NOTICE OF AVAILABILITY

South Warner Juniper Removal Project
Environmental Assessment (DOI-BLM-L050-2009-0037-EA) and
Draft Finding of No Significant Impact (FONSI)

The Lakeview Resource Area, Bureau of Land Management, has analyzed a proposal and several alternatives to improve habitats for sagebrush-dependent wildlife species, including sage-grouse (*Centrocercus urophasianus*), mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*) and pronghorn antelope (*Antilopcapra americana*) within the 69,000-acre South Warner Project Area. The Project Area lies south of Highway 140, approximately 12 miles east of Lakeview, Oregon. The alternatives range from no action (continue current management), to treating approximately 37,000 acres of invasive or post-settlement western juniper on public lands over a 5-10 year timeframe. One alternative also analyzes the impacts of using a portion of this material in a biomass electrical generation facility. The preferred alternative would improve habitat for wildlife by treating approximately 25,000 acres of post-settlement western juniper from sagebrush steppe habitat.

An EA and Draft FONSI have been prepared to document the impacts of the proposed project and are now available for review on the Lakeview District's website at http://www.blm.gov/or/districts/lakeview/plans/index.php. Hardcopies of these documents are available upon request. If you have questions regarding the proposal or wish to request the documents, please call Paul Whitman or Todd Forbes at (541) 947-2177. Comments on the proposal must be submitted in writing by July 22, 2011, to Thomas Rasmussen, Bureau of Land Management, Lakeview District Office, 1301 South G Street, Lakeview, OR 97630.

FINDING OF NO SIGNIFICANT IMPACT

SOUTH WARNER JUNIPER REMOVAL PROJECT

DOI-BLM-OR-L050-2009-0037-EA

The Bureau of Land Management, Lakeview District, Lakeview Resource Area (BLM), has analyzed several alternative proposals to improve habitats for special status and publicly important wildlife species such as sage-grouse (*Centrocercus urophasianus*), mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*) and pronghorn antelope (*Antilopcapra americana*). The alternatives include removing young western juniper trees (less than 130 years old) from sagebrush steppe, aspen, and forest habitats.

The Council on Environmental Quality (CEQ) regulations state that the significance of impacts must be determined in terms of both context and intensity (40 CFR 1508.27). The context of the proposed project is the South Warner Project Area. For this reason, the analysis of impacts in the attached Environmental Assessment (EA) is focused appropriately at this scale. The CEQ regulations also include the following ten considerations for evaluating the intensity of impacts:

1) Would any of the alternatives have significant beneficial or adverse impacts (40 CFR 1508.27(b)(1)?
( ) Yes (X) No

Rationale: Based on the analysis contained in the attached EA, none of the 4 alternatives would have either significant beneficial or adverse impacts on the human environment. There are no prime or unique farmlands, wild horse management areas, wild and scenic rivers, significant caves, designated wilderness areas, wilderness study areas, other areas with wilderness characteristics, areas of critical environmental concern, research natural areas, or hazardous waste sites located in the project area. No impacts would occur to low income or minority populations. Neither adverse nor beneficial impacts are anticipated to, floodplains, land tenure, or mineral and energy resources (pages 21 & 43).

Potential beneficial or adverse impacts to air quality, hydrology, water quality, soils, biotic crusts, vegetation, noxious weeds, wildlife habitat, special status plants, special status animals, livestock grazing management, recreation, visual quality, cultural and historic resources, areas of Native American religious concern, economic conditions, and greenhouse gas emissions anticipated by the various alternatives have been analyzed in detail within Chapter 4 of the attached EA and found not to be significant (pages 43-75).

2) Would any of the alternatives have significant adverse impacts on public health and safety (40 CFR 1508.27(b)(2)? ( ) Yes (X) No

Rationale: None of the 4 alternatives analyzed in detail in the attached EA would have significant impacts on public health or safety because the project area is not located near any populated rural or urban area. For this reason, there would also be no impacts to low income or minority populations (page 43). Further, there are no known hazardous waste sites in the project area (page 43). There are no drinking water sources located in the project area (page 43). Potential impacts to water quality in the project area have been analyzed in the attached EA and found not to be significant (pages 24-25, 43, 48-52, 64-65, 68-69 and 97). Potential impacts to air quality within and surrounding the project area have been analyzed in the attached EA and found not to be significant (pages 23 and 46-47).

3) Would any of the alternatives have significant adverse impacts on unique geographic characteristics (cultural or historic resources, park lands, prime and unique farmlands, wetlands, wild and scenic rivers, designated wilderness or wilderness study areas, or ecologically critical areas (*ACECs, RNAs, significant caves*)) (40 CFR 1508.27(b)(3)? ( ) Yes (X) No

Rationale: There are no park lands, prime or unique farmlands, wild and scenic rivers, ecologically critical areas, designated wilderness areas, or wilderness study areas located in the project area (page 43).

Impacts to riparian, wetlands and cultural resources values have been analyzed in the attached EA and found not to be significant (pages 53-57, 64, 68, 77, 79).

4) Would any of the alternatives have highly controversial effects (40 CFR 1508.27(b)(4)? ( ) Yes (X) No

Rationale: The BLM has extensive expertise planning, analyzing impacts, and implementing juniper removal projects such as those proposed by the 4 alternatives addressed in the attached EA. The potential impacts of these treatment actions on hydrology, water quality, soils, biotic crusts, vegetation, noxious weeds, special status plants, wildlife, special status animals, livestock grazing management, recreation, visual quality, cultural and historic resources, economic conditions, and greenhouse gas emissions can be reasonably predicted based on existing science and professional expertise. The attached EA analyzed these impacts (pages 43-80). The nature of these impacts is not highly controversial, nor is there substantial dispute within the scientific community regarding the nature of these effects. The BLM finds that there are not any highly controversial effects, as defined under 40 CFR 1508.27(b)(4).

5) Would any of the alternatives have highly uncertain effects or involve unique or unknown risks (40 CFR 1508.27(b)(5)? ( ) Yes (X) No

Rationale: The BLM has extensive expertise planning, analyzing impacts, and implementing juniper removal projects such as those proposed by the 4 alternatives addressed in the attached EA. The potential impacts of these proposed actions on hydrology, water quality, soils, biotic crusts, vegetation, noxious weeds, special status plants, wildlife, special status animals, livestock grazing management, recreation, visual quality, cultural and historic, and greenhouse gas emissions can be reasonably predicted based on existing science and professional expertise. The attached EA analyzed these impacts (pages 43-80). The nature of these impacts is not highly uncertain nor does it involve unique or unknown risks.

6) Would any of the alternatives establish a precedent for future actions with significant impacts (40 CFR 1508.27(b)(6)? ( ) Yes (X) No

Rationale: The BLM has extensive expertise planning, analyzing impacts, and implementing juniper removal projects such as those proposed by the 4 alternatives addressed in the attached EA. None of the alternative actions represents a new, precedent-setting rangeland or wildlife habitat management technique or would establish a precedent for future similar actions with potentially significant effects.

7) Are any of the alternatives related to other actions with potentially significant cumulative impacts (40 CFR 1508.27(b)(7)? ( ) Yes (X) No

Rationale: Based on the analysis contained within the Cumulative Effects section of Chapter 4 of the attached EA, none of the 4 alternatives would have significant cumulative effects within the project area, even when added to the effects of other past, present, and reasonably foreseeable future actions (pages 76-80).

8) Would any of the alternatives have significant adverse impacts on scientific, cultural, or historic resources, including those listed or eligible for listing on the National Register of Historic Resources (40 CFR 1508.27(b)(8)? ( ) Yes (X) No

Rationale: Potential impacts to cultural and historic resources and areas of Native American religious concern have been analyzed in Chapter 4 of the attached EA and found not to be significant (pages 28-29 and 55-56).

9) Would any of the alternatives have significant adverse impacts on threatened or endangered species or their critical habitat (40 CFR 1508.27(b)(9)? ( ) Yes (X) No

Rationale: None of the 4 alternatives analyzed in detail in the attached EA would have significant impacts on Federally-listed threatened or endangered species or their critical habitats. Potential impacts to threatened or endangered species or their critical habitats within the project area have been analyzed in the attached EA and found not to be significant (pages 65-68).

10) Would any of the alternatives have effects that threaten to violate Federal, State, or local law or requirements imposed for the protection of the environment (40 CFR 1508.27(b)(10)? ( ) Yes (X) No

Rationale: All of the 4 alternatives analyzed in the attached EA would comply with all Federal, State, and local environmental laws or other environmental requirements. In accordance with the Federal Land Policy and Management Act, the alternatives were reviewed for conformance with the current land use plan and other applicable plans and policies. The purpose and need for the proposed action conforms with the management direction contained in the *Lakeview RMP/ROD* (BLM 2003b). The *Lakeview RMP/ROD* (pages 23, 33, 34, 40, 44, 45, 50-52, 65, 70-72, 81-82, and 86-87), in turn, incorporated many of the findings and recommendations identified in the *Deep Creek Watershed Analysis* (FS and BLM 1998), the *Interior Columbia Basin Scientific Assessment* (FS and BLM 1996a; 1996b). This plan is also in conformance with the *National Sage-Grouse Habitat Conservation Strategy (BLM et. al. 2004)*, the *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* (ODFW 2011) and the *Oregon Mule Deer Initiative Plan* (ODFW 2009). The EA conforms to the requirements of the National Environmental Policy Act.

Finding

On the basis of the analysis contained in the attached EA, the consideration of intensity factors described above, and all other available information, my determination is that none of the alternatives analyzed would constitute a major federal action which would have significant adverse or beneficial impacts on the quality of the human environment. Therefore, an Environmental Impact Statement (EIS) is unnecessary and will not be prepared.

_____ _____

Thomas E. Rasmussen, Field Manager Date
Lakeview Resource Area

South Warner
Juniper Removal Project

ENVIRONMENTAL ASSESSMENT

DOI-BLM-OR-L050-2009-0037-EA

Bureau of Land Management
Lakeview District Office
1301 South G Street
Lakeview, Oregon 97630

June 2011

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I. INTRODUCTION

Purpose and Need for Action

The purpose of the proposed action is to remove existing post-settlement[1] western juniper (*Juniperus ocidentalis*) (juniper) in order to improve habitats for wildlife species within the South Warner Habitat Juniper Removal Project Area (hereafter referred to as the 'Project Area'). Habitats for sage-grouse (*Centrocercus urophasianus*), mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*) and pronghorn (*Antilopcapra americana*) have been degraded by the encroachment of juniper. Juniper if left unchecked will suppress native shrub, grass and forb species that these wildlife depend on. Removal of post-settlement juniper would maintain or restore sagebrush steppe habitats to proper functioning condition. This treatment plan/EA would provide guidance for treatment activities on BLM-administered (i.e. Public) lands in the Project Area for the next 5 to 10 years**,** consistent with the management goals and direction contained in the *Lakeview Resource Management Plan/Record of Decision* RMP/ROD (BLM 2003b).

The need for the proposed action arises from the fact that habitats for special status and publicly important wildlife species such as sage-grouse, mule deer, bighorn sheep and pronghorn antelope on BLM-administered lands in the Project Area are outside the desired range of conditions described in the *Lakeview RMP/ROD* (pages 23) due to the proliferation of existing post-settlement juniper. The *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat* (ODFW 2011), and the *Oregon Mule Deer Initiative* Plan (ODFW 2009), support this need for improvements to sage-grouse and mule deer habitat, respectively.

The *Lakeview RMP/ROD* places a high priority on the rehabilitation of shrub-steppe vegetation communities at risk due to decline in vegetative diversity and dominance by juniper. Emphasis is also given to the use of prescribed fire and mechanical treatment to regulate woody species dominance and direct vegetation composition toward desired conditions (pages 23-24). Priority areas for juniper management identified in the *Lakeview RMP/ROD* are: quaking aspen (*Populus tremuloides*) groves, riparian areas, sage-grouse breeding and nesting habitats, mule deer winter range, bighorn sheep range, and younger, invasive juniper sites impacting other resource values (pages 33-35). The *Lakeview RMP/ROD* also calls for maintaining or enhancing old-growth or pre-settlement[2] juniper woodlands (page 34).

Authority

This habitat treatment plan and associated Environmental Assessment (EA) has been prepared under the authority of the Federal Land Policy and Management Act of 1976 (FLPMA, 90 Stat. 2743, USC 1701) and the National Environmental Policy Act of 1969 (NEPA, 40 CFR 1500-1508).

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[1] "Post-settlement" juniper refers to juniper that was established after or near the time of European settlement or less than 130 year old.

[2] "Pre-settlement" juniper refers to juniper that was established prior to the time of European settlement or about 130 year old or more.

Background

The Project Area contains approximately 69,000 acres of mixed ownership and is located about fifteen miles east of Lakeview, Oregon (Map 1). Within the Project Area, BLM-administered lands account for 79% (54,202 acres) of the 69,000-acre Project Area with the remainder of the lands (14,813) in private ownership (21%) (Map 2). About 39% of the project falls within the Deep Creek Watershed. The *Deep Creek Watershed Analysis* (FS and BLM 1998) stated that vegetative diversity within the watershed has been reduced in abundance and distribution over the last century due to a combination of factors including: decades of fire exclusion, historic livestock grazing practices, encroachment of juniper into sagebrush-steppe and aspen stands, an increase of sagebrush densities, the reduction in abundance and distribution of cottonwood (*Populus* sp.) and aspen, changes in hydrologic regimes and erosion, and increases in hazardous fuel loading (FS and BLM 1998). A copy of this analysis can be found on the Lakeview District's webpage at the following web address: http://www.blm.gov/or/districts/lakeview/plans/files/deepcreekwa.pdf. The factors addressed in the *Deep Creek Watershed Analysis* in 1998 are still accurate today. The reduction in vegetative diversity refers to both a loss of complexity in vegetative communities (reduction of distribution and abundance of community types such as riparian cottonwood galleries) and a trend toward more homogenous communities of common vegetation (i.e. expansion of juniper woodlands and dense, late-seral stage of sagebrush communities). The following is a summary of the science regarding juniper expansion within the region.

The recent expansion of juniper in the surrounding region began in the late 1800s (Young and Evans 1981; Eddleman 1987; Miller and Rose 1995). Juniper in the Pacific Northwest is currently expanding at an unprecedented rate (Belsky 1996). Juniper was once confined to rocky ridges and unproductive pumic sands with sparse vegetation and infrequent fires (Eddleman and Miller 1992; West 1984; Miller and Rose 1995; Miller *et al*. 1999a). Juniper has now spread to more productive sagebrush sites with deep, well-drained soils (Miller and Rose 1999). Juniper has also invaded the dry fringes of pine stands and aspen sites where it competes vigorously with other species (Wall *et al*. 2001; Miller and Rose 1999). In one recent study in the region immediately surrounding the Project Area, three-fourths of the aspen stands sampled had established juniper populations. Twelve percent of the aspen stands had been completely replaced by juniper while twenty-three percent were dominated by juniper. Seventy percent of these stands had zero recruitment of new aspen (Wall *et al*. 2001).

Juniper now occupies over 2.5 million acres of eastern Oregon, southwestern Idaho, and northeastern California (Miller and Wigand 1994), including approximately 400,000 acres of juniper occurring within the Lakeview Resource Area (LRA). Extensive areas of juniper occur in the hills west of Warner Valley including 43,000 acres within the Project Area. Much of this juniper is less than 130 years old and falls in the early to mid-seral stage (Phase I & II) (Miller *et. al.* 2005).

Juniper expansion in the west has been most frequently attributed to the introduction of livestock, reduced role of fire, and optimal climatic conditions during the late 1800s to early 1900s (Tausch *et al*. 1981; West 1984; Miller and Wigand 1994). Heavy livestock grazing between 1880 and 1930 removed fine fuels that historically carried fire across the landscape, as well as removed competition from other species (Miller *et al*. 1999b). There was also a reduction in human set fires in the nineteenth century (Burkhardt and Tisdale 1976; Miller *et al*. 1994) and wildfire suppression began between 1910 and 1930 (Agee 1993). During the late 1800s until about 1916, winters in southeastern Oregon were milder and precipitation was greater than the current long-term average (Antevs 1938; Graumlich 1987). These conditions promoted vigorous juniper growth (Fritts and Xiangdig 1986; Holmes *et al*. 1986). Juniper's heavy use of soil moisture allows it to aggressively compete with herbaceous and shrubby forage species used by sage-grouse, mule deer, bighorn sheep and pronghorn. Watersheds can be degraded by juniper through ground cover reduction and subsequent surface erosion (Buckhouse and Gaither 1982; Gaither and Buckhouse 1983).

Research supports the importance of the role of fire as a natural disturbance process within sagebrush (*Artemesia* spp.) and juniper ecosystems (Kaufman and Sapsis 1989; Agee 1993; Miller and Svejcar 1994; Miller *et al*. 1995), as well as pine (*Pinus* spp.) forests (Franklin and Dryness 1973). Miller *et al.* (2005) found that early transitional states of juniper woodlands that still contain a healthy understory of shrubs, grasses, and forbs offered the most diversity of wildlife habitats and highest wildlife species diversity and abundance compared to closed juniper woodland stands with declining structural and plant diversity. As canopy closure increases and understory shrubs, grasses and forbs begin to drop out (i.e. vegetative diversity declines), wildlife species diversity also declines.

The BLM recognizes there is some minor controversy in the scientific literature related to how to best manage juniper. Belsky (1996) contends there are many "myths" with respect to the negative impacts of juniper expansion and positive impacts of juniper reduction. This EA contains an analysis of potential impacts, both positive and negative, expected from the proposed treatment project based on a review of the most current scientific literature available on this issue, including Miller *et al*. (2005 and 2007).

Miller *et al.* (2005) describes juniper woodland succession into sagebrush-steppe communities in terms of juniper tree dominance, understory (grass, forb, and shrub) presence or absence, and management options. Miller describes three phases of juniper succession and the transition zone where the shrub layer is becoming impacted thus restricting management options. In Miller's "Phase I" juniper trees are present, but grasses, forbs, and shrubs are the dominant vegetation that influences ecological processes (hydrologic, nutrient, and energy cycles) on the site. In "Phase II", juniper trees are co-dominant with grasses, forbs, and shrubs and all three vegetation layers influence ecological processes on the site. In the transition stage between "Phases II and III", juniper trees are co-dominant with grasses and forbs, but the shrub layer is out-competed by juniper and is on the decline. In "Phase III", juniper trees are the dominant vegetative component and the primary plant layer influencing ecological processes on the site. Native shrubs and grasses are sparse, though some invasive non-native species such as cheatgrass (*Bromus tectorum*) or medusahead rye (*Taeniatherum caput-medusae*) can be the dominant grass in the understory.

The most effective time to remove young juniper and restore sagebrush-steppe communities (in terms of both cost and desired vegetative response) is during Phases I and II. Once a stand transitions to Phase III, the understory is not adequate to carry a fire, nor is there an adequate seed source in the soil of desirable native understory plant species. Cheatgrass and other weeds often take over Phase III sites when the juniper canopy is removed without additional intensive work to the site such as seeding with native species. (Miller *et al*. 2007). Juniper Phases within the project Area are shown on Map 8.

Management Goals and Plan Objectives

The following Management Goals and Plan Objectives are based on, and consistent with, Management Goals, Objectives and the desired range of conditions adopted in the *Lakeview RMP/ROD* (BLM 2003b).

1. Manage public land to maintain, restore, or enhance populations and habitats of special status animal species (BLM 2003b).
    a. Improve nesting, brood rearing and winter habitats for sage-grouse through a reduction of post-settlement juniper. This includes, but is not limited to maintaining mature big sagebrush stands with intact native understory grasses, maintaining brood rearing habitats around springs, seeps, and meadows, and avoiding activities that would cause the long term spread of non-native grasses or noxious weeds.
    b. Remove juniper in the area west of Warner Valley to promote the maintenance and health of sagebrush, native grasses and forbs in sage-grouse habitats (ODFW 2011).
    c. Reduce sedimentation into stream habitats by improving ground cover conditions in the uplands (USFWS 1998).
2. Manage upland habitat, including shrub-steppe, forest, and woodlands, so that the forage, water, cover, structure, and security necessary for wildlife are available on public land (BLM 2003b).
3. Facilitate the maintenance, restoration, and enhancement of big game (mule deer, elk, pronghorn, and bighorn sheep) populations and habitat on public land (BLM 2003b).

a. Treat juniper on 115,000 acres of shrub steppe habitat in the Warner Wildlife Management Unit on public and private lands (ODFW 2009).

b. Treat forest stands with greater than 40% canopy closure to improve mule deer forage. (ODFW 2009).

4. Restore, maintain, or improve habitat to provide for diverse and self-sustaining communities of wildlife, fishes, and other aquatic organisms (BLM 2003b).

   a. Improve hydrologic function (including vegetative conditions that contribute to lower peak flows and increased base flows), reduce sedimentation from roads and restore and maintain riparian areas to conditions that enhance riparian-dependent resources (USFWS 1998).

5. Restore productivity and biodiversity in juniper woodlands and quaking aspen groves. Old growth juniper and ponderosa pine (*Pinus ponderosa*) stands would be maintained or enhanced (BLM 2003b).

   a. Improve aspen stands for a variety of wildlife species by reducing post-settlement juniper, reintroducing fire in some stands, and maintaining aspen stands on the landscape.

   b. Improve health and distribution of aspen stands on public lands. Prioritize stand selection based on the most risk of stand disappearing without treatment (ODFW 2009).

   c. Maintain pre-settlement (greater than 130 years old) juniper stands and individual trees for wildlife species, especially cavity nesting birds. Determine areas of young woodlands that will develop into future old-growth juniper woodlands.

6. Protect or restore watershed function and processes which determine the appropriate rates of precipitation capture, storage and release (BLM 2003b).

7. Restore, protect, and enhance the diversity and distribution of desirable shrub-steppe vegetation communities. Provide for their continued existence and normal function in nutrient, water, and energy cycles (BLM 2003b).

8. Restore, maintain, or improve riparian vegetation, habitat diversity, and associated watershed function to achieve healthy and productive riparian areas and wetlands (BLM 2003b).

The goals and objectives listed above are also are consistent with state management plans including: the *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitat* (ODFW 2011), the *Oregon Mule Deer Initiative* (ODFW 2009), and Oregon's Bighorn Sheep and Rocky Mountain Goat Management Plan (ODFW 2003).

Issues and Concerns / Scoping Process

Prior to public scoping, the BLM had internal staff discussions and communications with the Oregon Department of Fish and Wildlife (ODFW) and the U.S. Forest Service (USFS) to develop a preliminary list of issues to address within the Project Area. Several issues were initially identified in this manner and were included in the scoping letter sent out in February 2008. The

list of issues was further refined as a result of receiving one comment letter and one email during the scoping process from two separate groups. Meetings discussing the project with the Oregon Natural Desert Association (ONDA) were held on September 15, 2009 and on March 30, 2011. A field trip with both ONDA and the ODFW was held on May 5, 2011.

The issues and concerns are addressed in the discussion of the Alternatives, Environmental Consequences, Coordination, and/or Mitigation sections of the document to the extent BLM found them applicable to the proposed project. Those issues/questions raised during scoping are listed below. Those deemed not applicable to the proposed project have a response included immediately following the issue statement in italic text:

1. What should be done to improve or maintain watershed and sagebrush-dependent wildlife (i.e. sage-grouse) habitat conditions where past management practices have allowed juniper encroachment into shrub-steppe and aspen communities?
2. How should residual juniper, sagebrush, and bitterbrush stands be managed to provide an optimum ratio between forage, hiding, and thermal cover for mule deer?
3. Please insure vegetative manipulation benefits the long-term health of sage grouse habitat.
4. Consider previous comments (letter dated January 11, 2000) on lynx. *Based on suitable habitat description and historic records of lynx distribution (Verts and Carraway 1998, Squires et. al. 2006), there is no suitable lynx habitat within the Project Area. Lynx will not be considered further.*
5. Consider the Eastern Oregon All-Bird Plan.
6. Retain abundant snags and wildlife trees.
7. Avoid impacts to raptor nests.
8. How should old-growth juniper be managed to meet botanical, wildlife, and other resource objectives? Consider retaining or protecting old growth juniper ≥ 200 years old; address impacts to old-growth dependent sensitive species.
9. Address the fate of downed juniper.
10. Consider the conflicting science related to juniper treatment.
11. Consider the fact that native juniper plays an important role in Oregon's forests.
12. Consider retaining and protecting under represented species of conifer and non-conifer trees and shrubs.
13. How should Visual Resource Management (VRM) objectives be utilized to protect important viewsheds or travel corridors while still meeting other resource objectives?
14. Will off-road vehicle travel be used to access and manage the encroaching stands of juniper and how will the ensuing damage be rehabilitated?
15. Coordinate with the USFS and adjacent landowners.
16. Buffer streams from heavy equipment.
17. Complete special status species surveys prior to developing alternatives and before the decision is determined; monitor for Warner suckers.
18. Discuss riparian management objectives under PACFISH and INFISH. *The PACFISH and INFISH strategies do not apply to this Project Area because the areas covered by*

PACFISH and INFISH do not include the Project Area and will not be discussed further. However, riparian management objectives (RMOs) have been addressed in Appendix F of the Lakeview RMP/ROD (BLM 2003b and are also included as Appendix B in this document). Applicable RMOs will be addressed in this document.

19. Avoid activities in key or municipal watersheds. *No municipal or key watersheds are contained within the Project Area. These will not be considered further.*
20. Address potential of cheatgrass or noxious weed invasion following treatment and avoid treatments in areas highly susceptible to exotic species invasion.
21. Address impacts to topsoil health/cryptobiotic crusts.
22. Address nitrogen and carbon loss from the ecosystem.
23. Address pre- and post-treatment of livestock management after treatment.
24. Address the root of the problem: grazing and fire suppression.
25. Employ restoration that involves reseeding to native vegetation or allowing natural native regeneration in the absence of grazing disturbance.
26. Study the impacts of domestic livestock grazing in maintaining the unnatural and undesirable spread of Juniper and invasive weeds (and other invasive species such as cheatgrass) and/or the suppression of native grass, forb, and shrub species.
27. Study alternatives that involve reductions and/or exclusions of livestock, including substantial rest from grazing in treated areas following treatment.
28. Consider removing livestock and reintroducing fire without mechanical disturbance.
29. Recognize that thinning affects fire hazard in complex ways. Consider using prescribed fire after thinning.
30. Consider alternatives to mechanical disturbance.
31. Disclose any proposed road management activities associated with this project.
32. There were several individual issues brought forward that pertained to commercial timber forests stands, commercial logging and commercial thinning. *These issues are not relevant to this project since there are no commercial timber forest stands or activities identified in the alternatives under this plan. BLM believes these comments were rolled over from another project and submitted to this project. These issues are not addressed further in this analysis.*
33. Study the impact of the project and its mitigation measures in relation to global climate change as it interacts with encroaching juniper and changes to sagebrush habitats.
34. Make this an ecosystem plan and analyze cumulative impacts.
35. Consider both the qualitative and quantitative aspects in your cumulative effects analysis.
36. Please consider the full range of effects of the proposed project.
37. Avoid prescribed fire in Wyoming big sagebrush and lower-elevation basin big sagebrush unless such treatments are highly likely to improve sage grouse habitat.
38. A full range of alternatives should be developed. Address a full range of alternatives including wildlife enhancement, restoration, old growth protection, and non-motorized recreation.

Decision to be Made

The decision to be made is whether or not to implement a treatment plan that would reduce the encroachment of existing post-settlement juniper in order to improve sage-grouse, mule deer, bighorn sheep and pronghorn antelope on BLM-administered lands within the Project Area.

Wildfire suppression and rehabilitation, livestock grazing, and weed treatment decisions have already been addressed in the *Lakeview RMP/ROD* (BLM 2003b). These management decisions remain in effect and will not be addressed in this document.

Decision Factors

The following factors will be used in making the final agency decision:

1. The degree to which the alternative actions meet the purpose and need and project objectives.

2. The degree to which the alternative actions conform to the *Lakeview RMP/ROD* and other applicable management direction.

3. The nature and intensity of environmental impacts that would result from implementation and the expected effectiveness of related mitigations.

4. The cost effectiveness of the vegetation treatment to meet the project objectives.

5. The ability to offer areas for commercial biomass removal and other commercial activities.

Conformance with Other Land Use Plans/Policies

The management actions proposed within this document are consistent with or based upon management direction contained in the *Lakeview RMP/ROD* (BLM 2003b). The *Lakeview RMP/ROD* (pages 23, 33, 34, 40, 44, 45, 50-52, 65, 70-72, 81-82, and 86-87), in turn, incorporated many of the findings and recommendations identified in the *Deep Creek Watershed Analysis* (FS and BLM 1998), the *Interior Columbia Basin Scientific Assessment* (FS and BLM 1996a; 1996b), the *Greater Sage-Grouse and Sagebrush-Steppe Ecosystems Management Guidelines* (BLM et. al 2000) and the *National Sage-Grouse Habitat Conservation Strategy (BLM et. al. 2004)*. This plan is also in conformance with the *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* (ODFW 2011), the *Oregon Mule Deer Initiative Plan* (ODFW 2009) and *Oregon's Bighorn Sheep and Rocky Mountain Goat Management Plan* (ODFW 2003).

The *Deep Creek Watershed Analysis* was completed by an eleven-member interagency team from the Fremont National Forest and the BLM consisting of hydrologists, wildlife biologists, fisheries biologists, silviculturists, range management specialists and archaeologists. The team followed the six-step process outlined in *Ecosystem Analysis at the Watershed Scale, Federal Guide for Watershed Analysis* (Regional Interagency Executive Committee and Intergovernmental Advisory Committee 1995) and other guidance contained in the Forest Service's *Ecosystem Assessment Guide* (undated). The *Deep Creek Watershed Analysis* was not a decision document, nor did it make changes in land use allocation or select specific projects to be implemented. It did, however,

identify resource concerns within the watershed and made recommendations on projects that could correct those problems. Even though this document is greater than 10 years old, most of the analysis and recommendations are still current and still apply today. This project is proposed partially in response to recommendations made in the *Deep Creek Watershed Analysis*.

The proposed plan would conform with or compliment other on-going BLM management activities in the general vicinity including: weed treatment identified in the *Warner Basin Weed Management Area Plan* (BLM 1999a), *Noxious Weed Management Program EA* (BLM 2004), *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States* (BLM 2007) and *Vegetation Treatments Using Herbicides on BLM Lands in Oregon* (BLM 2010c). These plans would allow treatment of noxious weeds or invasive plant species where those plants impact wildlife habitats for federally listed or BLM sensitive species, including sage-grouse (BLM 2010c).

The proposed plan would also conform with or complement potential future wildfire suppression and rehabilitation activities, and livestock grazing management identified in the three following Allotment Management Plans (AMP's): Vineyard Individual 0201, AMP, Hickey Individual 0202 AMP, and the Lane Plan I 0207 AMP.

II. ALTERNATIVES INCLUDING THE PROPOSED PLAN

Alternatives Analyzed in Detail

The four alternatives described in this section were analyzed in detail and represent a reasonable range of management opportunities to meet the purpose and need within the Project Area.

Alternative 1: No Action – No Project Implementation

Under this alternative, no project implementation would occur. Natural processes (climate, wildfire, succession, etc.) would be the primary means of vegetation change on the 54,202 acres of BLM-administered lands within the Project Area. Current livestock grazing, wildfire suppression and rehabilitation, Warner sucker, firewood cutting, and noxious weed management activities would continue as described under other existing management plans and policies (BLM 1999a, 2003b, 2004; U.S. Fish and Wildlife Service 1997).

Management Direction Common to all Action Alternatives (Alternatives 2, 3 and 4)

BLM developed three action alternatives. The following discussion represents management direction from the *Lakeview RMP/ROD* (BLM 2003b), the *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* (ODFW 2011), the *Greater Sage-Grouse and Sagebrush-Steppe Ecosystems Management Guidelines* (BLM *et al.* 2000), the *National Sage-Grouse Habitat Conservation Strategy (*BLM *et al. 2004)*, the *Oregon Mule Deer Initiative* (ODFW 2009) and *Oregon's Bighorn Sheep and Mountain Goat Management Plan* (ODFW 2003) that would be incorporated into and common to these three alternatives.

Management Direction

a. Priority areas for juniper removal would be those areas where juniper is most adversely affecting other resources including: quaking aspen, riparian areas, greater sage-grouse habitats, mule deer habitats, and bighorn sheep habitats. Broadcast[3] burning would be avoided in areas that are highly susceptible to invasion by cheatgrass or medusahead rye and in most sage-grouse habitats. Broadcast burning could be conducted in marginal sage-grouse habitat areas including steep slopes (>30%) and rocky canyons. Pre-Settlement juniper stands would be maintained or enhanced. Areas treated by prescribed fire would be rested from livestock grazing for a minimum of two growing seasons until resource objectives are met as determined by a BLM interdisciplinary team. No increase in grazing preference would occur as a result of any portion of this project.

b. A portion of the Project Area lies within the Deep Creek Watershed Analysis area. The Deep Creek Watershed has been designated as one of eight "high priority" watersheds in the Lakeview Resource Area (BLM 2003b). Management activities would emphasize restoration or improvement of watershed function and processes. Active restoration of native plant communities (seeding or planning) would be used in areas unable to attain the desired range of conditions via natural processes alone.

c. Visual resource management direction calls for protecting scenic quality or mitigating all visual intrusions. All developments, land alterations, and vegetative manipulations within a 3-mile buffer of Highway 140 would be designed to minimize visual impacts. All projects were designed to minimize scenic intrusions commensurate with the appropriate VRM classification. Visual Contrast Rating Worksheets (BLM form 8400-4) were completed for all treatment activities located within VRM Class I and II areas and results are discussed in section IV of this EA.

Development of Specific Treatment Prescriptions

BLM developed prescriptions for juniper treatments on a stand-by-stand basis in consultation with the Oregon Department of Fish and Wildlife, using the handbook developed by Miller *et. al.* (2007) as a guide. Individual vegetation units were digitized using one meter resolution satellite imagery from the National Agricultural Imagery Program. During site visits, BLM staff visited individual vegetation units, took photographs, and recorded information on vegetation present, stand structure, invasive species, evidence of historic fire and other topics. Information from individually radio marked sage-grouse was also used to adjust prescriptions in an effort to avoid impacts to sage-grouse (BLM 2011).

Implementation

Project implementation would be conducted over a 5 to 10 year period of time. This would result in treating multiple units utilizing multiple entries to meet resource objectives. In general, under Alternatives 2 and 3, most units would either be entered only once to cut juniper trees, or twice,

[3] For the purposes of this project, Broadcast Burning is defined as cutting all or most juniper trees within a treatment unit by hand, allowing the cut trees to cure for at least one summer season, then igniting the trees and surrounding grasses and shrubs by hand or aerial ignition thereby allowing the fire to spread from tree to tree by using the grasses and shrubs between the trees for fuel. This type of burn is generally conducted in late summer or early fall when fuel conditions are dry enough to carry the fire.

once to cut the juniper trees and again after 1-3 years to burn the cut juniper. The BLM proposes to use prescribed fire and juniper cutting methods within the Project Area to maintain the integrity of sagebrush-steppe, bitterbrush, and aspen communities, and manage for intact understory grass, shrub, and forb components. These treatments would maintain a balance between juniper habitats and sagebrush steppe habitats, thus providing for habitat diversity and structure.

Treatment methods considered in the action alternatives include fall broadcast burning, winter single tree [4]burning, hand and mechanical thinning, firewood/post/biomass removal, and seeding of sites with inadequate native grass understory. A burn plan would be developed and implemented for each prescribed fire conducted within the Project Area. Burning seasons would be determined depending on resource objectives and control required to meet those objectives. Favorable broadcast burn conditions would generally occur in late summer to early fall when fuels would be cured out enough to burn well and be consumed. However, winter single tree burning would be used to protect bitterbrush and sagebrush stands except for sites identified for broadcast burning. Single tree burning involves only treating the individual cut trees. This leaves the areas of shrubs and grasses in-between unburned and intact.

Mitigation Measures

BLM staff surveyed all sites proposed for treatment activities for the presence of cultural resources and special status species. Based on the survey results, BLM built appropriate mitigation measures into the design features for the action alternatives. Those measures include site protection, avoidance, surface collection (cultural only), and other methods, as appropriate. If the specialist determined cultural resource and special status species values could not be adequately mitigated for a particular project unit, BLM eliminated the unit from the project.

The action alternatives all contain project design features aimed at minimizing the risk of noxious weed, cheatgrass, and other undesirable plant invasions. Broadcast burning would not be conducted in areas of susceptible to cheatgrass invasion. BLM staff would monitor pre-fire condition and post-fire effects to determine whether prescribed burn units are more likely to undergo natural recovery and/or noxious weed/cheatgrass invasion. All prescribed burn units containing sites prone to cheatgrass invasion or Phase III juniper areas would be reseeded with an appropriate native seed mixture to reduce the probability of cheatgrass establishment on those sites.

Livestock grazing would be coordinated with permittees prior to implementation of prescribed burning operations to accumulate sufficient fine-fuels if necessary to carry a prescribed fire. Following any burn, the area would be rested for a minimum of two growing seasons or until resource objectives are met, as determined by a BLM interdisciplinary team evaluation. After an interdisciplinary team determines that grazing can resume, livestock use and impacts to newly established desirable plants will be monitored several times over the first grazing season to determine if grazing can continue or if additional rest is needed. This monitoring will be conducted four times over the course of the first grazing season at roughly the following intervals; week one, two, three and week five after livestock are turned in and again after at the end of the

[4] For the purposes of this project, Single Tree Burning is described as cutting individual juniper trees by hand, allowing them to cure for at least one summer season, then igniting each individual tree by hand with a drip torch. Burning under this method is generally carried out when there is sufficient moisture or snow to eliminate or reduce the fire spread from tree to tree, thereby maintaining the majority of the shrubs and grasses while eliminating juniper slash.

first grazing season. If grazing is halted in an effort to provide additional rest, the same procedure will be repeated when grazing recommences.

BLM would avoid impacts to sage-grouse and migratory birds during the breeding and nesting season by designing appropriate mitigation measures into the design features for the action alternatives. Those measures include avoiding juniper treatments during spring nesting seasons that would impact sage-grouse or other nesting birds identified on the Birds of Conservation Concern list (USFWS 2008) and the Focal Bird Species list (USFWS 2005).

Best Management Practices

Best management practices (BMPs) are those land and resource management techniques designed to maximize beneficial results and minimize negative impacts of management actions. Best management practices for woodland management, prescribed burning, fire suppression, and noxious weed management were adopted in the *Lakeview RMP/ROD* (2003) and would be applied to management actions. A list of these BMP's is included in Appendix A in the back of this document. An Interdisciplinary team would determine which BMPs need to be applied to a given site on the basis of site-specific or seasonal conditions.

Alternative No. 2: Preferred Alternative

This alternative would remove post-settlement juniper from up to 45% (24,670 acres) of the 54,202 acres of BLM-administered lands within the Project Area to improve sage-grouse, bighorn sheep, mule deer and pronghorn habitats. Prescribed burning and mechanical treatment operations would concentrate on the Miller *et al.* (2005) Phase I (3,870 acres) and Phase II (19,433 acres) juniper stand types. Only 1,367 acres of Phase III stands would be treated. Most Phase III areas occur within aspen community types and would require seeding with native species after treatment.

This alternative includes different prescriptions depending on the treatment needs for each individual unit. A total of 18,007 acres would involve a combination of cutting and prescribed burning. Of the 18,007 acres of cut and burn, 1,373 would utilize a combination of hand cutting[5] and/or machinery[6] to accomplish the cutting and removal of juniper around sensitive sites such as aspen or ponderosa pine stands. Machinery could be used to cut the juniper and pull them away from other sensitive sites or juniper could be hand felled and then machinery used only for moving trees away from sensitive sites. The remaining 16,634 acres would utilize only hand felling. Hand cutting that would require no further slash removal with the use of prescribed fire would occur on 6,663 acres. This alternative also proposes to use material sales in the form of firewood as a form of slash removal in combination with prescribed fire on 3,475 acres. Firewood would be removed from accessible areas using standard pickup trucks, subject to normal BLM seasonal restrictions on firewood cutting for wet soil conditions and off-road travel. Map 3 shows the locations of treatment units under Alternative 2.

Minor adjustments in boundaries between differing prescription units would be made on a case by case basis at time of unit layout and treatment. These minor adjustments would account for no

[5] For the purposes of this project, Hand Cutting refers to cutting of trees on foot with chainsaws.

[6] Machinery could include tracked or wheeled equipment, including conventional tree harvesting equipment, an excavator with grapples, or tracked style tractors with grapple buckets.

more than a 5% overall change between prescriptions (1,234 acres or less). The total acres treated under Alternative 2 (24,670) would not change.

Areas that are broadcast or pile burned [7]would be rested from livestock grazing for a minimum of two growing seasons or longer until an Interdisciplinary Team determines that resource objectives have been met. After an interdisciplinary team determines that grazing can resume, livestock use and impacts to newly established desirable plants will be monitored several times over the first grazing season to determine if grazing can continue or if additional rest is needed. This monitoring will be conducted four times over the course of the first grazing season at roughly the following intervals; week one, two, three and week five after livestock are turned in and again after at the end of the first grazing season. If grazing is halted in an effort to provide additional rest, the same procedure will be repeated when grazing recommences. There would be no increase in grazing preference as a result of project activities.

Alternative 2 is designed to leave some juniper stands untreated. These would be stands made up predominantly of pre-settlement trees and some young stands that that would develop into future old-growth. Juniper stand age characteristics for the Project Area are shown on Map 9. Under this alternative, 18,379 acres (42%) of pre and post-settlement juniper would go untreated to provide for current and future old growth stands. Stands that were selected to go untreated were stands that had slow recruitment of new juniper trees. Overall stand structure within these areas would not change much over the next 20-30 years. These areas are less critical to sage-grouse, mule deer, bighorn sheep and pronghorn.

Three small forest stands totaling 233 acres would have juniper removed to improve habitat conditions for mule deer. Juniper would be hand or machine cut, piled away from other tree species including aspen, ponderosa pine or mountain mahogany. Piles would then be burned under fall or winter conditions.

Table 1. Preferred Alternative (2) prescriptions and acreage:

Prescription	Acres	Prescription	Acres
No Treatment	29,532	*Hand Cut & Single tree Burn*	11,547
Hand Cut & Leave	5,160	*Hand Cut & Firewood & Single tree Burn*	3,475
Hand Cut & Broadcast Burn	1,250	*Hand Cut & Single tree Burn, Seeding may be required.*	362
Hand Cut & Lop tops[8] below 4'	1,503	*Hand or Machine Cut, Pile & Burn*	1,373
		Thin & Pile Burn	0
		Total Actions	24,670

[7] For the purposes of this project, Pile Burning refers to burning of material that has been pulled away from other sensitive resources such as aspen or ponderosa pine and piled by hand or machine. Piles would be burned in late fall or winter when sufficient snow or moisture is available to limit fire spread.

[8] Loping tops refers to cutting on all parts of the tree so that no part of the slash of the tree would occur above 4 feet high. This is done to reduce raptor perches and speed the decay of cut trees.

Alternative No. 3: Maximum Treatment Alternative

This alternative would treat up to 68% (36,983 acres) of the 54,202 acres of BLM-administered lands within the Project Area to improve sage-grouse, mule deer, bighorn sheep and pronghorn habitats. Prescribed burning and mechanical treatment operations would concentrate on Phase I (4,209 acres) and Phase II (28,664 acres) juniper stands and 4,110 acres of Phase III stands. Phase III stands include aspen and mountain shrub community types where the shrub component is completely absent from the system. These areas would require seeding after treatments.

This alternative is similar to Alternative 2 in that it includes different prescriptions depending on the treatment needs for each individual treatment unit. The major difference between the two alternatives is that Alternative 3 would cut most post-settlement juniper and leave fewer areas of post-settlement juniper to develop into future old-growth stands. Relative to Alternative 2, there is a substantial increase in the acreage of cut and leave units, partial cut and broadcast burn units, and cut and single tree burn units. This alternative includes about 25,304 acres of juniper cutting and prescribed burning, and 11,679 acres of cutting only for juniper management. This alternative also proposes to use material sales in the form of firewood as a form of slash removal in combination with prescribed fire on 3,475 acres of juniper cutting. Firewood would be removed from accessible areas using standard pickup trucks, subject to normal BLM seasonal restrictions on firewood cutting for wet soil conditions and off-road travel. Map 4 shows the locations of treatment units under Alternative 3.

Minor adjustments in boundaries between differing prescription units would be made on a case by case basis at time of unit layout and treatment. These minor adjustments would account for no more than a 5% overall change between prescriptions (1,849 acres or less). The total acres treated under Alternative 3 (36,983) would not change.

Areas that are broadcast or pile burned would then be rested from livestock grazing for a minimum of two growing seasons or longer until an Interdisciplinary Team determines that resource objectives have been met. After an interdisciplinary team determines that grazing can resume, livestock use and impacts to newly established desirable plants will be monitored several times over the first grazing season to determine if grazing can continue or if additional rest is needed. This monitoring will be conducted four times over the course of the first grazing season at roughly the following intervals; week one, two, three and week five after livestock are turned in and again after at the end of the first grazing season. If grazing is halted in an effort to provide additional rest, the same procedure will be repeated when grazing recommences. There would be no increase in grazing preference as a result of project activities.

Seven small forest stands totaling 678 acres would have juniper removed to improve habitat conditions for mule deer. Juniper would be hand or machine cut and piled away from other tree species or scattered within the stand. These stands would then be broadcast burned in fall or spring to reduce slash, reduce understory shrubs, promote new growth of shrubs and forbs and restore mule deer forage conditions.

Table 2. Maximum Treatment Alternative (3) prescriptions and acreage:

Prescription	Acres	Prescription	Acres
No Treatment	17,219	*Hand Cut & Single tree Burn*	18,137
Hand Cut & Leave	10,972	*Hand Cut & Firewood & Single tree Burn*	3,475
Hand Cut & Broadcast Burn	2,652	*Hand Cut & Single tree Burn, Seeding may be required.*	362
Hand Cut & Lop tops below 4'	707	*Hand or Machine Cut, Pile & Burn*	0
		Thin[9] *& Underburn*	678
		Total Actions	36,983

Alternative No. 4: Biomass Alternative

This alternative would remove post-settlement juniper from up to 45% (24,670 acres) of the 54,202 acres of BLM-administered lands within the Project Area to improve sage-grouse, bighorn sheep, mule deer and pronghorn habitats. Prescribed burning and mechanical treatment operations would concentrate on the Miller *et al.* (2005) Phase I (3,870 acres) and Phase II (19,433 acres) juniper stand types. Only 1,367 acres of Phase III stands would be treated. Most Phase III areas occur within aspen community types and would require seeding with native species after treatment.

Within this alternative a total of 14,012 acres would involve a combination of cutting and prescribed burning. Of the 14,012 acres of cut and burn, 1,109 would utilize a combination of hand cutting and/or machinery to accomplish the cutting and removal of juniper around sensitive sites such as aspen or ponderosa pine stands. Machinery could be used to both cut the juniper and pull them away from sensitive sites or juniper could be hand felled and then machinery used only for moving trees away from sensitive sites. The remaining 12,903 acres would utilize hand felling. Hand cutting that would require no further slash removal with the use of prescribed fire would occur on 6,612 acres. This alternative also proposes to use material sales in the form of firewood as a form of slash removal in combination with prescribed fire on 851 acres. This alternative would also make 4,046 acres of juniper chips available for burning in a biomass electrical generation facility. These juniper chips would be used to generate power for residential use. Biomass removal would occur in areas identified for other treatment prescriptions under Alternative 2. Within the biomass treatment areas, additional seeding would be required along skid trails and landings. This would amount to approximately 250 acres of additional seeding with native species. Table 3 and Map 5 show the acres and locations of treatment units under Alternative 4.

Minor adjustments in boundaries between differing prescription units would be made on a case by case basis at time of unit layout and treatment. These minor adjustments would account for no more than a 5% overall change between prescriptions (1,234 acres or less). The total acres treated under Alternative 2 (24,670) would not change.

[9] For the purposes of this project, thinning refers to thinning understory trees including juniper trees out of forest stands.

Areas that are broadcast burned, pile burned or yarded for biomass material would be rested from livestock grazing for a minimum of two growing seasons or longer until an Interdisciplinary Team determines that resource objectives have been met. After an interdisciplinary team determines that grazing can resume, livestock use and impacts to newly established desirable plants will be monitored several times over the first grazing season to determine if grazing can continue or if additional rest is needed. This monitoring will be conducted four times over the course of the first grazing season at roughly the following intervals; week one, two, three and week five after livestock are turned in and again after at the end of the first grazing season. If grazing is halted in an effort to provide additional rest, the same procedure will be repeated when grazing recommences. There would be no increase in grazing preference as a result of project activities.

Alternative 4 is also designed to leave some juniper stands untreated. These would be stands made up predominantly of pre-settlement trees and some young stands that that would develop into future old-growth. Under this alternative, 18,379 acres (42%) of pre and post-settlement juniper would go untreated to provide for current and future old growth stands. Stands that were selected to go untreated were stands that had slow recruitment of new juniper trees. Overall stand structure within these areas would not change much over the next 20-30 years. These areas are less critical to sage-grouse, mule deer, bighorn sheep and pronghorn.

Three small forest stands totaling 233 acres would have juniper removed to improve habitat conditions for mule deer. Juniper would be hand or machine cut, piled away from other tree species including aspen, ponderosa pine or mountain mahogany. Piles would then be burned under fall or winter conditions.

Alternative 4 proposes to conduct the following activities within the biomass treatment areas:

1. Mechanically yard or skid juniper lying on the ground or in piles from hand or machine cutting units from 4,046 acres.

2. Juniper would be yarded or skidded 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.

3. No construction of new or temporary roads would be necessary.

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

5. Landing material and piles not removed for biomass would be burned.

6. Individual landing sizes would be limited to less than one acre and no more than 3% of the yarded area would be in landings. 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 the area could be opened to firewood cutting. Firewood could be removed from accessible areas using standard pickup trucks, subject to normal BLM seasonal restrictions on firewood cutting for wet soil conditions and off-road travel.

Table 3. Biomass Alternative (4) prescriptions and acreage:

Prescription	Acres	Prescription	Acres
No Treatment	29,532	*Hand Cut & Single tree Burn*	10,440
Hand Cut & Leave	5,160	*Hand Cut & Firewood & Single tree Burn*	851
Hand Cut & Broadcast Burn	217	*Hand Cut & Single tree Burn, Seeding may be required.*	362
Partial Cut & Broadcast Burn	1,033	*Hand or Machine Cut, Pile & Burn*	1,109
Hand Cut & Lop tops below 4'	1,452	*Thin & Pile Burn*	0
Machine Yarded Biomass	4,046	Total Actions	24,670

Alternatives Considered but Eliminated from Detailed Analysis

Based on public input, a number of additional alternatives were considered during the development of the proposed treatment plan as a means of addressing resource problems identified in the Project Area. Below are descriptions of these alternatives and discussions concerning why BLM eliminated them from further analysis.

One public comment suggested that BLM should consider an alternative that removes livestock grazing. This alternative was considered, but BLM found it to be outside the scope of analysis and not responsive to the stated purpose and need because it would not achieve the removal of post-settlement juniper from the Project Area. For these reasons, the BLM did not evaluate this alternative further.

Another alternative considered the reintroduction of fire using wide-scale broadcast burning to remove young juniper. This method would have been the most cost-effective and would have removed some of the young juniper. However, this alternative would have conflicted with some of BLM's management goals. It would not have achieved the project's purpose of improving habitat for wildlife species because the broadcast burning would have removed much of the sagebrush overstory and thus, much of the potential sage-grouse habitat. Use of broadcast burning in areas susceptible to cheatgrass expansion would also likely impede treatments or natural recovery of native plant communities (Baker 2011, Pyke 2011). For these reasons, the BLM did not evaluate this alternative further.

A commercial thinning alternative was considered for five small forest stands (1,200 acres) in a small portion of the Project Area. After review, BLM determined that an access road and stream crossing would need to be reconstructed in order to access these stands with heavy equipment. Due to the relatively small amount of commercial material available, this option was cost-prohibitive. For this reason, this alternative was not evaluated further.

One public comment suggested that non-motorized recreation management should be part of the suite of alternatives addressed by the treatment plan. This alternative was considered, but BLM found it to be outside the scope of analysis and not responsive to the stated purpose and need

because it would not achieve the removal of post-settlement juniper from the Project Area. For these reasons, the BLM did not evaluate this alternative further.

III. AFFECTED ENVIRONMENT

Introduction

This chapter describes the current resource conditions, amount, location, use, demands, etc., for each of the relevant resource values found in the Project Area.

Land Status

There are approximately 69,000 acres within the Project Area. Of this, public lands account for 79% of the area or about 54,202 acres. Private lands make up the remainder of the area with 14,813 acres or 21% (Map 2).

Land Tenure & Rights of Ways

There are several Rights of Ways located within the Project Area. The Bonneville Power Administration (BPA) maintains an 11 mile ROW for a 500 Kv power line that runs in a North-South direction through the eastern half of the Project Area. There is an improved all weather road that is also under ROW with BPA. Lake County maintains 13 miles of county roads within the Project Area. These are gravel surfaced roads that are regularly maintained.

There are currently two wind power testing rights-of-ways (ROW) located within the Project Area. The first testing ROW (Big Valley Wind Project) is located on the western edge of the Project Area just to the east of Big Valley. The second testing ROW (South Warner Rim) is located on the eastern edge of the Project Area on top of South Warner Rim. These ROWs encompass about 6,000 acres and are located in relatively open, low sagebrush communities.

Regional Climate

The Project Area is located in the semiarid rain-shadow region east of the Cascade Mountains and is characterized by cool temperatures, light precipitation, and moderate winds. This area has both maritime and continental climate patterns, with most of the weather patterns moving inland on cyclonic low pressure fronts off the Pacific Coast. Maritime air masses are blocked by the Cascade Mountain Range and the Warner Mountains. This results in the east side of the Warner Mountains receiving slightly less precipitation than the west side. The majority of precipitation falls as snow, with higher elevations receiving greater depths of snow. Total annual precipitation ranges from 11 – 21 inches. Elevations within the Project Area range from 4,500 feet to 6,400 feet with the average elevation around 5,700 feet. Eighty three percent the Project Area lies at elevations above 5,500 feet.

Temperature also varies widely, both seasonally and by elevation. Summer highs can exceed 100 degrees F in the lower elevations and winter lows below 0 degrees F can occur at all elevations. Freezing temperatures can occur any time of the year, especially at higher elevations. Higher elevation areas have a progressively shorter growing season, especially above the 6,000 foot elevation.

Greenhouse Gas Emissions, Carbon Sequestration, and Climate

Most climate scientists agree that average global temperatures have generally been rising over the past century. While an analysis of temperature anomaly data collected since 1998 indicates that average global temperatures have leveled off (NOAA 2009), there is still debate as to the timing and magnitude of temperature change and its effect on regional and global precipitation and weather patterns. Predictions of future climate conditions are based on outputs from broad-scale computer modeling studies. These predictions vary greatly depending upon which model is used and the assumptions and data that are plugged into the model. Further, the predictions are difficult to step down to the regional or project scale in a meaningful manner and cannot be tested in real time.

While many factors are known to have an effect on temperature (i.e. long-lived greenhouse gases, ozone, aerosols, water vapor, aviation contrails, surface albedo, and solar irradiance), not all have been studied at the same level of detail (Forster *et al.* 2007, Taylor 2009). Greenhouse gas levels represent one factor that has been widely studied in recent years. Forster *et al.* 2007 (pp. 129-234) reviewed scientific information on atmospheric constituents and radiative forcing and concluded that human-caused increases in greenhouse gas emissions since 1750 are extremely likely (95% confidence level) to have exerted a "substantial" warming influence on climate. Based on its own review of available science, the National Oceanic and Atmospheric Administration (NOAA) estimates that about 50% of the recent global warming is likely due to greenhouse gas increases caused by humans (NOAA undated). This implies that up to 50% of the global warming trend may be attributed to other causes, including natural fluctuations.

The Council on Environmental Quality (CEQ) has stated that it is not currently useful within a given NEPA analysis to attempt to link specific climatological changes, or the environmental impacts thereof, to a particular project or emissions; as such direct linkage is difficult to isolate and understand. CEQ also states that estimating greenhouse gas emissions can serve as a reasonable proxy for assessing potential impacts to climate (page 3; CEQ 2010). The U.S. Geological Survey recently reviewed the latest science on greenhouse gas emissions and concluded that it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration (storage) and designate it as the cause of specific climate impacts at a specific location (May 14, 2008 memorandum to the U.S. Fish and Wildlife Service). For these reasons, the BLM will not discuss the potential effects of the various alternatives on climate change. Rather, the BLM will focus its discussion on potential changes in greenhouse gas emissions and carbon sequestration (storage) processes that may result from alternative actions (refer to Section III).

The most common greenhouse gases include (in descending order of atmospheric composition): water vapor, carbon dioxide, methane, and nitrous oxide. Of the four, water vapor is the most abundant and important, representing over 90% of all greenhouse gases present in the atmosphere (Forster *et al.* 2007; Taylor 2009). Methane and nitrous oxide emissions represent a very small percentage of all greenhouse gases in the U.S. and have declined between 1990 and 2007 (U.S. EPA 2009). None of the alternatives analyzed would have any measureable effect on atmospheric water vapor, nitrous oxide, or methane, and will not be discussed further.

Each alternative would require the use of vehicles and heavy equipment in varying amounts during implementation. Based on vehicle emission analyses conducted recently for other projects in the

Resource Area (BLM 2010a and 2010b), the estimated annual contribution of carbon dioxide from vehicle emissions associated with all the alternatives would represent an insignificantly small proportion of the total U.S. transportation-related emissions and, thus, will not be analyzed further.

For these reasons, the remainder of this analysis (see Section III) will focus solely on attempting to quantify carbon dioxide emissions from the burning/biomass components and carbon sequestration processes associated with the various treatment actions. Some science contends that woodland expansion into grasslands may be a way to increase carbon sequestration on the landscape (Norris *et. al* 2001; Hibbard *et. al.* 2003). This may be true in some cases, however long term above ground sequestration may not be possible in arid fire-prone systems (Hurteau and North 2009; Rau *et. al*. 2010). Carbon pools are generally separated into below ground or soil pools and above ground pools consisting of vegetation and litter. In arid woodlands, above ground soil pools only account for 25% of the carbon storage, leaving the remaining 75% in belowground pools (Rau *et. al*. 2010).

Air Quality

The two major factors affecting air quality in south-central Oregon are the use of wood burning stoves for heating private residences in the winter months and wildfire and prescribed burning activities throughout the burning season. In the Project Area there are no air quality restriction areas (Class 1 air sheds, non-attainment areas, or special protection areas

Windblown particulate matter on federally administered lands originates from several sources including road dust, wildfire, and prescribed burning. Although smoke from fire is a natural part of ecosystem, it can potentially affect human health because of particulate matter concentrations and is therefore, an issue of concern.

Air quality is a sensitive issue in Lake County primarily because of the town of Lakeview recent efforts to avoid a designation as nonattainment area for PM2.5. Potential air quality consequences are important for the preservation of high quality visual values for the region. National Ambient Air Quality Standards (NAAQS) were established by the 1963 Clean Air Act and subsequent amendments to protect the public health and welfare from adverse impacts associated with the presence of pollutants in the ambient air. In 2006, EPA revised the 24-hour NAAQS for PM2.5 downward from 65 to 35 µg/m3. If the particulate matter for NAAQS is exceeded, the EPA is required to designate the area as a “nonattainment” area. With the emphasis on reducing risk of wildfire, fuels reduction projects using prescribed fire are also common source of pollutants that can contribute to reduced air quality. To comply with air quality standards and minimize impacts, the Lakeview Resource Area reports to the Oregon Department of Forestry (ODF) an estimate of the tonnage it expects to consume for each proposed project. Burn days are selected in coordination with the ODF Smoke Management to minimize the probability of sending smoke into these smoke sensitive areas.

Hydrology

The streams within the Project Area respond both geomorphically and hydrologically to the climate, particularly to the amount of precipitation, the form it comes in, and timing of snowmelt. The Project Area has a snow melt driven hydrology with occasional rain-on-snow events occurring in December or January. Normal spring runoff occurs from March through June with May usually producing the highest flows in Deep Creek. The higher elevations (mostly National Forest lands)

are a major source of flow for both base flow and spring runoff. The low elevation areas (mostly BLM-administered lands) contribute more towards spring runoff and have less influence on base flow. The floodplains store spring runoff and release base flows. The Project Area includes three 5th field watersheds Crump Lake (4,648 acres, 2%), Twentymile Creek (37,491, 29 %), and Deep Creek (26,848, 15%).

Rain on snow events periodically occur in December or January and result in the highest flow events. Normal spring runoff occurs from March through June with May usually producing the highest flows in Deep Creek. March produces the highest flows in Twentymile and Drake Creeks. The higher elevations are a significant source of flow for both base flow and spring runoff. The low elevation areas contribute more towards spring runoff with less influence on base flow. Current peak flows with a return frequency of five to 50 years appear to be 10 to 30% higher than historic flows. The gauging records show less change in the 1.5 and 100 year return periods. Deep Creek experienced peak flows exceeding a 100 year event in 1964. Possible causes of increased peak flows are linked to the impacts of high road densities and high levels of compacted soil from logging. The understory forest canopy has generally increased and forested stands now have higher canopy than the mean of historic conditions. However, the forested canopy is within the natural range of variability for the watershed and closer to the mean than the outside range. Also clearcuts or burn areas are less than 12% of any sub-watershed.

Base flows are estimated to have decreased a small amount as compared to historic conditions. Encroachment of conifers/junipers in meadows and stringers, downcutting of streams, loss of beaver dams and interception by roads create conditions for less base flow. Mean monthly flows have changed little since historic times, however duration of flows at bankfull have increased. This increase in high flows results in additional scour potential to the channel that can add to bank erosion.

Base flows in the Deep Creek watershed are estimated to have decreased a small amount as compared to historic conditions. Encroachment of conifers/junipers in meadows and stringers, down-cutting of streams, loss of beaver dams and interception by roads have contributed to conditions of less base flow (FS and BLM 1998). Mean monthly flows have changed little since historic times; however, the duration of flows at bankfull stages have increased (FS and BLM 1998).

Water Quality

In general, National Forest lands are at the headwaters and upper reaches of the watershed, private lands occupy the mid-elevation meadow areas, and BLM–administered lands are found in the lower elevation areas. Water uses in the Project Area include, irrigation, livestock and wildlife, fisheries habitat, and road dust abatement.

Water temperature is the main water quality parameter that is out of compliance with the State of Oregon, Department of Environmental Quality, Water Quality Standards (not to exceed 64 degrees F or 17.8 degrees C, 7-day average daily maximum). Increased width to depth ratios in stream channels and reduced shading from loss of riparian vegetation are the primary causes of elevated temperatures. None of the perennial streams in the Project Area are in compliance with water temperature standards (Table 4). Improved watershed and stream conditions would make progress toward achieving State stream temperature standards. Juniper trees in the project analysis area do not provide effective shade to perennial stream channels in the Project Area due to hydro-

geomorphic factors including seasonally high flows in the larger tributaries that prevent the establishment of conifers near the wetted edge of the channel. Juniper trees that do become established near the wetted channel compete with desirable riparian species such as willow and herbaceous riparian species which would otherwise promote and maintain higher water quality and provide additional stream shade.

In addition to temperature, 20 mile creek is also out of water quality compliance for silver and arsenic and 15 miles creek for silver. It is suspected that these elements are being contributed to these streams by hot springs that occur directly adjacent to the streams. These are naturally occurring hot springs and are outside the control of BLM.

Table 4. Major Streams in the South Warner Treatment Area and 303(D) Listing Criteria

STREAM	MOST LIMITING BENEFICIAL USE	303(D) LISTING CRITERIA	DOMINANT GEOMORPHIC CHARACTERISTICS
Deep Creek	Fish and Aquatic Life	Temperature	Canyon, transport, Rosgen B
Camas Creek	Fish and Aquatic Life	Temperature	Meadow, response, Rosgen C and Canyon, transport, Rosgen B
Parsnip Creek	Fish and Aquatic Life	Temperature	Transport, Rosgen B
Drake Creek	Fish and Aquatic Life	Temperature	Canyon, transport, Rosgen A & B, Meadow, response, Rosgen C
20 Mile Creek	Fish and Aquatic Life	Temperature, Silver, & Arsenic	Canyon, transport, Rosgen A & B
15 Mile Creek	Fish and Aquatic Life	Temperature & Silver	Meadow, response, Rosgen C and Canyon, transport, Rosgen B

Geology, Soils, and Microbiotic Crusts

Geologic and soil details about Project Area are set in context within Oregon's varied physical geography in the Atlas of Oregon (Loy *et al*. 2000). For context seven charts were employed: Geology, Soil Order, Soil Suborder, Annual Precipitation and Seasonality, Temperature and Seasonality and Vegetation. The Project Area occurs on high elevation plateau consisting of erosion resistant basalt. The dominant soils are in the Mollisol soil orders that are associated with grassland steppe vegetation (NRCS 1991, Kienzle 1999). The "Xeric" soil suborder has a dry season from July, August and September and a moist season from November to March. Soil temperatures are below freezing from December to February when snow cover persists (NRCS 1991, Kienzle 1999).

The geology of the Project Area is Basin and Range type with major north-south faults. All of the streams in the Project Area flow into the closed lake basins in the Warner Valley and are carved along cross faults between the west facing Abert Rim fault to the north and the east facing Warner Rim fault to the south.

Dominant soil series in the Project Area are described in the *Lake County Soil Survey, Southern Part* and are presented in Table 5. The basin has semi-arid forest to arid rangeland soil series (NRCS, undated). Forest soil series: Woodchopper, Rogger, Winterim, and Royst occur on mountains, plateaus, and hill. Sagebrush shrub covered soil series: Newlands and Ninemile occur down slope on mountains, hills, and terraces. On dryer tablelands, Carryback and Hart soil series occur. Along river canyons and rock outcrops Felcher and Riddleranch soil series occur.

Table 5 shows soils across the drainage area are dominated by basalt material that weathers into montmorillonitic clays. Overall, the soil series are characterized by "Argic," weathered clay accumulation in the soil profile. The soil climate is "Xeric," characterized by annual summer drought. Most soils are "Mollic," with accumulation of soil organic carbon from carbohydrate decay giving the soil dark coloration and soft friable characteristics.

The part of the Project Area administered by the BLM is dominated by cool sagebrush and dry low sagebrush tableland soils. Using fire regime condition class, reference vegetation types in Table 5, cool sagebrush is listed as CSGA1 and warm dry sagebrush is listed as WSAG1. Forest soils are a minor part of the Project Area and pine (PPIN1) sites dominate. Two soils, Winterim and Royst, have juniper as a woody component in pine forest for a PPIN1/JUPI1 combination. In sagebrush rangelands juniper is also associated with rim rock and other fire-safe land forms such as low sage dominated table lands. Within historic fire regimes, the rangelands in South Warner Treatment Area contained limited juniper woodlands. These woodlands are currently expanding and are altering plant communities and the underlying "Mollic" soils.

Table 5. Dominant soil series, taxonomy, mineralogy, and fire regime condition class (FRCC) reference vegetation for the South Warner Treatment Area.

Soil Series	Soil Taxonomy	Soil Mineralogy	FRCC Reference
Woodchopper	Pachic Ultic Argixeroll	mixed	PPIN1
Rogger	Ultic Haploxeroll	mixed	PPIN1
Winterim	Pachic Argixeroll	montmorillonitic	PPIN1/JUPI1
Royst	Pachic Argixeroll	montmorillonitic	PPIN1/JUPI1
Newlands	Argic Cryoboroll	mixed	CSGA1
Ninemile	Lithic Argixeroll	montmorillonitic	CSGA1/WSAG1
Carryback	Aridic Palexeroll	montmorillonitic	WSAG1
Hart	Aridic Palexeroll	montmorillonitic	WSAG1
Felcher	Xerollic Camborthid	mixed	WSAG1
Riddleranch	Aridic Haploxeroll	mixed	WSAG1

Fire regimes affect nutrient cycling in semi-arid forests. In the west it is not a question of whether an area will burn, but where, how much, and how hot the area will burn. Nitrogen, which burns (volatizes) at a relatively low temperature, is affected by fuel loading (Johnson *et al.* 1998). Soil heating at 20 tons/acre of woody fuel loading exceeds nitrogen's low volatilization temperature of (392° F) 200 degrees Celsius (C). At this temperature soil surface nitrogen is at risk of burning off the site (Brown *et al.* 2003; Johnson *et al.* 1998). Twenty tons per acre of woody fuel occurs with

scattered pole and limbs, which is easily achieved with juniper expansion onto sagebrush-grass rangelands. The risk of soil heating increases as juniper expansion onto sagebrush- grassland and pine forest become denser.

With increased wildfire risk, sustainable vegetation conditions have emerged as a key issue. Fire regime condition class (FRCC) is an interagency, standardized tool for determining the degree of departure from reference condition vegetation, fuels, and disturbance regimes (Havlina *et al.* 2010). The FRCC reference vegetation conditions are based on literature of classic observation and expert knowledge. Reference codes are listed by soil in Table 5. Reference conditions in FRCC list landscape scale proportion of seral conditions.

With increasing juniper expansion, soil conservation issues have emerged, similar to those described in detail in the *Gerber–Willow Valley Watershed Analysis* (BLM, 2003d). Here a few key soil conservation issues will be highlighted. Sustaining appropriate seral plant community proportions across the landscape for a natural balance of ground and crown cover is the primary soil conservation issue because these conditions sustain snow and dust deposits that build many of the soils across the Project Area landscape.

When vegetative diversity is lacking, soil erosion issues emerge. Soil erosion is moderated by the well-rooted ground cover. In juniper habitats, Miller *et al.* (2005) demonstrates ground cover moderates soil erosion. Soil conservation is correlated to grass, forb, and shrub cover, or lack of it, within juniper expansion areas. On the relatively level shrub and tablelands, the erosion rate is generally well below 1.0 tons per acre of accelerated erosion risk. Wildfire erosion rates are about 0.05 tons/acre for blackened sagebrush using Water Erosion Prediction Technology (WEPP, 2001). Soil risks are amplified by conifer, especially juniper, encroachment onto riparian corridors and displacement of appropriate riparian plants. The problem is aggravated by the loss of riparian species with effective sediment catching properties. The change from riparian species dominance to juniper dominance increases wildfire effects along steam courses. As juniper expands, wildfire erosion rates increase to 1.23 to 1.94 tons/acre depending on the slope. Similarly, without proactive forest thinning and fuel reduction activities, erosion rates are apt to be over 2.0 ton/acre in the closed pine forests after the occurrence of wildfire.

Soil erosion ranges from 0.36 to 0.05 ton/acre found within PPIN1 reference conditions. Wildfire erosion risk is reduced from about 2.0 to 0.2 ton/acre with activities that re-establish openings and well rooted ground cover.

No surveys for microbiotic crusts have occurred on BLM-administered lands within the Project Area. What little is known about microbiotic crusts in the Northern Great Basin is summarized in the *Lakeview Proposed RMP/Final EIS* (BLM 2003a). Belnap *et al.* (2001) notes that total protection from disturbance is often the easiest way to maintain or improve biological soil crusts, but it is not often possible or even desirable. There are many factors to consider in the management of soil communities, including disturbance type, intensity, timing, frequency, duration, or extent. More research is needed to determine realistic biological soil crust objectives by soil type in most vegetation types. The author also notes that proactive management is needed to prevent unnaturally large and/or frequent fires (and resulting negative effects on soil crusts) in areas where fuel build-up or annual grass invasions have occurred.

Cultural Resources

The Project Area contains cultural resources similar to the rest of the Resource Area. Archaeological or cultural sites range from small lithic scatters (areas of stone tool debris) of only a few flakes to large lithic workshops at quarry locations that cover many square miles. There are village locations, small temporary campsites, hunting stations, hunting blinds, game drives, rock art, religious sites, rock cairns, burial and cremation sites, and collecting sites present within the Resource Area, some of which occur in the Project Area. Areas with water and resources such as food plants and stone for tool making can be found at the main locations of these sites.

Deep Creek and other watersheds have provided a multi-faceted natural environment that is attractive to and utilized by human beings for all manner of activities. These activities range from utilitarian functions to spiritual pursuits and mental renewal. All the natural features that support a full array of human needs are contained within the watershed.

People took advantage of the dominant natural features, i.e. plant locations, lithic tool source areas, caves and rock shelters, rock outcrops, wet and dry meadows, pooled and running water, for their resource needs and religious practices. Occupation of the region spans a time period covering several thousand years.

Historically, the area was utilized and occupied by members of the Fort Bidwell Band of the Northern Paiute Indians. Oral history of the Northern Paiute indicates that they drove the Klamath Indians out of the area. Archeological evidence indicates that Northern Paiute entered the area sometime within the past 1,000 years. Prior to this, the evidence indicates that the area may have been occupied by people related to the Klamath Indians who are currently located approximately 100 miles to the west of this area. However, in the oral history of the Fort Bidwell Northern Paiute, they were created in this area and have always been here and they claim any archeological and spiritual sites in the area belong to their ancestors.

Early settlers and explorers focused their activities and settlement in the open areas near the many springs, streams, seeps and other water sources. The trappers and mountain men moved through the area taking furbearing animals. The abundant water and grasses were very attractive to early pioneers and they brought livestock to these resource rich areas. Permanent Euro-American settlement was located downstream away from the forested areas in the large open meadow/valley features (Big Valley) and further downstream in the non-forested grasslands.

One historic road, the Oregon Central Military Road, crosses the area. This road was used sporadically for the movement of supplies for the army during the late 1800's.

Historically, the area was used for ranching and livestock grazing. Numerous small water developments and range improvements dot the landscape. Reservoirs and spring developments provide water for livestock and wildlife. Some range and water projects within the Project Area were constructed in the mid to late 1930's by the Civilian Conservation Corps (CCC) and, therefore, have historic value.

Cultural Plants

A wide variety of cultural plants which are used for food, fiber, and medicine exist in the watershed. These plant uses have been determined by previous ethnographic studies (Kelly 1932;

Aikens 1986; Fowler 1986) of the area and in consultation with the tribes (Northern Paiute, Klamath, Modoc and Warm Springs). The Project Area is used for Native American cultural plant collection of blue camas, lomatiums (desert parsley), yampah (epos), bitterroot, tobacco root, wild onion, balsamroot, wyethia, red-osier dogwood, willows, squaw apple, elderberry, gooseberry, chokecherry, Indian plum, bitterroot, wild tobacco, wild grasses and other plants. In consultation with the Fort Bidwell Northern Paiute, they have stated that they consider all of the above listed plants to be "sacred" and must be maintained in order to ensure that their cultural practices can continue.

Vegetation

Three vegetation types dominate the Project Area: upland forest, riparian, and sagebrush/grassland steppe. Wetlands, special status plants, and noxious weeds are also present and are described in more detail below.

Wetland and Riparian Vegetation

Closed basins typify the BLM-administered lands within the Project Area. These basins include lakebeds that are inundated infrequently and for short durations and seasonal wetlands. Other valuable wetlands within the Project Area are those associated with seeps, springs, and streams scattered over the arid landscape. The variety of wetland/riparian shrubs, grasses and forbs present depends on a number of factors including: the degree and duration of soil moisture, elevation, soil type, and shade at each location.

Riparian ecological site types are defined as a combination of vegetation, soil, and hydrology. Riparian zones buffer the fluvial system from potential impact and disturbances caused by land management activities and natural events. A well-vegetated zone of grasses, sedges, herbs, shrubs and trees characterize riparian zones. The above ground biomass provides coarseness to the surface and dissipates the energy of flowing water acting as a filter to catch and hold sediment before it reaches the stream. Below ground biomass (roots and woody structure) holds the soil mantle together and minimizes stream bank erosion.

Riparian vegetation on BLM-administered lands is represented by aspen/silver sagebrush–grass types in drier areas, sedges and rushes in the wetter areas, and elderberry, chokecherry, and red osier dogwood in riparian stringers. In the Project Area, deciduous trees including cottonwood, aspen and alder cover the largest area with herbaceous meadows covering the second largest amount of land. Willow communities and shrubs make up the remainder. Juniper is encroaching on some riparian areas replacing riparian vegetation that is better adapted to hold stream banks together and provide more shade.

Several actions have occurred in the affected watersheds in the past that have impacted the proper functioning of the streams in the Project Area. Channel down-cutting has lowered the water table. Lowered water tables in riparian zones have changed the vegetative character and impaired floodplain functions. Willows and cottonwood have diminished over the years as water tables have been lowered. Past livestock management has resulted in the loss of bank holding vegetation. Improper road construction has restricted flood plain function. Past channelization for irrigation has reduced natural sinuosity of the streams. These watershed level changes have increased the severity of peak flows and have shifted flooding to earlier seasons (FS and BLM 1998). While many of the causative factors have been modified or eliminated, the impacts are still apparent. The

actions that impact the watershed and stream channels contribute to bank sloughing and erosion. Bank sloughing and erosion can lead to channel down-cutting and further lowering of the water table. Lowered water tables in riparian zones have changed the vegetative character and impaired floodplain function. Soil that is no longer held in place by the vegetative system is subject to erosion. The eroded material contributes to the sediment load in the stream.

Past fire suppression has affected the vegetative component of the riparian zones by allowing encroachment of juniper, into aspen and cottonwood stands. To reflect the magnitude of the juniper encroachment issue in the Northern Great Basin, three-fourths of sampled aspen stands had a juniper component and twelve percent of aspen stands had been completely replaced with juniper (Wall *et al.* 2001; Miller *et al.* 2005).

Lotic Proper Functioning Condition (PFC) assessments, stream survey data, and stream photo monitoring (all on file at the Lakeview BLM office), and field reconnaissance generally indicate improving trends in riparian conditions throughout the Project Area. Photos points established in the 1980's and 1990's that were retaken in 2009 show increases in native riparian vegetation, including willows, sedges and rushes, as well as stream channel narrowing and deepening, and increases in stream bank stability (see Photos 4 and 5).

Forest and Woodlands

Along the BLM/Forest Service boundary (forest fringe) there are ponderosa pine, lodgepole pine (*Pinus Contorta*), and mixed conifer forest communities, and juniper woodlands. The BLM-administered portion of the forest fringe is dominated by mixed pine and fir. These forest types occupy a very small percentage of the total area within the Project Area administered by the BLM (1,200 acres). While these stands have been classified as commercial forest stands, they are not suitable for intensive management for forest products and have no "allowable sale quantity" specified in the land use plan (page 33, BLM 2003b).

The *Deep Creek Watershed Analysis* (FS and BLM 1998) stated that historically the Deep Creek watershed was not prone to large-scale fire disturbances, however in recent years major fires such as the Grassy Fire and the South Warner Complex have occurred due to the accumulation of fuels on the forest fringe. Storm tracks, which produce lightning, usually skirt the Warner Mountains before proceeding northeast across the open desert or flowing up and over the western part of the National Forest. However, lightning has the potential to start more frequent and larger fires in the future due to the increased fuel loading on the forest fringe.

Juniper woodlands dominate an estimated 200,000 acres and are encroaching on another estimated 150,000 acres of the Resource Area as a sub-dominate component of these plant communities. There are 43,000 acres of juniper within the Project Area. Over 35,000 acres of juniper are encroaching into bitterbrush and sagebrush-steppe habitats, low sagebrush habitats, and aspen stands. Of the 43,000 acres of juniper within the Project Area, there are 8,000 acres in phase I conditions, 30,000 acres in phase II conditions and 4,000 acres in phase III conditions.

Under pre-settlement conditions, periodic wildfires killed most juniper saplings. As a result, juniper distribution was generally limited to rock outcrops or rocky table lands with light grasses and other low fuel levels incapable of carrying ground fires. Today these fire-protected sites contain stands of trees greater than 130 years old, with a few trees estimated to be greater than 400 years old. Within the Project Area, fire exclusion, loss of fine fuels, and fire suppression over the

last 130 years have allowed juniper densities to increase, as well as allow invasion into other plant communities. This expansion has resulted in degraded watershed function and the loss of sage-grouse, mule deer, bighorn sheep, and other sagebrush obligate species habitat. The increase in juniper has also increased the threat of wildfire within many of the same areas. Increased wildfires could lead to an expansion of invasive plants such as cheatgrass.

Sagebrush-Steppe

The dominant vegetation in the Project Area is low sagebrush-bunchgrass and mountain big sagebrush-bunchgrass with juniper as an overstory. Some basin big sagebrush and Wyoming big sagebrush stands exist within the Project Area, but these are limited to the lower elevations on the north and east sides of the Project Area and make up a small amount of the total area (≤ 3000 acres).

A small amount of BLM-administered rangelands contain vegetation associated with riparian areas or wetlands (see Riparian and Wetland section). Other shrub communities that occupy smaller percentages of the Project Area, but may be very important include: silver sagebrush, mountain mahogany, antelope bitterbrush, and some small stands of mixed pine and fir. There are also small inclusions of important plant populations such as snowberry and aspen. All of these unique vegetation types are very important habitat for sage-grouse, mule deer, elk, and other species.

The most common grasses found in the understory include Sandberg's bluegrass, bottlebrush squirreltail, Idaho fescue, bluebunch wheatgrass, and Thurber's needlegrass. These grass species are often found growing together, but one or two are usually the dominant species at a given site depending on soils, topography and previous disturbance. In low sagebrush the dominant grasses are Sandberg's bluegrass, bottlebrush squirreltail, and Idaho fescue. In mountain big sagebrush, the dominant grasses are bluebunch wheatgrass, Idaho fescue, bottlebrush squirreltail, and Sandberg's bluegrass. Within juniper/low sagebrush/grass, the dominant grasses are Idaho fescue, and bottlebrush squirreltail. Within juniper/mountain big sagebrush/grass, the dominant grasses are Thurber's needlegrass, bottlebrush squirreltail and bluebunch wheatgrass.

Cheatgrass occurs in several isolated patches scattered across the Project Area. Ecological sites most at risk of domination by cheatgrass within the Project Area are located on east and south facing slopes. There are two sites where cheatgrass is abundant within the Project Area. The first is a long strip of land along the base of South Warner rim. This area is the lowest in elevation within the Project Area and is east facing. The second site is a small area located on the western edge of the Project Area. This site is also east facing, but is not currently dominated by cheatgrass. No burning or surface disturbing activities are planned in either of these areas.

Noxious Weeds

Noxious weeds such as hoary cress (whitetop), Canada thistle, bull thistle, diffuse knapweed, spotted knapweed, field bindweed, Mediterranean sage, yellow toadflax, and perennial pepperweed have been identified in several areas within the Project Area. These infestation areas are small in size and located mainly in riparian corridors. Canada thistle has become pervasive in the riparian portion of the Project Area.

General Wildlife, Fish, and Aquatic Species and Habitat

Big Game Species and Habitat

The Project Area lies within ODFW's 600,000-acre Warner Management Unit and is managed for mule deer (*Odecoileus hemionus*), bighorn sheep (*Ovis canadensis*) and pronghorn antelope (*Antilopcapra americana*). The area also contains huntable populations of Rocky Mountain elk (*Cervus elaphus*), cougar (*Felix concolor*) and black bear (*Ursus americanus*). All are permit or quota system hunts with the exception of the general eastern Oregon black bear season.

There are approximately 45,000 acres of BLM-administered mule deer winter range within the Project Area, 7,000 acres of elk winter range, and no designated winter range for pronghorn antelope. Mule deer and pronghorn antelope are chiefly browsers and require sagebrush and bitterbrush throughout the year and also rely heavily on forbs during the spring and fall green-up periods. Juniper has expanded into several thousand acres of these bitterbrush stands and is changing the vegetative composition and vegetation species diversity of the stands. Juniper does provide thermal cover. However, these stands provide reduced food resources and cover is not a limiting factor within the Project Area. Elk are chiefly grazers and prefer sagebrush–grasslands for foraging and timber, including juniper woodlands, for security cover. Miller *et al.* (2005) reported that pronghorn antelope rarely use juniper woodlands, preferring more open shrub-steppe communities or stands with only scattered juniper trees.

There are approximately 30 California bighorn sheep that occur on Fish Creek Rim which borders the Project Area. Oregon Department of Fish and Wildlife (ODFW) have set a management goal of 100 bighorn sheep for this area. The bighorn sheep population is expanding. However, the current density of juniper is limiting full utilization of the potential habitat. There currently are 2,000 acres of designated yearlong bighorn sheep habitat within the Project Area. However, shrub and juniper encroachment is limiting their expansion into historic habitats. Bighorn sheep are chiefly grazers and prefer sagebrush–grassland habitats that provide forage and cover, as well as, openness to provide visibility for escape from predators. These areas generally occur near steep slopes used for escapement from predators. The *Lakeview RMP/ROD* (BLM 2003b) identified approximately 2,000 acres of bighorn sheep habitat in the Project Area that is currently being negatively impacted by juniper invasion.

Small Mammals and Nongame Birds and Habitat

There were nine priority bird species that were identified as publicly important species (Taylor *et. al.* 2005). Six of these species are associated with healthy sagebrush habitats. They include sage sparrow (*Amphispiza belli*), Brewer's sparrow (*Spizella breweri*), sage thrasher (*Oreoscoptes montanus*), loggerhead shrike (*Lanius ludovicianus*), lark sparrow (*Chondestes grammacus*), and vesper sparrow (*Pooecetes gramineus*). Taylor *et. al.* (2005) identified management goals for these species, including increasing the amount of healthy sagebrush habitats across the historic distribution, maintaining existing high quality sagebrush habitats, and restoring or enhancing degraded and converted sagebrush habitats where feasible and appropriate.

Taylor *et. al.* (2005) also identified three additional bird species that depend on old-growth or mature juniper woodlands. These species include gray flycatcher (*Empidonax wrightii*), ash-throated flycatcher (*Myiarchus cinerascens*), and chipping sparrow (*Spizella passerine*). Taylor *et. al.* (2005) identified management goals for these species, including protecting existing old-growth

juniper woodlands and managing lands to maintain current distribution of mature and old-growth habitats at existing levels over time.

In 2010, the BLM signed a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service to promote the conservation of migratory birds including golden eagles under the Migratory Bird Treaty Act of 1918 (as amended) and the Bald and Golden Eagle Protection Act of 1940 (as amended) (USFWS 1918, USFWS 1940, BLM & USFWS 2010). Under this agreement, the BLM agrees to evaluate the effects of the BLM's actions on migratory birds during the NEPA process and identify where take of migratory birds is reasonably attributable to agency actions and may have a measurable negative effect on migratory bird populations. In addition to the priority bird species identified by Taylor *et. al.* (2005) above and those identified in the Special Status Species section below, the USFWS identified six additional bird species on their list of Birds of Conservation Concern that are known to occur or have suitable habitat within the Project Area (USFWS 2008). These species include Flammulated owl (*Otus flammeolus*), Williamson's Sapsucker (*Sphyrapicus thyroideus*), willow flycatcher (*Empidonax traillii*), pinyon jay (*Gymnorhinus cyanocephalus*), Virginia's warbler (*Vermivora virginiae*) and green-tailed towhee (*Pipilo chlorurus*). There are no bird species reported in the literature that are obligates to closed juniper woodlands (Miller *et al.* 2005). In Eastern Oregon, avian species diversity and richness is greater in early transitional juniper woodlands with intact shrub layers and understory grass and forb components (Miller *et al.* 2005).

Raptors that are suspected or known to occur within the Project Area include golden eagle (Aquila chrysaetos), red-tailed hawk (Buteo jamaicensis), great horned owl (Bubo virginianus), Northern harrier (Circus cyaneus), prairie falcons (Falco mexacanus), kestrels (Falco sparverius), sharp-shinned hawks (Accipiter striatus), and Cooper's hawks (Accipiter cooperii). The Project Area was inventoried for raptor nests at the same time vegetation units were inventoried. Only one nest site (red-tailed hawk) was located on BLM lands and two nest sites were located adjacent to BLM lands. Since that inventory, two new raptor nests were located on BLM lands within the Project Area. The four "unknown species" nests are medium sized stick nests located in trees. These are presumed to be medium a sized hawk or raven nests. None of these nests appeared to be active at the time they were located. One golden eagle nest was located just outside the Project Area to the east located on a small rock outcrop. This nest was active during the 2011 breeding season.

There are numerous small mammals that occur within the area. Some of these include ground squirrels, chipmunks (*Tamias* spp.), yellow-bellied marmots (*Marmota flaviventris*), jackrabbits (Lepus sp.), cottontails (Sylvilagus nuttallii), bobcats (Lynx rufus), porcupines (Erethizon dorsatum), badgers (Taxidea taxus), spotted Skunks (Spilogale gracilis), striped skunks (Mephitis mephitis) woodrats (Neotoma spp.), mice, voles and bats. All of the species above are common to the sagebrush-steppe.

Small mammal and nongame bird habitat is currently being impacted by juniper invasion into shrub–steppe habitats. Small mammal and nongame bird habitat would benefit from juniper management in post-settlement juniper stands while maintain pre-settlement juniper.

Fish and Other Aquatic Species and Habitats

Fish habitat includes perennial and some intermittent streams, springs, lakes, and reservoirs that support fish through at least a portion of the year. The condition of fish habitat is related to hydrologic conditions of the upland and riparian areas associated with, or contributing to, a

specific stream or stream channel characteristics. Riparian vegetation reduces solar radiation by providing shade and thereby moderates water temperatures, adds structure to the banks to reduce erosion, provide in-stream structure for fish, and provide organic material, which is a food source for macro-invertebrates.

Intact vegetated floodplains dissipate stream energy, store water for later release, and provide rearing areas for juvenile fish. Water quality, including particularly temperature, sediment, and dissolved oxygen, also greatly affects fish habitat.

Proper Functioning Condition (PFC) assessments, stream surveys, and photo monitoring (all on file at Lakeview BLM), and field reconnaissance generally indicate improving trends in fish habitat conditions throughout the Project Area. Photos points established in the 1980's and 1990's that were retaken in 2009 show increases in native riparian vegetation, including willows, sedges and rushes, as well as stream channel narrowing and deepening, and increases in stream bank stability (see photos 4 and 5).

Photo 4 – Condition of Camas Creek in 1981.

Photo 5 – Condition of Camas Creek in 2009.

Special Status Species

These include species which are officially listed as threatened or endangered, proposed for listing, or are candidates for listing as threatened or endangered under the provisions of the Endangered Species Act (ESA), those listed by a State in a category such as threatened or endangered and those designated by each BLM State Director as Bureau Sensitive.

The objectives of the special status species policy (BLM Manual 6840) are:

1. To conserve listed species and the ecosystems on which they depend.
2. To ensure that actions requiring authorization or approval by the Bureau of Land Management are consistent with the conservation needs of special status species and do not contribute to the need to list any special status species, either under provisions of the ESA or other provisions of this policy. Conservation is defined as the use of all methods and procedures which are necessary to improve the condition of Special Status Species and their habitats to a point where their Special Status recognition is no longer warranted.

Special Status Plant Species and Habitat

Botanical surveys were completed during the 2009 and 2010 field seasons in the Project Area. No known or suspected BLM Sensitive plant sites were detected. There is suitable habitat for several Bureau Sensitive species in the Project Area, but no plants were found during the surveys. Awned sedge (*Carex atherodes*) is a BLM Strategic species found on BLM-administered land within the Project Area. These species are tracked, but require no special management.

Special Status Terrestrial Wildlife Species and Habitat

Northern bald eagles (*Haliaeetus leucocephalus*), a BLM sensitive species, occur in the winter, mainly in lower Deep Creek Canyon near Adel, Oregon. There is also major use in Warner Valley along Crump Lake and on private lands to the south. There are no known bald eagle nests or roost sites on the BLM-administered portion of the Project Area, however there are two known nest sites that are on lands adjacent to the Project Area. Both of these nest sites are located within 3 miles of the Project Area boundary.

American peregrine falcons (*Falco peregrinus*), a BLM sensitive species, have been occasionally observed within the Project Area, but sightings are rare. These sightings are probably associated with birds from the hack / release site on Crump Lake to the northeast that was used from 1992 through 1996. Historical sightings have also been recorded outside of the Project Area near Warner Canyon (1971), Walker Creek (1976), Peddlers Creek (1977), and Mud Creek (1978). There are no known active or historic nest sites within the Project Area.

Although the Project Area contains habitat for peregrine falcons, a study conducted by the Wilderness Research Institute (Boyce and White 1982) concluded the habitat is marginal. The study also concluded that the prey base for peregrines is inadequate above the rim (low numbers of small mammals and non-game birds). Therefore, they are completely dependent on sporadic migrations of Neotropical birds, shorebirds and waterfowl found along the wetlands outside the Project Area in the Warner Valley.

An analysis of occupied and potential sage-grouse habitats was conducted at the third order (fine scale) level (Johnson 1980, Stiver *et. al.* 2010). Information from individually radio marked sage-grouse form the Warner Mountain Sage-grouse Study along with habitat descriptions were used to determine current and potential habitat use areas (BLM 2011). Results of this analysis are shown in Table 6 and on Map 6. Occupied sage-grouse habitats make up 34% of the Project Area. These areas are divided into yearlong habitats and breeding / brood-rearing habitats. The breeding and brood-rearing habitats typically receive more snow cover allowing only for seasonal use. Marginal sage-grouse habitats make up 26% of the Project Area. These habitats are mostly steeper slopes and canyons that sage-grouse will occasionally use, but are not concentrated use areas. There is 38% of the Project Area that is not currently occupied sage-grouse habitat, but has potential to be. These are mostly habitats that have juniper densities that are high enough to preclude most sage-grouse use. The remaining 2% of the project has no potential to be sage-grouse habitat. This is made up of non-sagebrush steppe habitats, mostly forestlands.

Table 6. Third Order Sage-grouse Habitats within the Project Area

HABITAT DESCRIPTION	*ACRES*	*PERCENT OF PROJECT AREA*
Suitable Yearlong Habitat	12,418	18 %
Suitable Breeding / Brood-rearing Habitat	10,901	16 %
Marginal Yearlong Habitat	14,803	21 %
Marginal Breeding / Brood-rearing Habitat	3,573	5 %
Potential Yearlong Habitat	6,659	10 %
Potential Breeding / Brood-rearing Habitat	18,937	28 %
Unsuitable Habitat with No Potential	1,651	2%

There are four active and four inactive strutting grounds (leks) located within the Project Area. Sage grouse numbers in the southern half of the Lakeview Resource Area appear to be stable to slightly decreasing (ODFW 2011). On March 5, 2010 the U.S. Fish and Wildlife Service published the 12 Month Findings for the petition to list the Greater Sage-grouse (*Centrocercus urophasianus*) under the Endangered Species Act of 1973 (USFWS 2010). The Service found that the listing was warranted, but that it was precluded by higher priority listing actions. This makes the sage-grouse a candidate species.

Sage-grouse rely heavily on sagebrush systems throughout the year for foraging, cover and forbs when available during the green-up periods of the year (Connelly *et. al.* 2011). They also require residual herbaceous cover around nesting sites to conceal them from nest predators each spring (Gregg *et. al.* 1994, Holeran *et. al.* 2005, Connelly *et. al.* 2011). Sage-grouse also require open areas each spring for use as strutting grounds with adequate visibility to detect predators both aerial and terrestrial. Sage-grouse avoid juniper communities for strutting, nesting and winter use (Doherty et. al. 2008; Freese 2009); however they occasionally use open juniper communities for shade during hot summer afternoons. The four active leks located within the Project Area are not currently being directly impacted by juniper expansion; however, they are located directly adjacent to areas where junipers are expanding. Currently, juniper expansion is impacting sage-grouse nesting and brood rearing habitats within the Project Area by reducing available nesting cover, reducing native grass and forb cover, providing raptor perches for aerial predators, and providing cover for coyotes and other terrestrial predators. Map 6 shows the location of sage-grouse lek sites and location data.

The *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon: A Plan to Maintain and Enhance Populations and Habitats* (Oregon Strategy) (ODFW 2011) represents the most current and comprehensive sage-grouse management guidelines for Oregon. The Oregon Strategy recommends management actions at the local, project level scale. It identifies juniper invasion as a problem in the local area, especially in the area west of Warner Valley. Recommended treatment activities include the removal of juniper by mechanical or prescribed fire means, as long as the activities promote the return of sagebrush, native grasses, and forbs. A review of the Oregon Strategy reveals that the need for juniper management in the Project Area is even more urgent now than was expressed in an earlier strategy adopted in 2005.

Information on sage-grouse was made available in a set of 24 published chapters that summarizes current knowledge about sage-grouse on a range-wide scale (Monograph) (Knick and Connelly 2011). This publication was made available via a U.S. Geological Survey website in November 2009, and was formally published in 2011. Information from this publication was reviewed and applied at the local scale to this analysis. Based on this publication, and the 12 month finding (USFWS 2010), the following threats to sage-grouse habitat may occur within the Project Area: juniper encroachment into nesting, brood rearing and wintering habitats, exotic invasive plants, stand-replacing wildfire or prescribed fire in Wyoming and Basin big sagebrush, West Nile virus (WNv), energy development such as wind or geothermal power, fences, roads, off highway vehicle use and improperly conducted livestock grazing. Livestock grazing, fences, roads and off highway vehicle use are outside the scope of this analysis since they would not meet the purpose and need to remove juniper. These issues will not be discussed in detail. These issues will be addressed during the Lakeview Resource Management Plan amendment.

The threat of West Nile virus for the Project Area is low due to the high elevations and the moderate summer temperatures of the Project Area. According to the 12 Month Findings (USFWS 2010), the threat of West Nile virus outbreaks are reduced in higher elevation sites and at lower ambient air temperatures. One known outbreak has occurred in Oregon. This outbreak occurred in 2006 on private and public lands near Burns Junction, Oregon. Blood sample work has been conducted at a few locations in Oregon by ODFW and the National Wildlife Center to test for WNv in sage-grouse. Only one sample in over 1,000 was found to be positive. Both the location where the positive blood sample for WNv was collected and the site of the WNv outbreak occurred over 100 miles from the proposed Project Area. A majority of the blood samples came from Hart Mountain National Wildlife Refuge (HMHAR) located about 20 miles from the Project Area. No samples positive for WNv were collected from the HMNAR.

All of the proposed activities are consistent with recommendations presented in the Oregon Strategy (ODFW 2011), the Monograph (Knick & Connelly 2011), and the 12 Month Findings (USFWS 2010).

Four BLM sensitive bat species are known to occur within the Lakeview Resource Area. These include the fringed myotis, pallid bat, spotted bat, and the Townsend's big-eared bat. None of these species are considered juniper woodland dependent species, but they have been known to forage in open juniper woodlands. Fringed myotis may roost during the day in cavities within old-growth juniper and aspen trees. Roost sites for pallid, spotted, and Townsend's big-eared bats are generally in open caves, mines and old buildings.

Kit fox and pygmy rabbits, both BLM sensitive species, are also known to occur within the Lakeview Resource Area. However, both species are not juniper-dependent species. The only documented kit fox observation was on the far eastern edge of the Resource Area near Beaty Butte. The Project Area is not suitable habitat for kit foxes. Kit foxes are associated with sparser greasewood vegetation communities (Verts and Carraway 1998) that are not found in the Project Area. Pygmy rabbits prefer big sagebrush habitats with friable soil conditions necessary for burrowing (Verts and Carraway 1998). Potential habitat for pygmy rabbits in the Project Area is limited to deep soil, big sagebrush sites. Surveys were conducted for pygmy rabbits in some suitable locations, but no pygmy rabbits or evidence of pygmy rabbits were found.

Seven other BLM sensitive bird species are known to occur within the Lakeview Resource Area, none of which are juniper dependent species or obligates of closed juniper woodlands. The Northern goshawk is known to occur within the Project Area on the forest fringe. They are typically found in the ponderosa pine/fir forests. They may occasionally use juniper woodlands and canyon draws within the Project Area for incidental foraging. Ferruginous hawks have been observed foraging in the open juniper woodlands and sagebrush-steppe habitats, with the open sagebrush-steppe habitats being their optimum foraging habitat. These hawks commonly nest on open rocky cliffs or sturdy trees. Burrowing owls have not been observed within the Project Area and prefer sagebrush – steppe habitat that is free of juniper. Sage sparrows have been observed within the Project Area. They prefer open sagebrush habitat. Three woodpecker (Lewis', black-backed, and white-headed) species are suspected to occur within the Project Area. All three species prefer ponderosa pine forest habitats.

Special Status Fish and Amphibian Species and Habitat

The Project Area provides limited habitat for the federally listed (Threatened) Warner sucker (*Catostomus warnerensis*). The type locality (origin of the specimen for description of a species) for Warner suckers came from Warner Creek (now called Deep Creek) near Adel (Snyder 1897). There is occupied habitat in Deep Creek from the Deep Creek Falls downstream to Adel, Oregon and Crump Lake; however, most recent fish captures have been below Adel. Captures above Adel have been rare (White *et al*. 1990). Coombs and Bond (1980) found no suckers in Deep Creek above the upper diversion and felt sucker spawning occurred between Highway 140 and Crump Lake. Andreasen (1975) found no suckers in Deep Creek, even with several sampling attempts. No resident suckers have been found in Deep Creek since 1983 (U.S. Fish and Wildlife Service 1998). No spawning has been observed in Deep Creek, although it is suspected to occur between Crump Lake and Adel (U.S. Fish and Wildlife Service 1998).

A stream resident population of Warner suckers exists in the Twentymile Creek Watershed, in Twentymile and Twelvemile Creeks, almost entirely downstream of the Project Area (P. Scheerer, pers. comm. 2010). The only potentially occupied Warner sucker habitat in the Project Area is on private land in Twentymile Creek, near its confluence with Twelvemile Creek. Warner sucker have been found to occupy habitat in Twentymile Creek just outside of the Project Area, between County Road 3-14 and the confluence with Twelvemile Creek (P. Scheerer, pers. comm. 2010) and may at least seasonally move into the low gradient reaches above the county road, into the Project Area. Any occupied habitat in the Project Area would be on private land, downstream of BLM-administered land.

Of the 13.5 miles of designated critical Warner sucker habitat on BLM-administered lands in the Lakeview Resource Area, approximately 8.2 miles of it occurs within the Project Area (U.S. Fish and Wildlife Service 1985), all of it is located in Twentymile Creek. All of Twentymile Creek throughout the Project Area is Warner sucker Designated Critical Habitat.

All nine BLM-administered allotments within the Project Area had biological assessments completed in 1994 to determine the effect of livestock grazing management on the Warner sucker and to designated critical habitat. Grazing management in allotments 0203, 0209, 0210, and 0223 was determined to have "no effect" on Warner suckers. As a result of consultation, grazing management on these four allotments changed little from what occurred prior to consultation. However, since the initiation of consultation in 1994, enforcement of unauthorized use has become stricter.

Livestock management on the other allotments (0201, 0202, 0207, 0208, and 0211) was identified as either a "may effect, likely to adversely effect" or "may effect, not likely adversely effect" determination (U.S. Fish and Wildlife Service 1997). The consultation has been kept current through yearly BLM reports submitted to the U.S. Fish and Wildlife Service. Modifications to management have been coordinated with the U.S. Fish and Wildlife Service through the Section 7 Consultation process. Of the allotments listed as having "may effect" determinations, many have had riparian exclosures completed that removed grazing from streams.

Within the Project Area, only a portion of Camas Creek, Parsnip Creek, lower Deep Creek, Deep Creek around Sagehen Butte, small portions of Fifteen Mile Creek, and the intermittent portions of Upper Twentymile Creek receive regular, authorized grazing use.

Redband trout (*Oncorhynchus mykiss*), a Bureau sensitive species, can be found in all fish bearing streams within the watershed. Redband trout are generally temperature tolerant, but prefer temperatures between 10° -15° C. with critical thermal maxima of 28°-30.8° C (Gamperl and Rodnick 2003). Lower late season flows have had an impact on redband trout in the BLM reaches of the Project Area especially because of the accompanying high water temperatures. Although no recent water temperature data exists for streams within the Project Area, data collected in the 1990's within the Project Area (FS and BLM 1998) and more recently downstream of the Project Area (Richardson *et. al* 2010) shows that temperatures can reach the critical thermal maxima in and downstream of the Project Area.

Columbia spotted frogs (*Rana luteiventris*) are a Federal candidate species known to occur in three locations (two streams) near or within the Project Area. Columbia spotted frogs have been identified in Deep Creek, just upstream (approximately 50 meters) of the Project Area on private land, and on BLM-administered land at two locations in Parsnip Creek, within the Project Area.

Range Administration

There are six BLM-administered grazing allotments that lie completely within the South Warner Treatment Area: Lane Plan I 0207, Sagehen 0208, Schadler 0209, Lane FRF 0209, Rim 0210, Hickey FRF 0223, and portions of four other BLM grazing allotments that partially lie within the Project Area: Vinyard Individual 0201, Hickey Individual 0202, O'Keeffee FRF 0203, and Round Mountain 0211.

All of these allotments have Rangeland Health Standards Assessments completed (BLM 1999b, BLM 1999c, BLM 1999d, BLM 1999e, BLM 1999f, BLM 2000, BLM 2002b, BLM 2002c, BLM 2002d, BLM 2002e). All of the allotments meet the health standards for livestock grazing and are incorporated by reference into this EA. Rangeland Health Assessments and Allotment Management Plans can be found on the Lakeview District's webpage at the following web address: http://www.blm.gov/or/districts/lakeview/plans/inventas.php**.** Hardcopies are available in the range files upon request.

In 1982, the BLM initiated a strategy for setting management priorities among grazing allotments. This strategy was carried forward into the current land use plan (BLM 2003b as maintained). All allotments in the Lakeview District were categorized into one of three groups: Improve (I), Maintain (M), and Custodial (C). The "I" category allotments are those with unsatisfactory range resource conditions or conflicts with potential to improve and receive the first priority for

investment. The "M" category allotments are those where range conditions are generally satisfactory and the goal is to maintain those conditions. The "C" category allotments are to be managed in a custodial manner to avoid deterioration of current resource conditions. These may have a low percentage of public land, may have been designated for disposal, or may not have much potential for improvement. Of the 10 affected allotments, there is one "I" category allotment, five "M" category allotments, and four "C" category allotments.

The Vinyard Allotment (0201), an "I" category allotment, has 460 AUM's of grazing preference authorized on the 5,092 acres of public land, all within the Project Area. The allotment is grazed spring and summer under a rest-rotation grazing system. There are 8.5 miles of public land along Deep Creek in the allotment and of those 8.1 miles is now excluded from livestock grazing. The only land grazed along Deep Creek are 0.75 miles of privately owned land the 4 small water gaps (0.4 miles) on the public land. The entire 1.7 miles of Camas Creek located in the Vinyard Allotment are excluded from livestock grazing. Vegetative diversity and the amount of forage in the Vinyard Allotment has been reduced by juniper encroachment (junipers less than 130 years old) and would require juniper management to prevent this area from becoming dominated by juniper. (BLM 2000a).

The Hickey Individual Allotment (0202), an M category allotment, has 412 AUM's of grazing preference authorized on 2,798 acres of public land within the Project Area. The allotment is grazed spring, summer, and fall under a deferred rotation grazing system to permit seed production and seedling establishment. There are 2.4 miles of Parsnip Creek with 1.4 miles excluded from grazing and the remaining 1 mile grazed every other year (4-6 weeks in the spring). The entire 1.75 miles of Camas Creek is grazed as a riparian pasture with early use one year and rested the next. There is also 0.5 miles of Drake Creek that is excluded from livestock grazing.

The Lane Plan I Allotment (0207), an M category allotment, has 1,942 AUM's of grazing preference authorized on 24,725 acres of public land all within the Project Area. No perennial streams flow on the portion of the allotment within the Project Area and the allotment is grazed spring, summer, and fall under a rest rotation grazing system. The allotment is dominated by low sagebrush – grass communities in late and mid-seral condition. Vegetative diversity and the amount of forage in the Lane Plan I Allotment has been reduced by juniper encroachment (junipers less than 130 years old) and would require juniper management to prevent this area from becoming dominated by juniper. (BLM 1999e).

The Sagehen Allotment (0208), an M category allotment, has 266 AUM's of grazing preference authorized on 3,280 acres of public land, all within the Project Area. Deep Creek flows through 1.2 miles of public land and is grazed in the fall under a deferred rotation grazing system to meet riparian improvement objectives. The private landowner that owns the remaining 5.3 miles of Deep Creek has agreed to manage his section cooperatively with the public land to meet riparian objectives.

The Schadler Allotment (0209), a C category allotment, has 57 AUM's of grazing preference authorized on 790 acres of public land all within the Project Area. The allotment is grazed each summer and fall. The majority of the allotment is low sagebrush – grass in mid to late seral condition. Vegetative diversity and the amount of forage in the Schadler Allotment has been reduced by juniper encroachment (junipers less than 130 years old) and would require juniper management to prevent this area from becoming dominated by juniper. (BLM 2002c).

The Lane FRF 0209 is a "C" category allotment with 30 AUMS of grazing preference on 924 acres of public land all within Project Area. The allotment is grazed in the spring most years, but the use is slight to light as the allotment is mostly along South Warner Rim.

The Rim Allotment 0210 is a "C" category allotment with 39AUMS of grazing preference on 2,376 acres of public land all within the Project Area. The allotment is grazed in the spring most years but the use is slight to light as the allotment is mostly along South Warner Rim.

The Hickey FRF Allotment 0223 is a "C" category allotment with 64 AUMS of grazing preference on 412 acres of public land and 656 acres of private land all within the Project Area. The allotment is grazed in the spring in conjunction with the private meadow and hay lands on the Crane Creek Ranch.

The O'Keeffee FRF Allotment (0203) is a "C" category with 48 AUMS on 565 acres of scattered public land fenced in with over 4,000 acres of private land. Only about 265 acres of the public land is within the Project Area. The allotment is grazed in the spring and most of the public land receives slight or light grazing because it occupies the edges and the rocky areas of the allotment.

The Round Mountain Allotment (0211) is a "M" category allotment with 1,102 AUMS of grazing preference on 16,330 acre of public land and 1,640 acres of private land. About 13,630 of public and 1,000 of private land containing about 900 AUMS is within the Project Area. The grazing system uses three pastures in a rest rotation system in which grazing is rotated each year between early (May), late (June) or rested.

Wilderness Characteristics

There are no designated wilderness areas or wilderness study areas within the Project Area. The BLM recently reviewed and updated its inventory of wilderness characteristics on BLM-administered lands within the Project Area in October 2009 (BLM 2009). Pursuant to 40 CFR Sect. 1502.21, the BLM hereby incorporates this wilderness inventory update by reference. This inventory update has been posted on the Lakeview District website at http://www.blm.gov/or/districts/lakeview/plans/inventas.php and is also publicly available in hard copy at the BLM Lakeview District Office or upon request.

There were 11 wilderness character inventory units within the Project Area. Nine of these 11 units did not meet the size criteria (>5,000 acres). Of the 2 units that met the size criteria, one unit, Wakefield Cabin, did not meet the naturalness criteria. The Interdisciplinary Team that completed the wilderness character evaluation determined that the Wakefield Cabin unit did not meet the naturalness criteria because the total amount of human-caused disturbances have increased substantially and, when considered cumulatively, detract from the overall the natural quality of the area. The other unit, South Warner Rim, was found to be predominantly natural, but was found not to have outstanding opportunities for solitude because it is difficult to avoid the presence of others within the unit and it is difficult to escape the presence of man-made features that overpower the viewsheds to the north (state Highway 140), west (BPA 500Kv power line) and east (county road 3-14 and private residences). The ID team also found that the unit had a clear lack of outstanding opportunities for primitive and unconfined recreation. As explained in the inventory update, the BLM determined that wilderness characteristics are not present within the Project Area (BLM 2009). For this reason, wilderness characteristics will not be addressed further in this EA.

Recreation Opportunities

BLM lands in the area are open to motorized vehicle use. There are approximately 100 miles of roads and trails within the Project Area. Of these, 34 miles are hard surfaced roads and 66 miles are native surface roads and trails. These roads and trails are used by private landowners to access private lands, used by permittees to access livestock developments and are used by the general public for recreation. Travel within the Project Area is generally very limited from during December to April due to wet road conditions and winter weather. Generally public recreation use is very light and is limited to July-October.

Camping mostly occurs within dispersed camps located along Deep, Upper Twenty mile, Fifteen mile, Camas creeks and Lucky Reservoir. Major recreation activities include, but are not limited to, stream and reservoir fishing, hunting, camping, and off-highway vehicle (OHV) use. Camping, hiking, horseback riding, and mountain biking also occur in the area. This use is light and dispersed. There are no designated recreation sites or trails. Camping and OHV use is highest during the fall pronghorn antelope, mule deer, and upland bird hunting seasons.

Visual Resources

There are three VRM classes (II, III, and IV) within the Project Area. VRM classes specify management objectives and allow for differing degrees of modification in the basic elements of landscape features (form, line, color, and texture). These elements determine the degree of alteration that is acceptable within the characteristic landscape.

VRM Class II is designed to "retain the existing character of the landscape." The level of change to landscape characteristics should be low. Management activities may be seen, but should not attract the attention of a casual observer. Any changes must conform to the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

VRM Class III is designated to "partially retain the existing character of the landscape." Moderate levels of change are acceptable. Management activities may attract attention, but should not dominate the view of a casual observer. Changes should conform to the basic elements of the predominant natural features of the characteristic landscape.

VRM Class IV is designated to provide for management activities that require "major modification of the landscape." These management activities may dominate the view and become the focus of viewer attention. However, every effort should be made to minimize the impact of these projects by carefully locating activities, minimizing disturbance, and designing the projects to conform to the characteristics of the landscape.

In addition, the *Lakeview RMP/ROD* (BLM 2003b), states that "all developments, land alterations, and vegetative manipulations within a 3 mile buffer (6 mile total corridor width) of Highway 140 would be designed to maximize scenic quality and minimize visual impacts and/or scenic intrusions. Unseen areas within these zones will not be held to these standards". The 3-mile scenic buffer on the south side of Highway 140 accounts for approximately 22,000 acres of the Project Area. However, data from GIS simulations and analysis suggests that only about 2,800 acres of the buffer are potentially visible from the highway corridor**.** Approximately 44% (1,232 acres) of the visible portion of this corridor would allow for low levels of change (VRM Class II),

while about 56% (1,568 acres) would allow for moderate levels of change to landscape characteristics (VRM Class III).

As a whole, most of Project Area allows for moderate to major levels of change to the landscape (VRM III - 40%, VRM IV - 45%). While a fraction of the Project Area is designated to allow low levels of change to landscape characteristics (VRM II - 15%).

Visual Resource Contrast Rating Worksheets (BLM form 8400-4) were completed from selected Key Observation Points (KOPs) within the Project Area. KOPs are usually selected along commonly traveled routes, views from communities, and critical/likely viewpoints. Thus, for the purposed of this EA, KOPs were selected within the Highway 140 corridor, from the community of Adel, and atop Sage Hen Butte.

Fuels

Fuels within the Project Area consist generally of juniper, bitterbrush, big sagebrush, low sagebrush and bunch grasses. Ponderosa pines also occur in a small extent of the Project Area along the forest fringe. Lands adjacent to the Project Area contain a typical assemblage of high desert juniper/sagebrush steppe: big sagebrush intermixed with areas of mixed-seral bitterbrush, and large expanses of low sagebrush. Past fire exclusion and management have altered the fuel loading, as evidenced by the expansion of juniper. It is estimated that there is currently around 4 tons to the acre (160,000 tons) of available fuel loading within the Project Area.

Large pockets of duff and downed fuels in the pine stands make it very difficult to suppress wildfires in this area. Fire intensity can be great during burn periods creating problematic or unpredictable fire behavior, which increases the risk to firefighter safety.

Hazardous Materials

There are currently no known hazardous waste sites located on BLM-administered lands within the Project Area. However, there is the potential risk of accidentally releasing hazardous materials during various treatment activities.

IV. ENVIRONMENTAL CONSEQUENCES

Introduction

This chapter analyzes the environmental impacts that are projected to occur as a result of implementing the three alternatives. Each of the resource management activities that could impact other resource values are analyzed by program. The baseline used for projected impacts is the current condition described in Chapter III–Affected Environment. Impacts are projected for the short-term (0 to 10 years) and for the long-term (10 to 20 years). The final section is a description of secondary, indirect, and cumulative impacts of the past, present and reasonably foreseeable future actions.

The following resource values have been considered and are either not present, or would not be significantly affected by any of the alternatives considered: paleontological resources, prime and

unique farmlands, floodplains, drinking and ground water quality, designated wilderness areas, wilderness study areas, other lands with wilderness characteristics, areas of critical environmental concern, research natural areas, wild or scenic rivers, realty, geology, energy and minerals, or wild horses. There would be no impacts to low income or minority populations from any of the alternatives analyzed. These issues/resource values are not discussed further in this document.

Greenhouse Gas Emissions and Carbon Sequestration

Alternative 1 - No Action

This alternative would continue existing management activities. Juniper would continue to expand within existing vegetation communities. Generally, on-going natural processes would be expected to continue and drive any changes in carbon sequestration and greenhouse gas emissions into the future.

The one possible natural process that could result in a substantial release of carbon dioxide into the atmosphere would be wildfire occurrence. Fire releases carbon stored in plant material into the air as carbon dioxide gas (Hurteau and North 2009; Wiedinmyer and Hurteau 2010). However, the amount of carbon released by future wildfires cannot be predicted accurately and would depend upon the frequency of ignition(s), fuel loading, moisture content, intensity of the burn, amount of area burned. Several studies have concluded that carbon release from forests under wildfire conditions is much greater than carbon release under prescribed fire conditions (Meigs *et. al*. 2009; Hurteau and North 2009; Wiedinmyer and Hurteau 2010). Some sites if burned under wildfire conditions would be at high risk to cheatgrass invasion (see Map 7). Some studies have suggested that this conversion from perennial shrub-steppe to annual grasslands would reduce the fire return interval and greatly reduce the sites potential for carbon storage (Rau *et. al.* 2009; Rau *et. al.* 2010).

A large portion of the above ground carbon would be released after wildlife, however much of the below ground carbon would not be affected (Rau *et. al.* 2009). Carbon remaining from the ash would also leach back into the soil. Carbon sequestration would likely increase immediately following a fire, as vegetation reestablished on the site and the plants store carbon in their above ground tissue and below ground fine roots. This would offset the overall amount of carbon released (Meigs *et. al.* 2009). The rate would of sequestration would depend upon the intensity of the burn, amount of residual plants that survived the fire, seed source in the soil, reestablishment of fine rooted vegetation, rehabilitation/revegetation methods used, and soil chemistry (Meigs *et. al.* 2009).

Alternative 2 – Proposed Plan

This alternative proposes to treat 54,795 metric tons of juniper biomass using prescribed fire. The objective of the burning is to consume 50 to 80 percent of the juniper biomass (1.5-2.4 metric tons to the acre). The biomass consumed by the proposed prescribed fire would result in the direct emission of 2.8 to 4.5 metric tons of carbon dioxide (assuming 0.5 metric tons of carbon per metric ton of biomass; and 3.7 metric tons of carbon dioxide per metric ton of carbon). Therefore, the proposed action would result in the direct emission of a total of 50,684 to 81,096 metric tons of carbon dioxide from the 18,008-acres of burning within the Project Area. Burning done annually over the next five to ten years the carbon dioxide release would be no more than 8,109 to 16,219 metric tons per year.

The U.S. EPA only requires some industrial and agricultural sectors to annually report total carbon dioxide equivalent emission quantities greater than 25,000 metric tons per year (see 40 CFR 98.2). Further, the CEQ states that emissions less than this mandatory reporting requirement may not even warrant discussion within a given NEPA analysis (CEQ 2010, page 2). The project proposal is planned to last from five to ten years resulting in total carbon emissions per year from this alternative to be lower than this reporting requirement. For these reasons, the BLM finds that these emissions are not significant at either a regional, national, or global scale.

Overall carbon release under this alternative would be less than that of the No Action alternative assuming that a wildfire would release carbon by burning under dryer conditions with higher temperatures and would consume considerably more vegetation. A single tree prescribed fire would only burn the concentrations of juniper and would burn under considerably different temperatures and moisture conditions in a fall, winter, or spring burn.

Carbon sequestration would likely increase following the prescribed fire as vegetation reestablishes on the burned areas and the plants begin to store carbon. This would offset the overall amount of carbon released (Meigs *et. al.* 2009). The rate of new sequestration would be similar to that under Alternative 1 because unburned areas would continue to sequester carbon and burned areas would revegetate.

Alternative 3 – Maximum Treatment Plan

This alternative proposes to treat 77,499 metric tons of juniper biomass using prescribed fire. The objective of the burning is to consume 50 to 80 percent of the biomass (1.5-2.4 metric tons to the acre). The biomass consumed by the proposed prescribed fire would result in the direct emission of 2.8 to 4.5 metric tons of carbon dioxide (assuming 0.5 metric tons of carbon per metric ton of biomass; and 3.7 metric tons of carbon dioxide per metric ton of carbon). Therefore, the proposed action would result in the direct emission of a total of 71,685 to 114,698 metric tons of carbon dioxide from the 25,304-acres of burning within the Project Area. Burning done annually over the next five to ten years the carbon dioxide release would be no more than 11,496 to 22,939 metric tons per year.

The U.S. EPA only requires some industrial and agricultural sectors to annually report total carbon dioxide equivalent emission quantities greater than 25,000 metric tons per year (see 40 CFR 98.2). Further, the CEQ states that emissions less than this mandatory reporting requirement may not even warrant discussion within a given NEPA analysis (CEQ 2010, page 2). The project proposal is planned to last from five to ten years resulting in total carbon emissions per year from this alternative to be lower than this reporting requirement. For these reasons, the BLM finds that these emissions are not significant at either a regional, national, or global scale.

Overall carbon release under this alternative would be higher than under Alternative 2 since more acres would be burned. Carbon sequestration would also likely increase following the prescribed fire as vegetation reestablishes on the burned areas and the plants begin to store carbon. This would offset the overall amount of carbon released (Meigs *et. al.* 2009). The rate of new sequestration would be similar to that under Alternative 1 because unburned areas would continue to sequester carbon and burned areas would revegetate.

Alternative 4 – Biomass Removal

This alternative proposes to treat 41,911 metric tons of juniper biomass using prescribed fire. The objective of the burning is to consume 50 to 80 percent of the biomass (1.5-2.4 metric tons to the acre). The biomass consumed by the proposed prescribed fire would result in the direct emission of 2.8 to 4.5 metric tons of carbon dioxide (assuming 0.5 metric tons of carbon per metric ton of biomass; and 3.7 metric tons of carbon dioxide per metric ton of carbon). Therefore, the proposed action would result in the direct emission of a total of 38,766 to 62,026 metric tons of carbon dioxide from the 13,713-acres of burning within the Project Area. Burning done annually over the next five to ten years the carbon dioxide release would be no more than 6,202 to 12,405 metric tons per year.

This alternative also proposes to remove 17,628 metric tons of juniper biomass to be used in a biomass plant, it is recognized that some fossil fuels are being burned to 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. The most likely means of utilizing juniper biomass in this area will be as firewood or chips to be burned in the biomass plant for energy. If the material is burned as firewood or ground and burned as hog fuel, the subsequent storage of carbon would not occur. However, utilizing biomass to produce electricity would potentially preclude the need to generate electricity with other fossil fuels.

The U.S. EPA only requires some industrial and agricultural sectors to annually report total carbon dioxide equivalent emission quantities greater than 25,000 metric tons per year (see 40 CFR 98.2). Further, the CEQ states that emissions less than this mandatory reporting requirement may not even warrant discussion within a given NEPA analysis (CEQ 2010, page 2). The project proposal is planned to last from five to ten years resulting in total carbon emissions per year from this alternative to be lower than this reporting requirement. For these reasons, the BLM finds that these emissions are not significant at either a regional, national, or global scale.

Overall carbon release under this alternative would be slightly lower than under Alternative 2 since some material would be burned under controlled conditions in a biomass facility. Carbon sequestration would also likely increase following the prescribed fire as vegetation reestablishes on the burned and biomass harvested areas and the plants begin to store carbon. This would offset the overall amount of carbon released (Meigs *et. al.* 2009). The rate of new sequestration would be similar to that under Alternative 1 because unburned areas would continue to sequester carbon and burned areas would revegetate.

<u>Air Quality Impacts</u>

Alternative 1 - No Action

Most management activities under this alternative would not directly produce any PM2.5 emissions. However, the potential for subsequent wildfires that would produce significant quantities of PM2.5 would continue to increase as surface and ladder fuels accumulate. As an example, a single 2,000-acre wildfire could result in approximately 868 tons of PM2.5 emissions in the area, which would occur under unknown dispersal conditions (i.e. would drift in whatever direction the wind is blowing), and quite likely affect one or more smoke sensitive receptors.

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

Visibility under wildfire conditions is subject to the prevailing weather/wind patterns at the time of the fire.

Alternative 2 – Proposed Plan

Smoke emissions from prescribed burning activities vary depending on the method used (broadcast burn or pile and burn); the grass, shrub and tree species burned; the amount of fuel; the proportion of the fuel consumed by the fire; and weather conditions. BLM minimizes emissions from prescribed burning by adhering to seasonal and other timing restrictions imposed by Oregon Smoke Management Plan (OAR Chapter 629, Division 48), increasing interagency coordination, limiting new burning based on current or anticipated smoke accumulation and dispersion and using predictive forecasting of atmospheric conditions.

Studies indicate that prescribed fires, ignited under fuel moisture conditions that reduce total fuel consumption and conducted when mixing heights and winds are more favorable for smoke dispersal, produce lower levels of particulate matter than uncontrolled wildfires. Therefore, while prescribed burning may have a temporary negative effect on air quality, in the long term, acute impacts of prescribed fires can be reduced compared to wildfires (FS and BLM 1997).

Visibility can also be affected by prescribed burning. Fine particulate matter, generally less than 2.5 microns in diameter, is the primary cause of visibility impairment. Prescribed burning emissions, which may stay suspended for many miles, are in the 0.1 to 2.5 micron size class, and would temporarily reduce visibility (FS and BLM 1997). The Clean Air Act (1077 Amendment) requires the State to consider strategies for reducing visibility impairment from prescribed burns. Visibility concerns would be addressed and mitigated under restrictions described in the Smoke Management Plan.

Visibility under prescribed fire conditions is subject to the prevailing weather/wind patterns at the time of the fire, similar to Alternative 1.

Alternative 3 – Maximum Treatment Plan

The impacts of Alternative 3 would be very similar to Alternative 2. The only change is that Alternative 3 would have an increase of 7,296 acres that will be burned which would allow for an increase in smoke production.

Alternative 4 – Biomass Removal

The impacts of Alternative 4 are similar to those of Alternative 2 other than in Alternative 4 there is 4,046 acres that would be used as biomass instead of burning therefore reduced smoke emissions would be expected. The KFRA on the Lakeview District has been tracking removal of 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:

One acre with 10 tons of piled whole junipers openly burned emits 119 lbs of $PM_{2.5}$. This same quantity of material (10 tons) burned in a biomass plant equipped with an electrostatic precipitator equates to 6 lbs of $PM_{2.5}$ (Burke 1994 & EPA 2001). It should be noted that open burning of an acre of piled junipers does not typically consume all 10 tons of material. 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 (EPA 1996). 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).

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

Juniper processed as clean chips or saw logs and utilized in hardboard or some other forest product can result in carbon sequestration and less contribution to greenhouse gases. It is recognized that some fossil fuels are being burned to 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.

A reduction of wood smoke emissions as a result of utilizing the juniper would occur. 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 debris would be utilized.

Under the biomass alternative, 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 impacts are immeasurable at the level of this analysis.

Hydrology and Water Quality Impacts

Alternative 1 - No Action

There have been two recent reviews of juniper management that include discussions on the impacts of juniper range expansion on hydrologic processes in southeast Oregon. The first was a product of the Interior Columbia Basis Ecosystem Management Project (ICBEMP) scientific assessment titled *Western Juniper Woodlands (of the Pacific Northwest) Science Assessment* (Eddleman *et al.* 1994). Their findings are summarized below and are applicable to the proposed Project Area:

- In excess of 12% of annual precipitation can be intercepted by juniper canopy.
- On some juniper sites overland flow increases resulting in water and sediment loss. Current information is based on the study of small plots and expanding findings to watershed level is risky.

- Research to date has been based on summer impacts with little done in fall, winter, and spring.
- Considering the number of variables involved that influence site response to juniper management, including soil, climate, current understory, current canopy closure, and site condition, there is no model available to predict a juniper site's response to treatment activities.

The second document is *Biology, Ecology and Management of Western Juniper (*Miller *et al*. 2005). The summary of findings of the report follows:

> "As the tree layer increases in dominance the shrub and herb layer decline. The degree that the herb layer is depleted is dependent upon soil depth to a restrictive layer. The minimum time for the tree overstory to begin suppressing the understory is 45-50 years and to approach stand closure 70-90 years on cool wet sites and 120-170 on dry warm sites…. Changes in hydrologic processes and water balance as tree abundance and dominance increase are not well understood. Evidence suggests that juniper can impact infiltration rates, sediment loss, and soil water storage and depletion rates. Accelerated soil water depletion rates in juniper-dominated stands can decrease the length of the growing season by as much as 4-6 weeks. However, the impacts of juniper on the water balance at the watershed or basin level have not been determined, nor have the impacts of woodlands on subsurface flow into streams and springs…Juniper has increased in density and distribution since the late 1800's and if left unchecked can have measurable impact on soil resources, plant community structure and composition, water and nutrient cycles, and wildlife habitat."

Knowledge gaps include: 1) the impacts of juniper on subsurface water flow and soil moisture storage, 2) how juniper expansion impacts soil nutrients and development, and 3) relationships between juniper expansion, site potential, current condition, hydrology, nutrients, erosion, and stream and spring flows.

A third document relevant to water resources is a critical review of the potential to increase water yields (increase annual streamflow volume) through juniper removal in the Klamath Basin (Kuhn 2007). Research published to date indicates that increasing water yields by juniper removal is only feasible where annual precipitation is greater than 17.7 inches (45 centimeters) (Bosch and Hewlett 1982; Hibbert 1983; Wilcox 2002). Within the Project Area, areas receiving over 18 inches include the western portion of the Twentymile Creek and the southern, high elevation portion of the Deep Creek watershed (about 1/3 of the Project Area in total). Because high canopy cover juniper (Phase III) is relatively small as a percentage of these watersheds, it is unlikely that juniper expansion is currently having a substantial impact to water yield at the watershed scale.

However, impacts to water yield at smaller scales, including springs and seeps with near-surface groundwater connections, could be impacted by current juniper expansion. No site specific information is available to accurately determine these impacts. These impacts would depend on site specific variables such as existing juniper canopy closure, local geologic controls, soil type, and local groundwater/surface water interactions.

The literature reports that increasing juniper canopy cover results in interception of as much as 42% of precipitation depending on the duration and yield of the storm. "Interception" is a term that refers to precipitation hitting the plant surface and evaporating back into the air before it can hit the soil surface and soak into the ground. Miller *et al.* (1986) reported that as juniper trees

increased in size and density, transpiration and interception took most of the water received. Eddlemen *et al.* (1994) reported that interception by mixed prairie grasses to be 14 to 22 %, and McMillan and Burgy (1960) found dry grass had more interception effect than green grass. While all vegetation types will intercept some precipitation, juniper has a greater effect than grassland communities.

Also, depending on the water year and crown density, 2 to 5.6 inches of available moisture can be lost from transpiration of ground moisture by juniper. The shift to juniper dominance reduces the biomass and productivity of understory vegetation, as well as soil surface cover (Vaitkus and Eddleman 1987). This increased bare ground may reduce soil surface infiltration rates, which in turn increases overland flow and reduces soil water storage. Pierson *et al.* (2007) found that even at lower rainfall rates, juniper-dominated hillslopes produced significantly more soil surface runoff and erosion than hillslopes with juniper removed in southeast Oregon.

Under the no action alternative, juniper density in the Project Area would continue to expand in range and density. As juniper stands transition from Phase II to Phase III, canopy interception would increase, ground cover would decrease and bare soil would become susceptible to erosion and loss of groundwater infiltration capacity (Pierson *et al.* 2007). These changes have the potential to negatively impact water quality, as well as the timing and quantity of water capture and release. As juniper density along stream edges increases, competition between juniper and woody riparian species would increase reducing woody riparian species and reducing stream shading. This loss of riparian vegetation would contribute to slight increases in stream temperatures.

Alternative 2 – Proposed Plan

The following table (7) summarizes the acres proposed for treatment relative to Project Area and watershed area for each of the 5th field watershed included in the Project Area.

Table 7. Treatment Acres within 5th Field Watersheds

Alternative	Crump Water shed	% in 5th Field Water shed	Twentymile Watershed	% in 5th Field Water shed	Deep Creek Watershed	% in 5th Field Water shed	Total
Total Watershed Acres	215,522		130,082		175,922		
Watershed Acres in Project Boundary	4,648	2%	37,491	29%	26,848	15%	
Alt 2 Proposed	253	0%	12,332	9%	12,082	7%	24,668
Alt 3 Max	2,055	1%	19,339	15%	15,589	9%	36,983
Alt 4 Biomass	253	0%	12,332	9%	12,082	7%	24,668

A discussion of the current juniper science is included in the Purpose and Need section, as well as various discussions of the environmental impacts of the No Action Alternative (1) and will not be repeated here.

Under this alternative, ground cover would increase following juniper removal. Erosion would decrease compared to Alternative 1. Restoration of water cycles from juniper removal should also improve stream function (Miller *et. al*. 2005). While the science of juniper management has not

demonstrated the impact of increased juniper cover on flow regimes, there are numerous reported cases of stream and spring flow improvement after juniper management (Stabler 1985). Transpiration from juniper can remove 2 inches of soil moisture in a dry year and up to 5.6 inches in a wet year, shortening the understory growing season by as much as 6 weeks (Miller *et al.* 2005). Juniper can intercept as much as 12 to 42 % of storm precipitation with as much as 74% being intercepted directly under the juniper canopy (Eddleman *et al.* 1994; Eddleman 1986; Larson, 1993).

The impacts of proposed prescribed fire activities are dependent upon the severity of impact to the soil and the result rate of vegetation recovery following. Most studies have shown an increase in runoff and erosion rates the first year following fire (prescribed or wild), and returning to pre-fire rates within 5 years (Wright and Bailey 1982). Roundy *et al.* (1978) studied the impact of prescribed fire on hillslope hydrology of piñon-juniper woodlands on loamy soils in eastern Nevada. They found that fire had the greatest impact on areas directly below the juniper and sagebrush canopies with high surface litter accumulations. Water repellency under unburned trees in the juniper duff was greater than where the duff layer had burned. Across the site, fire had little effect on infiltration rates, but did significantly increase soil erosion. Pierson *et al.* (2003) summarized results of studies on the impact of fire within coarse-textured sagebrush-dominated systems and concluded that the greatest impact of the fire was on overland flow dynamics and rill erosion. Fire induced significant water repellency, particularly in areas dominated by shrubs with large accumulations of litter (Pierson *et al.* 2002). However, such systems were also found to have a high degree of natural water repellency when extremely dry (Pierson *et al.* 2001).

Both burned and unburned woodlands generate runoff under intense rainfall in the absence of vegetation in the tree canopy interspace. The immediate effect of fire is the reduction of ground surface barriers, which include shrub, herbaceous vegetation, and litter. The water then concentrates and increases in velocity resulting in greater erosive energy (Pierson *et al.* 2003). Water moves more rapidly down slope and ultimately into stream channels, impairing water quality and potentially causing downstream flood damage. An important component in evaluating the impacts of fire on the hydrology of a site is the vegetation response following fire, especially recovery of vegetation structure and surface litter. The BMPs that would be implemented with prescribed burning would minimize burn intensity and maintain some litter cover. This would minimize the negative hydrologic and water quality impacts of prescribed fire and fire treatment of residual juniper fuels.

<u>Summary</u>

Under Alternative 2, less sediment would be expected to enter the streams as herbaceous and shrubby ground cover increases, compared to Alternative 1. Upland sites would have better infiltration and soil holding grasses and forbs to stabilize slopes. The function of water cycles would improve, meeting the management goal of better capture, storage, and safe release of water in the system. Improving watershed and channel function would, in turn, improve water quality. As juniper is removed along stream edges, desirable woody riparian species would increase resulting in increased stream shading and slightly reduced stream temperatures. This alone would likely not cause enough temperature change to allow these streams to meet state water quality standards as there are several factors causing increased stream temperatures. It would however be a beneficial decrease in stream temperature.

Alternative 3 – Maximum Treatment Plan

The impacts to hydrology and water quality would be similar as those listed under Alternative 2 except that impacts would be slightly greater in magnitude under Alternative 3 due to more acres being treated.

Alternative 4 – Biomass Removal

The Biomass alternative is similar to Alternative 2 and 3 with respect to impacts of removal of juniper cover and concomitant impacts discussed above. There are 4,046 acres proposed for yarding. All of these acres occur within the Twentymile watershed.

Perennial shrubs and grasses 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 and groundwater recharge. 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. Proposed BMPs for woodland management should reduce or eliminate the risks of increasing erosion and disturbance related impacts. Applicable BMPs include limiting skidding operations to slopes less than 30% and operating when soils are dry, frozen, or covered with snow.

The direct impacts 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. Minimizing the aerial extent of the skid trail network will reduce the likelihood of flow routing during intense precipitation events.

One end suspension of juniper trees while yarding could 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 further increase erosion potential. If the spread and colonization of annual plants is persistent, this would likely cause long-term impacts to hydrologic function due to reduced infiltration. The application of full end suspension techniques would reduce disturbance potential from skidding.

Soil and Microbiotic Crust Impacts

Alternative 1 - No Action

Vegetation conditions currently depart from historic reference conditions in both sagebrush and pine forest vegetation types. Sites are prone to excessive soil heating during fires, especially where juniper has expanded onto sagebrush-steppe rangelands. Sites that, in the past, would have burned at a cooler temperature, now have 20 or more tons/acre of woody fuel load. Currently, sites are apt to burn hotter than 200 degrees C and volatilize nitrogen (Brown *et al*. 2003; Johnson

et al. 1998). Under this alternative, soil surfaces are at a much higher risk for nitrogen loss compared to Alternatives 2 and 3.

A lack of vegetation structure across these landscapes also limits understory plant composition and nitrogen fixation, especially in nutrient poor forest soils. Juniper expansion into sagebrush-steppe can affect the spatial distribution of soil organic matter and nutrients. The loss of nutrients would also increase if woodland development results in accelerated erosion (Miller *et al.* 2005).

Under Alternative 1, soil erosion may exceed 1.0 tons per acre of accelerated erosion. For example, in areas with juniper expansion subject to wildfire, erosion rates may range from 1.23 to 1.94 tons/acre depending on slope following fire. Similarly, in pine forest thickets, erosion is apt to be well over 1.0 ton/acre on the rolling pine forest slopes before wildfire.

Soil risks are amplified by conifer, especially juniper, encroachment into riparian corridors. Junipers absorb soil water very efficiently, dry out surrounding soils, compete and suppress other vegetative ground cover, create bare ground, and produce a water repellant litter. While encroaching conifers can provide stream shading in riparian corridors, they can also lead to the loss of site-appropriate riparian species such as sedges, willows, alder, and aspen which have effective sediment catching properties. Further, conifers burn at higher temperatures during fast moving wildfires. For these reasons, the risk of stand-replacing wildfires burning along stream courses, excessive heating of riparian soils, and transport of sediment are highest under this alternative.

Though little is known about biological crusts within the Project Area, research elsewhere can be used to anticipate potential fire impacts. Reference vegetation conditions would provide little fuel to carry fire across soil crust cover in the sagebrush-steppe communities. In addition, the crusts themselves provide little fuel capable of carrying a fire through the interspaces, thereby acting to slow the spread of fire and decrease its intensity (Rosentreter 1986). Fifty to 100 years has often been cited as the average (fire) return interval in shrub-steppe regions (Wright *et al.* 1979; Peters and Bunting 1994). This is an adequate timeframe to allow recovery of biological crust components. Unburned islands of vascular vegetation and biological soil crust provide propagules for crust reestablishment in burned areas. Johansen *et al.* (1993) observed that the crust's structural matrix was left intact following low-intensity fire, indicating that a lightly burned crust still functions to maintain stability against erosive forces for both vascular plants and biological soil crusts during the recovery period.

Moss, which is a dominant component of the local soil crusts, recovers well from fire or burns incompletely under reference conditions. However, without site-specific data, the reference condition for crusts cannot be described for the Project Area.

With a rise in sagebrush density and woodland expansion, fuel loads have built up in the Project Area. Higher fuel loads generate hotter soil temperatures during wildfires and can heat the crust's matrix, limiting the crust's ability to recover and function properly following wildfire. This alternative poses the greatest risk of stand-replacing wildfire and associated impacts to biological crusts compared to Alternatives 2, 3, and 4.

Alternative 2 – Proposed Plan

Overall, prescribed burning under proper soil and fuel moisture conditions would reduce landscape scale erosion compared to Alternative 1. Prescribed fire would maintain or enhance the vegetation diversity and sustain more appropriate detritus nutrient cycles over the long-term.

Alternative 2 would moderate soil erosion by promoting gains in well-rooted ground cover over the long-term. With juniper expansion, current wildfire erosion rates are about 1.0 tons per acre. Based on historic reference conditions, erosion rates as low as 0.05 tons/acre are possible for burned sagebrush. With the vegetative treatment activities proposed in Alternative 2, forest and woodland soil erosion would range from 0.05 to 0.36 ton/acre, much closer to the desired reference conditions (WEPP, 2001).

Considering the implementation timeframe and the scale of the treatment area, there would be local and temporary soil risks for a season or two following each treatment activity until ground cover vegetation is re-established. The impact of soil erosion from prescribed burning would be less than expected from hot, fast-moving, stand-replacing wildfires.

Soil erosion from wildfire (as noted under Alternative 1) typically ranges from 0.2-2.0 ton/acre. Soil erosion from burning piles or with mechanical treatment under Alternative 2 would range from 0.2 to 0.4 tons/acre. Wildfire in closed rangelands and pine forest poses more erosion risk over the short and long-term compared to the proposed treatments.

Belnap (2001) indicated that soil disturbance results from activities such as vehicle traffic (trucks, OHVs, machinery), trampling by livestock and people, and land-clearing (such as shearing machinery, biomass removal). These soil surface disturbances would compact the soil. The compaction influences soil water and nutrient-holding capacity, which can lead to changes in soil crust species composition. These subtle compositional changes often occur before cover changes are apparent. Impacts of mechanical disturbance are especially noticeable at sites with highly erodible soils and large topographic relief (Belnap 2001). By following the Woodland Management and Prescribed Burning BMP's, impacts to soil crusts would be limited.

Soil sedimentation risks from Alternative 2 would be less than Alternative 1 due to removing encroaching conifers in riparian corridors and promoting site-appropriate riparian species such as sedges, willows, alder, and aspen that are sediment catching plants. Compared to Alternative 1, there would less risk for hot, fast-moving, stand-replacing wildfires moving along steam courses, which would also promote ground cover by site-appropriate, sediment catching species.

Most soils in the Project Area have montmorillonitic clays, as shown in Table 5. These clay soils are more apt to rebound from compaction impacts caused by mechanical thinning, equipment access, and fuel reduction activities. These clays, especially the shallower soils, expand and contract with sufficient force during normal freeze-thaw and wet-dry cycles to lift rocks up onto the soil surface.

In some respects, the impacts of prescribed fire on microbiotic crusts under Alternative 2 would be similar to those associated with wildfire under Alternative 1. However, fire intensity and area burned would be much less than Alternative 1. This would allow a greater chance for the re-colonization of burned patches with microbiotic crusts from adjacent unburned areas. Johansen *et al.* (1993) observed that the crust's structural matrix was left intact following low-intensity fire,

indicating that a lightly burned crust still functions to maintain stability against erosive forces for both vascular plants and biological soil crusts during the recovery period.

Alternative 3 – Maximum Treatment Plan

The impacts to soils and microbiotic soil crusts would be similar to those in Alternative 2.

Alternative 4 – Biomass Removal

The impacts to soils and microbiotic soil crusts would be similar to those in Alternative 2.

Cultural Resource and Cultural Plant Impacts

Alternative 1 - No Action

Continuing current management would leave the area much more prone to future, uncontrolled, hot-burning wildfires, which could alter cultural site materials and expose large areas of sites to artifact collectors. In discussions with Native American tribes and individuals, it is preferable to have low intensity, smaller (prescribed) fires under controlled conditions, which tend to improve the condition of plant and animal habitats and cause less disturbance/risks to cultural sites than wildfires.

Wildland fires usually do not have a negative impact on many of the cultural plants. The use of retardant during suppression can cause damage to geophytes. Specific requests have been made by Tribal peoples to not use retardant unless absolutely necessary in those low sagebrush areas. (per. comm. Burns Northern Paiute, Warm Springs) In some cases, fire eliminates competition and the culturally-important root crops, grasses, and shrubs are healthier after a fire.

Alternative 2 – Proposed Plan

In general, Native Americans are opposed to the complete removal of juniper from an area since it is a tree used in medicines and religious practices. However, Alternative 2 is designed in a mosaic pattern to maintain or enhance pre-settlement stand character.

Surveys to locate historic and Native American structures were completed throughout much of the Planning Area. All rim and rock outcrops were examined for the presence of rock art which could be damaged by heat spalling of the rock surface. Due to mitigation measures applied (i.e. avoidance) in the alternative design, the nature of prescribed fire and the controlled conditions under which they are set, cultural resources in the area would not be exposed to the excessive heat common with wildfires. Thus, cultural resources would not be adversely affected by the prescribed burns proposed under this alternative.

The reduction of fuel loads would reduce the future occurrence of high-temperature wildfires (which can alter cultural site materials such as obsidian artifacts). In discussions with Native American Tribes and individuals, concerns have been expressed about the potential exposure of sites, and potential disturbances to rock cairns, rock art, and other features on the landscape after prescribed fire activities are conducted. To prevent spalling of rock art, destruction of wooden structures, or making vegetated sites visible to artifact collectors, specific sites have been excluded

from proposed treatment units. Known Native American religious sites will be avoided and left undisturbed.

Fire does not negatively impact many cultural plants. In some cases, fire eliminates competition and the root crops, grasses, and shrubs are healthier after a fire. While burning may harm some cultural plants in the short-term, in the long-term, controlled burning usually benefits cultural plants. Fire plays a positive role in helping create the type of long stem growth of berry plants and weaving material shrubs that occurs after fire and is good for selection of weaving materials. Mechanical treatment activities utilizing equipment to shear junipers could cause trampling damage to the individual plants, but would likely recover in a few growing seasons.

Alternative 3 – Maximum Treatment Plan

The impacts to cultural resources and cultural plants would be very similar to those listed under Alternative 2. Impacts from Alternative 3 would be slightly greater than Alternative 2 since Alternative 3 proposes to treat an additional 12,313 acres.

Alternative 4 – Biomass Removal

The impacts to cultural resources and cultural plants would be very similar to those listed under Alternative 2 except that the nature of the impacts associated with the yarding of juniper under Alternative 4 would be much greater. The avoidance or mitigation of archeological sites would be required. Mechanical yarding or skidding may have a severe impact upon cultural plant areas. Disturbances of the soil could lead to invasion of the area by non-native plants which could displace the desired cultural plants.

Vegetation Impacts

Wetland and Riparian Impacts

Alternative 1 - No Action

In high-flow events, riparian species such as rushes, sedges, willow and alder hold stream banks together better than dryland species such as Kentucky bluegrass, sagebrush, and juniper (BLM 1998). Under this Alternative (No Action), as juniper trees move into riparian sites and out-compete the riparian vegetation, increases in bank erosion and stream channel widening could occur in some areas.

The condition of the riparian canopy and its ability to regulate solar radiation is important for moderating the solar energy input to streams, especially during the hot summer months (Beschta *et al*. 1987). The amount, type, and distribution of shade-providing vegetation at a given site are controlled by channel processes and land use. Under this alternative, juniper would continue to expand into riparian areas resulting in decreased shade and increased channel impacts including loss of stream function and stream temperature increases.

Although large juniper and pine provide some stream shading, channel incision and conifer encroachment along stream edges would adversely affect riparian species under this alternative.

As juniper densities continue to increase, reduction in desired riparian vegetation would not provide adequate bank stability and adequate stream shading in some areas.

Alternative 2 – Proposed Plan

In high-flow events, riparian species such as rushes, sedges, willow and alder hold stream banks together better than drier-land species such as Kentucky bluegrass, sagebrush and juniper (BLM 1998). Removal of juniper under Alternative 2 would reduce competition between juniper and woody riparian plants adjacent to streams and allow establishment and increased vigor of these more desirable native woody species. Increased bank stability is expected as a result of this increased establishment and vigor.

The condition of the riparian canopy and its ability to regulate solar radiation is important for moderating the solar energy input to streams, especially during the summer months (Beschta *et al*. 1987). The amount, type, and distribution of shade-providing vegetation at a given site are controlled by channel processes and land use. Although large juniper and pine provide some stream shading, the level of shade provided by these species is generally much less than that created by the woody riparian plant community. This is primarily due to the fact that woody riparian species are more tolerant to saturated soil conditions and can grow much closer to the wetted edge of the stream, thereby allowing them to actually lean over the top of the stream channel (see photo 6). Because juniper can compete with woody riparian vegetation, juniper removal would promote stream bank stabilization and establishment of sedges and growth of woody species such as willow, alder, aspen and cottonwood. The establishment of these plants would provide shading that would compensate for any loss of juniper created shade.

Photo 6 – Deep Creek riparian area showing limited juniper shade production.

Alternative 3 – Maximum Treatment Plan

Impacts from Alternative 3 would be slightly greater than those listed under Alternative 2 because of the addition of three small treatment units located within riparian areas under Alternative 3. This would be a slight increase in magnitude above Alternative 2, but would not cause a significant increase in impacts.

Alternative 4 – Biomass Removal

No biomass removal activities would occur within any riparian or wetland area under Alternative 4. Other non-biomass juniper removal activities under Alternative 4 would be identical to those listed under Alternative 2, therefore, the impacts from Alternative 4 to riparian and wetlands would be expected to be of the same scope and magnitude than those impacts under Alternative 2.

Where biomass associated activities do occur within 250 feet of riparian or wetland areas (i.e. skidding across intermittent stream channel), only minimal, short term (less than two years) impacts would be expected, given the BMP's that would be followed (see Appendix A).

Forest and Woodland Impacts

Alternative 1 - No Action

Under this alternative (No Action), no juniper or quaking aspen treatment would be completed within the Project Area. Juniper would continue to expand and dominate the Project Area. Juniper dominated woodlands would continue to increase in density and area. Historic juniper sites would continue to experience an increase in younger trees, with increased mortality of individual old-growth juniper trees on the drier sites. Aspen stands would continue to decline and eventually die out due to the continued invasion and expansion of juniper.

Alternative 2 – Proposed Plan

Alternative 2 would treat approximately 24,000 acres of the 38,000 acres of juniper within the Project Area. This alternative would reduce most post-settlement juniper stands that are invading bitterbrush and sagebrush-steppe communities, low sagebrush communities and aspen stands as well as sage-grouse habitats. This alternative would improve the condition of the aspen stands within the watershed through the removal of the more competitive junipers invading the stands. Young juniper would be greatly reduced or entirely removed resulting in a net loss of juniper woodlands within the Project Area. Some uncut juniper trees located adjacent to cut trees could be killed when cut trees are burned.

Alternative 2 would leave all (100%) of the pre-settlement juniper stands intact within the Project Area. This would mean that the density of trees and canopy closure in pre-settlement juniper stands would increase over time. These increases are expected to be low for most stands, however over time this would put these stands at a greater risk of wildfire. Future changes in these stands would be driven by natural processes.

Alternative 2 would improve forest health on approximately 233 acres within the Project Area by reducing juniper competition in ponderosa pine forest stands. This would be accomplished by

hand or machine cutting juniper, piling it away from other tree species including aspen, ponderosa pine or mountain mahogany and burning the debris.

Alternative 3 – Maximum Treatment Plan

The impacts from Alternative 3 would be very similar to those under Alternative 2, except that under alternative 3, an additional 12,000 acres of juniper would be cut. Much of this additional juniper would be post-settlement trees that would be removed from pre-settlement juniper stands. This would improve the vigor of these pre-settlement stands, but would not allow for the natural development of future Old-growth stands. Alternative 3 would treat the largest area of juniper and provide the greatest benefits to most resource values, but would have reduced benefits to juniper communities.

Alternative 4 – Biomass Removal

Impacts to forest resources would be the same as those under Alternative 2. No additional biomass activities for forest stands are proposed under Alternative 4. Impacts to woodlands under Alternative 4 would be similar to those under Alternative 2; however the addition of mechanical yarding, skidding and the additional clearing of landings needed for biomass utilization would cause some additional soil compaction around landings and skid trails. This would lead to reduced vigor and growth for some nearby plants. Chipping cut junipers at landings would also create some additional need for post-biomass slash treatments on these landings.

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 for biomass, the area could be opened to firewood cutters.

Sagebrush-Steppe Impacts

Alternative 1 - No Action

This alternative would allow existing juniper stands to become denser, crowding out the sagebrush, bitterbrush, and other understory grasses (thus increasing fuel loads) (Miller *et. al.* 2005). Current brush communities would become decadent over time and would be replaced by juniper with little or no forb/grass understory. The mountain big sagebrush and the juniper/mountain big sagebrush/grass types would continue to change under this alternative. The amount of mountain big sagebrush would slowly decrease as more of this type is invaded by juniper and, therefore the juniper/mountain big sagebrush/grass type would increase. The juniper/mountain big sagebrush/grass type would also change as the increase in juniper would reduce the vigor and ultimately the amount of sagebrush and other shrubs that occur in the understory. Without some disturbance the juniper would continue to replace the mountain big sagebrush and other shrubs such as antelope bitterbrush and mountain mahogany, eventually creating closed juniper woodland on many sites (Miller *et al*. 2005).

Alternative 2 – Proposed Plan

Treatment activities under Alternative 2 would increase vegetative diversity, increasing both annual and perennial forb cover while reducing the quantity of juniper and woody debris. Reduction of woody fuels would result in an increase in the relative abundance of forbs and

grasses in these sites (Kauffman and Sapsis 1989). Evans (1988) observed that the release of understory forbs and grasses is not always accomplished with prescribed fire removal of over-story shrubs. Vegetative response is dependent on the existing diversity within the area and the amount and type of precipitation that follows burning. Vegetative response is expected to be good in most treatment units due to the amounts of existing native perennial grasses already established on these sites.

Kauffman and Sapsis (1989), note that the native flora has generally evolved in a fire environment. Although variability exists in fire return intervals, fuel loading, and potential fire behavior, most species are adapted to or dependent on fire to maintain health and vigor.

Both mechanical and prescribed fire treatments under Alternative 2 would have positive impacts to shrub steppe communities. Reducing the number of juniper trees would reduce competition for water and nutrients and improve the vigor of the remaining native shrubs, grasses, and forbs.

The areas that would be burned would result in a limited increase in the production and density of cheatgrass, depending on the temperature and precipitation in the years immediately following the fire. The reduction in the competition from the perennial trees and shrubs would provide extra moisture and nutrients, which both cheatgrass and established native perennial grasses would be able to use to their advantage. At the elevations throughout most of the Project Area (above 5,000 feet) the germination of cheatgrass is often limited by colder temperatures. Cheatgrass would be expected to recede to pre-fire levels in most areas as native grasses and sagebrush reestablish in a few years.

The reduction in juniper trees would also reduce the current rate of juniper invasion into surrounding mountain big sagebrush communities. Other vegetation communities that include antelope bitterbrush, mountain mahogany, and aspen would benefit from the reduction of juniper trees because of the reduced competition for space, water, and nutrients.

Alternative 3 – Maximum Treatment Plan

The impacts from Alternative 3 would be very similar to those under Alternative 2, except that under Alternative 3, an additional 12,000 acres of juniper would be cut. Much of this additional juniper would be post-settlement trees that would be removed from pre-settlement juniper stands. This would have minor positive impacts to some additional acres of sagebrush steppe communities.

Alternative 4 – Biomass Removal

Vegetation treatment activities under Alternative 4 would be the same as those under Alternative 2 except for 4,046 acres of potential biomass utilization. Mechanical skidding, yarding and 132 acres of landings would remove some shrubs from these areas. Shrubs would be removed on approximately 250 acres by the mechanical dragging of trees across the ground or at landings. These areas would be reseeded with native vegetation in these disturbed areas.

Noxious Weed Impacts

Alternative 1 - No Action

Under this alternative (No Action) the same moderate threat of the noxious weed invasion and spread that currently exists due to recreational use and on-going management activities would continue into the future. A potential increased threat of noxious weed invasion and spread would be associated with an increase in wildfire suppression activities over time.

Alternative 2 – Proposed Plan

There is an increased threat of noxious weeds being introduced into the Project Area by administrative vehicles associated with conducting the prescribed burns and other mechanical activities. Vehicles used during the project would be cleaned prior to arriving at the job site. Staging and turn-around areas would be specified in the burn plan to avoid areas of cheatgrass or other weeds.

The threat of weed invasion from recreation use, administrative access, and others using the area following treatment activities would be similar to Alternative 1, as these uses are not expected to change as a result of implementation of Alternatives 2.

Alternative 3 – Maximum Treatment Plan

The threat of weed invasion from recreation use, administrative access, and others using the area(s) following treatment activities would be similar to Alternative 1. These uses are not expected to change as a result of Alternatives 2.

Alternative 4 – Biomass Removal

The threat of weed invasion from recreation use, administrative access, and others using the area(s) following treatment activities would be similar to Alternative 2 except that biomass areas would be at greater risk to weed invasion due to the additional soil disturbance caused from yarding or skidding material. Seeding with native species would reduce the risk of invasive species invasion. However, additional inventory for noxious weeds would need to occur one year and three years after activities are completed in biomass areas.

General Wildlife, Fish, and Aquatic Species Habitat Impacts

Wildlife Species Habitat Impacts

Alternative 1 - No Action

Over time, there has been an increase in juniper within the Project Area. This has led to a gradual decline in wildlife habitat diversity, including loss of understory shrubs, forbs, and grasses and subsequent conversion of sagebrush / bitterbrush shrublands to juniper woodland habitat. As juniper continues to increase, under this alternative, habitat conversion is expected to continue.

The quantity and quality of winter browse habitat for mule deer would continue to decline as bitterbrush and sagebrush is replaced by juniper. Browse quality would also decline as older plants become decadent. Approximately 10,000 acres of mule deer winter range has already been negatively impacted by invasive juniper. More wildlife habitat would be negatively impacted in the future due juniper expansion and the lack of fire. Habitats for elk and pronghorn antelope would also gradually decline with juniper expansion. Habitats for California bighorn sheep would

gradually decline as juniper increases and forage decreases. Predator hiding cover would increase and bighorn habitat would continue to be impacted or avoided by bighorns entirely. Approximately 4,000 acres of bighorn sheep habitat has already been negatively impacted by invasive juniper.

Big game habitat could also be impacted by large stand-replacing wildfires due to the increased fuel loads from juniper expansion. These large wildfires would remove bitterbrush and sagebrush plants, used by mule deer and pronghorn for browse, and new shrubs seedlings would not provide adequate browse for many years following the fire. Elk and other big game animals could benefit from the short-term increase in herbaceous forage following wildfire, depending on the size and intensity of the fire. Big game use, however, may be restricted to the outer perimeter of a large fire in close proximity to winter thermal cover. The increase in juniper fuels could increase the frequency and intensity of future wildfires. This could impact bighorn sheep habitat depending on the severity and areal extent of the fire.

Some negative impacts would occur to shrub-steppe dependent and ground nesting bird species as shrubs and ground cover decrease and juniper increases. Negative impacts would also occur to shrub-steppe dependent small mammal species including yellow-bellied marmots with increasing juniper densities, reduced understory diversity, and increased chance of stand-replacing wildfires.

Habitats for cavity nesting old–growth dependent wildlife species would be maintained over time unless a stand-replacing wildfire occurs within these habitats in the future.

Alternative 2 – Proposed Plan

Alternative 2 would benefit bighorn sheep and their habitat by removing some juniper within the 2000 acres of bighorn sheep habitat currently affected by juniper encroachment within the Project Area. This would reduce densities of juniper, while native grasses, forbs and shrubs would increase. This would increase bighorn sheep foraging habitat and reduce cover for predators. There would be minimal short-term impacts to bighorn sheep habitat from prescribed burning or mechanical treatment activities. The long-term benefits would allow bighorns to more fully utilize habitats currently being affected by juniper encroachment.

Negative impacts from disturbance, prescribed burning and mechanical treatment activities of juniper on mule deer habitat under Alternative 2 would be minimal and short term within the Project Area. Removing juniper and burning the slash would remove some of the bitterbrush browse currently available over the short-term. However retention of most shrubs within the stands would retain foraging habitats while reducing competition between forage species and juniper. Positive impacts would occur on approximately 18,000 acres of mule deer winter range currently impacted by juniper encroachment. Thermal cover to be retained would be identified during project layout for all prescribed fire and mechanical treatment projects. These retention areas would be marked in cooperation with Oregon Department of Fish and Wildlife (ODFW) and BLM biologists prior to implementation. Adequate thermal cover and foraging area ratios would remain throughout the Project Area.

The impacts to elk habitat would be minimal over the short and long-term due to increases in the forage base after the fire. Decreases in cover would not negatively impact elk foraging within open areas due to the mosaic pattern of prescribed burning and juniper management.

Impacts to pronghorn antelope would be minimal in the short term due to disturbance during project activities. Long term impacts would benefit pronghorn as junipers were removed from foraging areas and hiding cover for predators was reduced.

Minor negative impacts from both prescribed fire and mechanical treatment activities to other small mammal and non-game bird species would occur**.** Alternative 2 would maintain pre-settlement juniper as well as some post-settlement stands. Habitat for cavity nesting bird species would be preserved under alternatives 2 through treatment activities designed to maintain the pre-settlement trees and through new dead standing (burned) juniper trees. Habitat mosaics would be created under Alternative 2 which would support both juniper and shrub-steppe dependent wildlife habitats. Miller *et al.* (2005) found that bird species diversity was at its highest in mid-successional juniper stands (containing diverse communities of shrub, grass, and forb species) and that wildlife species diversity decreased as juniper stands progressed to a closed woodland, late-successional stage with little or no understory. Miller *et al.* (2005) documented that shrub-steppe mid-successional transitional juniper communities contain a high degree of vertical diversity and are attractive to wildlife. These early and mid-successional juniper communities are used by 83 species of birds and 23 species of mammals. Opening juniper stands would improve food and cover for small mammals by increasing shrub and herbaceous recruitment and seed production.

Activities that would disturb nesting birds and cause "take" will be avoided during the nesting season. Prior to the initiation of on the ground activities such as juniper cutting or prescribed fire, a BLM biologist will review the proposed activity and determine if there is potential for nesting birds. If potential exists for nesting birds, the biologist will field check the site specific Project Area before a project activities are allowed to proceed. If nesting raptors, sage-grouse or other nesting Birds of Conservation Concern (USFWS 2008) are located, project activities will be delayed until after nesting season or modified in an effort to avoid "take" of migratory birds.

Before treatment activities take place within ¼ mile of any raptor nests, the nests will be checked for activity. The nest structures and a few surrounding trees will be left untreated. If new raptor nests are located, these nest structures and surrounding trees will also be left untreated.

Alternative 3 – Maximum Treatment Plan

Impacts to wildlife under Alternative 3 would be the same as for Alternative 2 except that impacts would benefit bighorn sheep slightly more than Alternative 2 by treating a greater portion of the habitat affected by juniper encroachment. The impacts to mule deer habitat would be slightly greater under Alternative 3 than under Alternative 2, however, the long-term benefits of the project would be greater for Alternative 3 due to treating a larger percentage of the habitat being currently impacted by juniper invasion.

Old-growth dependent cavity nesting species habitat would be preserved or enhanced under Alternative 3 through treatment activities designed to maintain the open spaced old-growth characteristics of the stand by removing young invading junipers within and adjacent to the stand. These open stands would act as firebreaks and would also protect the old-growth stands from future stand-replacing wildfires. The long-term benefits to non-game birds and small mammals from the proposed juniper management would be greatest under Alternative 3 due to additional acreage being treated. No significant impacts would occur from Alternative 2 for any small mammals or non-game bird species.

Activities that would disturb nesting birds and cause "take" will be avoided during the nesting season. Prior to the initiation of on the ground activities such as juniper cutting or prescribed fire, a BLM biologist will review the proposed activity and determine if there is potential for nesting birds. If potential exists for nesting birds, the biologist will field check the site specific Project Area before a project activities are allowed to proceed. If nesting raptors, sage-grouse or other nesting Birds of Conservation Concern (USFWS 2008) are located, project activities will be delayed until after nesting season or modified in an effort to avoid "take" of migratory birds.

Before treatment activities take place within ¼ mile of any raptor nests, the nests will be checked for activity. The nest structures and a few surrounding trees will be left untreated. If new raptor nests are located, these nest structures and surrounding trees will also be left untreated.

Alternative 4 – Biomass Removal

The impacts from Alternative 4 would be very similar to those under Alternative 2, except that 4,046 acres of juniper would be used for biomass under Alternative 4. Additional impacts from skidding or yarding material would have minor adverse impacts to general wildlife habitats. These impacts would mainly occur from the removal of shrubs on an estimated 300 acres. Seeding with native species would reduce these impacts in 3-5 years after seeding.

Fish and Other Aquatic Species Habitat Impacts

Alternative 1 - No Action

Fish and aquatic habitat quality is directly tied to riparian condition and water quality. Proper Functioning Condition (PFC) assessments, stream surveys, and photo monitoring (all on file at Lakeview BLM), and field reconnaissance generally indicate improving trends in fish habitat conditions throughout the Project Area. Photos points established in the 1980's and 1990's that were retaken in 2009 show increases in native riparian vegetation, including willows, sedges and rushes, as well as stream channel narrowing and deepening, and increases in stream bank stability. This upward trend in habitat conditions would generally be expected to continue with no action, although some stream reaches could be negatively affected by increases in juniper.

As juniper increases in density and range in the Project Area, watershed function and water quality could decline and affect Warner sucker, redband trout, and Columbia spotted frogs, if present. The increase in juniper along stream courses could increase the size and intensity of future wildfires and impact fish and amphibian habitat, by reducing shade, increasing temperature, and increasing sediment deposition in streams.

Alternative 2 – Proposed Plan

Impacts to fish and aquatic habitats would be similar to those discussed in the watershed and riparian Alternative 2 sections above. As water quality and stream channels improve, so would fish habitat conditions. Reduced sediment input to streams would decrease the amount of fine material that can adversely affect spawning substrates and spawning success.

Impacts would depend on the size of the unit, location, and treatment method. Use of fire would have an increased short-term risk of sediment input into the streams as rain or snow events occur on the burned, un-vegetated areas. Once ground cover increases on the burned area, the risk would

diminish and sediment loads, as discussed for the no action alternative, would diminish. Areas that have juniper cut and left on site for a number of years would experience an immediate increase in ground cover and the ability to collect snow without the water loss typical from transpiration.

Alternative 3 – Maximum Treatment Plan

Because no additional treatment activities will occur within or directly adjacent to any fish and/or amphibian habitat, the impacts of this alternative are expected to be the same as Alternatives 2.

Alternative 4 – Biomass Removal

Because no additional treatment activities will occur within or directly adjacent to any fish and/or amphibian habitat, the impacts of this alternative are expected to be the same as Alternatives 2 and 3.

Any downstream impacts (i.e. sediment deposition) in fish and/or amphibian habitat would be at an immeasurable negligible level given the BMP's that would be followed (see Appendix A), and the proximity to occupied habitat (over three miles from the nearest potential intermittent channel crossing site).

Any short-term sediment impacts resulting from implementation of road maintenance activities are expected to be at a negligible level in the short term. Sites proposed for road maintenance are generally depositing road derived sediment in streams and degrading fish and amphibian habitat conditions in their current condition. Road maintenance, particularly near stream channels, would benefit stream channels and fish and aquatic species habitat in the long term by: 1) reducing sediment deposition into streams and, 2) reducing water quality and quantity impacts by installing and maintaining drainage features (i.e. building and maintaining waterbars, cleaning drainage culverts, etc.) on affected roads.

Special Status Species Impacts

Special Status Plant Species Impacts

Alternative 1 - No Action

None of the alternatives (1-4) are expected to be inconsistent with conservation needs of these species or to contribute to the need to federally list any of the three plant species of management concern.

BLM staff conducted botanical surveys of the Project Area during the 2009 and 2010 field seasons. Those surveys did not detect any special status plants within the Project Area. Therefore, there would be no impacts to special status plant species within the Project Area. There would also be no impacts expected to BLM Assessment plant species from the increased potential of wildfire given the fire-adapted ecology and plant community history of these species. However, fire-fighting equipment and retardant used in the suppression process could have a damaging effect if applied directly to individual plants.

Alternative 2 – Proposed Plan

Because no special status plant species were found within the Project Area, impacts from Alternative 2 would be the same as those under Alternative 1. There would also be no impacts expected to BLM Assessment plant species from the cutting and burning of juniper given the fire-adapted ecology and plant community history of these species.

Alternative 3 – Maximum Treatment Plan

Impacts from Alternative 3 would be the same as those under Alternative 2.

Alternative 4 – Biomass Removal

Impacts from Alternative 4 would be the same as those under Alternative 2.

Special Status Terrestrial Wildlife Species Habitat Impacts

Alternative 1 - No Action

No impacts would occur to bald eagles or peregrine falcons under Alternative 1 because there are no known nest sites and very limited foraging areas for these species within the Project Area. Impacts to sagebrush-steppe dependent bureau sensitive birds (sage sparrow, ferruginous hawk and burrowing owl) and bat species (fringed myotis, pallid bat, spotted bat, and Townsend's big-eared bat) would continue to occur in the future with conversion of sagebrush-steppe and aspen habitat into juniper woodland habitat. None of these species are closed juniper woodland dependent species. Northern goshawk and woodpecker (Lewis', black-backed, and white-headed) habitat could be negatively impacted by juniper encroachment of ponderosa pine/fir forests and stand-replacing wildfires. Future wildfires, resulting from increased juniper fuel-loading, could also impact sagebrush-steppe dependent species habitat. Large stand-replacing wildfires could eliminate bird roosting and nesting cavities, as well as shelter for bats within juniper, aspen, and forest habitats.

Several studies have documented that as the density of juniper increases; sagebrush cover is reduced and eventually eliminated thereby reducing or eliminating sage-grouse habitats (Freese 2009, Doherty et. al. 2008, Pyke 2011, Wisdom et. al. 2011). The 12 month findings found that juniper invasion of sage-grouse habitats, if left unchecked, will likely eliminate sage-grouse occupancy of these areas (USFWS 2010). Under this alternative, continued negative impacts to, and loss of, sage-grouse habitat would occur over time as more sagebrush areas are replaced by dense juniper with little shrub and herbaceous understory. This would lead to declines in sage-grouse populations. Over 20,000 acres of sage-grouse habitat has already been negatively impacted by juniper in the Project Area. Three of five lek sites that were active in 1980 were inactive when relocated in 2003. Three new lek sites were located in 2003 in new locations. It is suspected that changes in juniper density had some level of negative impact and contributed to the abandonment of these three lek sites and the subsequent creation of new lek sites in areas with fewer junipers. This increase in juniper density could also increase the size and severity of future wildfires, further reducing sagebrush habitats.

West Nile Virus (WNv) has never been detected within the Project Area, however there is potential for it to exist within the Project Area. The level of threat that it poses to sage-grouse and other wildlife in this area is unclear. From 2009 to 2011, the BLM radio marked fifty sage-grouse within the Project Area and no detections of WNv have occurred. None of the Alternatives

proposes changes to natural or manmade water sources within the Project Area. West Nile virus is spread by specific species of mosquitos (*Culex spp.)* thereby requiring water sources to breed and spread. Since no changes are being made to any water sources, this alternative would have no impacts on the spread of WNv.

No impacts to kit fox or pygmy rabbit habitats are anticipated under any of the alternatives since neither species has been documented within the Project Area.

Alternative 2 – Proposed Plan

Impacts to bald eagles or peregrine falcons under Alternative 2 would be the same as those under Alternative 1 because there are no known nest sites and very limited foraging areas for these species within the Project Area. As part of the juniper treatments themselves under Alternative 2, some juniper trees that might serve as nesting structures for hawks, such as the ferruginous hawk, might be removed. However, the junipers that would provide the stronger and better structure for nesting would be the mature pre-settlement trees, which would be retained under Alternative 2. If new raptor nests are located, these nest structures and surrounding trees will also be left untreated.

This alternative would reduce impacts from juniper on over 20,000 acres of sage-grouse habitats including impacts to habitats surrounding lek sites. This would double the available habitat for sage-grouse within the Project Area. Minor negative short-term impacts would occur to sage-grouse from the treatment projects proposed under Alternative 2. These impacts would include the disturbance from people and noise while the treatment activities are being conducted, the minor loss of some habitat while the slash created from the cut trees is on the ground, and the disturbance from the secondary slash removal using fire. Treatments that would cause disturbance to lekking or nesting sage-grouse would be avoided by using seasonal or timing restrictions on these activities. All of these impacts will be of short duration and temporary in nature. Exactly how long it will take for sage-grouse to begin to use areas where juniper was cut is unknown, but is expected that they will begin to use these restored areas within a few months to a few years. In an area approximately 15 miles from the Project Area, radio marked sage-grouse were recently observed by BLM staff utilizing an area where juniper had been cut and burned only a few months earlier.

Conversion of ecological sites from shrub steppe to cheatgrass can negatively affect sage-grouse habitats (Baker 2011, Miller *et. al.* 2011). No significant impacts to sage-grouse habitats will occur as a result of such conversion under this alternative because prescribed fire will only be conducted in areas with good ecological condition with little or no risk of cheatgrass dominance. Broadcast burning will only occur on 1,250 acres, which is very steep (>30% slope) and unsuitable for sage-grouse use (Freese 2009, ODFW 2011). Single tree burning will be restricted to late fall, winter or early spring months to reduce the risk of spread. This form of burning will remove the slash left over from cutting juniper, but will leave most of the shrubs and grasses undisturbed and intact. Removing juniper while leaving shrubs, understory grasses and forbs intact would improve habitat conditions for sage-grouse nesting, brood rearing and wintering habitats. Long-term positive impacts in the form of higher quantity and quality of sage-grouse habitats would greatly outweigh any short term impacts. Sage-grouse nesting and late brood rearing habitats would benefit the most from the proposed treatment activities. Potential impacts from WNv) would be the same as those under Alternative 1.

Minor negative short-term impacts would occur from Alternative 2 to some Bureau Sensitive bat and cavity nesting bird species due to some juniper habitat loss; however, none of the species is considered to be juniper dependent. Old-growth juniper habitat would be maintained, which would provide habitat for roosting bats and cavity nesting bird species. Juniper woodlands would be managed to create mosaics across the landscape. Prescribed burn activities would create snags for bats and cavity nesting bird species and habitat openings to forage in. Mechanical treatment activities would retain the integrity of pre-settlement juniper stands and continue to provide habitat for roosting bats and cavity nesting bird species. Pygmy rabbit and kit fox would not be impacted from the proposed project because they were not detected within the Project Area. Habitats for Bureau Sensitive sagebrush-steppe dependent bird species including burrowing owls, ferruginous hawks and sage sparrows would be enhanced through the treatment of shrubland habitats.

Activities that would disturb nesting birds and cause "take" will be avoided during the nesting season. Prior to the initiation of on the ground activities such as juniper cutting or prescribed fire, a BLM biologist will review the proposed activity and determine if there is potential for nesting birds. If potential exists for nesting birds, the biologist will field check the site specific Project Area before a project activities are allowed to proceed. If nesting raptors, sage-grouse or other nesting Birds of Conservation Concern (USFWS 2008) are located, project activities will be delayed until after nesting season or modified in an effort to avoid "take" of migratory birds. If active nest trees are identified during unit layout, they would be marked for retention and avoided.

Alternative 3 – Maximum Treatment Plan

The impacts from Alternative 3 would be the same as those under Alternative 2, except that there would be additional positive impacts for sagebrush steppe associated wildlife species such as sage-grouse, ferruginous hawks, burrowing owls, and sage sparrows due to an additional 12,313 acres of juniper removal. Additional minor negative short-term impacts would occur from Alternative 2 to some Bureau Sensitive bat and cavity nesting bird species due to removal of additional juniper; however, none of the species is considered to be juniper dependent. Pre-settlement juniper habitat would be maintained, which would provide habitat for roosting bats and cavity nesting bird species.

Alternative 4 – Biomass Removal

The impacts from Alternative 4 would be very similar to those under Alternative 2, except that 4,046 acres of juniper would be used for biomass under Alternative 4. Additional impacts from skidding or yarding material would have minor impacts to special status wildlife species. These impacts would mainly occur from the removal of shrubs on an estimated 300 acres. Removal of this additional 300 acres of shrubs would have minor impacts to special status species because it would be spread over 4,000 acres. Seeding with native species would reduce these impacts in 3-5 years after seeding.

Special Status Fish and Amphibian Species Habitat Impacts

Alternative 1 - No Action

Fish and aquatic habitat quality is directly tied to riparian condition and water quality. As juniper increases in density and range in the Project Area, watershed function and water quality could decline (Pierson *et al.* 2007). This would have negative impacts to Warner sucker, redband trout,

and Columbia spotted frogs. The increase in juniper along stream courses would increase the size and intensity of future wildfires and impact fish and amphibian habitat, by reducing shade, increasing temperature, and increasing sediment deposition in streams.

Alternative 2 – Proposed Plan

All activities conducted under this alternative have been reviewed for potential impacts to Warner sucker. BLM determined with concurrence from the USFWS that this project "may effect, but is not likely to adversely affect" Warner sucker and/or Warner sucker designated critical habitat. Alternative 2 is "not likely to adversely affect" Warner suckers or any other federally listed Threatened, Endangered, proposed, or candidate wildlife species, or critical or proposed critical habitat. Alternative 2 is consistent with the conservation needs of existing special status species. It would not contribute to the need to federally list any of these species.

BLM's consultation with USFWS is being covered under the programmatic habitat restoration biological opinion and letter of concurrence (USFWS 2007). The South Warner Juniper Removal Project, including the potential biomass treatments, have been discussed extensively and toured with the Level One Consultation Team/US Fish and Wildlife Service.

Alternative 3 – Maximum Treatment Plan

Because no additional treatment activities will occur within or directly adjacent to any fish and/or amphibian habitat, the impacts of this alternative are expected to be the same as Alternatives 2.

Alternative 4 – Biomass Removal

Because no additional treatment activities will occur within or directly adjacent to any special status fish and/or amphibian habitat, the impacts of this alternative is expected to be the same as Alternatives 2 and 3 except for those listed below.

Any downstream impacts (i.e. sediment deposition) in special status fish and/or amphibian habitat would be at an immeasurable negligible level given the BMP's that would be followed (see above), and the proximity to habitat (over three miles from the nearest potential intermittent channel crossing site).

Any short-term sediment impacts resulting from implementation of road maintenance activities are expected to be at a negligible level in the short term. Sites proposed for road maintenance are generally depositing road derived sediment in streams and degrading special status species habitat conditions in their current condition. Road maintenance, particularly near stream channels, would benefit stream channels and fish habitat in the long term by: 1) reducing sediment deposition into streams and, 2) reducing water quality and quantity impacts by installing and maintaining drainage features (i.e. building and maintaining waterbars, cleaning drainage culverts, etc.) on affected roads.

Consultation on the biomass treatments, if Alternative 4 is chosen will be completed, including writing a Biological Assessment and receiving the resultant Letter of Concurrence, prior to signing a decision on this Environmental Assessment.

Range Administration Impacts

Alternative 1 - No Action

There would be short-term impacts to livestock operators when wildfire burns through an allotment that would require coordination with permittee(s). Arrangements would have to be made with the operators to graze their livestock in a different location. This would be for a minimum of two growing seasons after the wildfire, or until other resource objectives are met. These arrangements would be made on a case-by-case basis. Some operators could use other pastures within their existing allotments and some may have to find pasture on private land. Wildfire could provide a release of additional desirable forage species after the rest period. However, there would be no increase in grazing preference as a result of any wildfire.

Alternative 2 – Proposed Plan

There would be short-term impacts to livestock operators before and after conducting prescribed burning or other treatments that would require coordination with permittee(s) prior to implementation. Prior to burning, arrangements would have to be made so operators would have some place to put their livestock for a minimum of two growing seasons after the prescribed fire or until resource objectives are met. These arrangements would be made on a case by case basis as the exact burn boundaries are being established. Some operators could use other pastures within their existing allotments and some may have to find pasture on private land.

Alternative 3 – Maximum Treatment Plan

Impacts to range administration would be similar under those described in Alternative 2 except that 12,313 acres of additional treatment area would mean that additional areas would need to be rested from livestock grazing after treatments. This would cause additional impacts to livestock grazing permittees.

Alternative 4 – Biomass Removal

Impacts to range administration would be the same as those described in Alternative 2.

Recreation Impacts

Alternative 1 - No Action

Under the No-Action Alternative, there would be minimal impacts to recreation opportunities, apart from a wildfire incident. Suppression activities could restrict recreational use, especially if a fire occurs during fall hunting seasons. For several years following any wildfire, recreational use would be less desirable for camping and hunting due to loss of vegetation, changes in wildlife habitat, shade, screening, and the blackened landscape. Should a large-scale wildfire not occur in the near future, juniper expansion would continue and likely negatively impact recreational activities including camping, hunting, and off-highway vehicle use. Camp sites and game animals would be more difficult to find, thereby decreasing the potential for successful hunting opportunities.

Alternative 2 – Proposed Plan

Under Alternative 2, there would be short-term impacts to a small number of visitors during treatment periods, particularly if they take place during fall hunting seasons when most visitations occur. Smoke, dust, noise, and vehicle traffic related to mechanical or burning treatments would temporarily discourage users from entering or remaining in the vicinity. Any potential impacts to recreation would be much more controlled under the Alternative 2 than would be projected under wildfire conditions (Alternative 1).

Over the long-term, visitor use would not be expected to be negatively affected. Conversely, positive impacts associated with vegetation treatment activities would likely increase game habitat and populations, thereby increasing the potential for successful hunting opportunities in the Project Area.

Alternative 3 – Maximum Treatment Plan

Impacts to recreation would be similar to those described in Alternative 2. Impacts would be slightly greater under alternative 3 since additional areas would be treated.

Alternative 4 – Biomass Removal

Impacts to recreation would be the same as those described in Alternative 2.

Visual Resource Impacts

Alternative 1 - No Action

In the absence of wildfire under the No-Action Alternative, visual quality would change very little over the short term. Junipers would continue to encroach upon open areas, slowly decreasing the visual diversity of the Project Area. In the event of a stand-replacing wildfire, the visual impacts would be immediate, negative, and visible to the casual observer in the short-term. However, visible impacts due to fire would be perceived as natural to most viewers.

Alternative 2 – Proposed Plan

Scenic Highway Corridor:

Along the Highway 140 scenic corridor, treatment activities from Alternative 2 would be designed to maximize scenic quality and minimize visual intrusions along those areas which are visible from the highway. In the Project Area along Highway 140, Best Management Practices would exclude activities that tend to be more visually intrusive. For example, much of the corridor along 140 is too steep to allow equipment, and would have to be thinned by hand. Unnatural, blocky stump edges, easily picked out by the human eye, would be flush cut close to ground level. Areas planned to receive broadcast burning would be burned in the late fall or winter to shorten the timeframe, for which segments of the landscape would appear black. Winter snow accumulation would cover blackened areas through the winter, while spring green up would rapidly convert the landscape back to natural colors shortly after snowmelt. In broadcast burning units some junipers would be burned over, producing standing grey skeletons that may be visible for 20 plus years. However, these skeletons would appear as “natural” fire scars to the casual observer, thus fully meeting Class II objectives.

Conclusions from Contrast Rating Worksheets analyzed from six Key Observation Points found that the degree of alterations resulting from Alternative 2 would be acceptable for VRM II and III from critical viewpoints along the Hwy 140 corridor, the community of Adel, and atop Sage Hen Butte. Although, actions in these areas may attract the attention of a casual observer in the short-term, overall changes to the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape would be low.

Greater South Warner Project Area:

Visual impacts common to Alternative 2 can be lumped into three categories by treatment type: cut only, cut and burn and broadcast burn.

Cut only units, in the short-term, would visually result in red patches across the landscape as needles from felled trees would turn color after only a couple months. Red needles could persist up to four years before falling off. In the long-term, felled trees would lose their bark, turn grey and slowly blend into the landscape. Skeletons would likely remain for decades or until consumed by the next fire cycle. Cut and lopped units would be less visually obtrusive as felled tree skeletons would be cut down to four feet or less in height. Cut only units would account for 6,663 acres under Alternative 2.

Cut and burn units, in the short-term, would also visually result in red patches across the landscape. However, red needles in these units would only persist for two to three years until burned. Prior to burning, slash piles produced in firewood cutting units would be visible to the casual observer driving on roads through these units. Upon burning, a visual change in texture or density would occur as felled trees and slash piles were consumed. However, the landscape would appear natural to the casual observer, particularly in units with mature leave trees. Cut and burn units would account for 18,007 acres under Alternative 2.

Broadcast burn units, in the short-term, would also result in red patches across the landscape. Red needles would only persist for two to three years until burned. Upon burning, a visual change from course to fine texture or density would occur as a result of both felled trees consumed and broadcast burning of understory shrubs. A few juniper skeletons or snags would also be expected as a result of broadcast burn activities and would remain for decades or until consumed by the next fire cycle. Broadcast burn units would visually recover in one spring green up season. Thus, the landscape would appear natural to the casual observer, particularly in units with mature leave trees. Broadcast burn units would account for 2,250 acres under Alternative 2.

Impacts from Alternative 2 across the Project Area would meet VRM objectives for classes II, III, and IV by following the guidelines for Best Management Practices as outlined. Juniper prescriptions would incorporate mosaic patterns with fingers of treated areas intermixed with untreated pockets of vegetation to insure units appear “natural” to the casual observer. Upon completion of the project, visual resources and aesthetic character should be enhanced as the regeneration of shrubs and grasses become established, in combination the retention of large diameter ponderosa pine and junipers, creating a varied visual landscape commensurate with the area’s fire associated ecosystem.

Alternative 3 – Maximum Treatment Plan

Visual impacts common to Alternative 3 would be similar to those under Alternative 2 except that Alternative 3 would treat additional acres. These can be lumped into three categories by activity type: cut only, cut and single tree burn and broadcast burn.

Cut only units under Alternative 3 would account for 11,679 acres. Cut and burn units under Alternative 3 would account for 22,651 acres. Broadcast burn units under Alternative 3 would account for 2,652 acres.

Impacts from Alternative 3 across the Project Area would meet VRM objectives for classes II, III, and IV by following the guidelines for Best Management Practices as outlined. Juniper prescriptions would incorporate mosaic patterns with fingers of treated areas intermixed with untreated pockets of vegetation to insure units appear "natural" to the casual observer. Upon completion of the project, visual resources and aesthetic character should be enhanced as the regeneration of shrubs and grasses become established, in combination the retention of large diameter ponderosa pine and junipers, creating a varied visual landscape commensurate with the area's fire associated ecosystem.

Alternative 4 – Biomass Removal

Visual impacts common to Alternative 4 would be similar to those under Alternative 2 except that Alternative 4 would restore 4,046 acres using biomass utilization. Treatment activities under Alternative 4 can be lumped into four categories by type: cut only, cut and burn, broadcast burn, and biomass.

Cut only units under Alternative 4 would account for 6,612 acres. Cut and burn units under Alternative 3 would account for 12,762 acres. Broadcast burn units under Alternative 3 would account for 1,250 acres. Biomass utilization under Alternative 4 would account for 4,046 acres.

In the short-term, Alternative 4 would result in many of the same impacts above: red patches across the landscape, noticeable slash piles, and moderate to strong changes in texture. In addition, visual impacts would be moderate to strong where new roads, skid roads, chip sites and landings would be placed. Native seed would be used where feasible to rehabilitate skid trails, water bars and landings and to mimic the surrounding color and texture of the landscape. However, in the long-term, many impacts associated with the Biomass Alternative would likely persist for twenty plus years.

Impacts common to Alternative 4 across the Project Area would meet VRM objectives for classes II, III, and IV by following the guidelines for Best Management Practices as outlined. Biomass utilization would only be conducted in VRM Class III and IV areas where moderate to strong modifications to the landscape are permitted. Juniper prescriptions would incorporate mosaic patterns with fingers of treated areas intermixed with untreated pockets of vegetation to insure units appear "natural" to the casual observer. Upon completion of the project, visual resources and aesthetic character should be enhanced as the regeneration of shrubs and grasses become established, in combination the retention of large diameter ponderosa pine and junipers, creating a varied visual landscape commensurate with the area's fire associated ecosystem.

Of the Action Alternatives, Alternative 2 would have the least impact to visual resources with 24,670 acres treated. Alternative 3 would impact the greatest total area with 36,983 acres treated. However, like Alternative 2, these impacts would mainly only be observable to the casual observer

in the short-term. Alternative 4 would be similar Alternative 2 in terms of total area treated with 24,670 acres. Alternative 4 would have the most impact to visual resources of all alternatives in the long-term due to the longevity of visual disturbances related to biomass utilization.

Fuels and Firefighter Safety Impacts

Alternative 1 - No Action

Under the No Action Alternative fuel loading would increase; the encroachment of juniper due to fire seclusion would continue and the available fuel would change from fine (1hr to 10hr) fuels to woodier (100hr to 1000hr) fuels as juniper and brush component crowd out the grass and forb component. The change in stand structure would allow for a less frequent fire return interval, yet the fires that do occur would be of greater intensity and involve more commitment of resources, time, and money to suppress.

A study done by Jeanne Chambers, Research Ecologist with the USDA Forest Service Rocky Mountain Research Station, showed that fuel loads doubled between phase one and phase two juniper dominance and then double again between phases two and three. Fuel loads where as much as eight or more times what was present in the sagebrush ecosystem prior to tree encroachment (Chambers 2008). The 678 acres of pine are currently in a condition class 3 due to encroachment of white fir (*Abies concolor*) and juniper, as well as over-stocking due to past fire suppression. The no action alternative would allow these pine stands to remain in a condition class 3, at risk for a stand replacement fire.

Alternative 2 – Proposed Plan

Under Alternative 2, prescribed burning within suitable weather conditions would result in a 30-70% consumption of the downed junipers. Fuel loading would be reduced by 4-15 tons/acre and greatly reduce the probability of a stand-replacing wildfire in the future thus reducing threats to firefighter safety.

Alternative 3 – Maximum Treatment Plan

Alternative 3 would have similar impacts to those listed under Alternative 2. The major difference between Alternative 2 and 3 is that in Alternative 3 there would be an increase of 5,016 acres in the cut and leave units. The increase in cut and leave will be a substantial increase in the available fine (1hr to 10hr) fuels for large fire spread for 3 to 5 years after the trees are cut until the red needles have fallen from the branches. After the needles have fallen the risk for rapid large fire spread will be diminished but the fuel left to carry the fire will be the larger (100hr to 1000hr) fuels, the bowls and branches of the trees making firefighting more difficult due to slower rates of line production and longer burning residence time.

Alternative 4 – Biomass Removal

The Biomass Alternative would have similar impacts as those of Alternative 2 the main difference being the removal of the created slash on 4,046 acres that would need to sit for at least a year before it could be treated in Alternative 2. The slash could be more of a risk in Alternative 2 due to the fact it would be removed shortly after cutting in the Biomass Alternative.

Mechanical treatment activities, firewood / pole cutting, and biomass removal would have the same impacts of reducing fuel loading by 4-15 tons/acre as alternative 2 &3, however, short-term impacts would be realized where mechanical treatment activities are conducted and juniper trees are left on site at landing piles. The fuel loading would be consolidated at landings and pose a fire risk, especially from human caused ignition due to the fact the landings would be along main roads, until the juniper was removed.

Hazardous Material Impacts

Alternative 1 - No Action

The main risk of introducing hazardous materials into the environment within the Project Area under this alternative would be from wildfire suppression activities. Compared to the action alternatives, this risk would be very low and would be closely tied to the risk of wildfire occurrence.

Alternative 2 – Proposed Plan

During wildfire suppression, prescribed burning, or mechanical treatment activities, hazardous material spills could occur from vehicles and equipment. The risk of such a release is low. The cleanup of any hazardous substance or hazardous waste release that occurs (as defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C.9601, et seq. or the Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq.) would be the responsibility of the operator, their agents, or an unrelated third party and would be completed in accordance with all applicable hazardous waste disposal laws and regulations.

Alternative 3 – Maximum Treatment Plan

The risk of releasing hazardous materials into the environment under this alternative would be similar to Alternative 2.

Alternative 4 – Biomass Removal

The risk of releasing hazardous materials into the environment under this alternative would be similar to Alternatives 2 and 3.

Cumulative Impacts

Introduction

This section discusses potential cumulative impacts of past, present and reasonably foreseeable future BLM actions. This section also considers the potential cumulative impacts of other agency actions, as well as, actions on private land within the Project Area.

For the purposes of this analysis, cumulative impacts are considered at the Project Area geographic scale. The BLM selected this geographic scale for its analysis because the BLM has adequate knowledge of other on-going and potential reasonably foreseeable actions that may occur within the area. Many of these potential future actions have been identified in the *Lakeview Resource Management Plan/Record of Decision*, Appendix E (BLM 2003b) or other documents (BLM 2004,

FERC 2010). The timeframe of the cumulative effects analysis is defined as 10-40 years. Impacts from the treatment project would likely be negligible after this timeframe.

The Council on Environmental Quality (CEQ) issued cumulative impact guidance on June 24, 2005, that states the "environmental analysis required under NEPA is forward-looking," and review of past actions is required only "to the extent that this review informs agency decision-making regarding the proposed action." Use of information on the effects of past action may be useful in two ways: one is for consideration of the proposed action's cumulative effects, and secondly as a basis for identifying the proposed action's direct and indirect effects.

The CEQ stated that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." This is because a description of the current state of the environment (i.e. affected environment section) inherently includes the effects of past actions. Further, the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions." Information on the current environmental condition is more comprehensive and more accurate for establishing a useful starting point for a cumulative effects analysis than attempting to establish such a starting point by adding up the described effects of individual past actions to some environmental baseline condition in the past that, unlike current conditions, can no longer be verified by direct examination.

The second area in which the CEQ guidance states that information on past actions may be useful is in "illuminating or predicting the direct and indirect effects of a proposed action. The usefulness of such information is limited by the fact that it is anecdotal only, and extrapolation of data from such singular experiences is not generally accepted as a reliable predictor of effects".

The Department of Interior issued some additional guidance related to past actions which state, "when considering the effects of past actions as part of a cumulative effects analysis, the Responsible Official must analyze the effects in accordance with 40 CFR 1508.7 and in accordance with relevant guidance issued by the Council on Environmental Quality, such as 'The Council on Environmental Quality Guidance Memorandum on Consideration of Past Actions in Cumulative Effects Analysis dated June 24, 2005, or any superseding Council on Environmental Quality guidance (see 43 CFR 46.115)".

Past Actions

The current conditions of the lands affected by the proposed action are the result of a multitude of natural and human actions that have taken place over many decades. A catalogue and analysis, comparison, or description of all individual past actions and their impacts which have contributed to the current environmental conditions would be practically impossible to compile and unduly costly to obtain. Instead, the BLM has chosen more accurate and less costly ways to obtain the baseline information concerning past actions necessary for an analysis of the "impact on the environment which results from the *incremental impact* of the action when added to other past, present, and reasonably foreseeable future actions." (See definition of "cumulative impact" in 40 CFR § 1508.7.)

The information available on individual past actions is largely anecdotal, and is not a scientifically acceptable methodology that would help illuminate or predict the direct, indirect, or cumulative impacts of the proposed action and its alternatives. Ideally, the basis for predicting cumulative

impacts should be based on generally accepted scientific methodologies such as empirical research, which is not available for the Project Area. Further, scoping for this project did not identify any need to exhaustively list or catalog individual past actions for cumulative impact analysis purposes.

A description of the current state of the environment (i.e. "Affected Environment" section) inherently includes the impacts of past actions and serves as a more accurate and useful starting point for a cumulative impacts analysis, rather than attempting to establish such a starting point by "adding" up the impacts of individual past actions. The importance of "past actions" is to set the context for understanding the incremental impacts of the action alternatives. This context is determined by combining the current conditions with available information on the expected impacts of other present and reasonably foreseeable future actions. One can gain an understanding of the cumulative effect of any alternative by first describing the effects of the "no action" alternative (current environmental conditions and trends) and then adding or comparing the "incremental impacts" for each action alternative. For this reason, the BLM chose to use this methodology for this cumulative effects analysis.

Present and Reasonably Foreseeable Future Actions

The 680-mile Ruby Pipeline project is currently under construction. A short segment crosses the southwestern edge of the Project Area and includes approximately 200 acres of additional ground disturbance (including vegetation removal) on BLM and private lands within the Project Area. The impacts of this project have already been addressed in an EIS (FERC 2010). Pursuant to 40 CFR Sect. 1502.21, the BLM hereby incorporates the pertinent parts of this analysis by reference.

Grazing within the Project Area would continue to be managed on a rest rotation system in compliance with the Warner sucker biological opinion. Grazing within riparian or wetland areas would continue to be managed either through exclusion or use regulation to promote improved stream conditions. Based on consultation with the U.S. Fish and Wildlife Service related to impacts of grazing on Warner suckers, grazing would continue to be managed for riparian improvement within the Project Area on BLM-administered lands.

There are currently two wind power testing rights-of-way (ROW) located within the Project Area. The first testing ROW (Big Valley Wind Project) is located on the western edge of the Project Area just to the east of Big Valley. The second testing ROW (South Warner Rim) is located on the eastern edge of the Project Area on top of South Warner Rim. These ROWs encompass about 6,000 acres and are located in relatively open, low sagebrush communities. At this point in time, these projects are only in the testing phase and include three temporary wind testing meteorological towers collecting wind data. These towers occupy approximately three acres and will be removed and the sites rehabilitated at the conclusion of the testing phase.

At the present time, the BLM cannot accurately predict if either of these wind testing ROWs will proceed to a full-scale wind energy development or the exact nature of what such a development proposal would look like. The BLM will require further NEPA analysis should the proponent(s) move forward with the proposal(s). For these reasons, these proposals are considered speculative and will not be addressed further in this cumulative effects analysis.

Weed treatments identified in the *Warner Basin Weed Management Area Plan* (BLM 1999a), *Noxious Weed Management Program EA* (BLM 2004), *Vegetation Treatments Using Herbicides*

on Bureau of Land Management Lands in 17 Western States (BLM 2007) and *Vegetation Treatments Using Herbicides on BLM Lands in Oregon* (BLM 2010c) would continue. These treatments would focus on an Early Detection / Rapid Response course of action. Treatment priorities focus on areas where those plants impact wildlife habitats for federally listed or BLM sensitive species, including sage-grouse (BLM 2010c). Treatment priorities at this time are focused on Canada thistle and medusahead rye using both herbicides and biological controls.

Approximately 1,200 acres of juniper scattered across several parcels of private lands within the project area have been cut and removed. To date, there are no plans to burn any of these areas on private lands. All of these areas were post-settlement juniper and were once sagebrush steppe habitats. There is a reasonable likelihood that some additional juniper could be cut on private lands under a cooperative sage-grouse initiative program being conducted by the Natural Resources Conservation Service or under the Mule Deer Initiative being conducted by Oregon Department of Fish and Wildlife. At this time it is unknown if any additional willing private landowners will sign up for either of these initiatives, therefore the BLM cannot accurately predict if additional juniper will be removed from private lands. For these reasons, future juniper removal on private lands is considered speculative and will not be addressed further in this cumulative effects analysis.

The BLM plans to undertake a juniper treatment project of similar size and scope in the central Warner Mountains (just north of the Project Area) within the next few years. This project would be designed to improve sage-grouse, mule deer, bighorn sheep and pronghorn antelope habitats by reducing post-settlement juniper within sagebrush steppe habitats.

Cumulative Impacts Alternative 1 – No Action

The additive or incremental cumulative impacts from the Ruby Pipeline Project (Ruby) (FERC 2010) would remove 200 acres of sagebrush steppe plant communities and wildlife habitats on its 10 mile path through the Project Area. Much of this is mule deer winter range and sagebrush habitats. The project would mitigate the removal of these wildlife habitats by providing mitigation funds to be used to improve habitats elsewhere. In addition to mitigation funds, the Ruby project would be responsible for ensuring that native grasses and forbs are reestablished on all of the disturbed areas resulting from the construction of the pipeline. Cumulative impacts under Alternative 1 would occur as the Ruby project removes the additional 200 acres of sagebrush habitats from the Project Area where juniper is already impacting and reducing sagebrush steppe habitats. These actions would have minor negative impacts sagebrush steppe associated species, but the mitigation funds provided by the Ruby project would offset these impacts.

Additive or incremental cumulative impacts related to grazing would occur to sagebrush steppe associated species including sage-grouse. Impacts to sage-grouse would occur from collisions with existing range fences, reduced cover for nesting grouse, and an increased threat from West Nile virus (WNv) created from livestock water developments. Collisions with existing range fences do occur within the Project Area. Impacts from these collisions have been greatly reduced by marking all fences within 1 mile of active lek sites with anti-strike markers that allow most flying sage-grouse to avoid fence collisions. Data from Stevens (2011) suggests that fence collisions are greatly reduced when fences are marked with anti-strike markers. At this point in time, impacts to sage-grouse from WNv within the Project Area are negligible since the nearest outbreaks have been over 100 miles away and no detections of WNv have occurred within or adjacent to the Project Area. Impacts from livestock removal of forage are minor under the current

rest rotation grazing system. Current grazing practices only allow for grasses to be used at the moderate level where 40% must be left unutilized. Overall, cumulative impacts from grazing on sagebrush associated wildlife species would cause additive negative net impacts under Alternative 1 as juniper increased causing additional areas to be unsuitable for sage-grouse and other sagebrush associated species.

The additive or incremental cumulative impact from wind testing ROWs would be minor in nature due to the limited area of impact associated with the meteorological towers (3 acres). Any attempt to analyze cumulative impacts associated with full scale wind development at this time would be highly speculative in nature and therefore cannot be analyzed.

The extent of future noxious weed treatment and the anticipated impacts associated with such treatment would likely be small, but is highly speculative and difficult to accurately estimate. Based on the current knowledge of where noxious weeds exist in the Project Area, common vectors of weed transport in the Lakeview Resource Area (vehicle use and water transport) (BLM 2004) and the low risk of existing sites expanding or new sites developing in the area under current management, the cumulative impacts associated with future treatments under the No Action alternative (1) would be similar to and within the range of those identified and analyzed in the *Integrated Noxious Weed Control Program EA#OR-010-2004-03*. There would be a reduction in the overall introduction, spread, and establishment of noxious weeds across the landscape, higher awareness and education of the noxious weed problem, better inventory of weed locations, and improved upland and wet meadow ecosystem health (page 14; BLM 2004).

Juniper removal from private lands within the project area has had a minor positive impact to sage-grouse, mule deer and pronghorn antelope. Because juniper was removed without removing sagebrush, and bitterbrush habitats, forage and cover for these species was maintained while reducing competition between juniper and these shrubs.

Some recent research has suggested that small incremental increases in the human footprint or the amount of burned area within 54 km of lek sites may increase the likelihood that leks will go extinct over time (Knick and Hanser 2011). The variables studied included changes in percent of sagebrush, percent of area burned, amount of edge and the human footprint. As percent of area burned within 54 km of leks and the human footprint within 5 km of leks increased, probability that leks would not be able to persist also increased. Percent of sagebrush and edge had little effect on lek persistence. Average area burned within 54 km of leks that persisted within the Knick and Hanser (2011) study averaged 8.9% while leks that were abandoned averaged 11.3%. For each 1% increase in the amount of burned area within 54 km of a lek site, there was an 8% increase in the probability that the lek would not be able to persist. Score for the human footprint within 5 km of leks that persisted averaged 4.1 while score for leks that were abandoned averaged 4.3. Knick and Hanser acknowledge that "*We do not fully understand whether results from this cohort of leks are transferrable to all leks within the sage-grouse range.*"

An analysis revealed that currently 5.86% of the area within 54 km of the active leks that lie within the Project Area have experienced prescribed or wildfire since 1975. Under Alternative 1, no additional prescribed fire is proposed, however there would be an increased threat of wildfire. Additive and incremental cumulative impacts from prescribed fire and wildfire combined could lead to increased negative impacts to sage-grouse if the total amount of consumed acres within 54 km of the active leks within the Project Area were to increase near or over 11.3%. Additional negative impacts would occur as juniper increased and further reduced sage-grouse habitats. The

human footprint within 5 km of the active leks is not expected to increase over time and therefore would not cause additional cumulative impacts.

Cumulative Impacts Alternatives 2, 3 & 4

Cumulative impacts from the Ruby project would be similar to those under Alternative 1; however these negative impacts would be reduced further due to the fact that sagebrush steppe habitats would be restored on 24,000 – 36,000 acres under these alternatives. This would make the impacts from removing 200 acres of shrubs by the Ruby project negligible.

The use of prescribed fire and mechanical treatment under Alternatives 2-4 would have positive cumulative impacts on the surrounding watersheds. A juniper treatment project of similar size and impact is planned directly adjacent to this Project Area to the north. The cumulative effect would be to continue to improve sagebrush steppe habitats by removing post-settlement juniper and improving ecological diversity and habitat richness of the area, along with reductions in fuel loading and stand-replacing wildfire risks.

Cumulative negative impacts from wind testing ROWs would be the similar to those under Alternative 1; however, restoring 24,000 – 36,000 acres of shrub steppe habitats would reduce the impacts from these wind testing ROWs.

Cumulative impacts from grazing on sagebrush associated wildlife species under Alternatives 2-4 would be similar to those under Alternative 1. However, benefits from juniper removal under these alternatives would occur as juniper density is decreased and sage-grouse habitats increase allowing for additional areas to become suitable for sage-grouse and other sagebrush associated species. Overall, cumulative impacts from grazing on sagebrush associated wildlife species and would cause additive positive net impacts under Alternatives 2-4. Juniper treatments combined with grazing exclusion from some riparian areas would also result in cumulative benefits to aquatic resources, including native fish and amphibian species.

Greenhouse gas emissions resulting from these alternatives would total between 38,766 and 114,698 metric tons of carbon dioxide. Current global emissions of carbon dioxide total 25 billion tons of carbon dioxide (Denman et. al. 2007), and current U.S. emissions of carbon dioxide total about 6 billion tons (EPA 2009, p.2-3). Therefore, the emissions from these alternatives would constitute not more than 0.0000045% of current global emissions and 0.0000191% of current U.S. emissions. Land use and land use change, such as these actions, nationally results in a net sink of carbon dioxide of 1 billion tons (EPA 2009, P2-3); the emissions from these actions would represent about 0.000094% of this net sink.

Because noxious weed treatments and education would continue under all of the alternatives, positive impacts under Alternative 1 would also occur under Alternatives 2, 3, and 4. Overall, there would be a slight increase in the risk of noxious weed invasion/expansion in the Project Area because each of these alternatives includes some form of ground disturbing activity that could provide a new niche for noxious weeds to inhabit. This could result in an increased need to conduct weed treatments in the area in the future. Overall additive or incremental cumulative impact from activities under alternatives 2-4 would be mitigated by washing equipment prior to entering the Project Area, thereby reducing the chances of noxious weed spread.

Juniper removal from private lands within the project area when combined with jumper removal under Alternative 2-4 would have additive and incremental positive impacts to sage-grouse, mule deer, bighorn sheep and pronghorn antelope. Because the amount of juniper removed would be cumulatively greater, Alternatives 2-4 would provide much more sagebrush habitats for these wide ranging species than under Alternative 1.

An additional 25,000 acres of prescribed fire within 54 km of the active leks under Alternatives 2-4 would bring the total percentage of area burned up to 6.98%. This is still well below the average level of 8.9% of area burned where leks were still able to persist within the Knick and Hanser study (2011). A change of 1.12% in burned area within 54 km of a lek site would translate to a 9% increase in the probability of lek abandonment under Knick and Hanser (2011). Knick and Hanser (2011) did not account for different types of prescribed fire, especially those that seek to retain sagebrush habitats. The type of prescribed fire proposed within sage-grouse habitats under Alternatives 2-4 (single tree burning) is designed to maintain as much sagebrush as possible while reducing juniper slash. These impacts when combined with the benefits of additional juniper free sagebrush habitats would provide an overall positive impact to sage-grouse. The human footprint within 5 km of the active leks is not expected to increase over time and therefore would not cause additional cumulative impacts.

Irreversible and Irretrievable Impacts

Staff time and funding that would be required to implement the various alternatives would be Irreversible and Irretrievable. Removal of juniper would also be Irretrievable, at least for a few decades. Given the right conditions including active fire suppression and no prescribed fire activity, junipers would require 80-150 years to return to their current condition.

V. CONSULTATION AND PUBLIC INPUT

Public/Interagency Involvement and Coordination

The following organizations or agencies were consulted during the planning stages for this project:

U.S. Forest Service, Fremont-Winema National Forests
Bureau of Land Management, Northern California District
U.S.D.A. - Natural Resources Conservation Service
Oregon Department of Fish and Wildlife
Lake County Watershed Council

List of Recipients

A number of agencies, organizations, individuals and tribal governments were sent a notice of the EA/FONSI availability along with a request for comments. This mailing list is located in the project file.

VI. LIST OF PREPARERS

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Appendix A - Best Management Practices

Woodland Management BMPs

1) When soils or road surfaces become saturated to a depth of 3 inches, BLM-authorized activities, such as juniper yarding, shearing, and hauling, should be limited or cease unless otherwise approved by the authorized officer.
2) Mechanical shearing operations would not be allowed on slopes that are of 40 percent or greater.
3) Utilize designated skid trails and haul roads, where feasible, when ground-yarding of junipers.
4) Locate skid trails on upper slope positions, as far as possible, from surface water. Avoid skidding across drainage bottoms or creating conditions that concentrate and channelize surface flow.
5) Install waterbars and apply native or adapted non-native seed to skid trails and landings prior to temporary seasonal closures and following biomass removal operations. Consider subsoiling on skid trails and abandoned roads to reduce compaction where soil and slope conditions permit.
6) When ground or cable yarding, junipers should be fully, or at least have the lead end, suspended to minimize surface disturbance.
7) Locate landings away from surface water. Design landings to minimize disturbance consistent with safety and efficiency of operation.
8) Use low pressure heavy equipment, if possible, when piling slash.
9) Conduct mechanical treatments when soil surfaces are either frozen, dry, or have adequate snowpack to minimize impacts to soil and water resources.
10) Ground disturbing actions utilizing heavy equipment for prescribed burning and juniper cutting/shearing operations and excessive brush removal should be judiciously applied to protect sage-grouse habitat.
11) No tree removal for biomass will occur within 250 feet of fish bearing streams. Any other biomass associated activities (tree removal, skidding, yarding, temporary road construction, etc) within 250 feet of any stream channels (fish bearing, perennial, and/or intermittent), will require prior approval of District aquatics personnel.
12) No skidding and/or yarding of material will occur in or across perennial streams.
13) Any intermittent stream channel crossings associated with biomass removal, would generally be at right angles to the stream channel and would be at areas with large rock substrate which would be resistant to disturbance, or the crossing would be modified (i.e. the placement of trees in the channel to drive across in order to minimize channel and bank disturbance) and rehabilitated to minimize any effects.

Prescribed Burning BMPs

1) Design prescribed burns to create a landscape mosaic to provide wildlife edge habitat. Leave 30 to 60% of the planning area untreated to provide adequate thermal cover and bitterbrush browse for wintering mule deer. Concentrate prescribed burning treatments in

areas with an adequate native understory (Miller's Phase I, II, and transitional phase) of grasses, forbs, and shrubs to minimize the need for costly rehabilitation efforts of limited success. Juniper stands transitioning from Phase II to III are either in the process of losing the shrub component or has lost it completely and may not have sufficient fuels to carry a fire. Adequate perennial grass densities are more than 2 plants/10 ft^2. Conduct prescribed burns in the fall and winter, if possible, to minimize impacts to nesting birds and small mammals, wildlife habitat including sage-grouse (bitterbrush and sagebrush stands), and BLM Sensitive and Assessment plant species. Utilize fire-line mowing and brush-beating to maintain and protect bitterbrush stands from prescribed burning operations.

2) To protect soil productivity, burning should be conducted, if possible, under conditions when a low intensity burn can accomplish stated resource objectives. Burn only when conditions of organic surface or duff layer have adequate moisture to minimize effects to the physical and chemical properties of the soil. When possible, maximize the retention of the organic surface or duff layer.

3) Slash should not be piled and burned within riparian/wetland areas. If riparian/wetland areas are within or adjacent to the prescribed burn unit, piles should be firelined or scattered prior to burning.

4) Avoid prescribed burning in sage-grouse habitat in areas that are moderately or highly susceptible to cheatgrass invasion or other exotic species. Any vegetation treatments conducted in cheatgrass dominated communities greater than 10 acres in size (as per State and National Sage-Grouse guidelines) would be accompanied by intensive restoration and if necessary reseeding to achieve reestablishment of native vegetation.

5) Maintain the habitat character of sage-grouse leks and the surrounding sagebrush cover within 300 meters of the lek, as well as sage-grouse winter range when conducting prescribed fires. Utilize fire-line mowing and brush-beating to maintain and protect the surrounding sagebrush cover from prescribed burning operations.

Fire Suppression (Escape) BMPs

1) Minimize surface disturbances and avoid the use of heavy earth-moving equipment where possible, on all fire suppression and rehabilitation activities, including mop-up, except where high value resources (including lives and property), are being protected.

2) Install waterbars and seed all constructed firelines with native or adapted nonnative plant species as appropriate.

3) Avoid dropping fire retardant detrimental to aquatic communities on streams, lakes, ponds, and in riparian/wetland areas and to the extent possible, avoid known locations of Bureau Sensitive plant species.

4) The location and construction of handlines should result in minimal surface disturbance while effectively controlling the fire. Hand crews should locate lines to take full advantage of existing land features that represent natural fire barriers. Whenever possible, handlines should follow the contour of the slope to protect the soil, provide sufficient residual vegetation to capture and retain sediment, and maintain site productivity.

5) Suppression in riparian areas should be by hand crews whenever possible.

Noxious Weed Management BMP

1) All contractors and land-use operators moving surface-disturbing equipment into or out of weed-infested areas should clean their equipment before and after use on public lands. Heavy infestation areas of noxious weeds or cheatgrass should be avoided for staging operations and vehicle turn a-rounds and restrictions would be specified in the burn plan.

Appendix B – Riparian Management Objectives

Introduction

Riparian management objective values for stream channel conditions, when used in combination with objectives for this plan, provide criteria to help assess attainment of aquatic and riparian goals as described in the Desired Range of Conditions section of the Lakeview RMP/ROD (2003). These provide a description and characterization of watershed, riparian, and stream channel processes and existing conditions that can be expected to be achieved over time.

As indicated below, some riparian management objectives apply to forested ecosystems, some to rangeland ecosystems, and some to all ecosystems. Actions that reduce habitat quality are inconsistent with the purpose of this plan's direction. However, the intent of riparian management objectives are not to establish a ceiling for what constitutes good habitat conditions. The following statements provide the intent for the use of the riparian management objectives and their purpose in a comprehensive program:

1) Riparian management objectives are criteria (quantitative and/or qualitative) to help evaluate progress towards attainment of watershed, aquatic, and riparian goals described within the desired range of conditions.

2) Interim riparian management objectives are not to be viewed as independent from other components of the aquatic conservation strategy; rather, they are part of an aquatic conservation program. Riparian management objectives are not always sensitive to immediate effects but rather exhibit response to cumulative effects and factors influencing channel history over time.

3) Interim riparian management objectives do not replace state and Federal water quality standards promulgated under the CWA or state laws, but they should complement these standards in providing measurable habitat attributes.

Procedure for Riparian Management Objective Application

Riparian management objectives apply to all perennial streams during those times that the streams support aquatic life. Effects of land management activities on intermittent streams may influence the attainment of riparian management objectives in perennial streams. All instream and riparian variables should be used, in combination, to provide a comprehensive synopsis of watershed, riparian, and aquatic conditions, since placing emphasis on interpretations of individual variables may lead to erroneous conclusions related to watershed, riparian, and aquatic conditions.

Riparian management objective application or development can follow these steps:

1) The values apply where ecologically attainable. Locally developed riparian management objectives (quantitatively and/or qualitatively derived) supported with information from ecosystem analysis is preferred because of the variable nature of streams within the project and planning areas. Stream conditions can vary from disturbances and channel evolution histories that influenced channel form and conditions. It is recommended that district(s) staff conduct their own analysis due to the variable conditions in the planning area. Staff should consider using similar techniques described by Overton et al. (1995) to define appropriate riparian

management objectives. Riparian management objectives should be developed from evaluations of reference conditions in similar landforms, climate, stream type and valley bottom settings, and potential vegetation. In all cases, the rationale supporting these changes and the effects of the changes shall be documented.

2) Use information from Step 1 to develop management actions for conserving or restoring watershed, riparian, and channel processes.

3) Monitor implementation and effectiveness of management if they have the intended results. Provide feedback information for future management objectives, action, and evaluation of riparian management objectives.

Riparian Management Objectives

1. Instream Habitat Features

Pool frequency:

WE	10	20	25	50	75	100	125	150	200
PO	96	56	47	26	23	18	14	12	9

WE = wetted width (feet); PO = pools per mile.

Temperature ~ No measurable increase in maximum water temperature (7 day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7-day period). Maximum water temperature will be below 59 degrees F within adult bull trout holding habitat and below 48 degrees F within bull trout spawning and rearing habitats.

Maximum water temperatures below 64 degrees F within anadromous fish migration and rearing habitats and below 60 degrees F within anadromous fish spawning habitats.

Large woody debris ~ >20 pieces per mile; >12 inch diameter; >35 foot length.
(forested systems)

Bank stability ~ >80 percent stable in non-forested systems (rangeland systems)

Lower bank angle ~ >75 percent of banks with <90 degree angle (i.e., undercut).

Width/depth ratio: ~ <10, mean wetted width divided by mean depth.

2. Riparian Vegetation

Applies to all forest and range riparian areas: mature and old forest, and late ecological status range riparian conditions adapted to fire regimes and other disturbances characteristic for the site. Riparian vegetation riparian management objectives should be measured by the percent similarity of current riparian vegetation to the mature forest and late ecological status range riparian community/composition. The percent similarity shall be greater than 60 percent (USDA 1992).

The stepwise procedure for determining similarity is outlined in Figure 3 and in the Riparian Vegetation riparian management objective discussion.

Procedure for Determining Riparian Vegetation Riparian Management Objective: Functionality of aquatic and riparian environments can be fully evaluated with the inclusion of riparian vegetation. Riparian vegetation is generally more sensitive to immediate effects from management activities. In some vegetation and valley bottom settings, riparian vegetation can be responsive to restoration in short timeframes. Most instream riparian management objectives are dependent upon riparian vegetation condition; therefore, a riparian vegetation riparian management objective was included.

The following steps summarize a method to assess similarity of current riparian vegetation to potential riparian vegetation based on information presented within the Interior Columbia Basin area. The five-step method, Riparian Plant Association Groups and Associated Valley Bottom Types of the Columbia River Basin (Manning and Engelking 1995), could be used to determine the riparian vegetation riparian management objective.

1. Identify the potential vegetation group in which the riparian area occurs.

2. Identify potential vegetation type and valley bottom type.

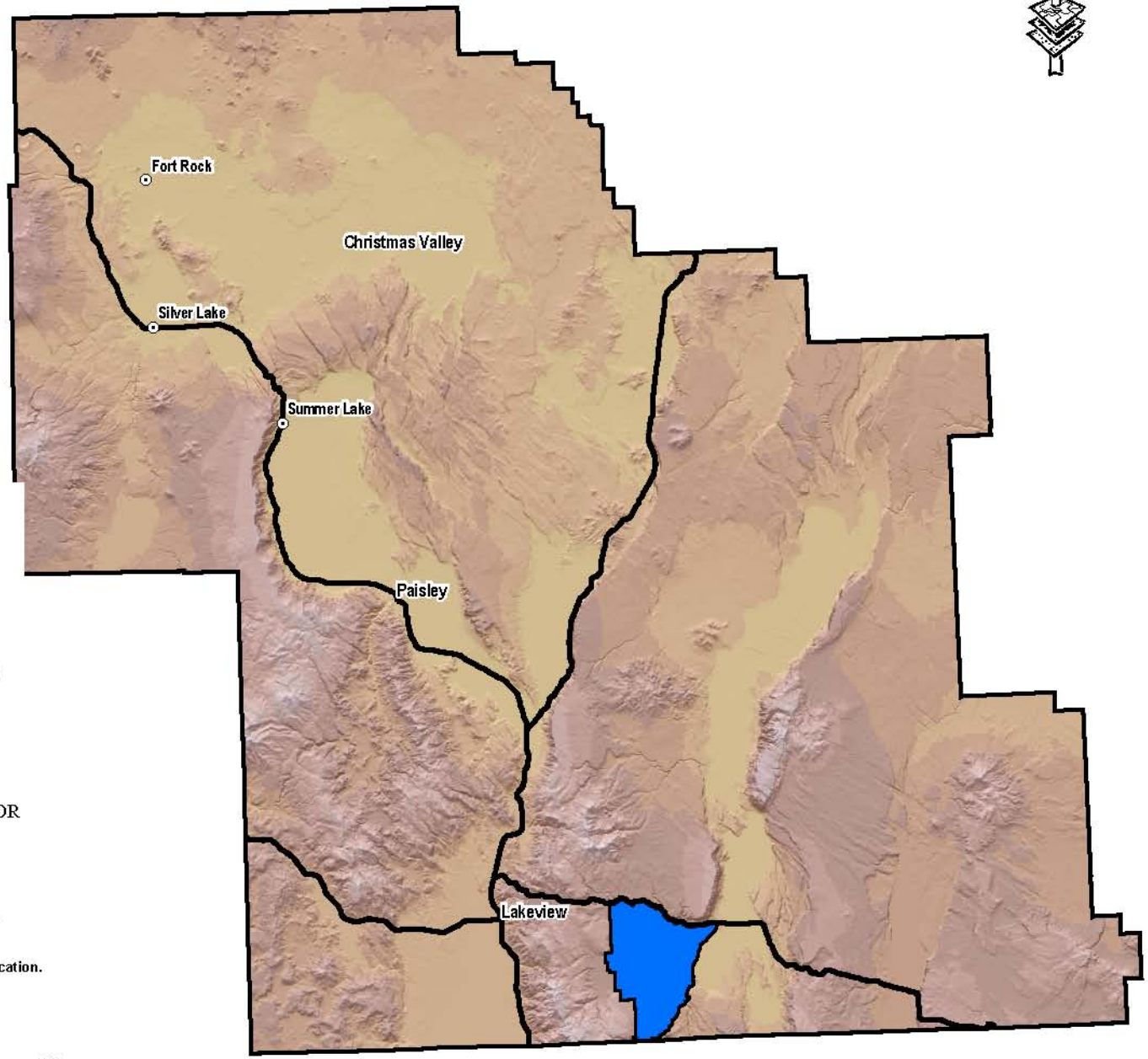
3. Identify potential riparian vegetation.

4. Determine existing riparian vegetation group.

5. Compare potential riparian vegetation group to existing riparian vegetation group.

The existing riparian vegetation should be at least 60 percent similar to the potential vegetation to meet the riparian management objective. If there is less than 60 percent similarity and it is not attributable to absence of the potential riparian vegetation group within the valley bottom setting, then management actions that move riparian vegetation toward the potential should occur.

South Warner Juniper Removal Project Vicinity Map Map 1



Legend

- Town
- Highways
- South Warner Project Boundary

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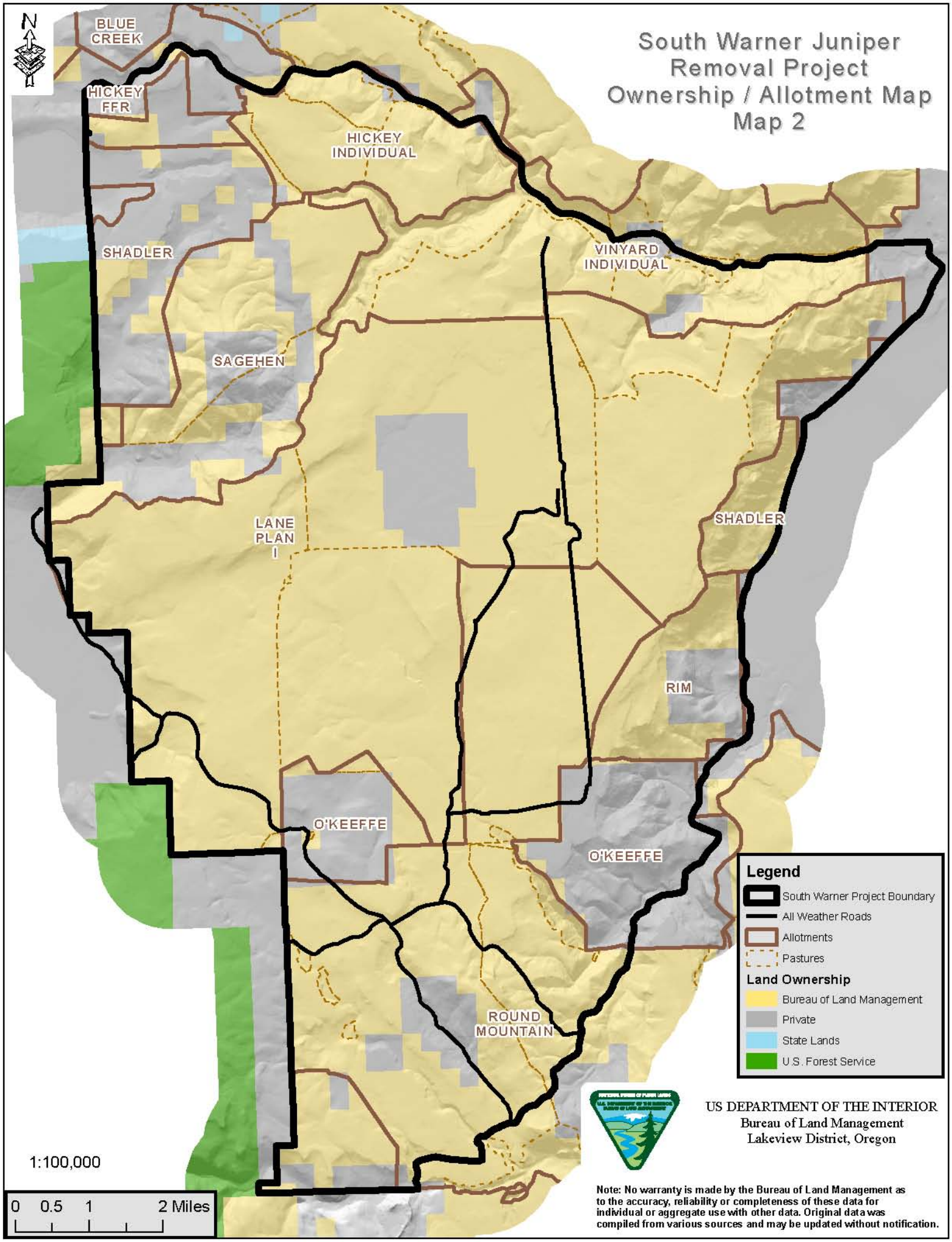
South Warner Juniper Removal Project Ownership / Allotment Map Map 2
N
BLUE CREEK
HICKEY FFR
HICKEY INDIVIDUAL
SHADLER
VINYARD INDIVIDUAL
SAGEHEN
LANE PLAN I
SHADLER
RIM
O'KEEFFE
O'KEEFFE
ROUND MOUNTAIN
Legend
South Warner Project Boundary
All Weather Roads
Allotments
Pastures
Land Ownership
Bureau of Land Management
Private
State Lands
U.S. Forest Service
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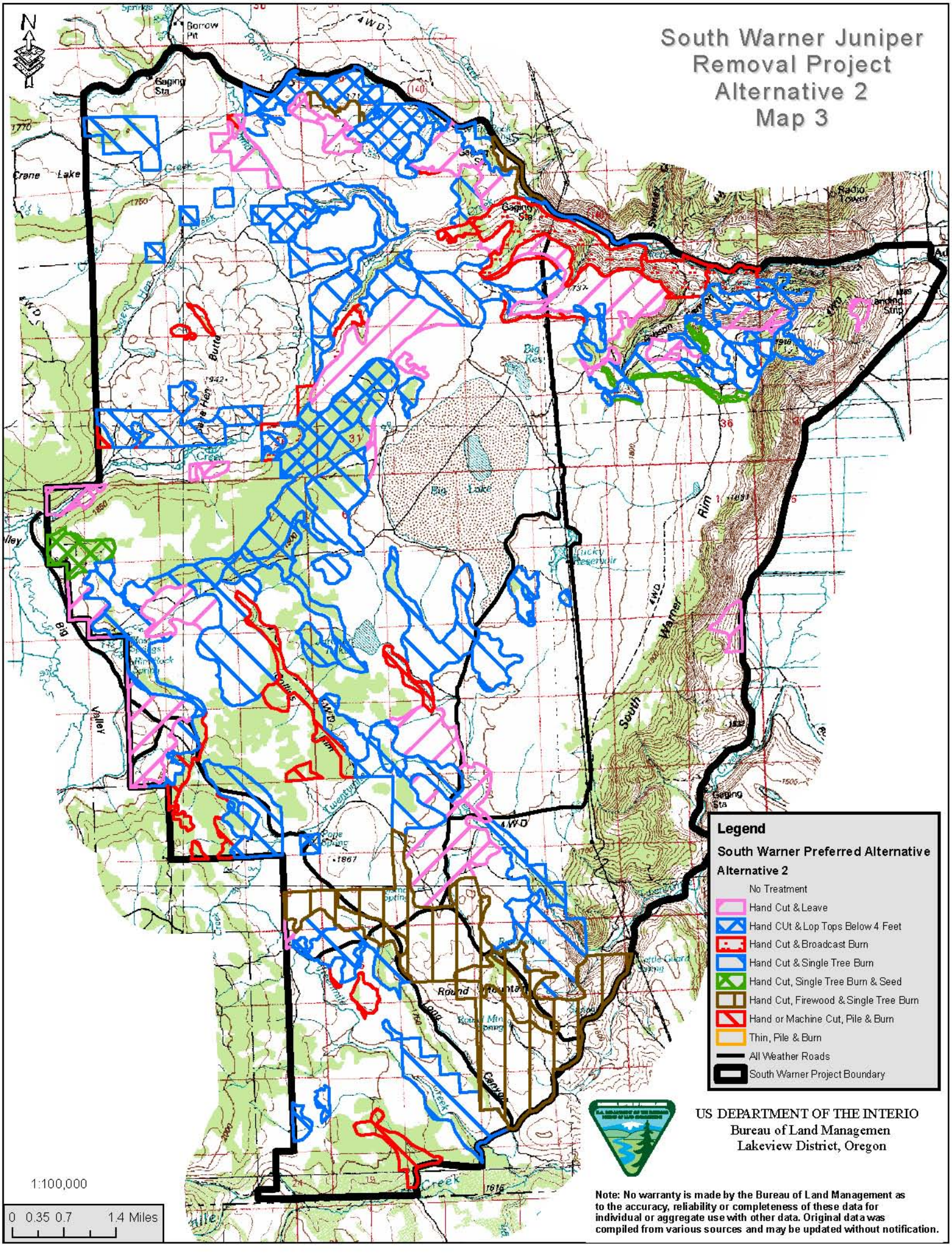
South Warner Juniper
Removal Project
Alternative 2
Map 3
N
Legend
South Warner Preferred Alternative
Alternative 2
No Treatment
Hand Cut & Leave
Hand CUt & Lop Tops Below 4 Feet
Hand Cut & Broadcast Burn
Hand Cut & Single Tree Burn
Hand Cut, Single Tree Burn & Seed
Hand Cut, Firewood & Single Tree Burn
Hand or Machine Cut, Pile & Burn
Thin, Pile & Burn
All Weather Roads
South Warner Project Boundary
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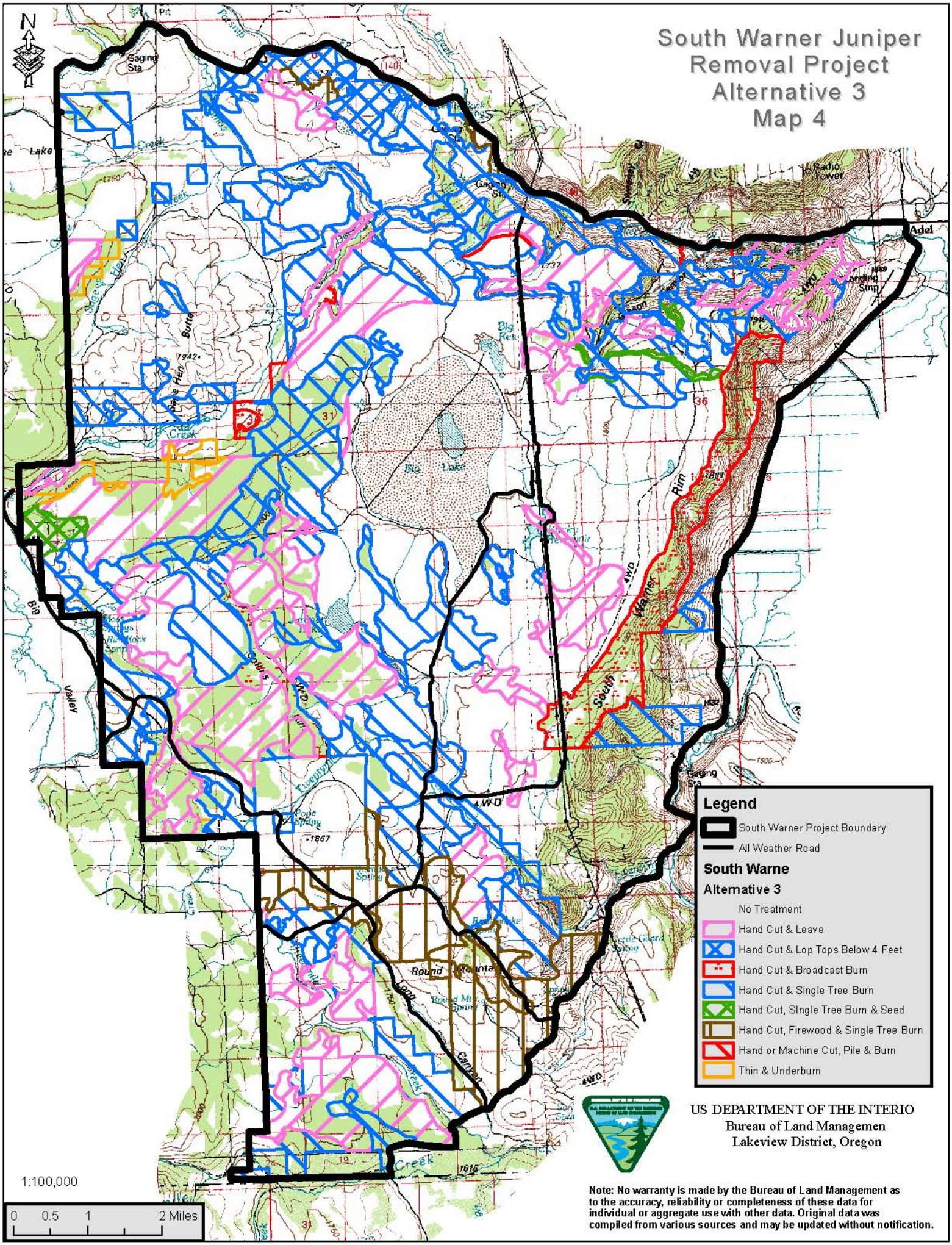
South Warner Juniper
Removal Project
Alternative 3
Map 4
N
Legend
South Warner Project Boundary
All Weather Road
South Warne
Alternative 3
No Treatment
Hand Cut & Leave
Hand Cut & Lop Tops Below 4 Feet
Hand Cut & Broadcast Burn
Hand Cut & Single Tree Burn
Hand Cut, SIngle Tree Burn & Seed
Hand Cut, Firewood & Single Tree Burn
Hand or Machine Cut, Pile & Burn
Thin & Underburn
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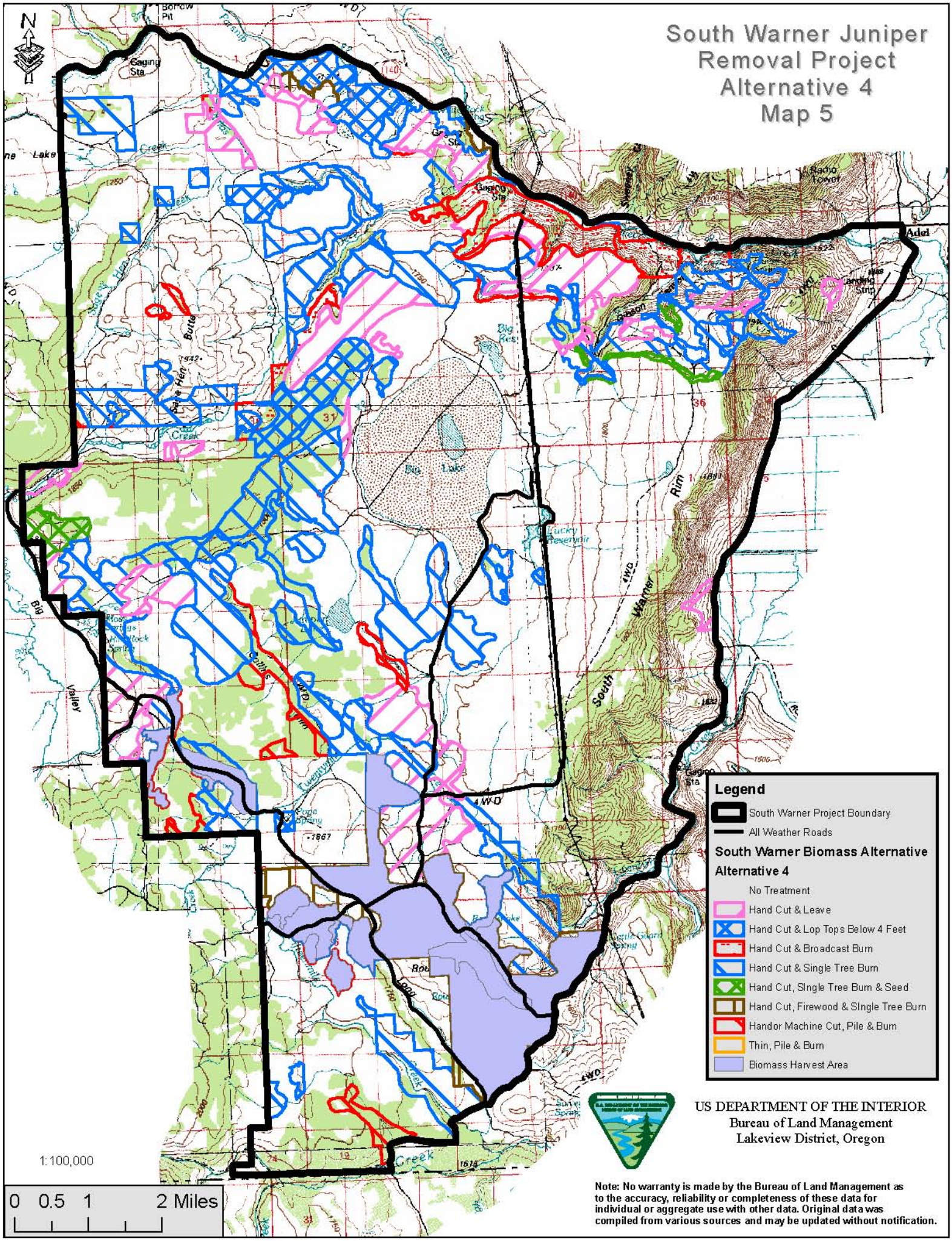
South Warner Juniper
Removal Project
Alternative 4
Map 5
N
Legend
South Warner Project Boundary
All Weather Roads
South Warner Biomass Alternative
Alternative 4
No Treatment
Hand Cut & Leave
Hand Cut & Lop Tops Below 4 Feet
Hand Cut & Broadcast Burn
Hand Cut & Single Tree Burn
Hand Cut, SIngle Tree Burn & Seed
Hand Cut, Firewood & SIngle Tree Burn
Handor Machine Cut, Pile & Burn
Thin, Pile & Burn
Biomass Harvest Area
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1:100,000
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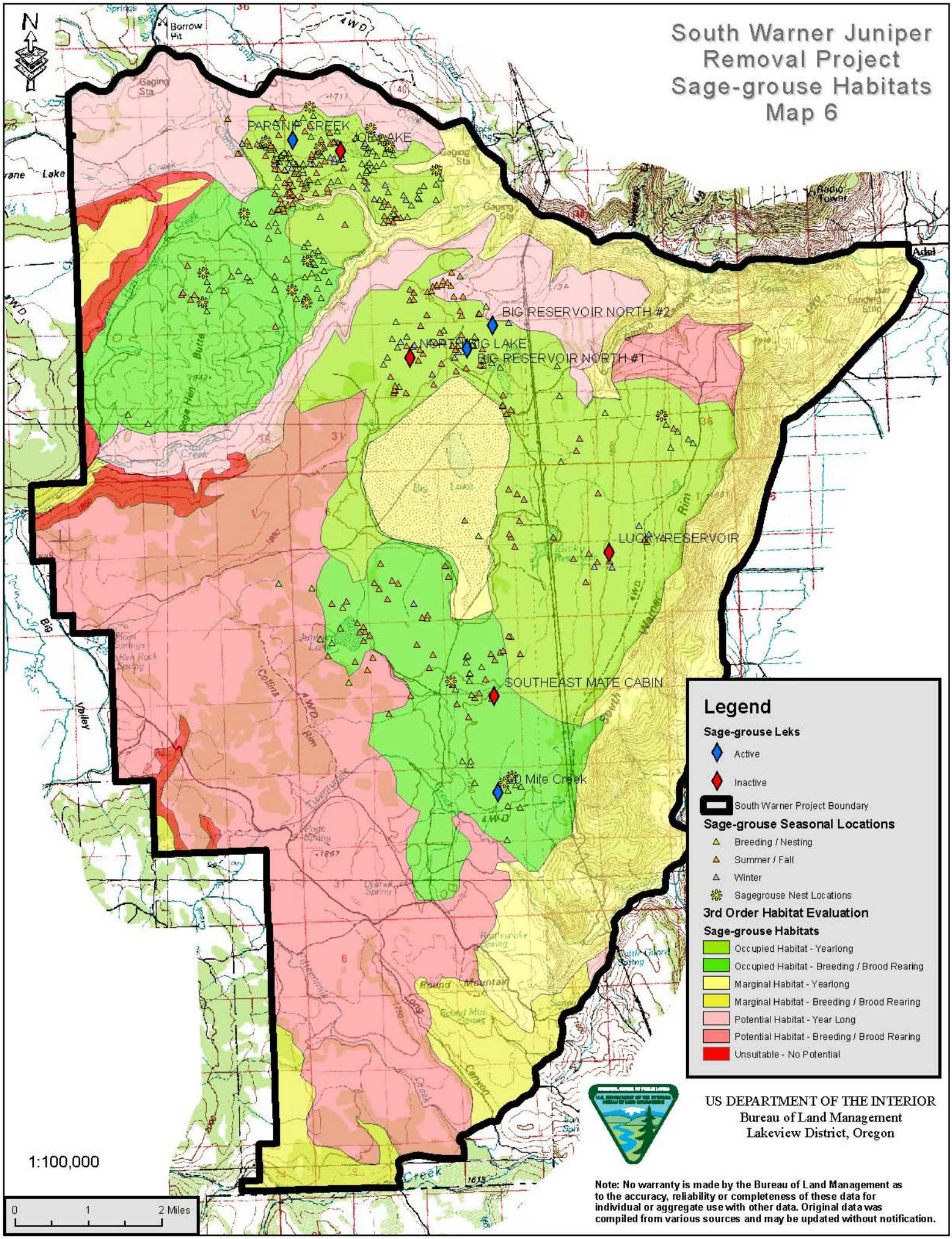
South Warner Juniper Removal Project Sage-grouse Habitats Map 6
N
PARSNIP CREEK
JOE LAKE
BIG RESERVOIR NORTH #2
NORTH BIG LAKE
BIG RESERVOIR NORTH #1
LUCKY RESERVOIR
SOUTHEAST MATE CABIN
10 Mile Creek
Legend
Sage-grouse Leks
Active
Inactive
South Warner Project Boundary
Sage-grouse Seasonal Locations
Breeding / Nesting
Summer / Fall
Winter
Sagegrouse Nest Locations
3rd Order Habitat Evaluation
Sage-grouse Habitats
Occupied Habitat - Yearlong
Occupied Habitat - Breeding / Brood Rearing
Marginal Habitat - Yearlong
Marginal Habitat - Breeding / Brood Rearing
Potential Habitat - Year Long
Potential Habitat - Breeding / Brood Rearing
Unsuitable - No Potential
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Lakeview District, Oregon
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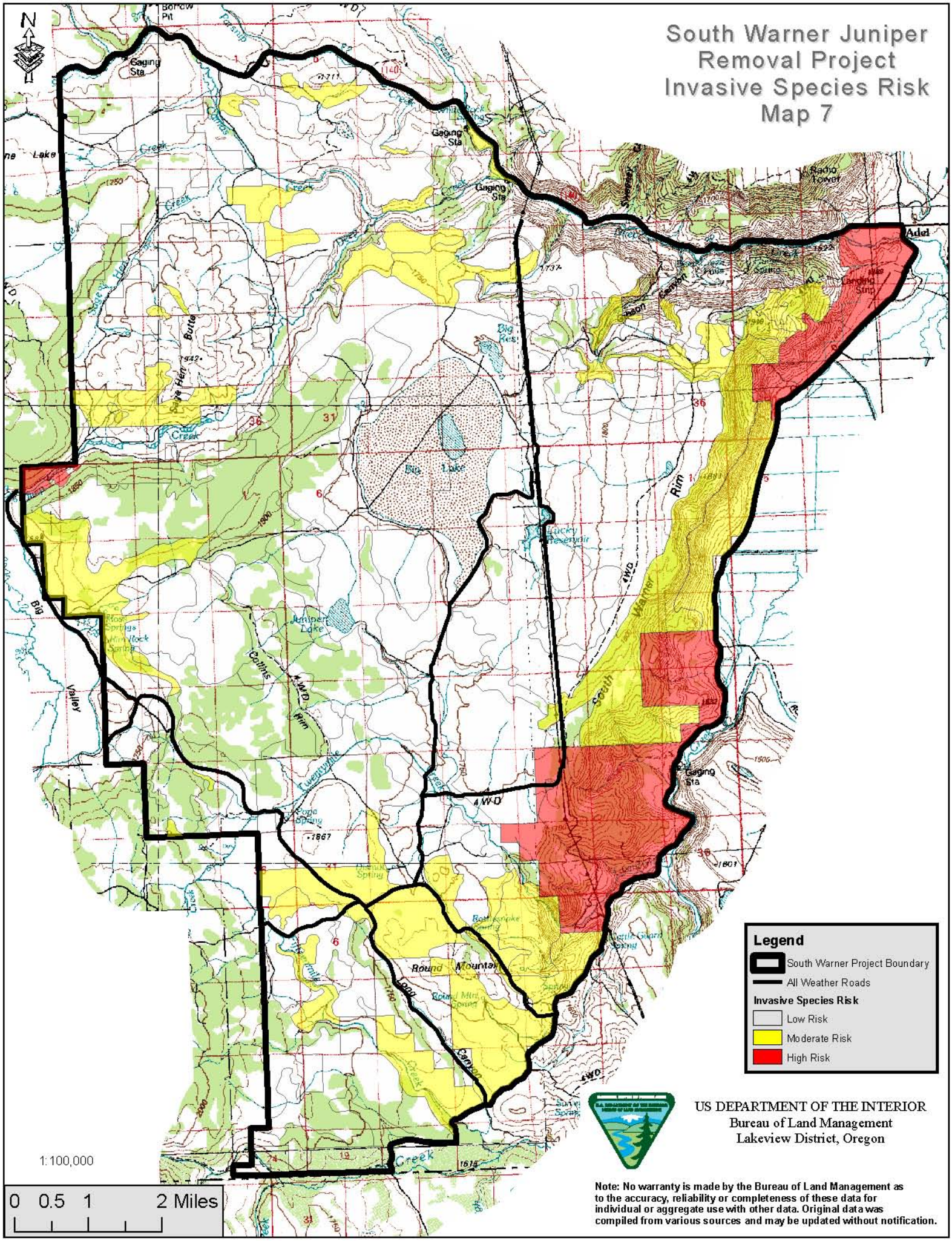
South Warner Juniper Removal Project
Invasive Species Risk
Map 7
N
Legend
South Warner Project Boundary
All Weather Roads
Invasive Species Risk
Low Risk
Moderate Risk
High Risk
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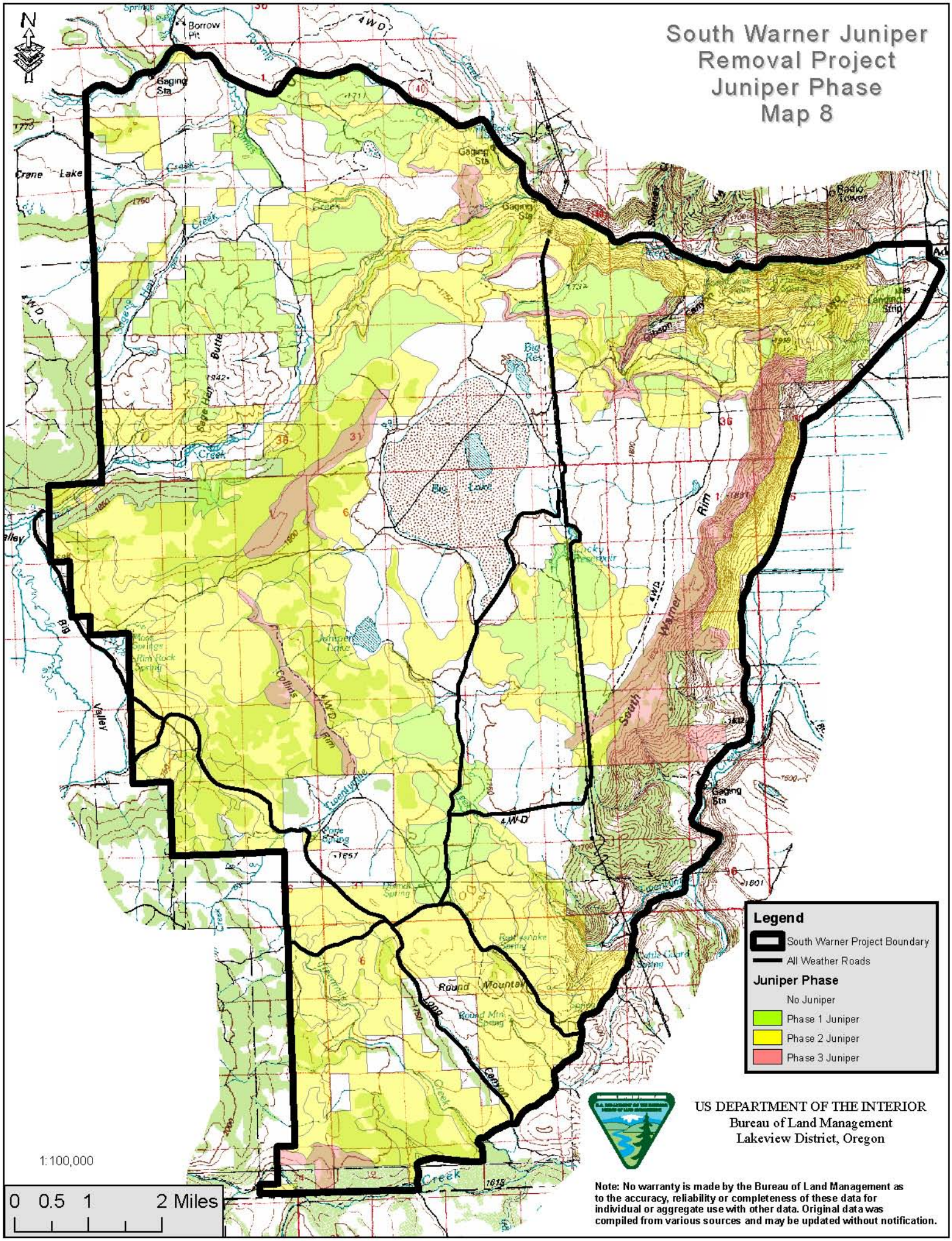
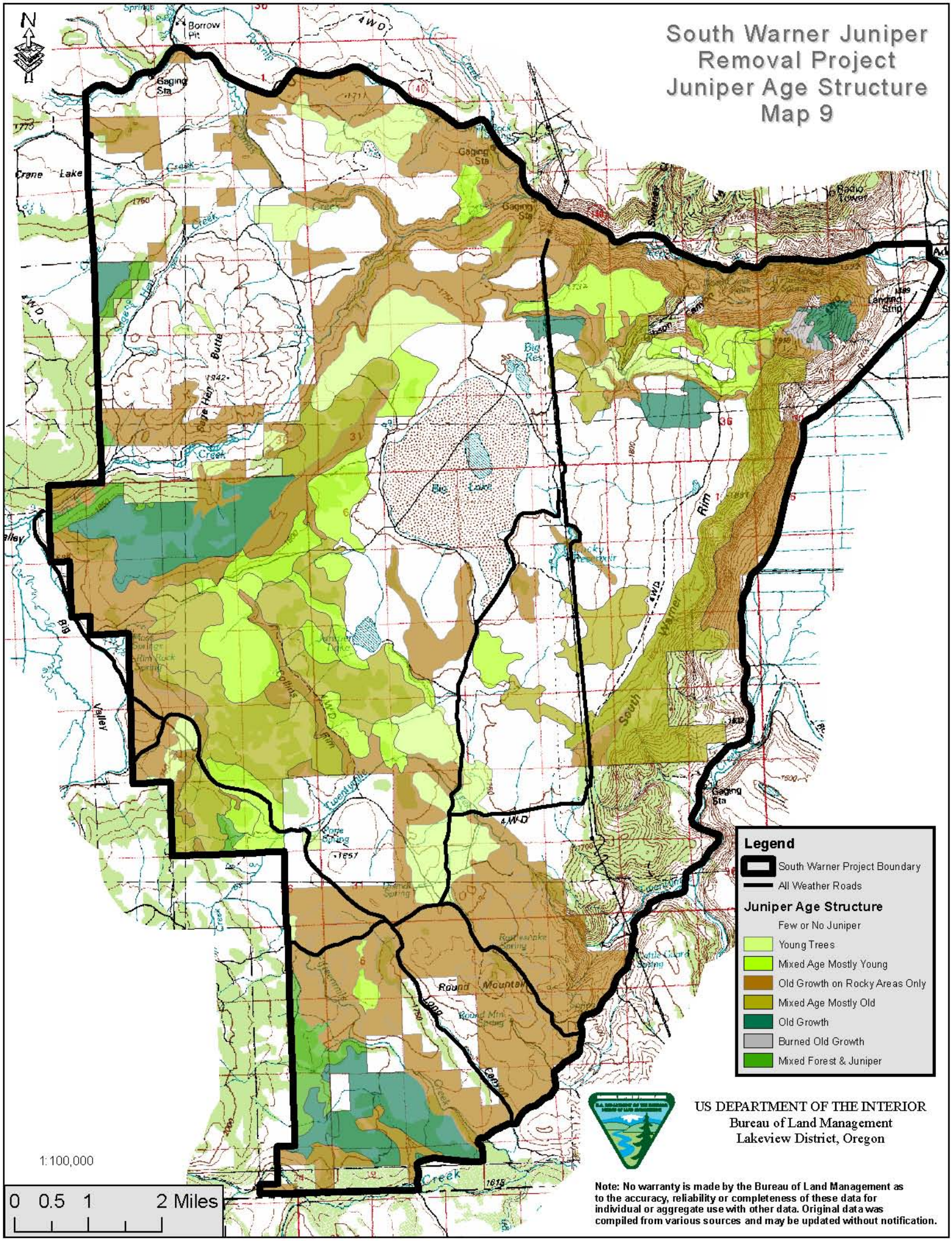
Lakeview District, Oregon
1:100,000
0 0.5 1 2 Miles
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources and may be updated without notification.
Adel
Big Lake
Juniper Lake
Round Mountain
Gaging Sta
Radio Tower
Landing Strip
Big Valley
South Warner Rim
Collins Rim
4WD


South Warner Juniper Removal Project Juniper Phase Map 8
N
Borrow Pit
Gaging Sta
Crane Lake
Big Lake
Big Res
Juniper Lake
Round Mountain
Radio Tower
Landing Strip
South Warner Rim
Collins Rim
Twenty Mile
Big Valley
4WD
Legend
South Warner Project Boundary
All Weather Roads
Juniper Phase
No Juniper
Phase 1 Juniper
Phase 2 Juniper
Phase 3 Juniper
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Lakeview District, Oregon
1:100,000
0 0.5 1 2 Miles
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources and may be updated without notification.


South Warner Juniper
Removal Project
Juniper Age Structure
Map 9
N
Legend
South Warner Project Boundary
All Weather Roads
Juniper Age Structure
Few or No Juniper
Young Trees
Mixed Age Mostly Young
Old Growth on Rocky Areas Only
Mixed Age Mostly Old
Old Growth
Burned Old Growth
Mixed Forest & Juniper
US DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Lakeview District, Oregon
1:100,000
0 0.5 1 2 Miles
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