vulnerability to noxious weed invasion. However, the No Action Alternative would minimize ground disturbance by vehicle entry, preventing new bare ground from being exposed and subsequently colonized by noxious weeds.

Fire Damage
This alternative does not include pile burning; no damage would occur directly affecting the vegetation from this action. However, leaving the fuel from the juniper thinning would increase the risk of wildfire due to increased fuel loading.

Mitigation
Treating known noxious weed populations with herbicides or mowing to prevent seed heads prior to public firewood collecting access would reduce the spread of plants. Seeding disturbed ground with native grass seed would colonize bare areas, improve habitat, and limit noxious weed invasion. Surveying for and treating new noxious weed populations associated with ground disturbance in the first few years after burning would curb spread.

Cumulative Impacts
The cumulative impacts of past, present and future treatments include disturbance of existing vegetation and increased potential for the spread of noxious weeds in the analysis area. Implementation of Project Design Features (PDFs) and Best Management Practices (BMPs) on past projects for weed prevention and soil protection have demonstrated effectiveness in controlling the spread of weeds. These measures (Appendix A) would continue to be implemented. Cumulative impacts on noxious weed distribution and dispersal are expected to be minimal.

Table 14 – Noxious weeds Environmental Consequences

<table>
<thead>
<tr>
<th>Unit Name</th>
<th>Proposed Alt.</th>
<th>Alt. 1 (Full Susp.)</th>
<th>Alt. 2 (Burn Only)</th>
<th>No Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTZ 110</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
</tr>
<tr>
<td>Smith Reservoir</td>
<td>Moderate increase</td>
<td>Minimal weed increase</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
</tr>
<tr>
<td>Pine Creek</td>
<td>High increase (medusahead)</td>
<td>High increase (medusahead)</td>
<td>High increase (medusahead)</td>
<td>Moderate increase (medusahead)</td>
</tr>
<tr>
<td>Schnipps</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
</tr>
<tr>
<td>North Willow Valley Sage</td>
<td>High increase (medusahead)</td>
<td>High increase (medusahead)</td>
<td>High increase (medusahead)</td>
<td>Moderate increase (medusahead)</td>
</tr>
<tr>
<td>Pitchlog Creek</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
</tr>
<tr>
<td>Miller Creek</td>
<td>Not recommended for ACEC values</td>
<td>Not recommended for ACEC values</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
</tr>
<tr>
<td>Potholes</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
<td>Minimal increase</td>
</tr>
</tbody>
</table>

1 These environmental reflect using PDS’s and BMP’s to minimize affects.

Special Status Vascular Plant Species – Affected Environment
No known special status species were found. However, habitat does exist for four special status species plants. Profuse-flowered mesa mint (*Pogogyne floribunda*) and disappearing monkeyflower (*Mimulus evanescens*) are BLM Sensitive annual plants that grow in seasonally moist soils on the edges of reservoirs in the Gerber area. Slender Orcutt grass (*Orcutia tenuis*) and Green’s Tuctoria (*Tuctoria greenii*) are federally listed T&E annual grasses that have recently been documented in vernally wet areas in Modoc County, California, to the south of the Gerber area. Vernally wet habitat surveys are ongoing for all of these species. All of these plants are found in seasonally wet soils adjacent to perennial or vernal water sources.
**Special Status Vascular Plant Species – Environmental Consequences**

Although no known special status plants occur in the proposed units, potential habitat for two bureau sensitive and two threatened and endangered species exists within most of the units, on seasonally wet soils. While the proposed utilization areas within the units are not directly in wet soils, most units are immediately adjacent to some form of perennial or vernal water sources. For all alternatives, vehicle traffic entering these areas could introduce noxious weed propagules which could compete with native vegetation. Vehicle traffic while soils are wet could also compact soils, preventing seed germination.

**Proposed Action and Alternative 1**

**Ground disturbance**

For both of these alternatives, full suspension yarding would occur in riparian areas and units around meadows, reducing impact to these habitats. However, there is potential to negatively affect these habitats through soil compaction.

**Fire Damage**

Fire damage would be minimized in vernally wet and riparian areas by not burning or moving burn piles prior to ignition.

**Mitigation**

Using Project Design Features (PDFs) and Best Management Practices (BMPs) will allow seasonally wet soils to be avoided or yarded during dry conditions. This would minimize impact to these soils and the potential habitat for the above mentioned species. Use of equipment designed for less soil impact would minimize soil compaction.

**Alternative 2**

**Ground disturbance**

Ground disturbance would occur in Alternative 2 to a lesser level than in the Proposed Alternative and Alternative 1. Some ground disturbance will occur from BLM fire vehicles, BLM skidsteer tractors used for re-piling the wood for burning, and wood cutter vehicles. Yarding and construction of landings and temporary roads would not occur under this alternative.

**Fire Damage**

Fire damage would be minimized in vernally wet and riparian areas by not burning or moving burn piles prior to ignition.

**Mitigation**

Using Project Design Features (PDFs) and Best Management Practices (BMPs) will allow seasonally wet soils to be avoided or used during dry conditions. This would minimize impact to these soils and the potential habitat for the above mentioned species.

**No Action**

**Ground disturbance**

Ground disturbance would be confined to wood cutter trucks, which would have the least amount of impact of all the alternatives.

**Fire Damage**

Fire damage would not occur under the No Action Alternative. However, if fuels from the juniper removal remain, there is also a possibility for damage via wildfire.
Mitigation
Using Project Design Features (PDFs) and Best Management Practices (BMPs) will allow seasonally wet soils to be avoided or used during dry conditions. Ensuring that wood cutters are not permitted to drive across wet soils would minimize impact to these soils and the potential habitat for the above mentioned species.

Fire – Affected Environment
Current fuel within the units is generally composed of grass with large juniper piles. The juniper piles within the Smith Reservoir, North Willow Valley Sage, Pine Creek, Miller Creek, Potholes, and Pitchlog Creek units still have needles, which greatly increase their flammability. The fuel within the units is best modeled as GR2 (low load, dry climate grass)(Scott and Burgan 2005). Fire spreads rapidly through this fuel type, approximately 2 mph (160 ch/hr) under normal fire season weather. The juniper piles have little effect on the rate of spread; however they greatly increase a wildfire’s resistance to suppression. This is due to the greater flame lengths and spotting distances produced.

Fire – Environmental Consequences

Proposed Action and Alternative 1
Juniper piles would be mostly removed from the units, resulting in a GR2 fuel bed. Fire occurring within the units would be easier to suppress than under the other alternatives due to the lack of large jackpots of fuel and the presence of skid trails. Until the skid trails re-vegetate, they will provide good control points at which fires may be stopped.

Alternative 2
Juniper piles would be mostly removed from the units, resulting in a GR2 fuel bed. Fire occurring within the units would be easier to suppress than under the No Action Alternative due to the lack of large concentrations of fuel. Until the burn scars re-vegetate, they will slow the spread of fire somewhat.

No Action Alternative
Juniper piles would remain in the units, resulting in no change in the fuel bed. Needles from the juniper piles in the Smith Reservoir, North Willow Valley Sage, Pine Creek, Miller Creek, Potholes, and Pitchlog Creek units will fall off over time, decreasing flammability somewhat. Fire occurring within the units would be more difficult to suppress than under the other alternatives due to the continued presence of large concentrations of fuel.

Recreation – Affected Environment
Recreational use of the proposed treatment/project areas generally consists of dispersed motorized and non-motorized uses such as camping, hiking, hunting, fishing, and wildlife viewing. The Potholes recreation site is located within the Potholes treatment area, and the upper portion of the Miller Creek (canyon) treatment unit is an area frequently used by fishermen and for primitive camping. Also, a segment of the Gerber-­‐Potholes hiking trail is located within the Potholes treatment area. This segment of the trail was completed in FY 08. Recently felled junipers and brush piles are located adjacent to and on this section of the trail. These juniper logs and piles have impacted trail users by making this section of the trail difficult to find and follow. BLM has received several comments from horseback riders wondering when the trail will be cleared of debris and logs.

The Potholes, Miller Creek, FTZ 110 and western one-half of Pitchlog Creek treatment areas are located in a VRM Class II area. Class II objectives are to retain the existing character of the landscape. The N. Willow Valley Sage, the eastern one-half of the Smith Reservoir and the northern one-third of the Pine Creek treatment areas are located in Visual Resource Management (VRM) class III areas. Class III objectives are
to manage for moderate changes to the existing character of the landscape. The Schnipps, the southern two-thirds of the Pine Creek, the western one-half of the Smith Reservoir and the eastern one-half of the Pitchlog Creek treatment units are located in a VRM Class IV area. Class IV objectives are to allow for maximum modifications to the existing character of the landscape.

**Recreation –Environmental Consequences**

Only temporary, minimal disturbances to recreation visitors would occur during juniper disposal activities. Short term disturbances to recreationists and adjacent landowners from noise, dust and smoke associated with juniper treatment activities in the project area could be expected. A potential positive recreation benefit of juniper disposal activities could occur through the increased availability of firewood and mushroom gathering opportunities after commercial operations have concluded. A potential negative effect to the juniper disposal activities and the offering of firewood would be additional off-highway vehicle OHV use (off of existing roads), primarily from those gathering firewood. This negative effect is most likely to occur where units are more easily accessed by the public, including those near recreation sites/areas and along major roads. For this reason, it is likely that the Potholes, Miller Creek and N. Willow Valley sage units would receive some OHV use if these areas are made available for firewood gathering.

For visual and scenic resources, VRM class objectives for the treatment area would be met. The alternatives propose vegetative treatments through removal of already felled junipers and burning, with minimal road building. There would be no additional adverse effects to visual resources, then previously described in the KFRA FEIS, pages 4-97-101. However, some additional project design features have been proposed to reduce the visual impact of harvesting along major roads, within VRM class II areas and within 1/4 mile of rural in your face areas.

**CHAPTER 4 – CONSULTATION**

**Endangered Species Act (ESA) Consultation**

The shortnose sucker (*Chasmistes brevirostris*) was listed as endangered in 1988 under the ESA (USDI-FWS, 1988). This species inhabits lakes and streams in the Klamath Basin and were once abundant in the Lost River watershed, Upper Klamath Lake, and its tributaries. Gerber Reservoir and its watershed was identified as Unit 6 in the Proposed Critical Habitat determination rule for shortnose suckers and is the only major habitat area inhabited by shortnose suckers but not Lost River suckers (USDI-FWS, 1994). Proposed Critical Habitat Unit 6 includes the waters of Gerber Reservoir below the high water line and a large portion of the Ben Hall, Barnes, Barnes Valley, Pitchlog, Long Branch and Wildhorse Creek watersheds (within 100-year floodplain of designated stream segments) (USDI-FWS, 1995).

In the FTZ 110 unit, the quarter mile wide zone between the unit and the creek is very rocky and heavily vegetated. There are two ephemeral drainages that originate within the unit and pass into/through the area between the unit and the creek. Although it is unlikely to occur, these drainages may route sediment toward Barnes Valley Creek during peak flow conditions and high flow events. The amount of sediment that would likely enter the creek would likely be nearly undetectable since peak flow events are generally associated with higher turbidity levels. However, in order to protect Barnes Valley Creek, the shortnose sucker, and Proposed Critical Habitat for the shortnose sucker from any additional sedimentation from utilization activities in FTZ 110, parts of the unit around the described drainages were removed from the action area (see unit map). By excluding mechanical yarding and traffic from machinery from these drainage areas, the proposed action within FTZ 110 will not contribute excess sediment into Barnes Valley Creek. Therefore, a determination of “no effect” regarding the shortnose sucker in Barnes Valley Creek and “no adverse modification” for Proposed Critical Habitat Unit # 6 along Barnes Valley Creek.

The Pitchlog Creek unit, containing portions of Barnes Valley, Pitchlog and Long Branch Creeks was treated (cut and piled) as a riparian thin under the Gerber Tributaries Riparian Thinning CX (CX-08-09). Project Design Features (PDF’s) were followed and stated that no piles shall be constructed within or directly adjacent to any active stream channel and no vehicle use or refueling within 100 ft of riparian or spring...
areas. Even with the PDF’s in place and pile burning likely occurring in winter, a small amount of sediment could enter the streams before riparian vegetation can reestablish the variably scorched soil area under the pile.

The Miller Creek unit was treated (cut and piled) as a riparian thin under the Gerber Tributaries Riparian Thinning CX (CX-08-09). Project Design Features (PDF’s) were followed and stated that no piles shall be constructed within or directly adjacent to any active stream channel and no vehicle use or refueling within 100 ft of riparian or spring areas. Even with the PDF’s in place and pile burning likely occurring in winter, a small amount of sediment could enter the streams before riparian vegetation can reestablish the variably scorched soil area under the pile.

Effects to shortnose sucker and Proposed Critical Habitat would likely be minimal and short term in duration. The long-term result of riparian thinning and pile burning will likely be beneficial to native fish and aquatic habitat. Therefore a determination of “May Affect, Not Likely to Adversely Affect” was made by the BLM for shortnose sucker in the Pitchlog Unit creeks and Miller Creek. A “No Effect” determination was made for all other listed species.

Overall, the proposed action is anticipated to have long-term beneficial effects to proposed critical habitat for the endangered shortnose sucker and is likely to improve all the Primary Constituent Elements (water, physical habitat, and biological environment) for the sucker in. This project will benefit habitat conditions for the sucker by restoring geomorphic and hydrologic function to improve the quality and amount of riparian and aquatic resources. Therefore, a determination of “May Affect, Not Likely to Adversely Affect” was made by the BLM for the Proposed Critical Habitat Unit #6 for the shortnose sucker (*Chasmistes brevirostris*) within the units described above.

Regarding aquatic threatened or endangered species, on January 6, 2009, BLM met with the US Fish and Wildlife Service. During the meeting, both agencies agreed that this project meets criteria and is designed to meet Project Design Criteria for coverage under the Biological Opinion for Forest Service and Bureau of Land Management aquatic habitat restoration activities (ARBO). The project is applicable to category 13 (Riparian Vegetation Treatment (controlled burning) (see Biological Opinion and Letter of Concurrence, USDA Forest Service, USDI Bureau of Land Management and the Coquille Indian Tribe for Programmatic Aquatic Habitat Restoration Activities in Oregon and Washington That Affect ESA-listed Fish, Wildlife and Plant Species and their Critical Habitats, US Fish and Wildlife Service, June 14, 2007). Use of this Biological Opinion requires that certain general and project category specific Conservation Measures (CMs) and Project Design Criteria (PDC) will be followed. These include spill containment and contingency plans, site preparation and restoration measures (see Appendix D).

Hand piles would not be placed in or directly adjacent to wet or dry stream channels and will typically be burned in the winter when snow prevents unwanted consumption of nearby riparian vegetation. All applicable general and activity specific Conservation Measures shall be implemented as outlined in the Aquatic Restoration Programmatic Biological Opinion. In addition, all applicable general and activity specific Project Design Criteria shall be implemented as outlined in the Aquatic Restoration Programmatic Biological Opinion.

**Tribal Consultation**

The Klamath Tribes- Les Anderson, Cultural Protection Specialist for The Klamath Tribes was consulted on January 22, 2009.
CHAPTER 5 – LIST OF PREPARERS

Mike Bechdolt       NRS
Shane Durant        Forester
Madeline Campbell  Forester
Matt Broyles        Wildlife Biologist
Brooke Brown       Archaeologist
Eric Johnson        Fire Management Specialist
Don Hoffheins   Planner and Environmental Coordinator
Dana Eckard         Range Conservationist/Vegetation
Kathy Lindsey       Writer-Editor
Andy Hamilton       Hydrologist
Rob Roninger        Fisheries Biologist
Nikos Hunner        Soil Scientist
Molly Boyter        Natural Resource Specialist – Plants
Scott Senter        Outdoor Recreation Planner
Appendix A – Assumptions and Best Management Practices

Assumptions for Analysis

(1) Yarding would be done with a rubber tired grapple skidder capable of either one-end suspension or full suspension of the logs.

(2) Approximately 5-15% of the area would result in main skid trails and landings using either one-end or full suspension yarding methods. Of this, less than 3% would be in landings and the rest in skid trails.

(3) The anticipated impacts, based upon monitoring of previous operations, to both the soils and the vegetation, would be as follows:
   • Soil Compaction - On 5-10% of the area, soils would be susceptible to compaction as a result of repeated passes from the rubber-tired grapple skidders on the same area.
   • Vegetation Disturbance –
     • One-End Suspension Yarding - It is anticipated that 10-15% of the existing vegetation could be impacted from one-end suspension yarding.
     • Full-Suspension Yarding – It is anticipated that less than 10% of the existing vegetation could be impacted from full suspension yarding.

(4) Maximum yarding distance would be 1,300 feet. Temporary roads with turnarounds and landings would be needed for areas where the yarding distance exceeds 1,300 feet from existing roads (up to 3 miles of new temporary roads). All temporary dirt spurs would obliterated upon completion of operations.

(5) Some residual landing debris would remain after utilization operations are complete. This residual material would be burned on site in accordance with an approved burn plan. (Approximately 5-20% of the total burned areas would be seeded and/or planted and tubed.)

(6) Hauling of material – Although there are subtle differences in the type of trucks that would be used to haul material, the effects of hauling would be similar. Less than 3% of the yarded areas would be in landings.

(7) Under Alternative 2 (Burn Only) vegetation would be killed or damaged by fire on approximately 3 to 20 percent of the proposed treatment areas (variability due to different juniper densities on different units), with 3-5% of the unit resulting in soil “sterilized” or heated to the point of becoming hydrophobic and largely devoid of organic matter. All yarding and hauling would occur outside the seasonal restriction period for deer winter range (Nov. 1 – April 15) unless approved by KFRA wildlife biologists and resource specialists.

Best Management Practices

Noxious Weeds

• Require cleaning of all equipment and vehicles prior to moving on-site to prevent spread of noxious weeds.

• 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.

• 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. If unable to mow, flag all noxious weed populations and these populations should be avoided.

• 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.
Protection of Range Improvements

Fences
- During mechanical yarding operations machinery will not physically contact fence components. If fences must be crossed to access yarding units, this should 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 day’s operation. At the completion of yarding 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 pile 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.

Protection of Recreation Improvements
- After mechanical yarding operations, restore the running tread and trail borders of the Gerber-Potholes trail where commercial yarding of downed logs disturbs the trail. Before pile burning operations, restack piles away from the trail and avoid burning trail border material.

Cultural Resources
- Follow procedures for cultural protection and management outlined in the KFRA ROD/RMP (page 43), and protect identified sites by buffering and flagging for avoidance.
- 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. 470e as amended), and/or other federal laws and regulations.

Soils - Best Management Practices and Mitigations for all Action Alternatives
Best Management Practices provided in the KFRA ROD (USDI, 1995) which are applicable and recommended during implementation and monitoring include:

Soil Resource Protection
- Practice A – Limiting Detrimental Soil Conditions - The cumulative effects of detrimental soil conditions are not to exceed 20 percent of the total acreage within an activity area. Sites where the 20 percent standard is exceeded will require treatment, such as ripping, backblading or seeding.
- Practice B – Minimize soil erosion and soil productivity losses – Retain and establish an adequate vegetative cover on disturbed sites to prevent accelerated erosion.
- Fragile Soils – Minimize surface disturbance on sites having high water tables where water is at or near the soil surface for sufficient periods of time that vegetation survival and growth are affected.
Siviculture

- **Soil Resource Protection** – To limit and mitigate soil erosion and sedimentation. Apply protective measures which may include water bars, grass seeding, planting deep rooted vegetation, and/or mulching. Use seasonal restrictions on unsurfaced roads.

- **Obliteration of Roads and Landings** – Minimize or reduce sedimentation and improve site productivity by obliterating roads and landings and rehabilitating the land. (1) Rip temporary spur roads and landings by an approved method to remove ruts, berms, and ditches while leaving or replacing surface cross drain structures. (2) Return roads or landings not needed for future resource management to resource production through ripping and/or vegetation with native species. Apply weed free mulch and fertilizer where appropriate.

- **Tractor yarding methods** – To minimize loss of soil productivity and reduce potential for surface runoff and subsequent water quality degradation.
  - In previously unentered stands, use designated skid roads to limit soil compaction to 12 percent or less of the harvest area.
  - Rip skid roads discontinuously, when the soil is dry. Rips should be spaced no more than 36 inches apart and from 12 to 18 inches deep or to bedrock, whichever is shallower.
  - Minimize the width of skid roads.

Additional Mitigation Measures not specified in the KFRA ROD include:

- Obliterate all new temporary roads upon completion of the yarding and hauling.
- Seed and/or plant with native vegetation and treatment units with greater than 20 percent disturbed areas; primarily skid trails and landings and where native plants occur at low densities.
- Where feasible, burning will occur between November and March on slightly moist soil, very moist soil or wet soil (see Table A.1 below) and when fuels are dry.
- After initial ignition of piles, but while still burning, allow each pile to be re-piled once (i.e., place large unburned pieces back into the burning pile). Additional re-piling will be allowed if necessary to achieve 80 percent consumption of the piled material.
- Water bars would be installed on steeper skid trails to provide proper drainage and prevent accelerated erosion.
- To the extent feasible, where yarding occurs on slopes greater than 10 percent, end-line material along slope contours (i.e. cross-slope) to avoid creating ruts oriented down-slope.
- Flag areas where cryptobiotic crusts occur and avoid burning piles in or yarding juniper through these areas.
- Provide adequate ground cover such as slash or wood chips and seed and/or plant with native vegetation where native plants occur at low densities to prevent accelerated erosion on landings and steeper disturbed skid trails.
- Limit the size and number of landings and temporary roads so that the combined area is less than 20% of the treatment unit area.
Table A.1 – Protocol for determining operability of soils based on soil moisture at 4-8 inch depth.

<table>
<thead>
<tr>
<th>Soil Moisture % Increases Downward</th>
<th>Coarse Soils</th>
<th>Light Soils</th>
<th>Med. Soils (≤35% clay)</th>
<th>Heavy Soils (≥35% clay)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry soils</td>
<td>Dry, loose, single grained flows thru fingers</td>
<td>Dry, loose, flows thru fingers</td>
<td>Powdery, dry, sometimes slightly crusted but breaks down into powdery conditions</td>
<td>Hard, baked, cracked sometimes has loose crumbs on surface</td>
</tr>
<tr>
<td>Slightly moist soil</td>
<td>Still appears dry, will not form a ball with pressure</td>
<td>Still appears to be dry; will not form a ball</td>
<td>Somewhat crumbly, but will hold together from pressure</td>
<td>Somewhat pliable; will form ball under pressure. At plastic limit.</td>
</tr>
<tr>
<td>Moist soil</td>
<td>Still appears dry, will not form a ball with pressure</td>
<td>Tends to ball under pressure but seldom will hold together</td>
<td>Forms a ball and is very pliable, sticks readily if high in clay.</td>
<td>Easily ribbons out between fingers, has a slick feeling. At plastic limit.</td>
</tr>
<tr>
<td>Very moist soil</td>
<td>Tends to stick together slightly, sometimes forms a very weak ball</td>
<td>Forms a weak ball breaks easily, will not stick. Plastic limit or nonplastic.</td>
<td>Forms a ball and is very pliable, sticks readily if high in clay. Exceeds plastic limit.</td>
<td>Easily ribbons out between fingers, has a slick feeling. Exceeds plastic limit.</td>
</tr>
</tbody>
</table>

Recommended not operable by USFS Regional Soil Scientist
Proposed additional restriction based on Bob Powers (USFS PSW Soil Scientist) comment

Appendix B - References


United States Environmental Protection Agency, Region 10, Oregon Area Designations For the 24-Hour Fine Particle National Ambient Air Quality Standard, August 18, 2008 Available online at http://www.epa.gov/pmdesignations/2006standards/rec/letters/10 OR EPAMOD.pdf


USDI – BLM, Gerber Watershed Assessment, 2003


Appendix C – List of Documentation Addressing the Cutting and Piling of Proposed Units

<table>
<thead>
<tr>
<th>Unit Name</th>
<th>NEPA Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTZ 110</td>
<td>OR-014-DNA-01-02</td>
</tr>
<tr>
<td>Schnipps</td>
<td>OR-014-DNA-01-02</td>
</tr>
<tr>
<td>North Willow Valley Sage</td>
<td>OR-014-CX-06-10</td>
</tr>
<tr>
<td>Pine Creek</td>
<td>OR-014-CX-06-02</td>
</tr>
<tr>
<td>Smith Reservoir</td>
<td>OR-014-CX-05-01</td>
</tr>
<tr>
<td>Pitchlog Creek</td>
<td>OR-014-CX-08-09</td>
</tr>
<tr>
<td>Miller Creek</td>
<td>OR-014-CX-08-09</td>
</tr>
<tr>
<td>Potholes</td>
<td>OR-014-CX-08-09</td>
</tr>
</tbody>
</table>

Appendix D – USFWS Aquatic Programmatic Biological Opinion Consultation
(PDCS, CMs For Applicable Project Activity Categories)

**General PDCs and CMs Applicable to All Activity Categories**

**General PDCs:** All projects will be guided by PDCs that help restore or enhance stream channel, riparian, wetland, and/or upland functions that would occur under natural disturbance regimes.

**General CMs:** CMs are intended to minimize effects to the aquatic environment, and the following apply, when relevant, to all 19 activity types:

i. Technical Skill and Planning Requirements
   - Ensure that an experienced professional fisheries biologist, hydrologist or technician is involved in the design of all projects covered by this BO. The experience should be commensurate with technical requirements of a project. If ESA-listed wildlife/plant species occur in the planning area, as determined by a unit wildlife biologist or botanist, the appropriate specialist will assist with project design.
   - Planning and design includes field evaluations and site-specific surveys, which may include reference reach evaluations that describe the appropriate geomorphic context in which to implement the project. Planning and design involves appropriate expertise from professional staff or experienced technicians (e.g., engineer, silviculturist, fire/fuels specialists.)
   - The project biologist should insure that PDCs and CMs are incorporated into any implementation contract agreements. If a biologist is not the Contracting Officers Representative (COR), then the biologist must regularly coordinate with the project COR to insure the PDCs and CMs are being followed.

ii. State and Federal Requirements
   - Follow the appropriate state (Oregon Department of Fish and Wildlife (ODFW) or Washington Department of Fish and Wildlife (WDFW)) guidelines for timing of inwater work. Exceptions to ODFW and WDFW in-water work windows must be requested and granted from the appropriate state agency. Exceptions can be approved through documented phone conversations or email messages with the state agency(s). Such guidelines are intended to prevent project implementation in fish spawning habitat when fish spawning is taking place or while eggs and young fish are in or associated with channel substrates.
   - Project actions will follow all provisions and requirements (including permits) of the Clean Water Act for maintenance of water quality standards as described by Oregon Department of Environmental Quality (Oregon FS and BLM), Washington Department of Ecology (Washington FS
and BLM) and the MOU between WDFW and the FS regarding Hydraulic Projects Conducted by USDA Forest Service, Pacific Northwest Region, January 2005.

- All regulatory permits and official project authorizations will be secured prior to project implementation.

iii. Pollution and Erosion Control Plans
- Administrative Units will develop and implement a Pollution and Erosion Control Plan (PECP) for each authorized project, one that includes methods and measures to minimize erosion and sedimentation associated with the project. The following measures will assist in the creation of a PECP.
- Spill Prevention Control and Containment Plan (SPCCP) - The contractor will be required to have a written SPCCP, which describes measures to prevent or reduce impacts from potential spills (fuel, hydraulic fluid, etc). The SPCCP shall contain a description of the hazardous materials that will be used, including inventory, storage, handling procedures; a description of quick response containment supplies that will be available on the site (e.g., a silt fence, straw bales, and an oil-absorbing, floating boom whenever surface water is present.)
- The PECP should be included in construction contracts or force account work plans.
- The PECP must be commensurate with the scale of the project and include the pertinent elements of iv, v, vi, and vii listed below.

iv. Minimize Site Preparation Impacts
- Establish staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, hazardous material storage, etc) beyond the 100-year floodplain in a location and manner that will preclude erosion into or contamination of the stream or floodplain.
- Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Stockpile large wood, trees, vegetation, sand, topsoil and other excavated material, that is removed when establishing area(s) for site restoration
- Materials used for implementation of aquatic restoration categories (e.g., large wood, boulders, fencing material etc.) can be staged within the 100-year floodplain.
- Prior to construction, flag critical riparian vegetation areas, wetlands, and other sensitive sites to prevent ground disturbance in these areas.
- Place barriers prior to construction around sites where sediment may enter the stream directly or through road ditches. Maintain barriers throughout construction.
- Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees within riparian areas when they pose a safety risk. If possible, fell trees towards the stream. Keep felled trees on-site when needed to meet coarse woody debris objectives.

v. Minimize Heavy Equipment Impacts
- Consider contracting with operators who use non-petroleum lubricants and fluids in their machinery.
- The size and capability of heavy equipment will be commensurate with the project.
- All equipment used for instream work shall be cleaned and leaks repaired prior to entering the project area. Remove external oil and grease, along with dirt and mud prior to construction. Thereafter, inspect equipment daily for leaks or accumulations of grease, and fix any identified problems before entering streams or areas that drain directly to streams or wetlands.
- All equipment shall be cleaned of all dirt and weeds before entering the project area to prevent the spread of noxious weeds.
- Equipment used for instream or riparian work shall be fueled and serviced in an established staging area outside of riparian zone. When not in use, vehicles shall be stored in the staging area.
- Minimize the number and length of stream crossings and access routes through riparian areas. Crossings and access routes should be at right angles. Stream crossings shall not increase risks of
channel re-routing at low and high water conditions and shall avoid potential listed fish spawning areas when possible.

- Existing roadways or travel paths will be used whenever reasonable. Minimize the number of new access paths to minimize impacts to riparian vegetation and functions.
- Project operations must cease under high flow conditions that inundate the project area, except for efforts to avoid or minimize resource damage.
- Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. When operating heavy equipment in stream channels it is because project specialists reasoned that such actions are the only reasonable alternative for implementation and/or would result in less sediment in the stream channel or damage (short-or long-term) to the overall aquatic/riparian ecosystem relative to other alternatives.

vi. Site Restoration

- Upon project completion, remove project related waste.
- Initiate rehabilitation of all disturbed areas in a manner that results in similar or better than pre-work conditions through spreading of stockpiled materials (from b.iv.b. above), seeding, and/or planting with locally native seed mixes or plants. Planting shall be completed no later than spring planting season of the year following construction.
- Short-term stabilization measures may include the use of non-native sterile seed mix (when native seeds are not available); weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.
- All riparian plantings shall follow one or both of the following direction documents: Regional FS letter to Units, Use of Native and Nonnative Plants on National Forests and Grasslands, May 2006 (Final Draft), and BLM Instruction Memorandum No. OR-2001-014, Policy on the Use of Native Species Plant Materials. When necessary, loosen compacted areas, such as access roads, stream crossings, staging, and stockpile areas.

Category 13 – Riparian Vegetation Treatment (controlled burning)

a) Description – Implement controlled burning to help restore plant species composition and structure that would occur under natural fire disturbance regimes. Controlled burning of piled, pre-commercially thinned trees associated with other vegetation treatments under this BO is permissible. Resulting benefits include restoration of desired levels of stream shade, bank stability, soil erosion and stream turbidity, stream nutrients, and/or LW inputs. Additional benefits include maintenance of late-seral (old-growth) trees which serve as sources of LW to streams and a reduced potential of catastrophic fire within watersheds occupied by isolated populations of ESA-listed fish. This treatment should maintain the function of the riparian area as it affects the aquatic environment (e.g., temperature regime). Equipment would include drip torches and chainsaws, along with fire suppression vehicles and equipment.

b) Design Criteria –

i. An experienced fuels technician, silviculturist, and fisheries biologist shall be involved in designing prescribed bum treatments.

II. Prescriptions/burn plans should be written to help restore plant species composition and structure that would occur under natural fire regimes.

III. Low severity bums shall constitute the dominant type of controlled bum, resulting in a mosaic pattern of burned and unburned landscape. Low severity bums, as defined in the National Fire Plan, are characterized by the following: low soil heating, or light ground char, occurs where litter is scorched, charred, or consumed, but the duff is left largely intact, although it can be charred on the surface. Woody debris accumulation is partially consumed or charred. Mineral soil is not changed. Fire severity in forest ecosystems is low if the litter and duff layers are scorched but not altered over the entire depth.
• Moderate-severity bums are permitted in no more than 20% of the riparian area to invigorate decadent aspen stands, willows, and other relevant deciduous species. Such bums shall be contained within the observable historic boundaries of the aspen stand or willow site. Moderate-fire severity, as defined in the National Fire Plan, is characterized by the following: moderate soil heating, or moderate ground char, occurs where the litter on forest sites is consumed and the duff is deeply charred or consumed, but the underlying mineral soil surface is not visibly altered. Light colored ash is present. Woody debris is mostly consumed, except for logs, which are deeply charred.

• Non-commercial tree thinning and slash removal maybe required to reduce fuel loads required to implement a low to moderate severity bum.

iv. Tree thinning may be required prior to project implementation to create fuel loads necessary to carry a controlled fire.

v. To the greatest degree possible, avoid creating hydrophobic soils when burning slash piles within the riparian areas adjacent to the stream. Slash piles should be far enough away from the stream channel so as any sediment resulting from this action will be less likely to reach the stream.

vi. Ignition can occur anywhere within the riparian area as long as PDCs are met.

vii. If other aquatic restoration activities included in this BO are used as complementary actions, follow the associated PDCs and CMs.

c) Conservation Measures ~ No additional CMs are required


d) Excluded Activities - The following activities are not included in this BO:

• No chemical fire retardants.
• No mechanical piles in riparian area;
• No fire line construction;
Appendix E – Maps

Figure 3 – Ecological Site map from the 1997-98 ESI survey for North Willow Valley Sage.
Figure 4 – Ecological Site map from the 1997-98 ESI survey for Pine Creek.
Figure 5 – Ecological Site map from the 1997-98 ESI survey for Potholes, Schnipps and FTZ110.
Figure 6 – Abbreviated ESI survey map (no soils information) done during data gathering for Rangeland Health Standards Assessments for Smith Reservoir units
Appendix F – Scoping Issues

Public Input Summary and Issue Development

A public scoping letter on the proposed project and EA was sent out on March 26, 2008. Two written responses were received and one verbal response was received. The issues pertaining to this EA listed below were raised by members of the public and/or the Klamath Falls Resource Area’s interdisciplinary team members. The issues and concerns raised were considered in formulation of alternatives (Chapter 2), the Affected Environment, Environmental Consequences sections and development of mitigation measures (Chapter 3).


A concern was expressed with the lack of up-front analysis of juniper cutting projects. The CXs for the projects which resulted in the existing piles of juniper were premised on the assumption that there would be no utilization, and thus no yarding impacts (road management, off-road equipment, soil and water disturbance, invasive weed spread, etc). Instead of a narrow CX for each cutting project, a comprehensive EA that looks at the impacts and options for both cutting and disposing of the cut material should be done. Response: Although some of the individual CX’s did address different methods for disposing of the western juniper including utilization or burning, the decision maker felt a more in-depth analysis (EA) was needed to assure adequate assessment of the environmental impacts associated with the different disposal methods, particularly the impacts of yarding the juniper for commercial purposes. This EA is a comprehensive analysis of different alternatives on the impacts of disposing of large concentrations of cut western juniper using different methods.

Issue: Connected Actions of Multiple Treatments

The commenter stated that the need for this juniper disposal EA proves that the numerous projects done under CXs are connected actions and should be analyzed under an EA in the first place. A complete EA for any juniper cutting action that addresses impacts and options for cutting and disposing of the cut material should be done in the future. Due to the increase in categorically excluded projects, especially large fuels reduction and juniper cutting projects, the agency needs to consider these CXs as connected actions, and the agency should be considering the cumulative effects of these projects. CX projects, though limited in scope, do not take place in a vacuum and must be considered in context in the same way that EAs and EISs are. Response: The individual units being considered under this EA, for which CXs were prepared, met the Departments of Interior and Agriculture definition of categorically excluded projects as defined in the Federal Register 67-77038. Cumulative effects or impacts are one of the criteria that are reviewed when preparing a CX determination. This EA does address the cumulative impacts of all the past cutting of juniper regardless of whether it was previously analyzed under a CX or EA.

Issue: No Opportunity To Comment on BLM CXs

The CX procedure the Klamath Falls Resource Area uses for projects like juniper cutting is insufficient to allow for public scrutiny. The projects are only briefly described in the project updates publication, with no timeline for public involvement. No information is sent to the public. The CXs are not put out to the public for a comment period as required by NEPA. On numerous occasions, requests to receive information on CXs have been made so public comment could be made. Response: Although the KFRA uses the Quarterly Planning Update to notify the public of upcoming projects including CXs, the BLM is not required to perform public scoping on CXs because the treatments meet the definition of categorically excluded actions (67 Federal Register 77038). Healthy Forest Restoration Act CXs require a thirty (30) day review prior to implementation. The Public will have thirty (30) days to review and comment on this EA.

Other Issues Raised: Analyze a full range of alternatives including: Cumulative Impacts, Impact from roads & public accessibility, impacts to vegetation, soils, grazing, air quality, socioeconomics, and hydrology. Response: Chapters 3 & 4 provide a detailed discussion on these issues and associated impact analysis. The alternatives developed and analyzed are design to address these issues.
SOIL ISSUES IDENTIFIED DURING INTERNAL SCOPING

Soil resource concerns and mitigations, which are to be included as Design Criteria, and were identified during analysis for proposed treatments.

Issue: Soil effects of pile burning
Pile burning could cause physical, chemical, and biological alterations when temperature levels within soils exceed 50 degrees C.
Response: Where feasible, burning will occur between November and March on moist soil, very moist soil or wet soil, (see table in Appendix A) and when fuels are dry. After initial ignition of piles, but while still burning, allow each pile to be re-piled once (i.e., place large unburned pieces back into the burning pile). Additional re-piling will be allowed if necessary to achieve 80 percent consumption of the piled material.

Issue: Increased compaction
Yarding of juniper will increase compaction through the development of temporary roads, landings, and skid trails.
Response: To minimize compaction, gullying, and rutting, yarding operations would be conducted only when soils are dry to slightly moist at the 4 to 8 inch depth. The size and number of skid trails, landings and temporary roads will be limited so that only 5 to 10 percent of a treatment unit will be affected. To the extent feasible, rip temporary roads and landings with brush blades to decrease compaction (Tractor yarding method BMP).

Issue: Cryptobiotic crusts
Cryptobiotic soil crusts are fragile and will be disturbed by skid trails, landings, or temporary roads.
Response: Areas containing cryptobiotic crusts will be flagged and avoided placing skid trails, landings, or temporary roads through these areas.

Issue: Top Soil Removal
Top soils and soil crusts helping to aggregate soils, and that provide nutrients for plant uptake, will be removed or destroyed during proposed treatments.
Response: The amounts of bare soil remaining after treatment will be minimized by providing ground cover, such as slash or wood chips, adequate to prevent accelerated erosion in disturbed areas. Water bars would be installed on sloped skid trails to provide proper drainage and prevent accelerated erosion (Practice E). To the extent feasible, where end-lining occurs on slopes greater than 10 percent, end-line material along slope contours (i.e. cross-slope) to avoid creating ruts oriented down-slope. Approximately 5 to 15 percent of yarded areas would be planted and tubed.

Issue: Landings and temporary roads
The creation of landings and temporary roads will cause a significant decrease in soil productivity.
Response: Landings may be decommissioned after operations are complete in each area using the following method. Lop and scatter slash or wood chips over the surface of the landing. Seed and/or plant with native vegetation 5 to 15 percent of yarded areas; primarily skid trails and landings and where native plants occur at low densities (Practice J). Limit the area disturbed by burning or yarding to between 5 to 10 percent of a unit.

Issue: Firewood cutting impacts
Firewood cutting could result in an increase of rutting, gully creation and subsequent erosion due to vehicle use on wet roads.
Response: Seasonal road closures will be maintained for firewood cutting for wet soil conditions.

Issue: Fragile soils near intermittent lakes
Soils near intermittent lakes are fragile because they have high water tables for sufficient periods of time.
Response: The Hippyjim soil is frequently ponded for a very long duration and mechanical treatments should be avoided on approximately 6 acres within the Pothole unit when this soil is moist to wet.

Issue: Illegal OHV activity
A decrease in vegetation may lead to an increase in illegal OHV activity potentially causing damage to soil and water resources.
Response: A combination of natural barriers (rocks, logs, etc.), screening, and fencing may be used to prevent/discourage illegal vehicle activity during and after the project treatment. Fire Prevention Technicians and other staff would monitor the area, and if/when problem areas arise, remedial and preventative actions would be taken as appropriate.