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U.S. Department of the Interior
Bureau of Land Management

Environmental Assessment

DOI-BLM-CA-N050-2016-05-EA

Little Cleghorn Stewardship Project

Forest Health Improvement and Hazardous Fuels Reduction Project

May 2016

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1 PURPOSE AND NEED

1.1 Introduction/Background

This Environmental Assessment (EA) is prepared to disclose and analyze the environmental consequences of authorizing a combination of mechanical treatments and prescribed fire fuels reduction treatments to reduce high densities of Jeffrey pine (*Pinus jeffreyi*) and high fuel loadings within a 558 acre project area. The EA is a site-specific analysis of potential impacts that could result with the implementation of the Proposed Action or other alternatives. The EA assists the Bureau of Land Management (BLM) in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and with other laws and policies affecting the alternatives. If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, the BLM would prepare a Finding of No Significant Impact (FONSI) statement, documenting the reasons why implementation of the selected alternative would not result in "significant" environmental impacts.

The vegetative composition and structure within the Little Cleghorn analysis area has undergone dramatic changes within the last one hundred fifty years. These changes include increased tree density, canopy cover, and surface and ladder fuel loadings, as well as, decreased canopy base height (CBH). These changes have been thoroughly documented in scientific literature (Norman 2002, Dolph et al. 1995, Youngblood et al. 2004 and Taylor 1998), forest reconnaissance reports, comparisons of transect data and Government Land Office (GLO) data. This research indicates that current landscape vegetative conditions within eastside pine landscapes on the Eagle Lake Field Office (ELFO) are outside their range of Historical Range Variability (HRV) in terms of vegetative pattern, structure, tree density and species composition. This movement of ecosystems outside their historical condition is a result, at least in part, of approximately 150 years of grazing and 100 years of fire suppression.

Eastside pine ecosystems are adapted to frequent low intensity fires. Historically, eastside pine-dominated stands would be expected to burn with a high frequency, low severity fire regime (Agee 2002). A fire history study conducted in eastside pine and mixed conifer forests on the Lassen National Forest (Norman 2002) determined that the eastside pine ecosystem burned on average every 13.7 (Mean composite fire return interval) years with a minimum return interval of two years and a maximum of 37 years. These fires started burning in the spring/early summer and continued to burn until changes in weather conditions or lack of available fuels extinguished them. Plots for this study are located on the Eagle Lake Ranger District (ELRD), within 15 miles of the analysis area.

The historical median fire return interval for the pine-dominated forest in Blacks Mountain Experimental Forest (BMEF), at a scale of 100-acre plots, was about 7-10 years (Oliver 2001, Skinner pers. comm. 2005). BMEF is located approximately 20 miles east from the Little Cleghorn Project Area. Similarly, Norman (2002) found that fire history along meadow-forest edges in eastside habitats on ELRD showed a frequent and prevalent disturbance at the meadow edge prior to 1850, with fire burning within study plots every 11-13 years. Norman also found

that there was a large number of coincident fire dates between the study sites, indicating fires of large extent. He suggested that these large fires provided strong evidence that meadows and intervening forests had a continuous herbaceous component that allowed fire to spread over wide areas (Norman 2002).

In contrast to historic fire return frequency and the widespread nature of the fires, there have been only, on average, 7 fires and 84 acres burned per year over the 95 year period from 1911 to 2005 (Lassen National Forest Fire History database). The lack of fire in the project area has contributed to the changes in the vegetative structure and composition discussed above. These changes have resulted in the project area having a much higher fire hazard than was present under historic conditions.

Fire suppression policies, over the last 80 years, have dictated a total suppression strategy in the local area and have been largely successful in suppressing fire starts. Successful fire suppression has led to the 'paradox' of fire suppression, as we have become more sufficient at suppressing wildfires the wildfire problem has only become worse (Brown and Arno 1991). This repeated action has reduced the percentage of the landscape that has burned annually and virtually eliminated the natural mechanism of controlling surface and ladder fuels in forest communities. It has led to a large increase in the stocking levels of conifer species and a subsequent increase in fuels available to wildfires, as well as a reduction in native understory plant diversity.

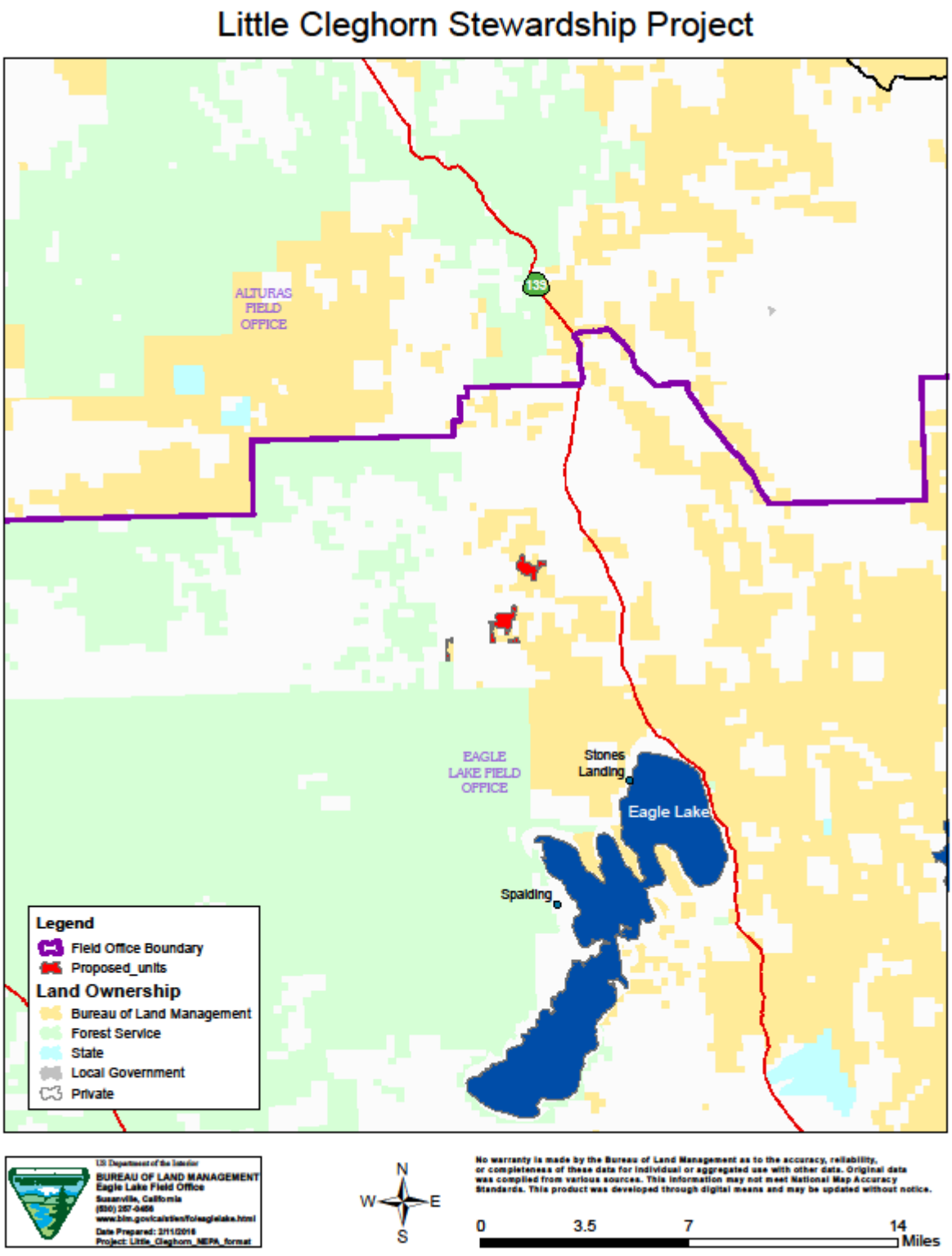
In June of 2008, the Corral Fire burned 12,500 acres west of the Little Cleghorn area. The stand density in much of the forested area within the Corral Fire was very similar to what is found in the Little Cleghorn area. A majority of the forest vegetation within the Corral Fire experienced high severity wildfire resulting in a dramatic shift in vegetation composition and structure. This resulted in loss of forest resources, wildlife habitat, loss of soil organic matter and increased erosion.

1.2 Proposed Action Location

The Little Cleghorn Stewardship Project lies approximately 24 miles north-northwest of Susanville, CA. The project area can be accessed using Cleghorn Road and traveling west from Highway 139 at the Grasshopper CalFire Station for approximately 5 miles. Little Cleghorn Reservoir is the approximate center of the treatment area. The elevation of the project area is approximately 6,000 feet with very little elevation changes across the project area.
The legal description is as follows:

T.34N., R.10E., sections 12, 13, 24, 25, 26, and 27.

T.34N, R.11E, sections 7 and 19.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EAGLE LAKE FIELD OFFICE
Stones Landing
Eagle Lake
Spalding
Legend
Field Office Boundary
Proposed_units
Land Ownership
Bureau of Land Management
Forest Service
State
Local Government
Private
US Department of the Interior
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1.3 Purpose and Need for the Action

The purpose of this project is to implement direction from the Healthy Forests Restoration Act of 2003 and the National Fire Pan. These laws direct federal agencies to implement fuel reduction projects in areas of high fuel concentrations to minimize the threat of catastrophic wildfires and to reduce wildfire threats to forest and rangeland ecosystems. Additionally the project would fulfill the vision contained in the Eagle Lake Field Office (ELFO) Resource Management Plan,2008 (RMP) which specifies that hazardous fuels be reduced on both commercial and non-commercial woodlands and to target areas with excessive fuels accumulation due to long-term fire exclusion.

This action is necessary to improve vegetation communities and minimize the threat of catastrophic wildfires in the ELFO Area. Detailed objectives are listed in section 1.4.

1.4 Project Objectives

Objective 1: Decrease the Risk of Catastrophic Wildfire

The primary objective of the project is to reduce the risk of losing forest resources, and the associated ecological functions, to high severity wildfire while improving the forest ecosystem integrity (Griffis et al. 2001). The reduction of the trees per acre would decrease the canopy bulk density and the ladder fuels in the stands. This would decrease the probability of a surface fire transitioning into a crown fire. The prescribed fire treatment would also reduce the surface fuel loading and reduce the intensity of a wildfire. Prescribed fire is effective at surface fuel reduction (van Wagtendonk 1996), and it can also increase canopy base height by scorching the lower crown of the stand (Agee and Skinner 2005).

Objective 2: Enhancement of Native Vegetation Using Prescribed Fire

Treatments utilizing prescribed fire would be planned after implementation of the necessary stand density reduction treatments. Prescribed fire would be implemented based upon an interdisciplinary assessment of resource goals in accordance with the Eagle Lake RMP. Burn and Smoke Management Plans specific to the project area would be developed to achieve outcomes envisioned by these goals. The reduction in stand density would increase sunlight to the forest floor and prescribed fire would reduce duff, litter, and 1-hour, 10-hour, and 100-hour loadings. Prescribed fire would also serve to release nutrients and increase the diversity and numbers of native annual and perennial species.

Objective 3: Improve Firefighter and Community Safety

Current fuel loads in the project area would be reduced in order to reduce potential fire intensity, increase firefighter safety, and reduce wildfire suppression costs and associated resource damage. The post-treatment fuel conditions would result in lower intensity fires by decreasing the density of pine trees and crown conditions susceptible to sustained crown fire runs. The

resulting condition within the project area would also reduce the probability of a large wildfire that could threaten the communities of Stones-Bengard and Spalding.

1.5 Land Use Plan Conformance

This action is in conformance with the Eagle Lake Resource Management Plan and Record of Decision, 2008, Section 2.6.5, Fuels Management, pp. 2-30-31 which states:

- All suitable methods (e.g., mechanical, prescribed fire, chemical, and biological) would be used for the treatment of hazardous fuels.
- Fuels projects would be designed to maintain healthy ecosystems, important wildlife habitats, and preserve or create biological diversity by mimicking the effects of naturally occurring wildfires.
- Anticipated Annual Hazardous Fuels Reduction Projects by Treatment Type:

Prescribed fire	0 - 4,500 acres per year
Mechanical treatment	500 - 3,500 acres per year
Biological treatment	50 - 1,500 acres per year
Chemical treatment	50 - 500 acres per year

1.6 Relationship to Laws, Regulations and Other Plans

- The Healthy Forest Restoration Act (HFRA) of 2003
- Collaborative Approach for Reducing Wildland Fire Risks to Communities and the environment: 10-year Comprehensive Strategy Implementation Plan (Western Governors Association and others 2002)
- Federal Wildland Fire Management Policy (USDI 1995) and Program Review (2001)
- BLM Environmental Assessment, CA-350-2002-30, Vegetative Products Harvest, 2002
- North Horse Lake Allotment Management Plan (AMP), BLM Eagle Lake Field Office
- Fire Management Plan (2004)
- Sage Steppe Ecosystem Restoration Strategy Final EIS (2008)
- BLM Environmental Assessment, DOI-BLM-CA-N050-2010-05-EA, Twin Peaks Herd Management Area Wild Horse and Burro Gather Plan, 2010
- BLM Environmental Assessment, DOI-BLM-CA-N050-2013-13, Integrated Invasive Plant Management, 2013
- National Bald Eagle Management Guidelines (2007)
- Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States. U.S. Fish and Wildlife Service Biological Technical Publication BTP-R6001-2003.

- Best Management Practices for Bald Eagles in the Eagle Lake Basin (2001)
- Nevada and Northeastern California Greater Sage-Grouse Approved Land Use Plan Amendment and Final Environmental Impact Statement (2015)
- MOU between the U.S. Department of the Interior Bureau of Land Management and the U.S. Fish and Wildlife Service To Promote the Conservation of Migratory Birds (2010)
- Antiquities Act (16 U.S.C. 433) (1906)
- National Historic Preservation Act (NHPA), Sec. 110, 106 (1966)
- Archaeological Resources Preservation Act (ARPA), Sec. 14a (1979)
- Executive Order 13007 - Indian Sacred Sites (May, 1996)
- BLM–California and Nevada State Historic Preservation Offices (SHPOs) Protocol Agreement (2014)
- American Indian Religious Freedom Act (1978)

1.7 Issues, Scoping and Public Involvement

Internal scoping for this project took place with the ELFO interdisciplinary team of resource specialists. An initial scoping letter was sent out on January 10, 2014 in anticipation of this EA. Another scoping letter was sent out March 28, 2016 requesting public comment on the draft EA. Scoping letters were sent to all identified interested parties that could be affected by the proposed action.

Consultation regarding the Little Cleghorn Stewardship Project has been ongoing with seven Native American Tribes since January 2012. The Susanville Indian Rancheria was last consulted on January 8, 2016 and the Pit River Tribe was last consulted on February 4, 2016. No comments or concerns were raised.

History of the Planning and Scoping Process

- February 4, 2014: Lassen Fire Safe Council was informed of the proposed project.
- March – May 2014: Internal Scoping with BLM ELFO Interdisciplinary Team.
- January 10, 2014: Scoping letters of the Proposed Action (with maps) were sent to all interested and affected parties, including 7 Tribes and 43 groups and individuals.
- March 28th, 2016: Request for public comment on the Draft EA was sent out to interested parties.

Four comment letters were received from groups and individuals. The following main issues were made:

- Concerns about cultural resources, special designated areas, wildlife, special status plants, invasive species, and cumulative effects,
- Concern that the reduction of western dwarf mistletoe might have negative impacts on some wildlife species,

- Concerns about impacts to special status species, including greater sage-grouse habitat,
- Concern about impacts to soils, native vegetation, and water resources from heavy equipment and other project activities,
- Concern about the risk of wildfire from prescribed fire use,
- Recommendation to decommission temporary roads after project use.
- Concerns that the EA didn't address seasonal timing restrictions for bat maternity season.

The BLM has discussed all of the issues mentioned above, and has either incorporated and analyzed them within this EA, or provided an explanation of why they were not analyzed in detail. When initially scoped, BLM proposed that one of the purposes of the document was to reduce western dwarf mistletoe infestation. In response to comments concerning the reduction of western dwarf mistletoe, BLM has developed another alternative that does not include sanitation of western dwarf mistletoe infected trees.

No known maternity colonies were found during biological surveys and clearances, therefore seasonal timing restriction would not be imposed for bat maternity season. However if found during the lifecycle of the project, restrictions would implemented as outlined in Table 2.25-1 in the Eagle Lake RMP.

2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 Alternative A (No Action)

Under this alternative the BLM would not remove high densities of Jeffrey pine and high hazardous fuel loadings on 558 acres near Little Cleghorn Reservoir. The project area would continue to be managed for limited motorized recreation, livestock grazing, and hunting.

If the No Action alternative were chosen the BLM would lose the opportunity to improve the health and vigor of the stands and minimize the threat of catastrophic wildfires in the ELFO Area.

2.2 Alternative B (Proposed Action): Thin Jeffrey pine and reduce surface, ladder, and canopy fuel loadings in the Little Cleghorn Project Area

The BLM proposes to reduce high densities of Jeffrey pine and reduce surface, ladder, and canopy fuel loadings within a 558 acre project area. The primary objective of the project is to reduce the existing hazardous fuel conditions and restore the natural function and biotic integrity of the Jeffrey pine ecosystem within the 558-acre project area. Reduction in Jeffrey pine stocking levels and reduction in surface and ladder fuel loadings in the Little Cleghorn Stewardship project area would break up and reduce the existing continuous fuel loadings, create a more open stand structure and allow the area to trend to a vegetative composition more characteristic of historic conditions.

The Proposed Action would decrease the risk of large catastrophic wildfires by reducing the stocking level of Jeffrey pine and reducing the loadings of and breaking up the continuity of surface, ladder, and canopy fuels. Generally, the larger dominant and co-dominant trees, which are more fire resistant, would be retained and desired spacing established off of them. However, smaller size class trees may be retained in preference to larger size class trees if they exhibit better growth form and vigor. The basal area of Jeffrey pine would be reduced from 90 to 110 sq ft/acre to between 40 and 80 sq ft/acre. Basal area is defined as the total cross-sectional area of all stems in a stand measured at breast height, and expressed as per unit of land area (typically square feet per acre). The average spacing between trees would be increased from approximately 14 feet to approximately 20 to 25 feet. The average trees per acre would be reduced from 200 trees per acre to an average of 80 trees per acre. The target reduction of surface fuel loadings would be between 30 to 50 percent of current loadings across the 1-hour, 10-hour, and 100-hour size classes. Whole-tree yarding would be used, during thinning operations, to reduce the creation of slash generated by harvest activity. Removal of limbs and tops by such methods would greatly reduce activity-generated surface fuels (Agee and Skinner 2005). The majority of trees would be removed using whole-tree yarding, which would effectively reduce the amount of activity-generated fuel accumulation. Thinning treatments may result in incidental activity-

generated fuel accumulations. However, these accumulations would be reduced during prescribed fire operations.

The Little Cleghorn Stewardship Project is made up of five individual units. Table 2.2 below shows the size, general location, and elevation of each unit:

Table 2.2: Little Cleghorn Units, elevations and general locations.

Unit	Size (public land acres)	General Location	Elevation (ft.)
1	40	North of Summit Lake	5,680
2	45	West of Little Cleghorn Reservoir	6,170
3	233	North end of Cleghorn Reservoir	6,090
4	22	South end of Little Cleghorn Reservoir	6,100
5	218	South of Heath Dam Reservoir	6,180
Total	558		

Achievement of project objectives would require the use of mechanical equipment including, but not limited to, rubber tire skidders, rubber tired rotary saws, chainsaws, whole tree chippers, chip transport vans, tracked equipment, and various firing equipment. It is estimated that fifteen to twenty green tons/acre of vegetative biomass would be removed and approximately 2.5 MBF (thousand board feet) per acre would be removed. Biomass material removed from the site would be hauled to a local co-generation plant and used for electricity production and saw timber would be taken to a local mill for conversion into lumber products.

2.2.1 Areas Excluded from Treatment, Modified Treatment Areas, and protection measures

The Little Cleghorn Stewardship Proposed Action would require certain precautions during implementation to ensure protection of resources. The following Project Design Features (PDF)would ensure that identified resources would be protected and or preserved. All project activities would be coordinated with the appropriate BLM resource specialist and or the BLM ELFO Interdisciplinary Team.

Cultural Resources

- The entire Little Cleghorn Stewardship Project has been inventoried for cultural resources and no sites warranting protection were found. If any previously unrecorded cultural resources are located during project implementation, work in the area shall stop and the Field Office Archaeologist would immediately be apprised.

Soils and Hydrology

- Entry into wet spring and riparian areas would be limited to broadcast burning.
- Any stream channel, whether or not it has flowing water, would have a minimum buffer of 100 feet from the banks where mechanical equipment would not be allowed. Approved roads that cross streams or stream channels or drainages are exempt from the buffer requirement. All approved roads that cross a dry or wet stream channel must be approved by BLM staff. Crossing channels with mechanized equipment would be at locations that are stable and naturally armored with rock. Stream channels would be crossed at right angles and would be limited to dry, rocky, and stable areas. A minimal amount of passes over dry stream channels would be allowed and would be monitored by the project COR.
- All approved stream channel crossings would be rehabilitated, when necessary, and/or re-vegetated following the project.
- Efforts would be made to avoid soils that are more vulnerable to erosion by working with the Eagle Lake Field Office staff.
- Areas where treatment activities have exposed soils (landings) would be protected by covering with juniper slash/chips to reduce the amount of soil movement during snow melt or storm runoff.
- Water bars on temporary roads and skid trails would be constructed to reduce the amount of sediment movement during high rainfall and or snow melt. To reduce the risk of soil compaction, all project activities related to mechanical harvesting or using temporary roads and/or trails would stop when the soil is at or near saturation. Soil moisture would be monitored during stoppages to determine when the soil has dried enough to resume activities.

Invasive Plants and Noxious Weeds

- All equipment associated with the Proposed Action would be pressure washed prior to engaging in project activities and before transport to new work areas, in order to minimize the potential spread of invasive plants and noxious weed species.
- Equipment operators and project inspectors would be provided with a noxious weed identification guide for species that are known to occur in northeast California.
- If a noxious weed site is discovered, project activities would cease and the Noxious Weed Coordinator notified of the occurrence. Project activities would not resume in the area until treatments and prevention procedures are in place.
- Livestock Permittees would be notified prior to herbicide treatments within the allotment. Safety measures designed to protect livestock are outlined in the Integrated Invasive Plant Management EA (2013) would be followed.

Wildlife

- If, during the implementation of the proposed action, threatened, endangered, BLM Sensitive species (TES), or other species of interest are found, areas of important or necessary habitat in the project area would be identified, flagged and protected from

project activities in coordination with a BLM Wildlife Biologist.

- Project activities are subject to buffer zones and seasonal restriction dates (Appendix A) designed to protect BLM TES and other important wildlife species and wildlife habitat. Buffer zones and seasonal restriction dates also apply to haul routes, and are established per the ELFO RMP.
- Project implementation would not occur from May 15 to July 15, due to the habitat classification to protect nesting birds. If nests are found, project implementation would not occur until the young have fledged.
- Jeffrey pine would be retained if wildlife nests, cavities, or other wildlife-associated activity is evident. This includes woodrat nests/middens, bird nests (including cavities), and obvious bat usage.
- Actions requiring vegetation/habitat disturbance such as construction of landings, and skidding or other movement of trees and related materials, should be accomplished in a manner resulting in as minimal disturbance as possible.
- Avoid disturbing large downed logs that were produced by old growth snags. Avoid disturbing standing snags and do not harvest any snags unless safety issues are apparent.
- Avoid dropping trees or scattering limbs over wildlife trails, burrows, ground nests or other sites of wildlife usage.

- ***Livestock Grazing-*** Range Improvements (fences, troughs, gates, cattleguards, pit reservoirs, etc.) would be maintained in the condition they were found in, or better.
- Range improvements (pit reservoirs, troughs, spring boxes, cattle guards, fences, wildlife guzzlers, etc.) would be protected during felling operations and cut trees would be removed and any slash scattered a minimum of 20 feet away from any range improvements to maintain access for livestock, and wildlife.
- Livestock and wildlife trails would be left open unless the IDT determines that there is a need to alter their movement due to land health concerns.
- If there is a need to cut a fence for project access, the fence would be re-wired immediately, or a wire gate or cattleguard would be installed while project work is occurring. If there is a need for assistance with controlling livestock near an access point or at any time, a BLM Rangeland Management Specialist would be contacted.
- Coordination with the Rangeland Management Specialist would occur when projects commence, in order to keep livestock permittees informed of project activities within their grazing allotments.
- The Livestock Permittee would be given a minimum of 1 year notice, when possible, if the treatment areas would need to be fenced and/or rested from livestock grazing prior to treatment. If the entire pasture is planned for rest, a minimum of 1 year notice to the permittees is required.
- The ELFO RMP requires that areas burned by wild or prescribed fire would be rested from livestock grazing for a minimum of two growing seasons. Decisions to re-open burned areas to grazing would be based on monitoring and assessment. Areas may be re-opened in less than two growing seasons only if such use can be shown to meet resource management objectives of the fire recovery plan specific to that site.

Recreation

- Areas where undeveloped and or hunting campsites occur would be excluded from mechanized treatment. Buffer zones would be established around these areas to maintain aesthetic values and would be coordinated with ELFO Recreation Manager.

Private Lands & Easements

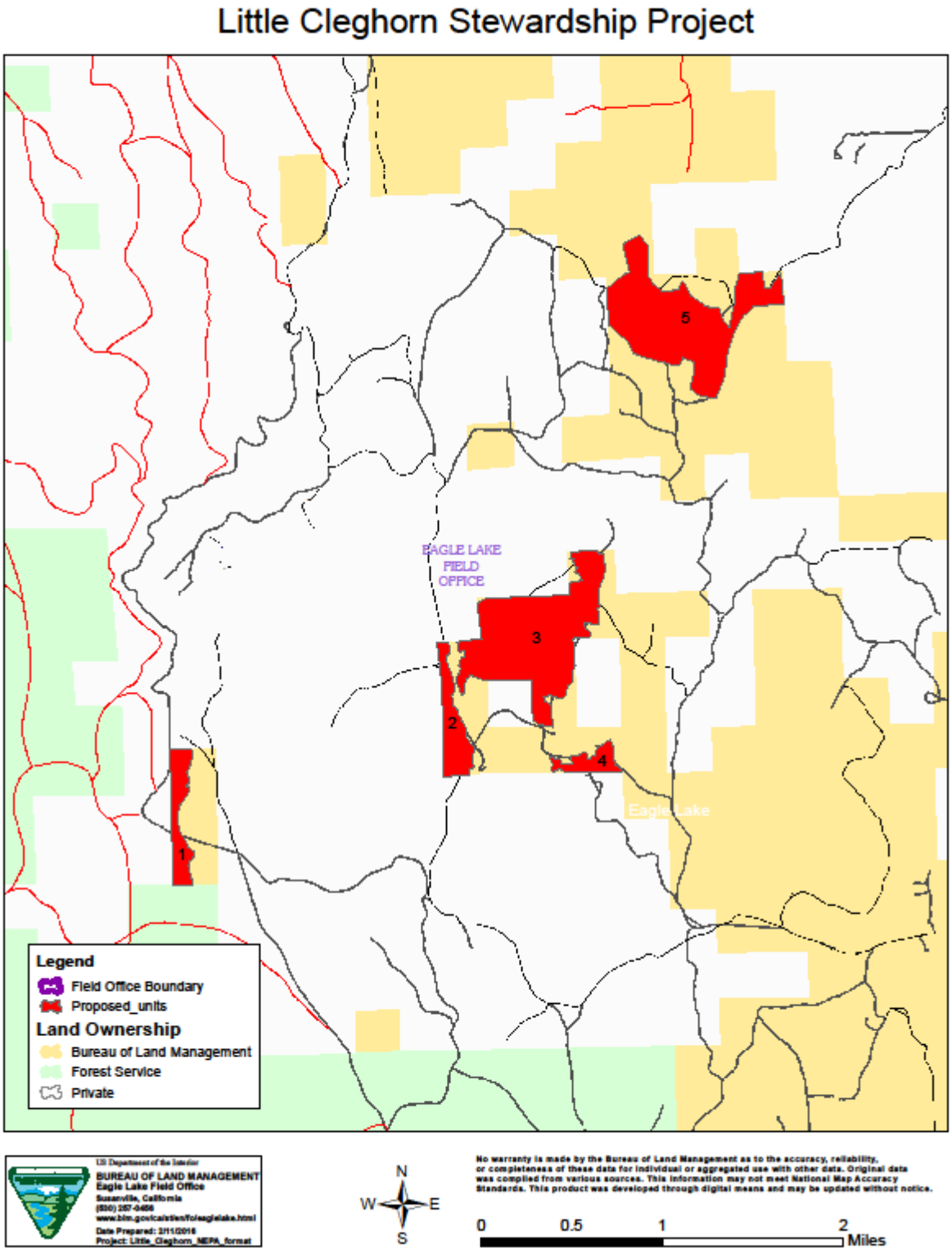
- The majority of the land within the project area is privately owned. These private landholdings are excluded from BLM treatment. Some private lands would be crossed with equipment during project activities. The land owner would be notified and permission to enter or cross private holdings would be required before BLM project activities commence.

Landing Construction and Rehabilitation

- Landings would be constructed in areas identified by the project COR to ensure no conflicts with identified resources.
- Landing areas would range in size from 1/5 acre to ½ acre and once abandoned would be rehabilitated. Landing areas would be located in places with less than 10 percent slope. Rehabilitation of landings would incorporate specific methods appropriate for each unit. The method used would be determined by BLM staff after each unit has been treated. This may include, but is not limited to, improving and repairing water bars and rolling dips, treating weeds and non-native species, seeding and possibly hand planting seedlings.
- Landings locations would be placed on previously disturbed areas. Areas with rocky shallow soils that support low sagebrush would be avoided.
- Landings would have slash, chips, or grindings broadcasted over the disturbed areas; this would especially occur on slopes greater than 15 percent.
- Restoration of site-specific areas may involve seeding or planting the appropriate species for the area, to facilitate reestablishment of native vegetation and for erosion control. If areas are identified as requiring rehabilitation BLM staff will prescribe an appropriate treatment for each area.

Prescribed Burning

- A prescribed fire burn plan would be developed and a smoke management permit would be obtained from the Lessen County Air Quality Control District prior to any implementation of prescribed fire activities. Following prescribed fire treatments the units would be fenced to exclude grazing or the entire allotment would be rested for at two seasons. Based on assessment of stand conditions, grazing restriction may be lifted after one season.
- A prescribed fire burn plan includes a risk assessment. A risk assessment analyzes the risk and consequences specific to the project area. The risk assessment and burn plan would not be approved, by the State Director, without a well thought out implementation plan and properly sized contingency force that minimizes the risks of an escape to an acceptable level.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2.3 Alternative C (Initial Proposed Action – not analyzed in full): Thin Jeffrey pine, targeting trees infected with dwarf mistletoe for removal, and reduce surface, ladder, and canopy fuel loadings in the Little Cleghorn Project Area

This alternative was developed as the Initial Proposed Action. However, based on comments from members of the public, it was determined not to be the most desirable alternative to meet the project objectives and goals put forth in the Resources Management Plan. Subsequently, this alternative was not analyzed in full.

3 AFFECTED ENVIRONMENT and ENVIRONMENTAL IMPACTS

3.1 Introduction

In accordance with law, regulation, executive order, policy and direction the interdisciplinary team reviewed the elements of the human environment to determine if they would be affected by the alternatives described in Chapter 2. Those elements of the human environment that were determined to be affected define the scope of environmental concern. This chapter describes the current conditions in the planning area and the reasonably foreseeable environmental consequences to the human environment that each alternative would potentially have on the relevant resources. Impacts can be beneficial, neutral or detrimental.

This analysis considers the direct impacts (effects caused by the action and occurring at the same place and time), indirect impacts (effects caused by the action but occurring later in time and farther removed in distance but are reasonably foreseeable) and cumulative impacts (effects caused by the action when added to other past, present and reasonably foreseeable future actions on all land ownerships). The temporal and spatial scales used in this analysis may vary depending on the resource being affected.

NEPA regulations define cumulative impacts as impacts on the environment that result from the incremental impact of the Action Alternative when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Under 43 CFR § 46.115 it states that when considering cumulative effects analysis, it must analyze the effects in accordance with relevant guidance issued by the Council on Environmental Quality (CEQ). As the CEQ, in guidance issued on June 24, 2005, points out, 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 on past action may be useful in two ways according to the CEQ guidance. 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 in this guidance that "generally, 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 inherently includes the effects of past actions. The CEQ guidance specifies that the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions." Our 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. Scoping for this project did not identify any need to exhaustively list individual past actions or analyze, compare, or describe the environmental effects of individual past actions in order to complete an analysis which would be useful for illuminating or predicting the effects of the proposed action.

When encountering a gap in information, the question implicit in the Council on Environmental Quality regulations on incomplete and unavailable information was posed: is this information "essential to a reasoned choice among the alternatives?" (40 CFR §1502.22[a]). While additional information would often add precision to estimates or better specify a relationship, the basic data and central relationships are sufficiently well established that any new information would not likely reverse or nullify understood relationships. Although new information would be welcome, no missing information was determined as essential for the decision maker to make a reasoned choice among the alternatives.

3.2 Past, Present, and Reasonably Foreseeable Future Actions

Past and Present Relevant Actions

1. Limited motorized recreation and hunting have occurred in the project area over at least the last 80 years.
2. Livestock grazing occurs in all units.
3. Forestry management activities.

Reasonably Foreseeable Relevant Actions Not Part of the Proposed Action

1. Limited motorized recreation and hunting would continue into the future.
2. Livestock grazing is expected to continue under the terms and conditions for the individual allotment permits.

3.3 Resources Evaluated

The following resources have been evaluated to determine if they are resource issues that may be impacted by the Proposed Action. All resources that are rated as "May Affect" are discussed and analyzed in chapter 3 Affected Environment and Environmental Impacts.

Table 3.3.1.1 Resource Issues which may be affected by the Proposed Action

Resource Issue	No Affect	May Affect	Not Present	Rationale
Air Quality/Global Climate Change	X			See Section and 3.4.5 below.
Areas of Critical Environmental Concern	X			Unit 2 is located within the Eagle Lake Basin ACEC. The proposed action is in accordance with the Eagle Lake RMP. See Section 3.3.1.
Cultural Resources	X			Surveys and clearances have been conducted as required under the Programmatic Agreement between BLM and the California SHPO. No historic properties were located. See Section 3.3.1.
Environmental Justice	X			No minority or low income groups would be affected by disproportionately high and adverse human health or environmental effects because the proposed project has low probability of causing significant environmental consequences.
Farmlands, Prime or Unique			X	None exist within the project area.
Fire and Fuels		X		See Section 3.4.4
Floodplains			X	None exist within the project area.
Livestock Grazing	X			See Section 3.3.1.
Migratory Birds		X		The potential impacts to migratory birds are discussed in Section 3.4.3.
Native American Religious Concerns	X			Local tribes have been consulted on the project, and no concerns regarding religious issues were given.
Noxious Weeds and Invasive Species	X			The project area has an environmental clearance for noxious weeds and invasive species. See Section 3.3.1. Integrated Design Features would be incorporated into the project design to address noxious weeds and invasive species.
Recreation	X			The project area receives only a small amount of undeveloped recreation, such as hiking, hunting, vehicle sightseeing with quads, wheel drives. No effects on recreation.
Soils		X		Soils may be temporarily impacted in areas where equipment is used or where burn piles occur. See Section 3.4.1.
T&E Fauna			X	No T&E fauna exist in the project area. See Section 3.3.1.
T&E Flora			X	No species of T&E flora exist in the project area. See Section 3.3.1.
Vegetation		X		Impacts to native vegetation are described in Section 3.4.1.
Visual Resources		X		See Section 3.3.1
Waste - Hazardous/ Solid	X			No hazardous materials or solid wastes would be produced as a result of this project.
Water Quality: Surface/Ground		X		Water resources are discussed in Section 3.4.2.

Resource Issue	No Affect	May Affect	Not Present	Rationale
Wetlands/Riparian		X		The activities of this project would avoid all riparian and wetland areas. Water resources are discussed in Section 3.4.2.
Wild horse and Burro			X	No Wild Horses or Burros are present in the project area.
Wild & Scenic Rivers			X	None exist within the project area.
Wilderness Study Areas			X	None exist within the project area.
Lands with Wilderness Characteristics	X			An inventory was completed in February 2016. The inventory unit did not meet the standard criteria and was determined to have no wilderness characteristics. See section 3.3.1
Wildlife and Fisheries		X		Impacts to Native Wildlife are described in Section 3.4.3. Fisheries described in 3.4.2.

3.3.1 Unaffected Resources: Resource Concerns Discussed but Eliminated as an Issue and from Further Study

The following topics were identified during internal and external scoping as possible concerns, but have been determined by the BLM not to be significant issues concerning the Proposed Action. The BLM has determined that the analysis of the following issues is not necessary to make a reasoned choice between alternatives:

- Areas of Critical Environmental Concern
- Cultural Resources
- Livestock Grazing
- Native American Religious Concerns
- Noxious Weeds and Invasive Species
- Recreation
- Special Status Plants
- T&E Fauna
- Visual Resource Management
- Wild Horses and Burros
- Wilderness Study Areas and lands with Wilderness Characteristics
- Wildfire Risk from Prescribed Burning

Area of Critical Environmental Concern (ACEC) – Eagle Lake Basin

A portion of Unit 2 is within the Eagle Lake Basin ACEC. The Proposed Action is in conformance with management actions for the Eagle Lake Basin ACEC, as described in Eagle Lake RMP, 2008, Section 2.12.5.2: "*Emphasize meeting land health standards and protection of wildlife habitats.* No adverse impacts to resources or values within the ACEC are expected to occur.

Cultural Resources

Following BLM regulations (43 CFR Part 8100) and other federal laws including the National Historic Preservation Act (16 USC § 470f) and its implementing regulations (36 CFR Part 800), as amended, the BLM reviewed the immediate region for historic properties prior to a federal undertaking (issuance of a federal permit). By definition, an historic property is a "prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places" and includes "artifacts, records, and remains that are related to and located within such properties" (36 CFR 800.16(l)(1)).

The mechanical treatment and hand treatment for this project has the potential to adversely affect cultural resources. Per 36 CFR Part 800 and 43 CFR Part 8100 (BLM), as amended, BLM is required to identify and evaluate cultural resources within the area of potential effect for this project. A Class III cultural resource inventory of the Little Cleghorn Stewardship Project occurred between July 23, 2013 and July 25, 2013. Class III inventory refers to a pedestrian investigation at no more than 30 meter spacing between surveyors. Two isolated finds were located. These isolated finds appear to represent nonessential losses or discards associated with logging and ranching activities in the area. They are of limited data potential except to document that historic use of the area has occurred. As a result, they have little significance when evaluated from the perspective of National Register eligibility criteria. Therefore, they do not qualify for listing to the NRHP under any of the criteria presented in 36CFR60.4 and do not merit further research or in-place preservation. No other cultural resources were located.

Lands with Wilderness Characteristics

Lands that lack wilderness characteristics are those that do not meet the naturalness criteria because they have extensive surface disturbance, vegetation treatments that are evidence of man's presence in the area or other man made features, do not provide outstanding opportunities for solitude or outstanding opportunities for primitive and unconfined types of recreation and/or do not meet the size criterion of 5,000 acres or larger. Areas less than 5,000 acres may have wilderness characteristics and require protective actions if BLM determines that wilderness characteristics are present. In 1979, BLM conducted a wilderness inventory of all public lands managed by BLM and the results of that inventory were published in the Final Intensive Inventory, Public Lands Administered by BLM California outside the California Desert Conservation Area, December 1979. Maps showing the wilderness inventory unit numbers and their boundaries accompanied that publication. BLM staff conducted a wilderness inventory of the project area on February 3, 2016. During the inventory it was determined that the unit did not meet the minimum standards for having wilderness character because none of the roadless areas of public lands in the Little Cleghorn project area are 5,000 acres or larger; therefore this project has no impacts to wilderness character.

Livestock Grazing

The project area is completely within the Cleghorn Pasture of the Slate Creek Allotment. One permittee is authorized to graze in the Cleghorn Pasture with 495 cattle from 4/16-10/31; generally cattle are not moved into this portion of the allotment until June and July. Only 41% of the pasture is public land, but the remaining land is unfenced and open to grazing through private land leases. There are approximately 15 miles of drift and boundary fences in the Cleghorn Pasture. PDFs would be followed to ensure that the cattle on-site would remain confined by fences or other temporary structures especially due to the proximity of Highway 139. There are approximately 5 livestock watering holes and 5 cattle guards in the project area. PDFs would also be followed to maintain both livestock access to range improvements, and the condition of range improvements.

Beneficial impacts to livestock are expected in both the short and long term. Improvements in both forage quantity and quality are anticipated from the fuels reduction and subsequent vegetative recovery. Reducing the chances of catastrophic wildfires occurring in the area would contribute towards maintaining a sustainable supply of perennial forage for livestock.

The scoping letter was sent to the current permittees, with no concerns expressed. Coordination would occur with the Rangeland Management Specialist and permittees prior to treatment operations. The permittees with adjacent grazing authorizations would also be included in coordination prior to treatment operations.

In order to provide for rest and recovery of vegetation after fire, the ELFO RMP requires that areas burned by wild or prescribed fire would be rested from livestock grazing for a minimum of two growing seasons unless such use can be shown to meet resource management objectives of the fire recovery plan specific to that site. Again, this will be coordinated with permittees a minimum of one year in advance of operations occurring.

Native American Religious Concerns

The Native American Tribes that have cultural affiliation with the area within the project boundaries are the Aporige Band of the Pit River Tribe and the Kammu Tukadu Band of the Paiute Tribe. Per 36 CFR Part 800 and 43 CFR Part 8100 (BLM), as amended, a consultation letter with a general summary of the proposed project, and map including the project area were sent to the Tribes on July 16, 2014, concerning the Little Cleghorn Stewardship Project. Consultation was initiated in January 2012 and is ongoing.

A Class III has been conducted for the proposed mechanical treatment areas as identified and may potentially have an effect on tribal concerns. Per 36 CFR Part 800 and 43 CFR Part 8100 (BLM), as amended, the BLM would review known tribal concerns and conduct Native American coordination and consultation as necessary. As always respect for all cultural resources would be maintained especially in the case of human remains that may be inadvertently discovered in the process of conducting the proposed treatments.

Noxious Weeds and Invasive Species

The project area has undergone an environmental survey for noxious weeds and invasive species. There are no populations of noxious weeds known to exist in this project area. If any noxious weed species are found during implementation of the Proposed Action, the BLM would map and treat these areas using management techniques outlined in the ELFO *Integrated Invasive Plant Management EA*, DOI-BLM-CA-N050-2013-13.

Activities associated with the Proposed Action that are prone to noxious weeds would be monitored for the introduction of new occurrences for three years post-treatment. Equipment (trucks, tractors) associated with the Proposed Action would be pressure-washed prior to engaging in project activities, and before transport to new work areas, to minimize the potential spread of noxious weed species.

Recreation

Areas where undeveloped and or hunting campsites occur would be excluded from mechanized treatment. Standard Operating Procedures (Appendix A.) would be implemented for Recreation and Visual Resource Management; hence no adverse impacts to recreational activities are expected to occur. The individual project units are used for the following recreational purposes:

- Unit 1: Dispersed use for deer hunting is the primary use in the fall.
- Unit 2: Dispersed use for deer hunting is the primary use in the fall.
- Unit 3: Dispersed use for deer hunting and upland game hunting in the fall.
- Unit 4: Dispersed use for deer hunting and upland game hunting in the fall.
- Unit 5: Dispersed use for deer hunting and upland game hunting in the fall.

Off highway vehicle driving also occurs on the road network in the project area with quads and four wheel drive vehicles occasionally using the area. Wood cutters also drive and use the area.

The Proposed Action would open up areas by reducing both stems per acre and surface fuel loading and provide more browse and forage for deer and upland game birds, as grasses and shrubs increase in production in the years following thinning and underburning. This would improve opportunities for hunting in the mid- to long- term as the ecosystem returns to more of a pre-fire suppression habitat type.

Special Status Plants

There are no threated and endangered flora species known to occur on the Eagle Lake Field Office. A special status plant survey was conducted in July, 2013 within the treatment units. Although some species of special status plants are known to occur in the surrounding vicinity no populations of special status plants were found within the proposed treatment area or adjacent surveyed areas.

Threatened and Endangered (T&E) Fauna

No federally-listed threatened or endangered wildlife species are known to occur within the Little Cleghorn Stewardship Project units. Although the project area contains suitable habitat for the federally endangered gray wolf (*Canis lupus*), the last known occurrence of this species in Lassen County was in March 2013.

Visual Resource Management

The project units are within areas designated as VRM Class II and III in the Eagle Lake Resource Management Plan, 2008. VRM objectives are:

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

Class III: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

The project area is not readily viewed from any main travel routes, recreation activity areas such as Eagle Lake or from sustained viewing areas such as from homes or seasonal cabins at Eagle Lake.

The proposed forest thinning would be evident from the roads that are in the project area but because of the visual screening provided by the surrounding forest the project would not be readily seen from Highway 139 and Lassen County Road A-1 around Eagle Lake. VRM Objectives for Class II and Class III areas would be met because the visual changes would not be seen by the casual observer from viewing areas traveled or used by most public land visitors

3.4 Affected Resources

3.4.1 Soils and Native Vegetation

Affected Environment

The ELFO RMP discusses goals for vegetation types across the field office. The main goal is to achieve and maintain the biotic integrity of vegetation associations and alliances that would be sufficiently resilient to the loss of structure and function in the event of a drastic disturbance such as wildfire, and have the potential to recover following such events. The majority of the vegetation within the project area is comprised of sagebrush plant communities intermixed with stands of Jeffery pine.

Tables 3.4.1.1 and 3.4.1.2 present information from the Soil Survey of Susanville Area, Parts of Lassen and Plumas Counties, California. A soil survey provides baseline physical and biotic features expected for an area. The USDA has identified Buckbay and Orhood as soils that can support woodlands. These soil types are present in a small section of approximately 25 acres in unit five.

The proposed project exists primarily in soil map unit 353. Soil components (individual soil series) within soil map unit 353 include Said (60%), Ninemile (25%), Eaglelake (5%), Fredonyer (5%), and Rock Outcrop (5%). The Said soil series is mapped as a forested soil type, and therefore does not have an associate ecological site. The Said series consists of deep, well drained, loamy soils that formed in volcanic ash over colluvium and residuum weathered from volcanic rocks. The Ninemile soil series are shallow and have a claypan, restricting root penetration. Typically, Ninemile soils consist of low sage vegetation communities. As such, these areas do not support pine forests that are targeted as part of this project, although these soils may need to be traveled through with equipment to access portions of the project area. Eaglelake soils are similar to Said soils in use and management. Fredonyer soils are shallower and have more rock fragments than Said or Eaglelake soils. Fredonyer soils also typically have rangeland vegetation. A small portion of the proposed project in unit 5 exists in soil map unit 133. Major soil components within soil map unit 133 include Buckbay (35%), Orhood (25%), Devada (20%); minor soil components include Devada, Puls, Fredonyer, and Petescreek. Both Buckbay and Orhood are identified as woodland soils, although Orhood is typically juniper woodland. Devada soils are shallow and have a claypan with low sage rangeland vegetation communities. Therefore, the areas of this project within soil map unit 133 likely consist of the Buckbay soil series, which is similar in use and management to Said and Eaglelake but occurs in lower elevations and is shallower to bedrock.

Table 3.4.1.1 Soil Map Units within the Middle Creek Stewardship Project

Project Unit	Soil Map Unit	Soil Map Association	Size (Acres)
All	353	Said-Ninemile Association, 2 to 30 Percent Slopes	533
5	133	Buckbay-Orhood-Devada Association, 2 to 30 Percent Slopes	25

The Said soil series likely covers more than 90% of the entire project area. The main limitation for the construction of haul roads and landings on Said soils is site slope. Said soils are rated as moderate for road, trail, off-road, and off-trail erosion hazard due to slope and erodibility. The rating for potential damage by fire is low. Said soils have low resistance to soil compaction but have high potential for soil restoration. Soil rutting risk is slight. Overall, the main limitations of the Said soil series for this project are related to slope and compaction.

Table 3.4.1.2 presents native plant communities that can be expected for each Soil Map Unit (SMU). Each soil inclusion has an associated Ecological Site Description (ESD). Each SMU in each project unit was examined and the ecological site listed in the table was based on a database query and site visits and best fits the associated landform for where that soil was mapped.

Table 3.4.1 Expected Native Plant Communities within each Soil Map Unit

Soil Map Units	Dominant Ecological Site	Ecological Soil Type	Expected Plant Communities
353	R021XE173CA	Shallow Stony Loam 12-16"	Needlegrass, bluebunch wheatgrass, low sagebrush, bitterbrush
133	R012XE174CA	Stony Loam 12-16"	Bluebunch wheatgrass, big sagebrush, Idaho fescue, bitterbrush
133	R021XE176CA	Loam 12-16"	Western juniper, bitterbrush, Idaho fescue, big sagebrush
353	R021XE178CA	Very Stony Loam 12-16"	Idaho fescue, mountain mahogany, mountain big sagebrush

The majority of plant communities within the project area are dominated by Jeffery and ponderosa pine stands with some western juniper inclusions. There are two prevalent sagebrush vegetation communities in the project area, both occur in a mixed mosaic pattern and are interspersed with forest tree species of Jeffery pine, (*Pinus jeffreyi*), Ponderrosa pine (*Pinus ponderosa*) and western juniper (*Juniperus occidentallis*). Mountain big sagebrush communities occur in all the project units and have strong species diversity consisting of shrubs, forbs and perennial grasses. Specific species observed in the big sagebrush communities include bitterbrush (*Purshia tridentata*), snowberry (*Symphoricarpos rotundifolius*), desert gooseberry (*Ribes velutinum*), bluebunch wheatgrass (*Pseudoroegneria spicatum*), Thurber's needlegrass (*Achnatherum thurberianum*), bottlebrush squirreltail, (*Elymus elymoides*) Idaho fescue (*Festuca idahoensis*), Sandberg's bluegrass (*Poa sandbergii*), and a wide variety of forbs. A complete plant list for each project unit is included in Appendix A.

Low sagebrush plant communities are also very prevalent across this area, outside of the treatment units and occur in mosaic patterns. This vegetation type is associated with shallow, rocky soils that often have high clay content. These soils often support a lower diversity of perennial grass and forb species than the deeper loamy soils found in big sagebrush communities. Some of the species observed in these areas include, Sandberg's bluegrass, (*Poa secunda*), sandwort (*Eremogone congesta)* Pursh's sheeppod *(Astragalus purshii var. purshii),* pussytoes (*Antennaria ssp*.), Indian paintbrush (*Castilleja ssp*.), low penstemon (*Penstemon humilus*), bottlebrush squirreltail (*Elymus elymoides*) and various buckwheat and biscuitroot species *(Eriogonum ssp.and Lomatium ssp).*

Forested areas identified as treatment areas are currently experiencing canopy closure to the point that light and rainfall are not able to reach the forest floor and support the understory. As a result, plants that make up the understory in these areas are dying, creating a moderate to heavy level of litter and duff accumulating on the forest floor. In addition, there is a presence of non-native, invasive annual grasses and forbs, mainly cheatgrass, (*bromus tectorum*) and various mustards, in the Brassicaceae family found across the project area.

Alternative A (No Action)

Direct and Indirect Effects on Soils and Vegetation

Direct effects under Alternative A would be minimal. There would be no soil or vegetation disturbance to the project units. No roads or landings would be constructed and no trees would be disturbed. Under this alternative the expanding canopy would further alter vegetative cover,

and diminish the sagebrush understory. Canopy cover increases as tree density increases, shading out necessary perennial grasses and other herbaceous species and creating opportunities for annual non-native species to establish. As succession progresses and the tree canopy thickens herbaceous species and dense woody species such as sagebrush and bitterbrush also begin to subside.

With the loss of perennial herbaceous and woody species and the establishment of an annual non-native understory the ecosystem is at a higher risk of experiencing hotter more severe canopy fires. With more severe wildfires, the risk to soil resources increases. Fires may burn hot enough to burn soil organic matter, which is necessary for healthy soils and takes decades to centuries to accumulate in place. Bare soil also tends to increase beneath tree canopies as the canopy cover increases. These factors may lead to increased soil erosion and soil loss (Miller et al. 2005).

Cumulative Effects on Soils and Vegetation

Under Alternative A the BLM would continue management practices consistent with other project environmental assessments and with the Eagle Lake RMP. Adverse impacts resulting from the Alternative A include a future increase of high-density fuels in and around the proposed project area. The threat of catastrophic wild fire and the risk of losing key components of the ecosystem are currently moderate to high but may increase to severe over time. Severe wildfires lead to a loss of soil organic carbon through volatilization which can decrease soil productivity (Neff et al. 2005). Also, wildfires can cause widespread soil loss and erosion. Canopy cover and density of Jeffery pine would increase and out-compete other valuable native plant species essential for wildlife habitat and erosion control. Biodiversity and biotic integrity of the plant communities would be adversely affected.

In addition to the direct and indirect effects of the Alternative A, other effects to soils and vegetation in this project area include dispersed recreational uses and livestock grazing.

Recreational uses include dispersed OHV use, hunting, hiking and wildlife viewing and generally have minimal impacts on vegetation. Any impacts associated with recreational uses are anticipated to be temporary and plants are expected to recover quickly. Recreational use of roads and trails may lead to minor soil erosion, especially on primitive, undeveloped roads.

Livestock grazing would continue to be managed using a pasture rotation system. Under current ecological conditions where the understory is diminishing in treatment areas the added stress of livestock grazing could intensify the removal of native perennial vegetation and increase the possibility of soil erosion.

Alternative B (Proposed Action)

Direct and Indirect Effects on Soils and Vegetation

Soils

The proposed action would thin 558 acres of thickly forested Jeffery pine within sage-steppe plant communities. Temporary landings would be between 0.2 - 0.5 acres with no new road

construction. Estimating that one .5 acre temporary landing would be constructed for each unit equates to 2.5 acres of lost soil productivity due to topsoil disturbance. The main limitations of the Said soil series for this project are related to slope and compaction. Project Design Features (PDF) for landings and prescribed burns were developed to minimize impacts from actions associated with this project. Runoff and erosion risks increase with steeper slopes; therefore, slope limitations and guidance have been included in the PDF's. Compaction risks increase when soils are saturated during periods of rain or snowmelt. PDF's are in place that address working during saturated conditions.

Direct impacts to soils within the project area would also result from the operating of harvesting equipment throughout the treatment units. To help protect soils, heavy machinery would be limited to slopes less than 30 percent. Soil disturbance could occur on up to approximately 500 to 800 acres from the use of mechanized equipment during harvesting activities and biomass extraction. This impact may result in some instances of minor to moderate soil disturbance and displacement. However, because equipment would be dispersed through the units and would not repeatedly drive over the same paths, it would not be expected that there would be any measurable loss of soil productivity in these areas.

The soils in the project area are rated as having a range from very low to moderate tolerance for soil loss, indicating that if significant erosion were to occur, these soils would become degraded and vegetative production would decrease. This would also increase the risk of invasive species and weeds becoming established. Also, the soils closer to the ground surface contain the highest levels of carbon and nutrients, providing for soil fertility and productivity. The Said soil series is rated as having moderate tolerance to soil loss; since Said soils comprise a majority of the project area, the overall concern level is low.

Compaction is one of the primary soil concerns resulting from Alternative B, since the soils in the project area are rated as low resistance to compaction. Compaction causes reduced infiltration and increased runoff. Prior to this project, all soils in the project area are rated either high or very high for runoff. This means that a large storm event can lead to overland flow, and soils would then be at a very high risk of sheet or rill erosion, possibly resulting in sedimentation in waterways. As a result of the sensitivity of these soils, specific PDFs were designed to reduce erosion and protect drainageways, thereby lowering this effect where project actions have disturbed or displaced soils or reduced soil cover. For example, machinery access within drainageways would not be permitted unless reviewed and approved by BLM staff. To reduce the risk of soil compaction, all project activities related to mechanical harvesting or using temporary roads and/or trails would stop when the soil is at or near saturation. Areas of high soil disturbance would be rehabilitated and re-vegetated following project completion.

Under this alternative it is expected that long term soil productivity would increase in response to the removal of pine and juniper tree species and increase in shrub and grass cover.

Vegetation

Under Alternative B some plants would be directly impacted by mechanical removal activities, temporary landing construction and prescribed fire. Implementation of this alternative would result in the construction, use and decommissioning of approximately 2.5 acres of temporary landings. It is expected that native plant species occurring in these places would be crushed or removed.

Indirect effects include the possible establishment and spread of non-native invasive species in these disturbed areas. In addition, prescribed fire would provide both positive and negative impacts to vegetation where they occur. Burning biomass generally improves soil conditions due to the deposition of added nutrients to the soil. These nutrients can become available to plants (Brady and Weil, 2008) including annual non-native plants as well as native perennial species. Once each unit is completed decommissioned roads and landing scars would be surveyed and treatment would be prescribed. This can include herbicide treatments and seeding of native perennial species. A detailed description of post project activities is discussed further in the Vegetation PDF found in the Proposed Action.

Indirect effects associated with thinning of Jeffrey pine and reduction of surface fuel loadings include allowing more sunlight to reach the understory and opening growing space for understory species. It would also reduce the competition for resources, and would allow for improved growth rates of the residual stand and understory vegetation. Improving and maintaining appropriate functional structural groups for these sites improves soil, plant and water interactions. In addition, this alternative would indirectly improve habitat conditions for wildlife species that rely on intact forest plant communities.

Cumulative Effects on Soils and Vegetation

In addition to the direct and indirect effects associated with Alternative B, other effects to soils and vegetation in this project area include dispersed recreational uses, and livestock grazing.

Cumulative effects of recreational use are the same as discussed in Alternative A.

Livestock grazing would continue to be managed using a pasture rotation system. As livestock move from pasture to pasture cumulative effects are generally low. This allows plants to recover from being trampled and eaten and soils to recover from compaction.

3.4.2 Water Resources

Affected Environment

Table 3.4.2.1 lists the watersheds and subwatersheds that would be affected by this project. For management activities of this scale, the subwatershed level is more appropriate for analysis. While this project does not intersect any perennial waterways, each of the affected subwatersheds contains perennial waterways.

Eagle Lake is a very important and sensitive aquatic ecosystem that contains the endemic Eagle Lake Rainbow Trout. Cleghorn Creek is an intermittent Creek that flows into Eagle Lake. Units 2 and 5 have small areas within the Cleghorn Creek-Frontal Eagle Lake Watershed that drain

into Cleghorn Creek. At the headwaters of Cleghorn Creek is Cleghorn Reservoir, which is intermittent.

All units drain into Heath Dam Reservoir and/or Slate Creek, which are both perennial water bodies. Slate Creek flows out of Heath Dam Reservoir, and the flow is controlled by the reservoir outlet. Intermittent drainages flow into Heath Dam Reservoir and Slate Creek. Units 4 and 5 contain intermittent drainages that flow into Slate Creek below Heath Dam Reservoir. The Dry Valley-Grasshopper Valley Watershed is a terminal basin, meaning that this watershed does not flow into another watershed. Slate Creek infiltrates into the ground when it reaches Grasshopper Valley.

There are no springs or wetlands in the project area, and downgradient springs and wetlands are not expected to be affected by this project.

Table 3.4.2.1 Watersheds and Sub-watersheds within the Little Cleghorn Stewardship Project

Unit	Watersheds (HU-10)	Subwatersheds (HU-12)	Acres
1,2,3,4,5	Dry Valley-Grasshopper Valley	Heath Dam Reservoir	513
2,5	Lower Pine Creek-Eagle Lake	Cleghorn Creek-Frontal Eagle Lake	45

Alternative A (No Action)

Direct and Indirect Effects on Water Resources

Under the Alternative A, no direct effects on water resources are anticipated. Indirect effects may result from wildfire that would be more severe under this alternative due to higher fuel loads. Wildfires generally cause increased erosion and sedimentation in waterways. Riparian areas and floodplains that burn at high intensity are at a higher risk due to subsequent bank sloughing and habitat degradation.

Cumulative Effects on Water Resources

Alternative A would result in an increased risk of a severe wildfire, which would cause increased sedimentation in waterways. Other past, present and future management activities within the watersheds of the project area that cause increased sedimentation in waterways include livestock grazing and forestry practices. Eagle Lake does not have a surface outflow, so it is susceptible to degradation caused by inputs of nutrients and sediment.

Livestock grazing is currently managed to be in balance with the ecosystem and to minimize soil erosion which impacts waterways. Historical overgrazing in these watersheds may have caused degraded rangeland and watershed conditions, causing higher baseline sediment delivery. Therefore, cumulative effects pertinent to this project probably would include the effects of historical overgrazing.

The effects of past forestry activities in these watersheds have been minimal. Other current forestry projects within these watersheds include small-scale thinning projects. These projects have effects similar to those described in Alternative B for this project.

When all past, present, and future projects and management activities are considered, current conditions within these watersheds may be measurably altered temporarily, in particular by severe wildfire that would be more likely to occur under Alternative A.

Alternative B (Proposed Action)

Direct and Indirect Effects on Water Resources

Under the Proposed Action Alternative, direct effects on water resources would be caused by soil erosion and degradation that would occur as a result of some aspects of this project, as described in Section 3.4.1. However, because of the established PDFs for this project that are designed to reduce negative effects on soils, the overall effects on water resources are expected to be minimal.

Sedimentation in waterways is one of the biggest issues in these watersheds pertaining to water quality and aquatic habitat. Sedimentation can be derived from upslope soil erosion or from degradation in and near drainageways. Upslope soil erosion can occur from roads, trails, landings, and soil disturbance from harvesting equipment. Roads can create a conduit for sediment to travel from upslope towards waterways. Sediment from localized minor upslope soil erosion usually does not reach drainageways, since the sediment is trapped by vegetation and small depressions in the landscape.

The PDFs relating to soil erosion ensure that sedimentation derived from upslope erosion would be minor and not have negative impacts on downstream aquatic ecosystems. These PDFs include slope limitations for landing areas, and stopping the project when soils are saturated to reduce soil compaction. Landing areas would be rehabilitated and if necessary, re-vegetated following project completion to limit erosion and sedimentation effects in the future.

Sedimentation within drainageways results when upslope soil erosion causes sediment to move towards and into drainageways, and also when soil is disturbed within and near drainageways. While there are minimal direct adverse effects from sediment deposition in drainages that are typically dry, during storm events these drainages flow towards perennial streams and lakes where aquatic ecosystems are at risk from excessive sedimentation and high storm flows.

Perennial streams at risk of sedimentation due to this project include Slate Creek. Eagle Lake is fed by Cleghorn Creek during storm events, which may be slightly impacted by this project. In these water bodies, increased sedimentation causes increased water turbidity and can degrade or eliminate fish spawning habitat and habitat for organisms that depend on the stream or lake bed. For this reason, it is important to protect these areas throughout the project, as described in the project SOPs. Avoiding soil disturbance within and near drainageways, streams, and riparian areas is achieved by using a 100-foot buffer around these areas where large equipment would not be permitted.. The PDFs in place describe the best processes for implementing stream and

drainage crossings, such as limiting crossings to dry, stable, and rocky areas, crossing at 90-degree angles, and minimizing the number of channel crossings.

Generally, soil compaction and increased road and trail densities both cause storm flows to become more severe due to reduced infiltration of precipitation, increased surface runoff and overland flow, and more direct paths towards drainages. High flow events have the potential to cause bank failures and downstream habitat degradation. Some level of soil compaction may occur throughout the project areas, but the overall effects of compaction are expected to be localized and negligible on the watershed scale.

While there are several water bodies potentially at risk, the aforementioned risks would be reduced by following the previously discussed PDFs that are aimed at protecting watershed functions. Moreover, the overall size of this project is relatively small, and any negative effects are not likely to be measurable at the watershed scale. Only 45 acres of the project exist within the Eagle Lake watershed; therefore, noticeable impacts to Eagle Lake are not expected.

Cumulative Effects on Water Resources

Other past, present, and future management activities within the watersheds of the project area that impact water resources include livestock grazing and recreation use. Eagle Lake does not have a surface outflow, so it is susceptible to degradation caused by inputs of nutrients and sediment. The only water quality impact on Eagle Lake due to this project would be due to sediment, which would be minimized by following the PDFs.

Livestock grazing is currently managed to be in balance with the ecosystem and to minimize soil erosion which impacts waterways. Historical overgrazing in these watersheds may have caused degraded rangeland and watershed conditions, causing higher baseline sediment delivery. Therefore, cumulative effects pertinent to this project probably would include the effects of historical overgrazing.

The effects of past forestry activities in these watersheds have been minimal, and as long as future forestry activities follow established protection measures, no noticeable cumulative effects would be expected. Where minor sedimentation could occur as a result erosion from roads, landings, or other disturbance, affected draws would not contribute to the same perennial stream channels or water bodies as those discussed in this project. As such, the impacts of this alternative would remain consistent with the magnitude of the direct and indirect impacts discussed above. When all past, present, and future projects and management activities are considered, current conditions within these watersheds would not be measurably altered.

3.4.3 Wildlife

Affected Environment

BLM Sensitive Species

BLM sensitive species that are known or may occur within the project area include the greater sage-grouse (*Centrocercus urophasianus*), pygmy rabbit (*Brachylagus idahoensis*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene*

cunicularia), Swainson's hawk (*Buteo swainsoni*), Northern goshawk (*Accipiter gentilis*), greater sandhill crane (*Grus canadensis tabida*), bank swallow (*Riparia riparia*), tri-colored blackbird (*Agelaius tricolor*), Northern sagebrush lizard (*Sceloporus graciosus graciosus*), fringed myotis (*Myotis thysanodes*), long-eared myotis (*Myotis evotis*), pallid bat (*Antrozous pallidus*), Townsend's western big-eared bat (*Corynorhinus townsendii*), Western small-footed myotis (*Myotis ciliolabrum*), and Yuma myotis (*Myotis yumanensis*).

Of these species, the following are not expected to be found within the proposed project areas or affected by project actions: greater sage-grouse, pygmy rabbit, burrowing owl, Swainson's hawk, bank swallow, tri-colored blackbird, Northern sagebrush lizard.

Bald eagles, golden eagles, Northern goshawks, sandhill cranes, and BLM Sensitive bat species have the potential to occur within the project area.

Bald eagles require large perching and nesting trees near lakes or large rivers. Their food is primarily fish, waterfowl, and carrion. While there is potential for this species to occur within the Little Cleghorn units due to the proximity to Summit Lake, Cleghorn Reservoir, Little Cleghorn Reservoir, and Heath Dam Reservoir, no bald eagles or bald eagle nest were found in the project area during the site surveys.

Golden eagles generally nest on cliffs, although a few use large trees for this purpose (Menkens and Anderson 1987). Golden eagles may frequent the Little Cleghorn units, but no nests or documented sightings are currently known.

Northern goshawks utilize mature coniferous forests for breeding, and other habitat includes riparian and open woodlands, canyons, forest edges and dense tree groves in more open country. While potential exists for this species to occupy units within the Little Cleghorn Stewardship Project, no nests or documented sightings are currently known.

Greater sandhill cranes primarily nest in wetlands; either in shallow water where they assemble a nest of floating plant debris, or on nesting islands. Although habitat for this species does not occur within the boundary of unit 2, a sandhill crane was reported at the southeast corner of Little Cleghorn Reservoir in the spring of 2012 (Salverson pers. comm.).

Potential habitat for BLM sensitive bats and other bat species occurs within cliff crevices, cave-like openings, trees, and buildings. The most recent surveys for bats within the ELFO were conducted via Anabat devices that were attached to the four Horse Lake Wind Energy Project (HLWEP) meteorological towers located on lands between Eagle Lake and Horse Lake. These devices were utilized from August 2009 through November 2010 to identify bat activity by detecting and analyzing echolocation calls. Results documented a total of 15 different species of bats, including all six BLM ELFO sensitive bat species (SWCA Bat Study 2011).

Migratory birds

In April 2010, the BLM signed a Memorandum of Understanding (MOU) with the U. S. Fish and Wildlife Service (Service) to promote the conservation of migratory bird populations. The purpose of this MOU is to strengthen migratory bird conservation by identifying and

implementing strategies that promote conservation and minimize adverse impacts on migratory birds.

Numerous species of migratory birds utilize the project area units and the surrounding vicinity for various life history requirements. Results from 2007-2008 avian surveys conducted for the proposed HLWEP documented at least 19 large bird and 54 small bird species, while the 2010 surveys documented 15 large bird and 58 small bird species (although no distinction was made between migratory and non-migratory species) (SWCA Final Preconstruction Avian Survey Report 2011). While these surveys did not occur within the Little Cleghorn Stewardship Project units, they reveal the numbers of birds utilizing the general area.

Other Native Wildlife Species

Mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*) occur throughout the ELFO, and occupy a variety of habitat types throughout each year. These populations are managed under California Department of Fish and Wildlife (CDFW) Management Plans.

Mule deer inhabit early-to intermediate-successional forests and brushlands, and prefer a mosaic of various-aged vegetation that provides woody cover, meadow and shrubby openings, and free water (Zeiner et al. 1990). Foraging habitat is considered a limiting factor for mule deer in northeastern California, but lands managed by the ELFO provide important transition or intermediate ranges (California Department of Fish and Game 1998). These ranges are important to deer preparing for fawning in spring and preparing for winter by gaining weight. Recent counts and information from CDFW indicate a relatively small decline in local mule deer populations (Ehler, pers. comm.). All units of the Little Cleghorn Stewardship Project and the surrounding lands are ELFO-RMP designated key mule deer fawning habitat. Mule deer trails, tracks and scat were observed on multiple occasions during field surveys of the Little Cleghorn Stewardship Project units.

Pronghorn occupy low structured sagebrush habitats, and prefer open rangeland that supports a variety of vegetative types. Pronghorn numbers statewide have declined significantly due to human-associated activities; in northeastern California only a small isolated population remains. The Little Cleghorn Stewardship Project units are forested, and do not contain priority habitat for this species.

Alternative A (No Action)

Direct and Indirect Effects on Wildlife

Wildlife species currently inhabiting or utilizing the Little Cleghorn Stewardship Project units would not experience disturbance and displacement due to the presence of humans, vehicles, and equipment, and the associated noise from project activities. Habitat would not be modified or lost due to tree removal, log or other fuels removal, and landing construction. Rehabilitation of landings would not be necessary. Livestock grazing within the units would not be affected, which would have beneficial or adverse effects to wildlife habitat depending on the species. The likelihood of habitat loss due to catastrophic wildfire would continue to increase.

Reduction of Jeffrey pine and high fuel loadings on 558 acres within the 5 units of the Little Cleghorn Stewardship Project would not occur. The increased canopy cover would provide more potential for cover, shelter, and forage for some species, but would also limit foraging activity for various species such as raptors. Increased fuel loadings could make travel or migration through the units difficult for deer or other larger species, and would contribute to fire intensity by providing additional surface and ladder fuels over time. The continued presence and eventual increase in logs and ground fuels would provide cover, shelter, and forage for many wildlife species. A decrease in sunlight to the ground would mean fewer understory vegetation species, which would result in less cover, shelter, and forage for some wildlife species.

Migratory bird species would continue to reflect a woodland species guild. Increasing tree canopy density would also increase potential habitat for bats, Northern goshawks and some other bird species, but would also result in fewer habitat openings which would decrease suitability for some bird species and several ground-dwelling species. Increasing canopy closure of Jeffrey pine would benefit deer hiding and thermal cover, but would decrease plant diversity including shrub and grass species that serve as forage for numerous wildlife species.

Cumulative Effects on Wildlife

Hunting and limited motorized recreation would continue, and cause minor wildlife disturbance and displacement. This would primarily affect individuals, not populations, and would occur intermittently. Motorized recreation is not prevalent within the project units, but could impact wildlife habitat or reproduction. Livestock grazing would also continue and result in various effects to wildlife and wildlife habitat.

Without treatment, some wildlife species utilizing the project units would benefit, while others would experience adverse effects. The ecological potential of the units would continue to decline as Jeffrey pine increases in density and canopy cover and understory vegetative diversity decreases. Beneficial and adverse effects to various wildlife species of implementing the Little Cleghorn Stewardship Project would not be realized, and would not contribute to connectivity to similar adjacent or proximate projects.

Alternative B (Proposed Action)

Direct and Indirect Effects on Wildlife

Wildlife species occupying the Little Cleghorn Stewardship Project units would experience temporary disturbance and temporary or permanent displacement due to tree removal, landing construction, under-burning activities, rehabilitation efforts, and the associated human, vehicle, and equipment presence and movement from project activities. Wildlife habitat modification or loss would also occur and is directly associated with these project actions. Project efforts such as rehabilitating landings, washing of equipment and vehicles pre-and post-treatment to prevent the spread of invasive weeds, and conforming to burning restrictions for wildlife, would assist in

minimizing adverse effects to wildlife from project activities. Treatment described in the Proposed Action would decrease the likelihood of habitat loss due to catastrophic wildfire.

Reducing canopy cover of Jeffrey pine would decrease potential cover, shelter, and forage habitat for various species that use these trees, including bats and certain species of birds. The proposed treatment would provide additional openings which should increase habitat suitability for some species such as bald eagles, and would allow for increased sunlight to the ground to promote an increase in diversity of understory vegetation and forage for a variety of wildlife species.

Migratory bird species would be affected beneficially or adversely based on post-treatment stand characteristics and specific bird species' life history requirements.

Hiding and thermal cover for mule deer would be reduced; however, decreasing Jeffrey pine density within the project area would benefit deer and numerous other wildlife species, as plant diversity, including shrubs, should increase. Additionally, some species, particularly ground-dwellers, would benefit from the increased cover and shelter habitat provided by a more diverse shrub and vegetative understory.

Overall, depending on life history requirements, effects from implementing the Proposed Action would be beneficial for some wildlife species, while resulting in adverse effects to other species. Implementing the proposed project would serve to improve the ecological potential of the treated units, as Jeffrey pine density and canopy cover is reduced, and understory vegetative diversity increases. Beneficial and adverse effects to various wildlife species of implementing the Little Cleghorn Stewardship Project would be realized, and the project would contribute to connectivity regarding similar adjacent or proximate projects. Treatments would decrease the risk of losing wildlife habitat should a large wildfire occur.

Cumulative Effects on Wildlife

Hunting, livestock grazing, and limited motorized recreation would continue, and cause minor wildlife disturbance and displacement, resulting in the same cumulative effects on wildlife and wildlife habitat as the No Action alternative.

Because impacts within this project area, along with other past, current, and future projects would be expected to be short term or intermittent across the landscape, the combined impacts from all actions are not expected to adversely affect any wildlife species populations.

3.4.4 Fire and Fuels

Affected Environment

The Fire and Fuels Affected Environment for the Little Cleghorn Project area is described by the following parameters: historic fires, stand structures and composition, and existing fuel conditions and fire behavior.

Historic Fires

The project area experiences fire caused by human and lightning activity, with the majority of the fire starts originating from lightning. According to the Lassen National Forest fire history records; there have been 643 fires between 1911 and 2005 in the vicinity of the Little Cleghorn project area. These fires ranged in size from 0.10 to 2002 acres. Table 1 illustrates that during the last ninety-five years only 7,040 acres have been burned in a wildland fire. Additionally, during that 95 year period there have been only 19 fires that were larger than 10 acres and only seven fires larger than 100 acres.

Table 3.4.4.1: Historic fires recorded in the vicinity of the Little Cleghorn Project Area (1911-2005) by size class.

	Fires and Size Class Distribution						
	A 0 – 0.25 Acres	B 0.26-9.9 Acres	C 10 – 99.9 Acres	D 100 – 299.9 Acres	E 300 – 999.9 Acres	F 1000-3000 Acres	Total
Fires	493	131	12	3	2	2	643
Acres	16	148	95	383	830	5,974	7,940

Source: Lassen National Forest fire history records.

The expected fire behavior in the project area has also changed dramatically since pre-settlement times. The frequent low intensity, widespread fires that burned historically, no longer occur, and as a result a wildland fire occurring during extreme fire weather can now be expected to burn with greater intensity and cause more damage to vegetation and habitats than occurred in the area historically.

The Cone Fire is one example of how a wildland fire could be expected to burn under extreme fire weather conditions within the project area. The fuel loadings and stand structure are very similar to the Little Cleghorn project area. The Cone fire started September 26, 2002 just outside of BMEF on the Hat Creek Ranger District. During the first thirty-six hours, the fire burned approximately 1,500 acres, much of this as a high intensity, stand replacing fire. Overall, the Cone Fire burned 2006 acres with 1600 acres of this within BMEF. The fire burned into several mechanically thinned and underburned units. These treatments occurred in 1996 and 1997 respectively. The fire effects were dramatically different between the treated and untreated areas. The fire burned as a predominately stand replacing crown fire where most of the trees were killed by the fire (>80% mortality) in the untreated areas. When the fire entered the treated areas it transitioned to a low intensity surface fire with much less damage (<20% mortality) to the residual trees. The mortality within areas treated with thinning and prescribed fire was mostly caused by radiant heat from the adjacent untreated stands. When the fire entered the stands treated with thinning and prescribed fire it either went out, or burned as a low intensity surface fire (Ritchie and others 2007).

Vegetative Structure and Composition

Lack of fire has contributed to changes in both the structure and composition of the vegetation within the project area. According to research conducted in the vicinity of the project area, stands have become many times denser and as a result, canopy base heights are now much lower than what was found in the area historically. Estimates of historical tree density based on 1938 plot data from Blacks Mountain Experimental Forest (BMEF) indicate that there were approximately 24 trees per acre greater than 12 inches diameter at breast height (dbh). Norman (2002) estimated historical tree densities for trees greater than 2 inches dbh, within eastside pine forests on ELRD averaged from 8 trees per acre for "open" pine forests to 56 trees per acre for "closed" pine forests. Additionally, Munger (1917) stated that fully stocked ponderosa pine stands in the Blue Mountains of Oregon generally contained 20 to 30 pines per acre over 12 inches dbh and that over large areas on average there were generally less than 70 total trees per acre over two inches dbh. Although, as stated, this information is from Oregon, Youngblood et al (2004) suggest that ponderosa pine structure was remarkably similar between Oregon and northeastern California, therefore, using these data seems reasonable for the eastside pine stands in the Little Cleghorn area.

In contrast to the estimates of historical tree density for eastside pine stands, there is now an average of greater than 250 trees per acre based on initial inventory of the Little Cleghorn area. This is almost five times the trees per acre than that estimated by Norman for "closed" pine stands historically.

As discussed in the introduction, Norman (2002) found that historically there were fires of large extent in the project area and suggested that a continuous herbaceous component existed to carry these fires. Due to grazing, densification of stands and lack of fire in the area the extent and continuity of the herbaceous component has been greatly reduced. Densification of these stands has also led to a decrease in the shrub component due to the increasing canopy cover (USDAFS 1994).

Fire Hazard Assessment

Fire hazard identifies the availability of fuels to sustain a fire. Fire hazard for any particular forest stand or landscape reflects the potential magnitude of fire behavior and fire effects as a function of fuel conditions. Understanding the structure of fuels and their role in the initiation and propagation of fire is the key to developing effective fuel management strategies. Forest fuels that are the key components of fire hazard are described in three categories. Surface fuels, which are composed of grass, herbs, low-lying shrubs, litter, and dead and down woody material. Ladder fuels are composed of live and dead shrubs and understory trees. Canopy fuels are the live and dead material in the canopy of trees (Petersen et al. 2003).

Fire behavior is the manner in which a fire reacts to available fuels, weather, and topography. A change in any of these components results in a change in fire behavior (DeBano et al. 1998). Fire behavior is described by flame length and rate of spread (Rothermel 1983). Fire behavior is

complex, with many contributing factors; the most critical of which are topography (slope, aspect, elevation), weather (climate, air temperature, wind, relative humidity, atmospheric stability) and fuels (size, type, moisture content, total loading, arrangement) (Agee 1993). Topography and weather at a given location are beyond the ability of management to control. Fuel hazard is the only factor that can be reduced by management action. Weather conditions such as drought, temperature, humidity, and wind play a major role in the spread of wildland fires. These conditions are influenced by topography as well as global influences such as La Niña and El Niño. Weather conditions are a major factor in the initiation and spread of all wildland fires, but Omi and Martinson (2002) found that stands with prior fuel treatments experienced lower fire severity than untreated stands burning under the same weather and topographic conditions. Fuel management modifies fire behavior, ameliorates fire effects, and reduces fire suppression costs and danger (DeBano et al., 1998). Manipulating fuels reduces fire intensity and severity, allowing firefighters and land managers more control of wildland fires by modifying fire behavior in the fire environment (Pollet and Omi, 2000).

Fuels management can include reducing the loading of available fuels, lowering fuel flammability, or isolating or breaking up large continuous bodies of fuels (DeBano, 1998). Fuels contribute to the rate of spread of a fire, intensity, flame length, fire residence time, and the size of the burned area (Agee et al., 2000). For these reasons, the comparison of alternatives in this analysis focuses on the reduction of important fuels (surface, ladder and canopy) and predicted fire behavior.

A fire hazard assessment should analyze crown fire potential as well as that of a surface fire. Crown fires normally are highly destructive, difficult to control, and present the greatest safety hazard to firefighters and the public. Therefore, fuels management must emphasize the factors that lower the probability of the initiation and spread of crown fires. These factors include height of the forest canopy above the ground (canopy base height) and the density of the crowns (canopy bulk density) and surface fuel loading (Omi and Martinson, 2002). In general, crown fires burn hotter and result in more severe effects than surface fires. Crown fires generally spread many times faster than surface fires (Rothermel, 1983). Fires that spread quickly and at higher intensities can pose a greater risk to firefighters and the public when they occur. Agee (1996) states that crown fire potential can be managed through prevention of the conditions that initiate crown fires and allow crown fires to spread. Three main factors contributing to crown fire behavior can be addressed through fuels management: initial surface fire behavior, canopy base height, and canopy bulk density.

Fire hazard in stands proposed for treatment is rated as high due to the low canopy base heights and the predicted flame lengths in the majority of stands. These factors could, under 97th percentile weather, result in a sustained passive crown fire. There are areas within the project area that have a moderate or even low wildland fire hazard rating (i.e. meadows, rocky areas or areas of previous fuels treatments).

Existing Fuels Conditions

Anderson (1982) identifies fine surface fuels as the primary carrier of fire at the flaming front. Fine surface fuels are course down woody material with diameters of up to 3.0 inches. These

fuels are an important factor in determining how fast a surface fire would spread and how hot it would burn under given atmospheric and topographic conditions. They directly affect fire intensity and spread by linking fire from the surface and into the ladder fuels, which can lead to propagation of fire into the crowns of trees.

Table 7 shows the estimated existing surface fuel loading (TU5) and the predicted surface fuel loading (TL3) following proposed treatments. These fuel loadings are a representative example of existing and predicted surface fuel conditions in the project area. Estimates for existing loadings were based on field observations using the Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott and Burgan 2005). Representative Fuel Models were selected to represent data from the site specific surveys and to represent fire behavior in the project based on past observations of fire in stands with similar characteristics. The representative fuel model following proposed treatments was selected to represent conditions found in areas previously treated with thinning followed by prescribed fire.

Table 3.4.4.2. Estimated average surface loading of dead and down woody fuels by fuel model (tons/acre). Rates of Spread and Flame Lengths are based on the very low (D1) moisture scenarios as defined in the source publication and 15 mph mid-flame wind speed.

Fuel Model	Rate of Spread (chains/hour)	Flame Length (feet)	Total Loading (tons/acre)
TU5	37	14	7.0
TL3	5.5	1.8	1.0

Source: Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model.

The majority of stands proposed for treatment are moderately to densely stocked, with stands averaging approximately 250 trees per acre. In-growth of small, suppressed trees has occurred throughout the project area. This in-growth has created hazardous ladder fuel conditions, greatly increasing the potential for passive crown fire initiation and mortality in overstory trees

Desired Fuels Conditions/Fire Behavior

Desired fuels conditions include reduction of surface, ladder and crown fuels in order to reduce predicted flame lengths, rates of spread, probability of crown fire initiation or spread, and to reduce predicted mortality within the stand. Desired fuels conditions would be achieved by reducing surface fuels using broadcast burning, reducing ladder fuels by thinning from below to raise the canopy base height and thinning the canopy to decrease canopy bulk density

The goal of surface fuel treatment is to reduce surface fuels so that a wildland fire burning under 97th percentile weather would produce, on average, a flame length of four feet or less. Additionally, ladder fuel treatments would raise the canopy base height (CBH) to a level that would prevent or greatly reduce the likelihood of a surface fire transitioning into the canopy. To

meet desired conditions, surface fuels would be reduced or rearranged, by broadcast burning, and ladder fuels would be reduced by thinning of small understory trees.

Passive crown fire initiation (torching) is governed by several conditions including surface fire intensity, foliar moisture content, canopy base height (CBH) and canopy bulk density (CBD). CBH is the average height from the top of the surface fuel to the lowest part of a tree's crown at which there is a sufficient amount of crown fuel to propagate fire vertically into the canopy (Scott and Reinhardt, 2001). CBH incorporates ladder fuels such as shrubs and understory trees as well as the live and dead lower branches of mature trees. It is measured at the lowest height above ground where at least 0.010 kilograms per cubic meter (kg/m3) of available canopy fuels are present. The lower the crown base height, the easier it is for a given surface fire to initiate a crown fire. Low crown base height provides the "ladder" which allows a surface fire to become a crown fire. Canopy bulk density is defined as the amount of available canopy fuel per unit canopy volume.

CBD is the average mass (kg/m^3) of tree crowns across a forest stand (Brown and Smith, 2000). It is a bulk property of a stand, not an individual tree, and is represented as the available canopy fuel load divided by canopy depth (Scott and Reinhardt, 2001). For any given species, less trees per acre equates to a lower canopy bulk density, which makes it more difficult to maintain crown fires. CBD would be reduced within the project area by thinning of the co-dominant trees to reduce overall crown biomass and increase spacing between canopies.

Alternative A (No Action)

Direct Effects and Indirect Effects – No Action Alternative

The Little Cleghorn Project would not be implemented under Alternative A and therefore there would be no direct effects.

The absence of fuels treatment and prescribed fire would allow continued increases in fuel loading across the project area. Down woody material would continue to accumulate at a rate that is greater than decomposition. Absence of thinning would allow continued in-growth of ladder fuels. As stands become denser with understory in-growth and surface fuel loads increase, anticipated fire behavior and effects would become more severe. These factors would cause an increase in the probability of stand replacement in the event of a wildland fire. The project landscape would remain in a state that could allow the loss of key ecosystem components in the event of a large wildland fire.

Under 97th percentile weather conditions, predicted flame lengths in a wildland fire would be in excess of 4 feet in much of the project area. Flame lengths during passive crowning are predicted to be approximately 9 feet and during active crowning they are predicted to be around 79 feet. Rates of spread range from 24 to 41 chains per hour. Predicted flame lengths and rates of spread would create a situation where direct fireline attack would be prohibited and firefighters would have to employ indirect suppression methods. Such a situation would allow fires to become considerably larger, more expensive, and potentially more hazardous for firefighters and the public. Associated smoke from intense, severe wildland fires could create

both nuisance and health concerns in nearby communities for considerable durations (days or weeks).

Cumulative Effects

Under Alternative A , densification of stands, and surface and ladder fuel loading throughout the project area would continue to increase. Lives, property, and natural resources in and around the Little Cleghorn Project area would continue to be at risk from wildland fires that have the potential to be both large in size and damaging to the ecosystem well beyond the scope of what occurred in this area historically. In the event of a wildland fire in the project area, under existing fuel conditions and extreme fire weather, large-scale loss of key ecosystem components could result. Twenty years in the future, these conditions would be more pronounced without some type of fuels reduction treatment or other disturbance (wildland fire) that reduces fire hazard in the area.

Alternative B (Proposed Action)

Direct and Indirect Effects to Fuels and Fire – Proposed Action

The thinning prescription would use low thinning, also known as "thinning from below," to remove ladder fuels in the suppressed and intermediate crown classes, which would reduce the vertical continuity between surface and canopy fuels (Peterson et al. 2005, Graham et al. 2004). Removal of saplings and pole-sized trees would reduce stand density, ladder fuels, and shade-tolerant species, while increasing canopy base height.

This prescription would also thin the co-dominant trees to reduce the horizontal continuity of canopy fuels. The reduction of canopy continuity would reduce stand density, canopy bulk density, and interlocking crowns by increasing crown spacing between residual trees. The treated areas would be made more resistant to developing or maintaining a crown fire by the thinning of the co-dominant trees. Species preference for retention would be given to shade-intolerant trees with more fire-resistant characteristics, such as Jeffrey pine.

Whole-tree yarding would be used, during thinning operations, to reduce the creation of slash generated by harvest activity. Removal of limbs and tops by such methods would greatly reduce activity-generated surface fuels (Agee and Skinner 2005). The majority of trees would be removed using whole-tree yarding, which would effectively reduce the amount of activity-generated fuel accumulation. Thinning treatments may result in incidental activity-generated fuel accumulations. However, these accumulations would be reduced during prescribed fire operations.

The direct effects would be a reduction in conifer stocking from an average of 250 trees per acre to an average of 80 trees per acre, with a corresponding increase in average tree spacing from an average of 14 feet to an average of 25 to 30 feet and an average increase of CBH from 10 feet to

20 feet, and reduced surface fuel loadings. Basal area per acre would be lowered from an existing average of 110 square feet per acer to 40 to 80 square feet per acre.

The indirect effects associated with reduction of CBD and increased tree spacing, would include increased wind speed within the stands, increased growth of shrubs and grasses and a decreased probability of perpetuating or initiating a crown fire. The indirect effects associated with a reduction of surface fuel loadings would include a reduction in fire behavior, decreased tree mortality (during prescribed fire operations and in the event of a wildfire) and a decreased probability of maintaining or initiating a crown fire. The indirect effects associated with an increased CBH include a decreased probability that a surface fire would transition to a crown fire, increased probability that a crown fire approaching the treatments from an outside source would transition to a surface fire and a reduction in canopy scorch and torching during prescribed fire treatments.

Another indirect effect associated with the treatment area would be to reduce the amount of acres burned at high severity in the event of a wildland fire. The decreased flame lengths and fire line intensity, which would result from the proposed treatments, would give firefighters a better chance of halting the progress of a wildland fire and keeping the final amount of acres burned to a minimum. This effect would result in increased protection for areas outside of the treatments including communities, watersheds and wildlife habitat.

Cumulative Effects

The Fire and Fuels cumulative effects analysis area for the Little Cleghorn Project includes the area within the project boundary and areas immediately adjacent to the project area that have experienced recent treatments. The combined proposed treatments would change the stand structures, when compared to areas not proposed for treatment within the project area. These differences in structure would contribute to landscape-level diversity by creating areas of lower stand densities, and reduced surface and ladder fuel loading. The diversity in forest structure created by these treatments and their spatial arrangement across the landscape may greatly reduce the growth of large fires (Graham et al. 2004).

The combined proposed treatments would create a relatively open forest structure, compared to the areas not proposed for treatments, where fuel loadings and arrangements would be altered to encourage low-intensity surface fires.

The combined effect of these treatments would increase the ability of fire suppression personnel to both safely and effectively limit the size of wildland fires. The treatments from the proposed action would also connect to other similar treatments that have been completed and others that are planned.

3.4.5 Air Quality

Indirect and Cumulative Effects to Air Quality-- Alternative A

This alternative would create no short-term impacts to the local areas from prescribed fire. However, the risk of a major air quality impact from a large wildland fire burning in the area would be increased under this alternative. The amount of smoke created, in the event of a large wildland fire burning in the project area, would be increased for several reasons. There would be more acres burned in a shorter period of time, the fire would burn under hotter and drier conditions, so the amount of fuel consumed would increase and fuels would burn that would have been removed under the Proposed Action. Increased consumption of the canopy fuels, due to the more intense fire behavior, would also contribute to increased smoke production. Additionally, smoke impacts to local communities would be more severe in the event of a wildland fire due to the normal summertime inversions. Inversions cause smoke to linger near the surface in low-lying areas and can last for extended periods, especially during summertime conditions. Summertime inversions have impacted the area during years when large wildland fires burned including 1977, 1987, 1992 and 1999.

Indirect and Cumulative Effects to Air Quality- Alternative B

The Proposed Action Alternative could create short term smoke and fugitive dust impacts to nearby areas. The possible short term impacts would be mitigated by compliance with the prescription laid out in the project's burn plan, as well as, the Smoke Management Permit issued by the Lassen County Air Quality Management District. The possible impacts from fugitive dust created by hauling operations would be mitigated by conducting operations during periods when soil moisture conditions would minimize dust production or watering roads when necessary.

4 CONSULTATION and COORDINATION

4.1 Persons, Groups and Agencies Consulted

California Department Of Fish & Wildlife	Kristin Hubbard
California Department Of Fish & Wildlife	Brian Ehler
Lassen Co Planning Department	
Rocky Mountain Elk Foundation	Byron Donaldson
Pew Environmental Group	
Lassen National Forest Supervisor	Dave Hays
Representative	Doug Lamalfa
Assemblyman	Brian Dahle
Assemblyman	Ted Gaines
Red River Forests LLC	
Bailey George L Jr & Jane A Trust	
Ralph C. & Donna L. Keenen JT	
Robert D. & Susan F. Somerville	
Pyramid Lake Paiute Tribal Council	Mr. Elwood Lowery, Chairman
Pyramid Lake Paiute Tribe	Shannon Mandell, Museum Director
Susanville Indian Rancheria	Mr. Stacy Dixon, Chairman
Pit River Tribal Council	Ms. Delores Raglin, Chairperson
Susanville Indian Rancheria	Ms. Melany Johnson, Thpo
Pit River Natural Resources	Morningstar, Thpo
Cultural Representative, Aporige Band	Ms. Anna Barnes
Washoe Tribe Of Nevada And California	Mr. Kaizer, Chairman
Washoe Tribe Of Nevada And California	Mr. Darrel Cruz, Thpo
Greenville Rancheria	Mr. Kyle Self, Chairman
Greenville Rancheria	Ms. Lacie Miles, Environmental Director
Reno-Sparks Indian Colony	Mr. Arlan Melendez, Chairman
Reno-Sparks Indian Colony	Ms. Michon Eben, Thpo
Honey Lake Maidu	Mr. Ron Morales
Western Watersheds Project	C/O Dr. Michael J. Connor
Lassen County Fish And Game Commission	Don Armentrout,
Cw Johnson Ranch	
Roberts Ranches LLC	
Edgar 'Red' Roberts	C/O Red Roberts
Frosty Acres, Inc.	C/O Aaron Albaugh
John Espil Sheep Co.	C/O John Espil
Thunder Mountain	
Casiano Land And Livestock	C/O Joey And Tim Ochotrena
Dallice And Logan Nuttall	
Wood Cattle Ranch	Dennis Wood
Travis And Darcie Stewart	
5-Dot Land And Cattle Company	C/O Todd Swickard
Darrell And Callie Wood	
Darren And Taylor Hagata	
John E. Hanson	
George L. Bailey And Son	

4.2 List of Preparers

Name	Title	Project Role
Clif Motheral	BLM Forester/ Fuels Specialist	Project Lead - EA Preparation Fuels/Fire/Forestry
Stan Bales	BLM Outdoor Recreation Planner	Recreation/VRM/Wilderness
Patrick Farris	BLM Rangeland Management Specialist	Range//Land Health/ Wild Horse and Burro
Landon Gryczkowski	BLM Hydrologist	Soils/Hydrology/Riparian/Wetland/Air
Amy King	BLM Rangeland Management Specialist	Range/Land Health
Joshua Huffman	BLM Lead Biological Technician	Noxious Weeds
Jim Hunt	BLM Recreation Maintenance Worker	Facilities Management
Valda Lockie	BLM Ecologist	Soils/Vegetation/Special Status Plants/Weeds
Marilla Martin	BLM Archaeologist	Cultural Resources
Melissa Nelson	BLM Wildlife Biologist	Wildlife/ T&E Species
Jill Poulsen	BLM Lands/Realty Specialist	Lands/Realty
Marisa Williams	BLM Outdoor Recreation Planner	Recreation/Travel/OHV/Wilderness
Dan Ryan	Planner	NEPA EA Review and Editing
Jeffrey Bellaire	BLM Supv. Resource Mgt. Spc.	NEPA EA Review and Editing

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Appendix A.

Plant List for Little Cleghorn Project

U.S. DEPARTMENT OF THE INTERIOR – BUREAU OF LAND MANAGEMENT

SPECIAL STATUS PLANT SPECIES ASSESSMENT

U.S. DEPARTMENT OF THE INTERIOR – BUREAU OF LAND MANAGEMENT

SPECIAL STATUS PLANT SPECIES ASSESSMENT

Part I. Project Location and Description

Project Title: Little Cleghorn

Project No.: DOI-BLM-CA-N050-2013-01

Field Office: CAN 050 Eagle Lake

Legal Description: T43N R11E Sections 7 and 18.
T34N R10E Sections 12, 13, 23, 24, 25, 26 and 27.

Project Lead: Clif Motheral

Date Received: 7/1/2013 Date Due: 8/1/2013

Project Description:
The primary objective as stated above is to reduce the risk of losing forest resources to high severity wildfire while improving the forest ecosystem integrity (Griffis et al. 2001). The reduction in stand density will increase sunlight to the forest floor and prescribed fire will reduce duff and litter loadings. The residual stand will also be more resilient to insect infestations and disease.

The initial treatment will be a pre-commercial thin of the stands targeting areas of high reproduction and any stems infected with dwarf mistletoe. This treatment will be conducted by hand crews utilizing chainsaws. The second entry treatment method will be mechanized harvest using conventional tractor harvesting systems followed by prescribed fire treatments. The primary forest product will be biomass (wood chips) that will be yarded from the stand and processed at a landing. Approximately one mile of new temporary roads and 20 landings (totaling no more than 8 acres) will be constructed within the project area.

Part II. Clearance Findings/Section 7 Consultation Recommendations
This section is based on conclusions from the reverse side of this form.

__X_ Full Clearance – To the best of my knowledge, this project will not adversely impact any special status plant species or their habitat.

___ Conditional Clearance – Special status plant species may exist within the area of impact of this project; further investigation is necessary and will be done prior to (date).

___ Conditional Clearance – Special status plant species do occur within the area of impact; project medication or delineation of an avoidance area is recommended. See the Biological Evaluation.

___ Negative Clearance – To the best of my knowledge, this project is likely to adversely impact special status plant species or their habitat.

___ Section 7 Consultation/Conferencing with FWS is needed (federally listed or proposed species) or technical assistance from the FWS is recommended (federal candidate species).

Valda Lockie
Printed name of person conducting clearance

_____ _____
Signature Date

Part III. Species List and Biological Evaluation

Actions taken to assess the project area for presence of special status plants or their habitat:

CNPS database consulted: X **ELFO SSP Geodatabase consulted:** X

Consultant Report:

Physical examination of the area: ___X _ YES ___ NO

Dates examined: 7/23/2013-7/25/2013; 7/30/2013 **Time Spent:** 30 hours

Special Status Plants Occurrence:

___ Confirmed ___ Suspected ____List _ X__ None sighted

Dominant plant species or community types in the project area:

Species List attached: **__X_ YES** **_____ NO**
Attached to botany clearance file

__X__ Based upon the field exam, special status plants or their habitats **do not exist** within the project area.

___ Based upon the field exam, special status plants or their habitats **do exist** within the project area as listed in the previous section.

___ The field exam was conducted at an inappropriate season (see discussion below).

___ A field exam was not conducted (see discussion below).

Plant lists for units 1,2,3,4 and 5 are attached below.

Little Cleghorn
North Unit 1

Scientific Name	**Common Name**
FORBS	
Achillea millefolium	*c*ommon yarrow
Agoseris ssp.	false dandelion
Agoseris grandiflora	shortbeak agoseris
Allium spp.	wild onion
Amsinckia ssp.	fiddleneck
Antennaria rosea	rosy everlasting
Arabis sparsiflora	sicklepod rockcress
Arnica sororia	twin arnica
Astragalus ssp.	vetch
Astragalus curvicarpus	curvepod milkvetch
Balsamorhiza hookerii	Hooker's balsamroot
Brassica ssp.	Mustard
Calochortus macrocarpus	Mariposa lily
Castilleja spp.	Desert paintbrush
Ceratocephala testiculata	Bur buttercup
Chaenactis douglasii	chaenactis
Cirsium cymosum	Peregrine thistle
Crepis acuminata	tapertip hawksbeard
Epilobium spp.	willoweed
Erigeron ssp.	fleabane
Eriogonum cespitosum	mat buckwheat
Eriogonum ovalifolium	cushion buckwheat
Eriogonum umbellatum var nevandense	Nevada sulfur buckwheat
Gilia inconspica	shy gilia
Hesperolinon micranthum	dwarf flax
Lomatium dissectum	fernleaf biscuitroot
Lomatium triternatum	nineleaf biscuitroot
Lupinus spp.	lupine

Mentzelia albicaulis	white-stemmed stick-leaf
Monardella odoratissima	Pacific monardella
Monardella villosa	coyote mint
Navarretia intertexta ssp. propinqua	needle leaf navarretia
Orthocarpus ssp.	owlsclover
Paeonia brownii	brown peony
Phlox hoodii	spiny phlox
Potentilla gracilis	slender cinquefoil
Senecio intergerrimus	lambstongue groundsel
Sidalcea glaucescens	waxy globemallow
Taraxacum officinale	common dandelion
Viola purpurea	goosefoot violet
Zygadenus venenosus	death camas

GRASSES

Achnatherum thurberianum	Thurber's needlegrass
Bromus tectorum	cheatgrass
Elymus elymoides ssp. californicus	bottlebrush squirreltail
Festuca idahoensis	Idaho fescue
Poa secunda var. secunda	Sandberg's bluegrass
Pseudoroegneria spicata	bluebunch wheatgrass

SHRUBS

Amelanchier utahensis	Utah serviceberry
Arctostaphylos patula	greenleaf manzanita
Artemisia arbuscula	low sagebrush
Artemisia tridentata var vaseyana	mountain big sagebrush
Ceanothus prostratus	mahala mat
Ceanothus velutinus var. velutinus	tobacco brush
Cercocarpus ledifolius	curlleaf mountain mahogany
Chrysothamnus viscidiflorus	yellow rabbitbrush
Eriogonum microthecum	Great Basin buckwheat
Prunus emarginata	bittercherry
Prushia tridentata var. tridentata	antelope bitterbrush
Ribes cereum var. cereum	wax currant
Ribes velutinum	desert gooseberry
Rosa woodsii var. ultramontana	Wood's rose
Symphoricarpos rotundifolius	snowberry
Wyethia mollis	wolly wyethia

TREES

Juniperus occidentalis var.occidentalis	western juniper
Pinus jeffreyi	Jeffery pine
Pinus ponderosa	ponderosa pine

MISCELLANEOUS
Fungi
Lichen

Unit 2

Scientific Name	**Common Name**
FORBS	
Achillea millefolium	common yarrow
Agoseris grandiflora	shortbeak agoseris
Alyssum desertorum	desert madwort
Antennaria rosea	rosy everlasting
Arabis sparsiflora	sicklepod rockcress
Arnica sororia	twin arnica
Astragalus flipies	threadstalk milkvetch
Balsamorhiza sagittata	Arrowleaf balsamroot
Calochortus macrocarpus	Mariposa lily
Crepis acuminata	tapertip hawksbeard
Erigeron divergens	spreading daisy
Eriogonum nudum var publiflorum	naked stem buckwheat
Eriogonum ovalifolium	cushion buckwheat
Erodium bothrys	longbeak stork's bill
Hesperolinon micranthum	dwarf flax
Lomatium dissectum	fernleaf biscuitroot
Lupinus spp.	lupine
Monardella odoratissima	Pacific monardella
Paeonia brownii	brown peony
Phlox ssp.	phlox
Solidago ssp.	goldenrod
Sphaeralcea ssp.	globemallow
Taraxacum officinale	common dandelion
GRASSES	
Achnatherum thurberianum	Thurber's needlegrass
Bromus tectorum	cheatgrass
Elymus elymoides ssp. californicus	bottlebrush squirreltail
Festuca idahoensis	Idaho fescue
Poa secunda var. secunda	Sandberg's bluegrass
Pseudoroegneria spicata	bluebunch wheatgrass
GRASSLIKES	
Carex ssp.	sedge
SHRUBS	
Arctostaphylos patula	greenleaf manzanita
Artemisia arbuscula	low sagebrush

Artemisia tridentata var vaseyana	mountain big sagebrush
Ceanothus prostratus	mahala mat
Ceanothus velutinus var. velutinus	tobacco brush
Cercocarpus ledifolius var. intermontanus	curlleaf mountain mahogany
Chrysothamnus nauseosus spp. washoeensis	Washoe rubber rabbitbrush
Chrysothamnus viscidiflorus	yellow rabbitbrush
Prunus emarginata	bittercherry
Ribes cereum var. cereum	wax currant
Ribes velutinum	desert gooseberry
Vaccinium parvifolium	red huckleberry
Wyethia mollis	wolly wyethia

TREES

Juniperus occidentalis var.occidentalis	western juniper
Pinus jeffreyi	Jeffery pine
Pseudotsuga menziesii	Douglas fir

MISCELLANEOUS
Moss
Lichen
Fungi
Mistletoe

Unit 3

Scientific Name	**Common Name**

FORBS

Achillea millefolium	*c*ommon yarrow
Agoseris ssp.	false dandelion
Alyssum desertorum	desert madwort
Brassica ssp.	Mustard
Epilobium spp.	willoweed
Erigeron ssp.	fleabane
Eriophyllum lanatum	wolly sunflower
Lomatium dissectum	fernleaf biscuitroot
Lupinus ssp.	lupine
Orobanche ssp.	broomrape
Phlox ssp.	phlox

GRASSES

Achnatherum thurberianum	Thurber's needlegrass
Bromus tectorum	cheatgrass
Elymus elymoides ssp. californicus	bottlebrush squirreltail
Festuca idahoensis	Idaho fescue
Pseudoroegneria spicata	bluebunch wheatgrass

GRASSLIKES	
Carex ssp.	sedge
SHRUBS	
Arctostaphylos patula	greenleaf manzanita
Artemisia tridentata var vaseyana	mountain big sagebrush
Chrysothamnus viscidiflorus	yellow rabbitbrush
Eriogonum microthecum	Great Basin buckwheat
Prushia tridentata var. tridentata	antelope bitterbrush
Tetradymia glabrata	littleleaf horsebrush
TREES	
Juniperus occidentalis var.occidentalis	western juniper
Pinus jeffreyi	Jeffery pine
Pseudotsuga menziesii	Douglas fir
MISCELLANEOUS	
Fungi	
Lichen	
Mistletoe	

Unit 4

Scientific Name	**Common Name**
FORBS	
Achillea millefolium	*c*ommon yarrow
Agoseris ssp.	false dandelion
Allium ssp.	wild onion
Alyssum desertorum	desert madwort
Antennaria ssp.	pussytoes
Astragalus ssp.	vetch
Blepharipappus scaber	eyelash plant
Brassica ssp.	Mustard
Calochortus macrocarpus	Mariposa lily
Cryptantha intermedia	common cryptantha
Epilobium spp.	willoweed
Erigeron ssp.	fleabane
Erigonum ssp.	Buckwheat
Eriogonum ovalifolium	cushion buckwheat
Eriophyllum lanatum	wolly sunflower
Lomatium dissectum	fernleaf biscuitroot
Lomatium triternatum	nineleaf biscuitroot
Lupinus ssp.	lupine
Phlox ssp.	phlox
Rumex crispus	curly dock

Rumex salicifolius	willow dock
Taraxacum officinale	common dandelion
GRASSES	
Elymus elymoides ssp. californicus	bottlebrush squirreltail
Bromus tectorum	cheatgrass
Festuca idahoensis	Idaho fescue
Poa secunda var. secunda	Sandberg's bluegrass
SHRUBS	
Artemisia nova	black sagebrush
Artemisia tridentata var vaseyana	mountain big sagebrush
Cercocarpus ledifolius	curlleaf mountain mahogany
Chrysothamnus viscidiflorus	yellow rabbitbrush
Ribes velutinum	desert gooseberry
Symphoricarpos rotundifolius	snowberry
Tetradymia glabrata	littleleaf horsebrush
TREES	
Juniperus occidentalis var.occidentalis	western juniper
Pinus jeffreyi	Jeffery pine
Pseudotsuga menziesii	Douglas fir
MISCELLANEOUS	
Lichen	

Unit 5

Scientific Name	**Common Name**
FORBS	
Achillea millefolium	common yarrow
Agoseris ssp.	false dandelion
Alyssum desertorum	desert madwort
Antennaria ssp.	pussytoes
Arabis sparsiflora	sicklepod rockcress
Astragalus ssp.	vetch
Blepharipappus scaber	eyelash plant
Brassica ssp.	mustard
Calochortus macrocarpus	Mariposa lily
Castilleja ssp.	desert paintbrush
Collinsia parvaflora	Blue eyed Mary
Cryptantha intermedia	common cryptantha
Dieteria canescens var. canescens	hoary Aster
Epilobium spp.	willoweed
Erigeron ssp.	fleabane
Erigonum ssp.	Buckwheat

Eriogonum umbellatum var nevandense	Nevada sulfur buckwheat
Eriophyllum lanatum	*wolly sunflower*
Lomatium dissectum	fernleaf biscuitroot
Lupinus ssp.	lupine
Monardella villosa	coyote mint
Orobanche ssp.	broomrape
Phacelia heterophylla	weed phacelia
Phlox ssp.	phlox
Sidalcea glaucescens	waxy globemallow
Taraxacum officinale	common dandelion
Tragopogon dubius	yellow salsify

GRASSES

Achnatherum thurberianum	Thurber's needlegrass
Bromus tectorum	cheatgrass
Elymus elymoides ssp. californicus	bottlebrush squirreltail
Festuca idahoensis	Idaho fescue
Poa secunda var. secunda	Sandberg's bluegrass
Pseudoroegneria spicata	bluebunch wheatgrass

SHRUBS

Amelanchier utahensis	Utah serviceberry
Arctostaphylos patula	greenleaf manzanita
Artemisia arbuscula	low sagebrush
Artemisia nova	black sagebrush
Artemisia tridentate var. wyomingensis	Wyoming big sagebrush
Ceanothus prostratus	mahala mat
Chrysothamnus viscidiflorus	yellow rabbitbrush
Eriogonum ssp.	buckwheat
Pleiacanthus spinosus	skeletonweed
Prushia tridentata var. tridentata	antelope bitterbrush
Ribes cereum var. cereum	wax currant
Symphoricarpos rotundifolius	snowberry
Tetradymia canescens	gray horsebrush
Wyethia mollis	wolly wyethia

TREES

Juniperus occidentalis var.occidentalis	western juniper
Pinus jeffreyi	Jeffery pine
Pseudotsuga menziesii	Douglas fir

MISCELLANEOUS
Lichen