United States
Department of
Agriculture

Forest
Service

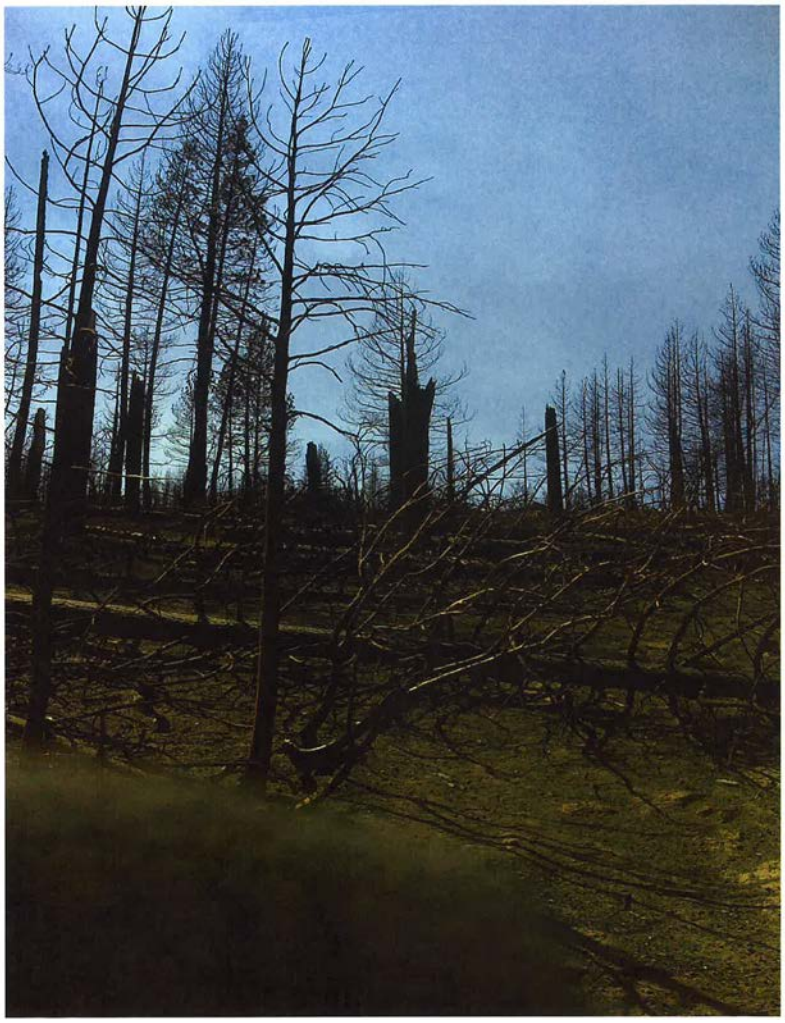
Pacific
Southwest
Region

April 28, 2015

Environmental Assessment for the

Bald Fire Salvage and Restoration Project

Lassen National Forest
Hat Creek Ranger District
Lassen & Shasta County, California



Source: Bald Project area

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Chapter 1: Purpose, Need, and Proposed Action

Introduction

The Forest Service is proposing to take management action in response to the conditions created by the Bald Fire, which burned approximately 31,324 acres of National Forest System (NFS) lands on the Hat Creek Ranger District of the Lassen National Forest (LNF) from July through September 2014. Post-fire management opportunities are generally focused in areas that experienced moderately high to very high vegetation burn severity effects (recognizing the mosaic pattern of vegetation burn severities). Removal of hazard trees is the first priority to insure the safety of the public and Forest Service (FS) personnel within the footprint of the fire. Salvage logging would be the first step in the process to capture the economic value of hazard trees and dead trees, which pays for their removal from the forest and potentially for other future restoration treatments.

The Lassen National Forest is requesting an Emergency Situation Determination (ESD) for the actions proposed for the Bald Fire Salvage and Restoration Project (Bald Project). If granted, an ESD would allow hazard tree removal and salvage harvesting under the Bald Project to begin in early July 2015. Local timber industry representatives have expressed interest in the project provided salvage harvest and hazard tree removal operations can be completed by the end of the 2015 field season. In addition, implementing the project in 2015 would result in the lowest economic loss to the government, thereby allowing the Forest Service to effectively conduct the restoration work (such as tree planting) associated with removing the burned timber. A portion of the value from the timber sales would be used to fund the proposed reforestation work. Finally, implementation of the Project in 2015 would address hazards to human health and safety within the project area at the start of the summer season, when this area receives its highest levels of human use.

Project Location

The Bald Project is located approximately 14 miles southeast of Fall River Mills, California. The legal location for the Bald Project includes portions of Township (T) 34 North (N), Range (R) 5 East (E), Section 1; R6E, Sections 1-18, 20-23, and 27; R7E, Sections 5-7, and 18; T35N, R5E, Sections 11-15, 22-26 and 35-36; R6E, Sections 7-36; R7E, Sections 18-20 and 30-31; T36N, R5E, Sections 25-27 and 33-36; R6E, Sections 16, 19-22, and 26-35, in Shasta and Lassen Counties, California. (Figure 1) shows the general location of the Bald Project Area relative to the Lassen National Forest boundaries and nearby communities. There are approximately 8,500 acres of Bureau of Land Management (BLM), State, and privately owned land within the Project Area.

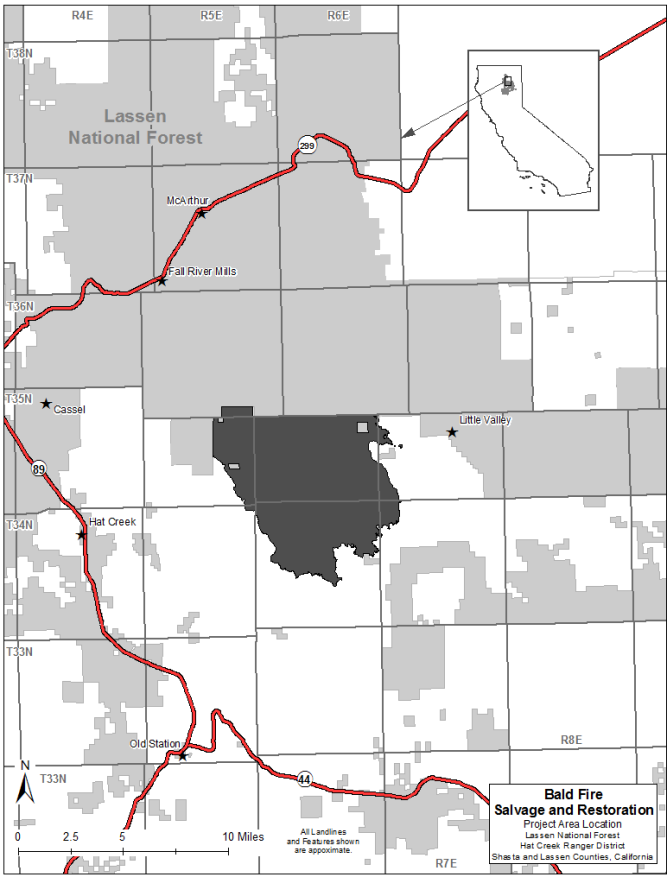


Figure 1 – Project Vicinity

Background

The Bald Fire was started by lightning on July 30, 2014 and burned a total of 39,832 acres before being controlled on September 15, 2014. Of the total acreage, 31.324 were on NFS lands. Burn severity varied across the landscape, leaving areas with complete tree mortality while other areas still support a green tree component. Table 1 summarizes the percent of the acres burned by the fire and the level of basal area tree mortality on NFS lands.

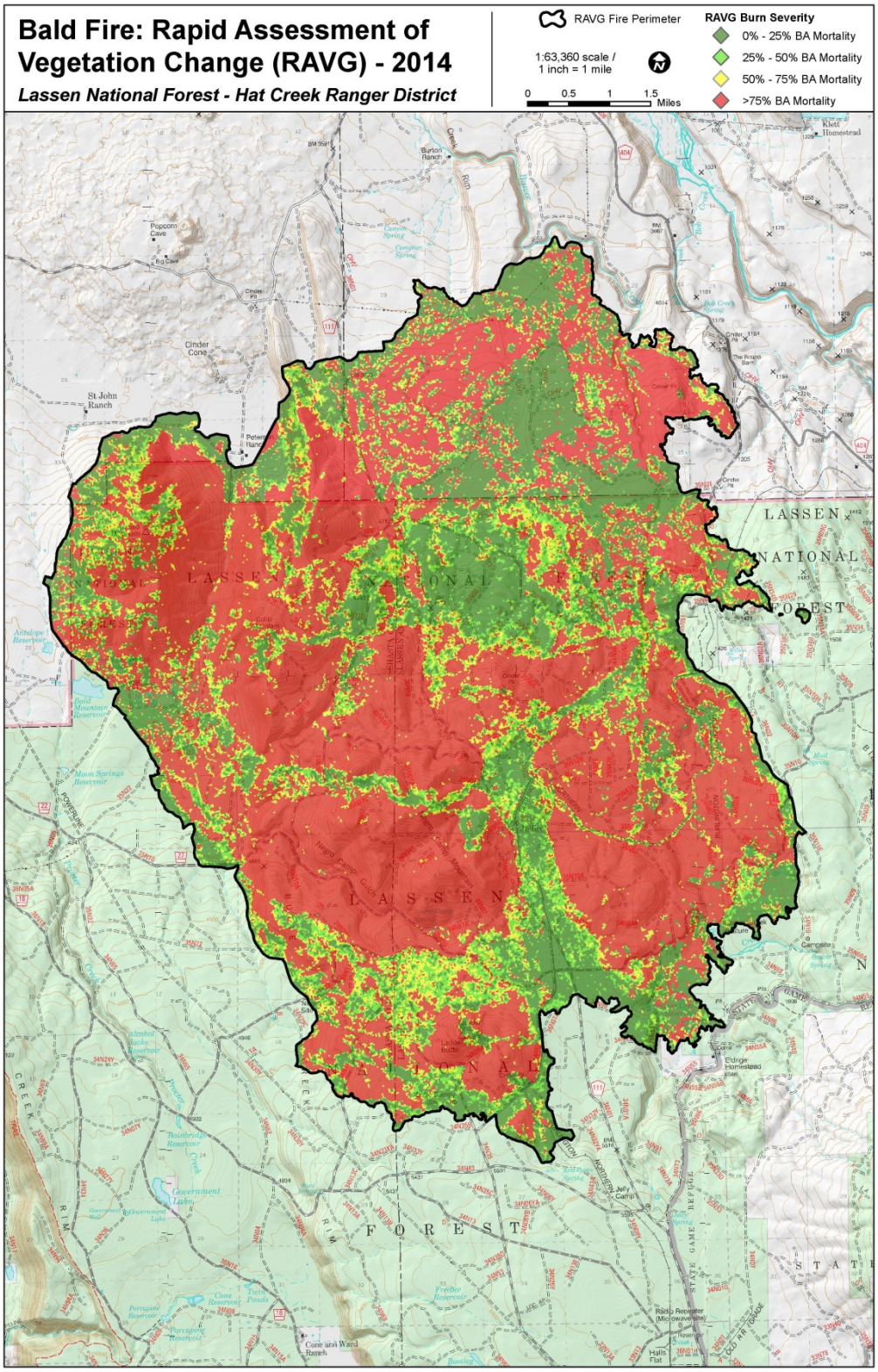
Table 1 – Bald Fire Area Percent Burn Severity on NFS Lands

	Severity - Percent Basal area tree mortality		
	Low-Moderate (< 50%)	Moderately High (50% to 75%)	Very High (> 75%)
Percent of Fire Area	34%	10%	56%

Source: Based upon data received from the Remote Sensing Applications Center (RSAC) at Salt Lake City, Utah[1]

[1] The Remote Sensing Application Center (RSAC) produces a suite of products using the Rapid Assessment of Vegetation Condition after Wildfire (RAVG) process following containment of a wildfire that burns 1,000 acres or more of forested National Forest System land. The LNF obtained the geographic information system (GIS) information from htp://fsweb.rsac.fs.fed.us/RAVG/Region5/2014/Bald

Figure 2: Fire Severity



Purpose and Need for Action

The purpose of the Bald Project is to immediately reduce numerous safety hazards caused by the Bald Fire, capture the limited remaining forest product economic value, reduce fuel loads, adequately prepare sites for regeneration, reduce future loadings that create conditions prime for devastating re-burns, and quickly reforest suitable portions of the landscape deforested by the Bald Fire before these sites become fully occupied by competing vegetation. Reforestation would expedite the beneficial re-establishment of a forested landscape capable of producing a variety of wood products, wildlife habitat, and ecological services. Delaying any of these treatments dramatically increases risk to health and safety, decreases economic benefit, and increases the cost of restoration.

Management Direction

The Chief of the Forest Service and the Regional Forester stress safety of the public and our employees is our central concern. Within transportation corridors, hazard tree management is vital to everyone's safety.

Additionally, under the Multiple-Use Sustained-Yield Act of 1960, as amended (74 Stat. 215; 16 USC 528-531) and the Forest and Rangeland Renewable Resource Planning Act of 1974, as amended [88 Stat. 476; as amended by the National Forest Management Act of 1976 (16 USC 1600-1614)], the Forest Service is authorized to sell timber and reforest National Forest System lands.

The desired conditions for the project area are guided by the direction contained in the 1992 Lassen National Forest Land and Resource Management Plan (LRMP) and 1993 Record of Decision (ROD) as amended by the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) Final Supplemental Environmental Impact Statement (FSEIS) and Record of Decision (ROD), and the 2007 SNFP Management Indicator Species Amendment. These documents are herein referred to as the "Forest Plan". The Bald project is designed to be consistent with the desired conditions described in the Forest Plan.

The Forest Plan provides for ecosystem restoration following large, catastrophic disturbance events. Restoration activities may be conducted in all land allocations and include objectives for managing disturbed areas for long-term fuel profiles, restoring habitat, and recovering the economic value of some dead and dying trees. Restoration projects can include salvage of dead and dying trees for economic value as well as for fuels reduction (SNFPA ROD, pp. 4 and 6). Salvage harvesting within Riparian Conservation Areas are allowed when the activity is consistent with Riparian Conservation Objectives (SNFPA ROD, pp 64).

Forest Plan Standards and guidelines help managers to design post-disturbance restoration projects to reduce potential soil erosion and the loss of soil productivity caused by loss of vegetation and ground cover; protect and maintain wildlife habitat, manage development of fuel profiles over time, and recover the value of timber killed or severely injured by the disturbance (SNFPA ROD, p. 52).

The project area is located in the Ladder Management Area (MA5) as identified in the LRMP. Pertinent Forest Plan land allocations within the Bald Fire perimeter include northern goshawk protected activity centers (PACs), Riparian Conservation Areas (RCAs), General Forest, and Old Forest Emphasis Area.

Project Objectives

Reduce public safety hazards in high use areas including National Forest System roads

Removal of hazard trees2 within the fire-affected area is essential for providing safe access to the area for the visiting public as well as Forest Service employees, contractors and adjacent landowners. The National Forest System (NFS) roads in this area are heavily utilized by the public for travel and recreational uses including: hunting, fishing, hiking, camping, woodcutting, and sightseeing. In addition, these road systems are crucial to providing access to Forest Service employees as well as adjacent landowners for future land management in this area and possible future fire suppression activities. Any delay in removing these hazards would significantly increase the risk to those traveling and working in this area.

Recover the economic value of fire-killed trees

The economic timber value of fire-killed/fire injured trees is short lived and will continue to decline over time. Timely removal of these trees through harvest is necessary to remove fire caused safety hazards. If these dead trees are left on site, they will eventually fall increasing fuel loadings. As a result, future wildfires would burn hotter and would be more difficult to suppress. A managed salvage tree removal would mitigate safety hazards to work crews conducting fuels reduction, site preparation, tree planting, and follow-up tree release treatments.

Timing of implementation is critical to capture the window of opportunity for recouping enough value from the material removed to pay for its way out of the woods. Delaying for even one operating season would potentially diminish the economic value to a point of jeopardizing recovery of any economic value at all.

The communities of the Hat Creek Valley, Burney Basin, Little Valley, and Fall River Valley all reside in close proximity to the Bald project. These communities are supported by an active timber industry and wood products infrastructure. There are two active sawmills and one active cogeneration facility in Burney. A viable timber industry and wood products infrastructure greatly improve the ability to treat and manage forest vegetation in a cost-effective and efficient manner, while ensuring long-term local employment.

Reduce surface fuel load to levels, which facilitate site preparation for planting, minimize the difficulty of suppressing future wildfires, and protect forest resources

There is a need to prepare sites in a timely manner for reforestation and worker safety, as well as to reduce fuel loading to decrease the potential for and severity of a re-burn. Planting trees is an investment of both money and resources for the goal of reforesting a particular site. Planting trees within two years of the fire would reduce the likelihood of a site becoming dominated by shrubs and other competing vegetation.

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[2] A hazard tree (referred to as a danger tree in Forest Service Handbook 6709.11, Glossary) is defined as, “a standing tree that presents a hazard to people due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem, or limbs, and the direction and lean of the tree.”

The Bald Fire resulted in a reduction to near total elimination of surface and small understory (ladder) fuels. Changes in fuel loadings and stand composition will have varying effects, over time. In the short-term, changes in fuel loading and composition is expected to reduce wildfire intensities and rates of spread for several years. As the standing dead trees decay and fall to the ground, these areas would become occupied by a complex arrangement of fallen trees, broken tops and branches intermixed within an increasingly heavy shrub component. The longer-term effect of this condition would result in increased fuel loading and would limit the ability of firefighters to safely and effectively control future wildfires, particularly in strategic locations that could be used for future fire suppression actions.

Recent accounts from the Plumas National Forest during the Chips fire, which burned in the footprint of the old Storrie Fire, documented that untreated fuels in previously burned area presented wildfire control problems. Under these conditions, fire containment lines would need to be constructed far from the fire's edge where it would be safe and practical to do so. Increased soil heating from burning logs kills soil microorganisms, reduces soil productivity, reduces infiltration ability, and increases erosion. Failure to remove dead trees before they deteriorate could have severe consequences when the next wildfire occurs.

Several areas with aquatic features, including Beaver Creek, Sheep's Flat, and Negro Gulch Reservoir, were burned to varying intensities during the Bald Fire. In some areas, there is a need to treat the areas surrounding the aquatic features and/or riparian areas to reduce the continuity of fuels to decrease the risk of these areas burning at high severity in the future. There is also a need to treat these areas differently to minimize surface erosion and provide future opportunities for downed coarse woody material to enhance structural complexity in aquatic features.

Removing burned trees and fuels where tree mortality exceeds the needs for snag and log recruitment would move these areas towards meeting the desired fuels conditions and protecting multiple resources including soils and watersheds from future threats of high-intensity fires.

Implement reforestation including maintaining vegetative diversity

In order to safely implement reforestation activities, salvage harvest and fuels treatments must be accomplished. Delaying these first steps in the process decrease the likelihood of success and would increase the treatments required to restore a forested component. Without treatment, shrubs would dominate large areas within the burn perimeter. Snags left un-salvaged would create unsafe operating conditions for future treatments.

Approximately 16,000 timbered acres on NFS lands burned under moderate to high severity in uncharacteristically large patches. This resulted in a reduction of multiple forest cover types resulting in the loss of a variety of wildlife habitats and a range of forest products, as well as changing future fuel loads. These severely burned areas also resulted in a reduction of ground surface cover, negatively influencing both soil and watershed functions.

Due to the severity of the burn, most of the conifer seed sources were killed and seed for tree regeneration would need to come from the surrounding area. Due to the large patch size of the moderate to high severity burn areas, conifer re-establishment would be prolonged. Without reforestation, these patches

would shift towards a shrub-dominated community for several decades or more. Re-establishing native conifer cover quickly would minimize competition from brush and other vegetation and would accelerate long-term establishment of conifer forests that provide habitat for various plant and wildlife species. Understory vegetation, particularly manzanita, grasses and forbs would be expected to recover naturally.

Hardwoods including aspen, cottonwood, and oak are disturbance dependent, fire-resilient, shade-intolerant species. Hardwood communities increase landscape heterogeneity because they provide a deciduous forest type in a conifer dominated landscape. Hardwood communities offer additional species diversity in relation to birds, mammals, insects, and understory plants that provide forage and hiding cover for wildlife. There is a need to reduce fuel loads in these areas as well as protect and promote natural regeneration of these hardwoods within the project area.

Manage road infrastructure for project implementation

In order to meet the objectives of salvage, fuels reduction, and reforestation, road access is needed. The Bald Project proposes to use existing forest system roads wherever possible. To provide access to implement the proposed projects and for long-term management, some existing non-system roads would be used. In addition, temporary roads would be established to access portions of proposed treatments, and then decommissioned.

Public Involvement

The following list outlines the public involvement process for the Bald Project:

- The Rapid Assessment was presented and discussed with the Collaborative Forest Landscape Restoration Group (CFLR).
- The Rapid Assessment was presented and discussed with at the annual meeting with the American Forest Resource Council (AFRC).
- Tribal Consultation, meetings were held with the Pit River Tribe and the Susanville Indian Rancheria.
- An update on the project was presented at the local Cattleman's Association annual meeting. Consultation with affected permittees has been ongoing.
- Pre-Scoping News Releases were published with a brief description of the projects and project-lead contact information.

  Lassen County Times on December 9, 2014
  Inter-Mountain News on December 3, 2014
  Mountain Echo on December 16, 2014

The project was listed in the Lassen National Forest Schedule of Proposed Actions (SOPA) in January and April 2015.

Scoping

Scoping for this project was initiated on December 19, 2014. Scoping information packets were made available to the public. Letters were sent to adjacent landowners, range permittees, Shasta and Lassen

County Boards of Supervisors, the Lassen and Hat Creek Fire Safe Councils, the Central Valley Regional Water Quality Control Board, and the Natural Resource Conservation Service. The Pit River Tribe also received this information packet. The information was published on the Lassen web site.

Ten individuals/organizations responded in writing. All suggested changes to elements of the proposed action received from the public were considered. The analysis of the public comments is contained in the document titled "Bald Project Public Scoping Issue Analysis and Alternative Development" (located in the Bald Project Record, HCRD office).

Issues Analysis and Alternative Development

The Forest Service considered all potential issues (point of discussion, debate, or dispute). Non-issues were defined as : 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Code of Federal Regulations (40 CFR Part 1501.7(3)) of The Council on Environmental Quality's (CEQ) NEPA regulations requires us to: "Identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review…"

Alternatives suggested during the scoping process were also considered. Alternatives not considered in detail may include, but are not limited to, those that fail to meet the purpose and need, are technologically infeasible or illegal, or would result in unreasonable environmental harm. Descriptions of alternatives considered from scoping and the reasons for their elimination from detailed study are contained in the document titled Bald Project Public Scoping Issue Analysis and Alternative Development (Bald Project Record).

Alternatives Considered in Detail

Three alternatives: Alternative 1 - Proposed Action, Alternative 2 - No Action, and Alternative 3 - Road Hazard Only are described in detail in Chapter 2

Decision Framework

The Lassen National Forest Supervisor is the Responsible Official for this project proposal. The Forest Supervisor will decide whether to approve the proposed action, approve a modification to the proposed action, or take no action related to this proposal.

The decision will include a non-significant Forest Plan Amendment (FPA) for a deviation from the current LNF LRMP Standards and Guidelines for project implementation in watersheds that are over Threshold of Concern (TOC). Due to impacts associated with the Bald Fire, several watersheds in the project area are over threshold. A non-significant, site specific FPA would be necessary to meet management direction and permit project actions to occur.

Chapter 2: Alternatives

This chapter describes and compares the alternatives. This chapter also details the design features and management requirements. The intent of these features and requirements is to protect resources and ensure that the Action Alternatives are consistent with the Forest Plan standards and guidelines. Design features that would be implemented are considered part of the proposed actions. Finally, this Chapter displays the alternatives in comparative form, defining the differences between them and providing a basis for a choice among the options by the Responsible Official.

Alternative 1 - Proposed Action

The proposed action was developed to accomplish the purpose and need for the Bald Project by evaluating existing vegetation conditions, fire burn patterns and intensities, and land allocations within the fire perimeter. Preliminary estimates of treatment acres were based on the Bald Fire Rapid Assessment. These acreages have been adjusted since original scoping based on analysis for wildlife habitat needs, considerations for riparian area and aquatic feature protection, and archeological sites. Additional pockets of merchantable timber (commercial salvage) have been identified in areas initially designated for fuels treatment. Areas identified for commercial salvage would also receive follow-up fuels treatments if needed to meet desired fuel loading: these may include mechanical, hand, and prescribed fire[3] treatments.

Large and medium patches of existing burned forest habitat interspersed throughout the burned area would be left untreated under the proposed action to allow for natural recovery.

To provide for snags and down woody debris across the treatment areas, retention islands would designated in all treatment units except road hazard removal units. Retention islands would consist of small-untreated patches within the boundary of treatment units that range in size commonly between two to five acres, and would comprise 20 percent of the acres within each unit. Retention islands would be distributed across the unit to provide a variety of burned conditions representative of those present in the unit prior to treatment.

Snag retention differs in the riparian conservation area (RCA) land allocation to provide for future coarse woody recruitment that would provide aquatic habitat structural diversity and hydrologic function such as sediment routing. No treatment would occur with the RCA of the Beaver Creek mainstem with the exception of limited hand treatments of fuels within one sensitive area, hazard tree felling adjacent to fences that requires repair, and possibly small patches of site prep prior to planting riparian vegetation (if monitoring deems artificial regeneration necessary). Within the RCA of the tributaries to Beaver Creek, other ephemeral and intermittent drainages within the project area, and the special aquatic features at Sheep Flat and Negro Gulch integrated design features would be implemented. No treatments are proposed around Willow, Coble, and Gibbs Springs.

[3] Prescribed fire is an inclusive term that refers to underburning, broadcast burning, and pile burning. All burning would be completed within prescription as well as in accordance with all State and County regulations.

Treatments proposed under Alternative 1 include hazard tree removal, area salvage, area fuels treatments, and planting only treatments (Table 2). Treatments would use a combination of mechanical, hand, and prescribed fire. All acres unless specifically noted were analyzed for mechanical equipment. All acres proposed for treatment would also be analyzed for planting.

Table 2 - Proposed treatment and estimated acres in the Bald Project

Alternative 1	Estimated Acres	Percent of Project
Hazard Tree Removal	4,815	15%
Area Salvage	3,632	12%
Area Fuels	5,499	18%
Reforestation Only	417	1%
Total proposed for treatment	14,363	46%
Natural Recovery	16,961	54%

Source: GIS ELRD

Hazard Tree Removal

Hazard trees within approximately 150 feet along maintenance level (ML) 2 or higher roads within the fire-affected4 area would be felled and removed. Hazardous trees along the Burlington Northern Santa Fe railroad easement would also be felled. Depending on access, these trees would be removed or left in place.

Hazard tree marking guidelines would be based upon both the fire-injured tree marking guidelines and the hazard tree marking guidelines developed by Region 5 Forest Health Protection. The objectives of these guidelines are to: 1) remove those trees that are dead or have a high probability of mortality due to fire-injury or that have structural defects that indicate high failure potential to abate potential hazards to visitors and improve safety and access and 2) retain those trees that would likely survive to maintain visual quality, wildlife habitat and recreational values. This balance aims to retain healthy forested conditions while providing for safety and access to the area. The marking guides for hazard tree removal would be based on a probability of mortality of 60 percent (Pm-0.6).

Sub-merchantable trees and non-merchantable hazard trees would be felled and left in place, or piled and the piles burned, depending upon the amount of surface fuel loading present.

[4] In addition to roads, and the railway within the fire perimeter; incidental hazards along the perimeter roads would be treated

Area Salvage Harvesting

Fire-killed and fire-injured trees within the Bald Fire perimeter would be harvested. Merchantable trees would be removed as sawlogs if operations occur before the wood deteriorates. Non-merchantable trees would be removed as biomass, masticated, felled and lopped, machine piled and burned or broadcast burned to meet desired fuel conditions.

Fire salvage marking guidelines to be used are based upon the fire-injured tree marking guidelines developed by Region 5 Forest Health Protection5. The marking guides for area salvage would be based on a probability of mortality of 70 percent (Pm-0.7). The objectives of these guidelines are to balance the need remove hazardous trees to allow for safety in accessing national forest lands and retain the healthier trees for other resource needs

The salvage harvest operations would utilize ground-based, mechanical harvesting to remove fire-killed and fire-injured trees from treatment areas on slopes 35 percent or less. Activity-generated fuels would be masticated, broadcast burned, piled mechanically or by hand, and the piles burned. On slopes greater than 35 percent, hand felling would be used to create openings for artificial regeneration and activity fuels would be hand treated

Area Fuel Treatments

In areas that burned at moderate and high severity and where timber does not meet merchantability standards; hazard abatement, fuels reduction, and site preparation for reforestation would be accomplished by biomass removal, mastication, felling and lopping, machine piling and burning, or broadcast burning. Ground based mechanical harvesting would be used areas on slopes 35 percent or less. On slopes greater than 35 percent, only hand operations would be allowed. In all areas, trees designated for removal would use the same guidelines as discussed above under Area Salvage. Activity-generated fuels would be broadcast burned or piled mechanically or by hand, and piles burned.

Reforestation

Reforestation would occur on approximately 12,200 [6]acres within the project area. This includes the areas proposed for salvage and fuels treatments and an additional 417 acres that would be “reforestation only. Prior to planting, concentrations of activity-generated fuels and sub-merchantable trees would be removed to facilitate reforestation, help protect planted trees once they become established, and reduce the risk of a possible re-burn.

Site preparation would include a variety of treatment methods that include machine or hand cutting and piling followed by pile burning, mastication of fire killed shrub stems and/or broadcast. In addition, sprouting shrubs and vegetation may need to be treated adjacent to planted trees to reduce competition for site resources in order to assure establishment. This may be done through manual or mechanical cutting methods such as grubbing, mastication, or use of brush cutters. Ripping may be done prior to planting.

[5] Report #RO-011-01, Smith and Cluck, May 2011 developed by Region 5 Forest Health Protection.
[6] Roadside hazard units within natural recovery areas would not be planted.

Reforestation would need to occur within two years to increase the probability of survival of the planted trees with the competing brush.

Tree planting strategies would be implemented to comply with Region 5 Stocking Guidelines over time. These guidelines define future minimum and recommended stocking levels by forest type and site class, ranging from 75 to 300 trees per acre. Lower quality sites would have lower stocking levels than higher quality sites, contributing to a heterogeneous forest structure across the landscape. Planted tree species would represent the historical tree community for each site. This mixture of tree species would include Jeffrey, ponderosa, or sugar pines, as well as Douglas fir, and incense cedar. Only native tree species grown from locally adapted seed sources would be planted.

Planting strategies proposed for reforestation include conventional planting, founder stands, cluster planting, and natural regeneration. Reforestation strategies are based upon the primary objectives for the landbase. On the T (timber emphasis) and K (timber emphasis on rocky ground) designated management prescriptions, the objective would be to create conditions of a fully stocked stand. On A and B (range-wildlife emphasis) designated management prescriptions the growth and production of timber is a lesser objective. Reforestation objectives on A and B areas would be to maintain a tree component on the landscape. Natural regeneration is a reforestation strategy that would be used in areas where live trees remain on site or in the adjacent areas, areas dominated by montane chaparral, juniper, or are economically or technically infeasible, and in retention islands.

Reforestation strategies include considerations for vegetative diversity where it exists within the project area. Since no reforestation would occur in retention areas, once the snags fall, these areas would temporarily function as openings within a re-forested conifer-dominated landscape. Hardwood trees would be encouraged and promoted.

In conifer plantations, survival examinations would occur at one year and three years after planting. Seedling survival would be assessed to determine if competing vegetation might need to be treated. The proposed action includes at least one release treatment using manual or mechanical methods such as hand grubbing, mastication, or brush cutting to control competing vegetation within one to three years and a second treatment conducted within two to five years of planting. Planted sites would be certified of establishment five years after planting. Animal control actions such as protective barriers or trapping may be used.

Managing Road Infrastructure

Where possible, the existing forest transportation system roads would be used to provide access to proposed treatment areas. Road maintenance, including surface protection and erosion control, would be performed on portions of system roads as needed for project implementation. A dust abatement plan would be included to control wind-caused erosion from road use. National Forest System roads and non-paved county roads used for haul would receive pre-, during-, and post-haul maintenance.

Approximately 2.2 miles of non-system roads within the project area would be needed for project implementation (salvage, fuel treatments, and reforestation) and long-term future management. These

non-system roads would be added to the Forest transportation system as maintenance level 2 roads. Up to one mile of temporary road may be constructed to access proposed treatment areas. Following project implementation, these roads would be decommissioned.

All water sources proposed for use in this project for dust abatement meet best management practice (BMP) standards. The following water sources would be used for dust abatement:

- Halls Flat (T33N R6E, N ½ sec. 1)
- Bidwell Pond (T34N R4E, S ½ sec. 1)

Alternative 2 – No Action

Under the No Action alternative, none of the activities proposed under Alternative 1 would be implemented. The No Action alternative would not preclude activities already approved in this area or activities planned as separate projects. No fuels treatments, site preparation, or reforestation would occur. Current management practices such as road maintenance and fire suppression would continue.

Hazard tree felling could occur along roads currently open to the public as part of road maintenance as per LRMP direction. These hazard trees would be felled and left in place.

Alternative 3 – Road Hazard Only

To respond to concerns raised during public scoping, the Responsible Official has proposed limiting treatment to hazard tree removal (along approximately 129 miles of NFS roads and approximately 10 miles of the Burlington Northern Santa Fe railway). Commercial sized hazards would be felled and removed along ML2 and higher roads. Sub-merchantable hazards would be felled and left in place or piled and burned. No other site preparation or reforestation would occur along these roads. No other management activities (besides those previously authorized) would occur. The total footprint of treatments on national forest lands under Alternative 3 would be approximately 4,736 acres. Existing roads used under this alternative would be repaired and maintained.

Integrated Design Features – Alternative 1 and 3

The following are resource protection measures that are incorporated as part of the Action Alternatives for the project. The following IDFs would be in addition to standards and guidelines from the Forest Plan, as amended. California Best Management Practices (BMP) would be implemented for the entire project. CA BMPs are described in Water Quality Management for Forest System Lands in California, Best Management Practices (2011). They are implementation parameters that would be incorporated into treatments, contracts, or used to guide Forest Service personnel in conducting implementation.

Table 3 - Integrated Design Features (IDFs)

IDF	Requirement	Alternative	
Air Quality		**1**	**3**
1.	A dust abatement plan would be developed and implemented. Fugitive dust would be controlled where logging and vegetation management activities with rubber-tired vehicles are operating on haul routes. Water for dust abatement would be trucked-in. A dust palliative may be approved which could include magnesium chloride, calcium chloride, lignin sulfate, or an approved equal. Dust palliatives would not be used within 25 feet of water bodies and seasonal wetlands. Dust palliatives would be stored and mixed outside of RCAs.	x	x
Threatened, Endangered, Forest Service Sensitive (TES) and Special Interest Plant Species		**1**	**3**
2.	All known occurrences of *Eriastrum tracyi, Hackelia cusickii, Limnanthes floccosa ssp. floccosa, Mimulus pygmaeus*, and *Thermopsis californica var. argentata* (with the exception of LNF occurrences #10 and #29) and low sagebrush plant communities would be protected from project activities through flag-and-avoid methods.	x	x
3.	The *Eriastrum tracyi* occurrence along road 35N14 located within T35N R6E section 32, in the vicinity of Coble Spring, would not be bladed or scraped during pre-haul maintenance or during project implementation activities.	x	x
4.	Tree planting would not occur within 25 feet of all known occurrences of TES, Special Interest plant species or low sagebrush plant communities (with the exception of *Astragalus inversus*, for which no planting buffers would be required).	x	
5.	New occurrences of TES and Special Interest plant species discovered before or during ground-disturbing activities would be protected from project activities through flag-and-avoid methods and no tree planting would occur within 25 feet of these occurrences (with the exception of *Astragalus inversus*, for which no special protections would be required).	x	x
Invasive Plants		**1**	**3**
6.	Staging of equipment would be done in weed free areas.	x	x
7.	Known invasive plant infestations would be identified, flagged where possible, and mapped for this project. Locations would be displayed on contract maps. Identified invasive plant sites within or adjacent to the project area containing isolated patches with small plant numbers would be treated (hand pulled or dug) by forest botany staff prior to project implementation. Any larger or unpullable infestations would be avoided by harvesting equipment, or equipment used would be washed on site before leaving the infested area and entering un-infested areas to prevent spreading invasive plants within the project area.	x	x
8.	New small infestations identified during project implementation would be evaluated and treated according to the species present and project constraints and avoided by project activities. If larger infestations are identified during implementation, they would be isolated and avoided by equipment, or equipment used would be washed on site before leaving the infested area and entering un-infested areas.	x	x
9.	Hazard trees would be hand felled and left in place where they occur within invasive plant infestations.	x	x
10.	Post-project monitoring for implementation and effectiveness of invasive plant treatments and control of new infestations would be conducted as soon as possible and for a period of multiple years following project completion.	x	x

11.	If project implementation calls for mulches or fill, they would be certified weed-free. Seed mixes used for re-vegetation of disturbed sites would consist of locally adapted native plant materials to the extent practicable.	x	x
Cultural Resources		**1**	**3**
12.	Class I (eligible properties) and Class II (potentially eligible properties) historic properties within or adjacent to treatment areas, activity areas (i.e., landings, water sources etc.) or access roads would have their boundaries flagged and tagged as non-entry zones for all project activities. No project-related activities shall occur within site boundaries.	x	x
13.	Class I and Class II historic properties located within the project area but not in close proximity to identified treatment areas shall be protected from indirect project impacts such as use of sites for staging equipment or vehicles (i.e., timber harvest equipment; water trucks; road construction, reconstruction or maintenance equipment; Forest Service vehicles etc.) or any other activities. Forest Service project manager would be apprised of all site locations to insure protection from direct as well as indirect effects; permanent tags shall define the site boundary.	x	x
14.	Linear sites such as historic roads, ditches, or communication lines may be crossed on a limited basis in previously disturbed areas. All crossings would be made perpendicular to the site, and the site would be returned to its original design at project completion. All crossings would be designated by heritage personnel.	x	x
15.	Hauling on NFS roads that bisect historic properties would continue. Vehicles and equipment using these roads must stay on the road prism in areas that bisect historic properties. New road construction, reconstruction, decommissioning, or modification of the existing prism within site boundaries would not occur without additional review and/or consultation.	x	x
16.	Forest system spur roads and non-system roads that bisect archaeological sites shall not be used except under the following circumstances: heritage properties have been evaluated and determined ineligible for the NHRP or protective material is placed on roadbed in sufficient quantity to protect surface of site from disturbance.	x	x
17.	Hand piles would not be constructed or burned within the boundaries of historic properties unless locations (e.g., a previously disturbed area) have been specifically approved by the Historic Program Managers (HPM) or qualified Heritage Program staff.	x	x
18.	Felling and removal of hazard trees within historic properties may occur under the following conditions: a) Trees may be limbed or topped to prevent soil gouging during felling; b) Felled trees may be removed using only the following techniques: hand bucking, including use of chain saws, and hand carrying, rubber tired loader, crane/self-loader, helicopter, or other non-disturbing, HPM-approved methods; c) Equipment operators shall be briefed on the need to reduce ground disturbances (e.g., minimizing turns); d) No skidding or tracked equipment shall be allowed within historic property boundaries.	x	x
19.	Tree planting by hand following a wildfire may occur within a historic property when a low impact method is used (e.g., planting bar; no mechanical auger), and where heritage personnel have determined that such activities would not affect the integrity of historic properties.	x	
20.	If cultural resources are identified during project implementation (unanticipated discovery) all work would cease immediately in that area until the situation is reviewed and an assessment and mitigation plan instituted to insure protection of the site.	x	

Fuels		**1**	**3**
21.	Fire lines would be constructed for prescribed fire operations, except where existing roads, skid trails, or natural barriers would serve as control lines. Hand lines would not be constructed within RCAs and wet meadow areas where graminoid and forb indicator species of a wet site are present.	x	
22.	Pile burning and ignition for underburning would not occur within 25 feet of low sagebrush plant communities or dry meadow areas; or where graminoid and forb indicator species of a wet site are present; however, low intensity fire would be allowed to back into portions of these areas.	x	x
23.	Post treatment, activity generated fuels would be treated to reduced fuel loading to five to seven tons per acre.	x	x
Range		**1**	**3**
24.	Livestock grazing would be deferred within the fire perimeter until desired vegetative conditions are established. Desired vegetative conditions means all rangelands are in satisfactory or better ecological condition with stable or upward trends	x	x
25.	Fences damaged during the fire and necessary to control cattle from entering the fire perimeter would be repaired prior to returning grazing animals to the allotments.	x	x
26.	Exclosure fences damaged during the fire would be repaired prior to livestock returning to the allotments.	x	x
Recreation and Visual Quality		**1**	**3**
27.	The Lassen Backcountry Byway would be protected during operations a) Informational signs posted in advance of project implementation. b) Cut tree marking would be applied within 150 feet of the Byway in areas where residual green trees are greater than 50 percent. c) Operations-created slash within 50 feet of the Byway, would be piled, and piles burned or removed within one-year post treatment. In areas where residual green trees are greater than fifty percent, piles would be located a minimum of 50 feet from the edge of the Byway d) In salvage units, trees removed within 50 feet on either side of the Byway would leave a maximum eight-inch stump. e) Equipment crossings of the Byway would be limited to designated crossings. The trail tread would be restored at crossings.	x	x
28.	Within areas with the recreational opportunity spectrum (ROS) designation of semi-primitive, non-motorized (SPNM), impacts of mechanical treatment would be minimized.	x	x
29.	In areas of high recreational use, some vegetation, where available, would be left along the edge of trails and roads. Residual vegetation can act as a visual barrier to discourage future unauthorized routes.	x	x
Riparian Conservation Areas		**1**	**3**
Table 4 identifies the waterbodies and features specific to the Bald Fire Salvage project area and RCA widths allocated along these areas in accordance with the 2004 SNFPA ROD			

Table 4 - RCA Widths		
RCA Type	**RCA Width**	**Project Feature**
Perennial Streams	300 feet (each side of stream), measured from bank- full edge of stream	Beaver Creek
Seasonally Flowing Streams (includes ephemerals with defined stream channel and evidence of scour)	150 feet (each side of stream), measured from bank- full edge of stream	Scattered throughout the project area
Streams in Inner Gorge (slopes > 70% gradient)	The top of the inner gorge	Beaver Creek Gorge
Special Aquatic Features (includes wet meadows, wetlands, and springs)	300 feet from edge of feature or riparian vegetation, whichever width is greater	Scattered in the project area including Sheep Flat, Beaver Creek Wetlands, Gibbs Spring, Negro Camp Spring, Coble Spring, etc.

30.	Treatments are proposed within the RCAs. Table 5 lists the site-specific design features (*Roadside hazard tree removal is exempt from these design features)	**x**	

Table 5 - Site-specific Design Features and Snag Retention Guidelines*		
Project Water Feature	**Site-specific Design Features**	**Snag Retention w/in the RCA**
Main stem of Beaver Creek	No treatment would occur within the RCA (as defined in Table 4) with the exception of limited hand treatments of fuels in a sensitive area (approx.14 acres) , the area adjacent to fences that requires repair and possibly small patches of site prep prior to planting native riparian vegetation (if monitoring deems artificial regeneration necessary)	No additional requirements
Tributaries to Beaver Creek	No treatment would occur within the inner 25 feet of the RCA	Retain 8-10 snags per 100 linear feet in the larger size classes
Sheep Flat spring and meadow	No treatment within the first 25 feet of the high water mark or indicator of riparian vegetation	No additional requirements
Negro Camp springs, reservoir, and wetlands Ephemeral/ Intermittent drainages in the Negro Camp Gulch, Bald and Lower Beaver Creek Watersheds Special Aquatic Features (not listed above)	No mechanical treatment within the inner 25 feet of the RCA: • Machinery may reach in • Hand treatment of fuels may occur	Retain 8-10 snags per 100 linear feet in the larger size classes

31.	When mechanical operations occur within the RCA the following IDFs would be implemented: a) Soils must be dry at 10-inches deep before equipment could be operated. b) Use of existing landings would be limited to the outer 50 feet and would be agreed to and designated on the ground prior to use. New landings would not be constructed. c) Conifers would be harvested with feller-bunchers. Track widths would be 24-inches or greater. d) Turning of equipment would be minimized. e) Where extant, conifers necessary for stream bank stability would be retained. f) Ground-based equipment would be kept off areas with slopes greater than 20 percent. g) When no longer needed, skid trails would be covered with 90 percent ground cover. Slash, mulch, straw, etc. would be used. h) Biomass removal, grapple piling, handwork, mastication, and prescribed fire would be the only permitted fuel reduction techniques. i) Stream crossings would be limited to ephemeral and/or intermittent channels and designated prior to implementation. (1) Crossings would be perpendicular to the channel. (2) When there is loose soil that is likely to be displaced, erosion control measures, such as wattles, silt fences, or a functional equivalent would be deployed down channel from the crossing. When the need is passed, they and any backed up material would be removed. (3) At the conclusion of activities, the channel would be remediated, with the flow path restored and any detrimental soil disturbance corrected. j) Temporary roads would not be constructed within RCAs	x	
32.	When prescribed fire operations occur within proximity to the RCA, prescribed fire could be backed into the RCA.	x	
33.	For aquatic feature in hazard tree units, ground based mechanical equipment would be restricted to the road prism. Trees would be felled onto the road and skidded to the nearest landing. When hazard trees cannot be felled onto the road would be felled parallel to the contour of the slope and left in place.	x	
Silviculture		**1**	**3**
34.	Black oak, aspen, and other hardwoods, alive or dead, greater than three feet tall would be retained and protected within treatment units within the limits of safety and operability.	x	x
35.	Conifers would not be planted within 20 feet of live California black oak and white oak tree crowns, including sprouts greater than three feet tall.	x	
36.	Conifers would not be planted within 150 feet of aspen and cottonwood communities on the east, south and west side of the stand or 100 feet on the north side to maximize light to the stand and allow for expansion. Where browsing inhibits recruitment of regenerating aspen and cottonwoods, fencing would be constructed to protect regeneration until suckers and sprouts exceed the browse line.	x	
37.	Along stream channels with existing riparian communities (e.g. willow, alder, sedges, juncus, etc.) reforestation of conifer species would not occur within 20 feet of the riparian plant community.	x	
38.	No conifer planting would occur within 50 feet of a meadow edge. From fifty feet of the meadow edge and out, planting density would increase using the planting strategy and spacing based on the surrounding forest stand condition.	x	
39.	Monitoring of riparian areas within the project area during the growing season of 2015 would be done to determine the amount and effectiveness of natural regeneration. If vegetation regrowth does not appear to be sufficient, hand plantings of willow, aspen,	x	

	sedges, and/or other appropriate riparian species would be prescribed for follow-up treatment.		
40.	All stumps 24 inches in diameter and greater within 200 feet of NFS roads would be treated in all vegetation types except aspen, with Sporax® ,Cellu-Treat® or a similarly registered product, to prevent the spread of annosus root disease. No Sporax or Cellu-Treat would be applied within 25 feet of known Forest Service Sensitive and Special Interest plant species, or streamcourses, and special aquatic features, shown on the contract map.	x	x
41.	Once ecological conditions have been achieved and livestock are returned to the portion of the allotment within the fire perimeter management would be adjusted to allow for conifer response following planting. Site-specific changes to grazing management may include but are not limited to deferred grazing, complete rest, temporary fencing, and/or other means for distributing livestock away from planted areas.	x	x
Soils		**1**	**3**
42.	In treatment units outside of RCAs, soil moisture conditions would be evaluated using Forest established visual indicators before equipment operations proceed. Lassen National Forest Wet Weather Operations and Wet Weather Haul Agreements would be followed to protect the soil and transportation resources.	x	x
43.	Areal extent of detrimental soil disturbance would not exceed 15 percent of the area dedicated to growing vegetation. Soil porosity would be at least 90 percent of undisturbed conditions.	x	x
44.	Following implementation, the project site would be evaluated by a qualified specialist to determine if detrimentally compacted ground exceeds the LRMP standard of 15 percent areal extent (as required in item 43). If restoration were needed to achieve compliance an appropriate subsoiler, ripper or other implement would be used to fracture the soil in place leaving it loose and friable. Landings no longer needed for long-term management would be remediated as described. Where landing construction involved cut and fill, the landing would also be re-contoured to match the existing topography.	x	x
45.	To the extent possible, existing landings and skid trails would be utilized.	x	x
46.	Mechanical equipment would not operate on slopes greater than 35 percent.	x	x
47.	A minimum of five logs per acre, representing a range of decomposition classes, would be retained. This may include the three logs retained on the landscape for wildlife habitat.	x	
48.	On slopes greater than 20 percent, in addition to waterbars, slash would be placed on all skid trails to achieve a minimum of 75 percent soil cover (rock, woody debris, vegetation, and litter). On rhyolitic soils if slash is not available weed-free straw would be used. Outside of RCAs, retain litter and duff at a minimum of 50 percent. Activity-generate slash would be piled to minimize the amount of soil displaced into burn piles.	x	x
49.	Ripping, if determined necessary as part of site prep for planting would only occur on T ground outside of RCA and on non-rhyolitic soils, on slopes less than 20 percent	x	
50.	Biomass removal, grapple piling, or mastication, would be the only permitted techniques for machine based fuel reduction and site preparation for planting in the following units: 113, 135, 136, 137, 157, 112-157, 506, 507, 806, 807, 810, 811, 815, 818, 819, 820, and 841. Handwork would also be permissible.	x	
Wildlife		**1**	**3**
51.	A limited operating period (LOP) would be in effect from February 15 through September 15 within ¼ mile of active northern goshawk PACs unless surveys confirm that northern goshawks are not nesting. Protected Activity Centers (PACs): Harvest activities may occur in northern goshawk habitat that has been rendered unsuitable as determined by the wildlife biologist and documented within the Biological Evaluation.	x	x
52.	In addition to the overall snag retention, retain large diameter cull trees that may be of use as dens sites by bears or other wildlife.	x	

Chapter 3: Environmental Consequences

This section describes the environmental impacts of the alternatives in relation to whether there may be significant environmental effects as described in 40 CFR 1508.27. The following documents are summarized in this EA (available upon request) and are hereby incorporated by reference into this assessment:

- Silviculture Report for the Bald Project; Pearson Ramirez, April 27, 2015
- Fire and Fuels Report for the Bald Project; Pearson Ramirez, Lewis, and Mayer, April 27, 2015
- Biological Evaluation (BE) for the Bald Project (Terrestrial); Kozlowski, April 27, 2015
- Biological Evaluation and Assessment (BE/BA) for Federally listed and Forest Service Sensitive Aquatic Species; McFarland, April 27, 2015
- Management Indicator Species (MIS) Report, Bald Project; Kozlowski, April 27, 2015
- Management Indicator Species (MIS) Project Report for Aquatic Habitat; McFarland, April 27,2015
- Biological Evaluation and Assessment (BE/BA) for R5 Forest Service Sensitive and Federally Listed Plant Species, Bald Project; Kellison and Sanger, April 27, 2015
- Soil Specialist Report, Bald Project; Thornton, April 27, 2015
- Hydrology Report, Bald Project; Wheelock, Pearson Ramirez, and Thornton, April 27, 2015
- Cultural Resources Report, Bald Project; Neel, April 27, 2015
- Range Report, Bald Project; Pasero, April 27, 2015
- Recreation and Visual Quality Resources, Bal Project; Taylor, April 27
- Transportation Report, Bald Project; Nagel, April 27, 2015

Additional documents used for the Bald Project are also available upon request and are hereby incorporated by reference into this assessment, including the following:

- Migratory Landbird Conservation on the Lassen National Forest, Bald Project Assessment; Kozlowski, April 27, 2015
- Black backed Woodpecker (BBWO), Bald Project Assessment; Kozlowski, April 27, 2015
- Bald Project, Invasive Plant Risk Assessment; Kellison and Sanger, April 27, 2015
- Past, Ongoing, and Reasonably Foreseeable Future Actions Report for Bald Project (PORFFA), April 3, 2015

Further analysis and conclusions about the potential effects are available in the above reports and other supporting documentation located in the project record. The following sections are discussions of resources that have relevance to a determination of significance. The cumulative effects boundary for each resource was the Bald Project area, unless otherwise defined.

Silviculture

Silvicultural treatments are generally focused within areas which have experienced moderately high to very high burn severity and which are now in a deforested vegetative condition. Deforested vegetation condition describes; a temporary condition in which forest vegetation has burned at such high severity that little to no vegetation is left for the forest to naturally regenerate and function properly. As a rule, this describes a resulting forest with less than 10 to 20 percent canopy cover. Areas that experienced low to moderate severity, where vegetation could recover unaided would be deferred from treatment and left to recover "naturally".

Generally, the lower to moderate burn severity effects are found on the outer edges of the fire and the previously treated areas. The high severity burn effects, which account for the majority of the burned area, are found in the center of the fire with one patch exceeding 3,800 acres, and an average patch size of 214 acres.

Prior to the Bald Fire, approximately 73 percent of the project area was considered forested and 2 percent barren. Due to the high intensity of the fire, it is estimated that only 15 percent of the project area remains forested, and 81 percent of the area is considered barren (Table 2). These forested areas are generally found on the outer edges of the fire perimeter, while the deforested areas are in the center of the project area

A summary of the cover types and density class distribution using the California Wildlife Habitat Relationship (CWHR) for the pre- and post-fire conditions and the proposed vegetative treatments under Alternatives 1 and 3 and an explanation of the indicators can be found in the project record in the Silviculture Report.

Alternative 1

Direct and Indirect Effects of Hazard Tree Removal, Area Salvage Harvesting, and Area Fuel Treatments

Direct effects of the hazard tree treatment would be removal of hazards along publically traveled roads, safety, reduced fuels, and utilization of forest products

Treatments would diminish the high probability of potential hazards to visitors and improve safety and access within the Bald Fire area. Removal further decreases safety risks associated with wildland fire management activities.

Direct effects of hazard tree and salvage harvest would be the capture of economic value. The potential revenue from a timely executed timber sale could help offset the costs of other treatments such as removal of fire-killed biomass, additional fuel treatment, and reforestation costs. Timber sales also help support the forest product industries as well as, the local communities that rely on revenue generated by forest products.

Damage to residual trees and vegetation may occur during harvesting operations including damage to stems, bark scraping, wrenched stems, broken branches, broken tops, and crushed foliage (McIver et al.

2003). These effects are typical in logging operations, and contractual provisions are implemented to minimize the potential for damage to residual trees. The Forest Service would inspect timber sales during harvesting to ensure that damage to residual trees and vegetation is within reasonable tolerances.

Damage and/or mortality of natural regeneration may occur during harvesting operations, particularly in ground-based harvesting treatments (Donato 2006). Areas where the risk of seedling damage and/or mortality is greatest would be within or near skid trails and landings. However, reforestation after salvage logging activities would allow managers to have better control over density, spacing and desirable conifer species. The LRMP soil quality standards provides direction that landings and permanent skid trails should not encompass more than 15 percent of timber stands. Consequently, damage and/or mortality of natural regeneration due to harvesting operations would be limited in size and scale to skid trails dispersed through the stand.

Indirectly, salvage harvest would reduce excessive fuels in the future, thus decreasing potential fire severity if the area were to burn again (Brown et al. 2003). Salvage harvest would facilitate artificial and natural regeneration efforts and help protect plantations, which are both an investment of money and resources, once they become established. Harvesting dead and dying trees that are in excess of other resource needs would provide a safer work environment during tree planting and release. Seedlings and saplings would be at high risk from any wildfire event in early stages of growth due to low crown heights and heavy shrub growth. Reducing existing and future heavy fuel loading prior to planting would help to protect young plantations should wildfire occur in the future. Reduced fuels from salvage operations could increase public and worker safety.

Direct and Indirect Effects of Reforestation

The National Forest Management Act (NFMA) requires maintaining forest cover at certain levels in accordance with forest plans. The 2004 SNFPA FEIS ROD provides for ecosystem restoration following catastrophic events in all land allocations including salvage of dead and dying trees and habitat restoration.

The direct effects of artificial reforestation would be the re-establishment of fire resistant; shade intolerant conifer species before shrub, grass, and forb competition preclude natural regeneration of these tree species. Reforestation activities are proposed to take advantage of bare ground now before subsequent growth of shrubs, forbs and grasses fully occupy the proposed units (Tappeiner and McDonald 1996, Sessions et al. 2004). Planting trees as soon as possible following a fire ensures the best possible survival rate, especially without use of herbicides to release planted seedlings from vegetation competition. Deferring reforestation treatments would result in the need for even more ground disturbing activities to achieve any reforestation results. Deferred site preparation activities would need to treat highly competitive vegetation by pulling shrubs and scraping the ground to expose bare mineral soil. Even with these kinds of measures, trees planted later would have a lower survival rate than those planted immediately following the wildfire (Sessions et al. 2004). Additionally more snags may need to be cut down for safety reasons if reforestation activities are deferred. Weakened fire damaged trees would continue to die in the years following the wildfire.

Direct and Indirect Effects on Vegetation Diversity and Resiliency

Reforestation strategies include considerations for vegetative diversity where it exists within the project area. Integrated design features were developed as part of Alternative 1 to encourage hardwoods and enhance meadow and riparian function.

Pre-fire shrub and herbaceous vegetation comprised approximately 24 percent of the project area. These areas are expected to recover and remain as shrub and herbaceous vegetation. In addition, the timbered acres that burned at high severity and are not proposed for treatment would become dominated by shrubs. Additional areas in proposed units would not be treated (wildlife retention islands). Reforestation would not occur in retention areas; once the snags fall, these areas would temporarily function as openings within a re-forested conifer-dominated landscape.

Direct and Indirect Effects on Tree Size and Density and Shrub Class Distribution

Treatments would affect the conifer size and density class distribution in the project area. These changes in size and density class distribution can be shown using the California Wildlife Habitat Relationship (CWHR) system. Assumptions on post treatment CWHR size and density classes:

(1) Pre-fire conifer areas that burned at high severity currently classified as barren (BAR) and that are proposed for planting would be classified by seedling, size class 1; undetermined canopy cover and over time would increase in size class and density.

(2) Pre-fire conifer areas that burned high severity currently classified as barren (BAR) that are not proposed for planting, are expected to become shrub dominated.

(3) Grasslands, wet meadows, and lacustrine areas would naturally recover to pre-fire conditions.

(4) Shrublands would also naturally regenerate to shrub systems although species composition may be more chaparral dominated.

Areas of oak and other hardwoods would re-sprout enabling a shrub component. Treatments proposed in Alternative 1 would increase the forested type to approximately 50 percent of the area. Considerations for hardwoods, riparian vegetation, if Alternative 1 would help create healthy, resilient landscapes mandated in the Region 5 Ecological Restoration. Table 6 in The Silviculture Report shows the distribution of CWHR tree size and density classes for post treatment for Alternative 1.

Cumulative Effects - All Treatments

Artificial regeneration with native conifer seedlings would allow for the return of forested cover expediting recovery when compared to natural recovery times. Artificial regeneration would also affect future stand composition and structure. This could speed the recovery of habitat for forest dependent wildlife species. Sparsely treed mature forests, CWHR size and density classes 4P, 4S, 5P, and 5S that are planted would develop into multi-storied forests with a component of understory vegetation.

Areas not treated would develop with natural regeneration of shrubs, grasses, forbs, and/or trees depending on local seed sources and presence of root sprouting species. Approximately 50 percent of the project area would consist of existing montane chaparral and untreated burned barren areas that would develop into shrub dominated vegetation cover. Shrub dominated areas would persist for an indefinite time and contribute to landscape diversity.

In hardwood and riparian community treatment areas, planting strategies would allow understory shrub and herbaceous communities to re-establish and increase coverage in future years. Hardwood regeneration would likely improve and help to promote long-term sustainability and resiliency of these stands.

Snag retention leave-islands left untreated would become dense pockets of understory species, especially shrub species and standing dead trees. Snags are expected to remain standing for 8 to 20 years (Ritchie et al. 2013), and would then fall to the ground and become down woody material. These would create pockets of heterogeneity in the future, providing a non-timbered aspect to the landscape.

Alternative 2

Direct, Indirect, and Cumulative Effects

Under Alternative 2, the felling of fire-killed and fire-injured trees on NFS lands would be limited to roadside hazard removal during road maintenance. This would provide for safe travel on roads open to the public within the project area. Roads where hazard trees are not removed immediately would continue to present a risk for members of the visiting public as well as Forest Service employees, contractors and adjacent private landowners in those areas. Due to the scale and timing of maintenance, many road segments of untreated burned areas would exist. Roads may need to be administratively closed until hazards could be abated.

There would be no recovery of the economic value of any of the fire-killed trees.

Over time fuel loading would increase throughout the project area as trees die and snags fall over (Brown et al. 2003, McIver and Ottmar 2007, Ritchie et al. 2013. Heavy fuel loading could become a hindrance to fire suppression and standing snags can become a safety hazard. Standing snags can also contribute to fire behavior and fire spread by acting as a source of embers that can be lofted into the air and carried down wind, starting spot fires (van Wagtendonk 2006). There would be a potential for continuing tree mortality due to insect and disease activity as well as increased safety hazards along Forest system roads.

Alternative 2 would allow stands to recover naturally. By deferring silvicultural treatments, the opportunity to accelerate restoration of coniferous forest types would be forgone Re-establishment of forest cover would rely on natural regeneration and could take decades or longer.

It is expected that tree distribution throughout all of the diameter ranges, as well as basal area, in areas of moderately high-to-high fire severity would remain low for many decades.

Alternative 3

Direct, Indirect, and Cumulative Effects

Direct effects of the hazard tree treatment would be removal of hazards along publically traveled roads, increased safety for people using these roads, and utilization of forest products. Timber sales generate revenue for the Forest Service, which can be used to accomplish post-harvest treatments. Timber sales also help support the forest product industries as well as the local communities that rely on revenue generated by forest products.

Without salvage and post-harvest reduction of small diameter fuels outside of the roadside hazard areas, there would be no decrease in future fuel loading, no decrease in the potential fire severity, and no increase in firefighters' safety.

All other effects are the same as those discussed under Alternative 2.

Fire and Fuels

Removal of hazard trees is the first priority to insure the safety of the public, contractors, and Forest Service (FS) personnel within the footprint of the fire. Trees that were killed by the Bald Fire pose a hazard to the public and forest workers that are traveling and working in these areas. As snags age over time, they become less stable and increase the safety risk to all forest users (Ritchie et al. 2013).

The Bald Fire resulted in a significant reduction to near total elimination of surface and small understory (ladder) fuels. In the short-term, this change in fuel loading and composition is expected to reduce wildfire intensities. Bringing fuel load levels and fuel arrangement to conditions that reduce the likelihood of stand-replacement fire in regenerated stands, particularly during early stages of stand development, would promote the long-term survival and growth of new conifers. Predicted increases in fire hazard within the high-severity areas of the fire could be mitigated by salvage logging or otherwise removing fire-killed trees or slash. Because the primary cause of high fire hazard in these areas would be the increased surface fuel loading as fire-killed trees fall and become downed woody material over time, removal of this heavy fuel load would prevent the predicted increase in fire hazard in these areas (Greenlee and Greenlee 2002; Peterson and Harrod 2011; Ritchie et al. 2013; Peterson et al. 2015).

Alternative 1

Direct and Indirect Effects to Safety

Worker safety would be increased within the treatment areas, due to the reduction of standing stags and overhead hazards. Alterative one moderates the fire hazard by treating the surface fuels created by the Bald fire. Flame lengths and fireline intensities would be reduced within the treatment areas. Resistance-to-control would be improved; the reduction of snags and large down materials reduces sources of combustion, ember production and spotting receptors. Although the predicted fire behavior for Alternative1 would not allow fire suppression resources to use direct attack methods, line production rates would be improved by allowing firefighters to work directly by the fire. If the hazard trees/snags were not

removed, for safety, firefighters would have to work 2.5 tree lengths from any burning snag. This would lead to an increase in fire size and the numbers of resources need to suppress the fire.

Direct and Indirect Effects Condition Class

Salvage harvest and area fuel treatments would contribute to long-term restoration objectives in dry coniferous forests by restoring surface fuels to levels more consistent with low severity fire regimes. At the stand scale, post-fire logging reduces surface fuels over the longer term, particularly in the large diameter classes, which should increase management options for applying prescribed fire treatments or allowing future wildfires to burn without causing excessive damage to forest vegetation and soils (Peterson et al. 2015).

Direct and Indirect Effects to Reburn Potential and Resistance to Control

Flame lengths and fireline intensities would be reduced within the treatment areas. Resistance-to-control would be improved; the reduction of snags and large down materials reduces sources of combustion, ember production and spotting receptors.

Initially the fire risk is low throughout the project as there is not a fuel bed to carry fire through the area. Brush and herbaceous cover is expected to quickly recolonize the site. Over time, the combination of this vegetation and the planted trees create this fuels bed. The brush and fuel models indicate that flame length would be between six and eight feet. This is above the desired threshold of four-foot flame length, which allows direct attack by hand crews; they are however, within the threshold for direct attack by equipment.

Within the plantations the grasses and forbs that come in post fire can creates, substantial fine fuel with a year of the fire, and the potential for subsequent fire exists (Peterson et.al). This was demonstrated by the Bald fire when it re-burned the plantation created following the 2008 Peterson fire. The Bald fire also re-burned portions of the Gulch and Willow plantations that were a result of wildfire. These plantations were between 20 to 22 years old.

The fire behavior in these areas would have predicted flame length up to 6 foot and rapid rates of spread, but fireline construction rates with engines, crews, and bulldozers are rapid in this fuel type. Engines would not be able to work directly on the fireline, but with hose lays; firefighters would be able to knock the fire down so fireline could be put directly on the fires edge. After ten years, the trees that are planted would be big enough to contribute to fire behavior. The brush would also start to grow back into the sites. Flame lengths in the brush/plantation combination are expected to be 7 feet. Indirect fireline would be required to contain this fire. With these flame lengths and rates of spread heavy equipment would be needed to help fight the fire. Overall, suppression efficiency would be improved within the treatment areas by creating an environment where wildfires would burn at lower intensities and where firefighting production rates would be increased because less ground fuels would need to be cleared for fireline construction and backfiring operations. Treated areas would provide a safer and more efficient environment for fire crews to stop wildland fires

Timbered stands with no prior treatment and wildlife retention islands not treated under Alternative 1 would develop into a fuel model (FM) 12 once the snags begin to fall. Fires in these conditions would be high intensity. Flame lengths would preclude the use of direct attack by either hand crews or equipment. Fireline construction rates would be slower allowing the fire to become larger and harder to control. Fires may present serious control problems such as torching, crowning, and spotting.

These untreated areas also put the adjacent treated areas at risk. As seen in the Bald fire along the Pittville highway untreated areas generated high intensity fire creating a zone of mortality. In places along the previously treated Pittville project, this mortality zone was up to 400 yards wide. This phenomenon was also noticed in places where the untreated areas were located on a slope and the treated areas were at the top of the slope.

Table 6 - Fire Behavior Modeling Results - Bald Project Area using 90th Percentile Weather

Treatment Areas	Years	Fuel Model	Flame Length (feet)	Rate of Spread (Chains/hour)	Loading (tons/ac)
Area Salvage and Area Fuels followed by Reforestation	0 to 10	FM 1	6	142	1
	10 to 30	FM 5	7	30	3
Reforestation Only	0 to 10	FM 1	6	142	1
	10 to 30	FM 2	8	49	4
Natural Recovery Areas	**Years**	**Fuel Model**	**Flame Length (feet)**	**Rate of Spread (Chains/hour)**	**Loading (tons/ac)**
Timbered stands with no prior treatment and Wildlife Retention Islands	0 to 10	FM 1	6	142	1
	10 to 30	FM 12	11	20	40-50
Eastside pine stands previously treated (thinning and/or underburning). Grey pine/oak woodlands	0 to 10	FM 9L	2	7	4
	10 to 30	FM 9	3-4	9	6-7
Chaparral (manzanita), Sage Flats, and Grasslands	10 to 30	FM 5	7	30	3
	10 to 30	FM 2	8	49	4

Source: Fire behavior outputs from Behave Plus 5.0.5. Note: Fuel models were chosen to represent the primary fuel types and surface fuel conditions that would be found throughout the project area over time.

Cumulative Effects of all Treatments

Cumulative effects for Alternative 1 include safer access to the area due to the hazard tree removal along maintenance level (ML) 2 or higher roads in this project. In addition, fuels treatments would improve the safety for all users. The treatment of CWD and smaller fire-killed vegetation would result in a reduction in fire behavior, fire effects, and resistance-to-control, thereby increasing safety during a wildfire event. Reduced fire behavior would allow suppression forces to take appropriate action and use direct attack methods. Fire spread on public lands would be altered reducing the chance of fire spreading between the public and private lands interface.

The combined effects of these proposed treatments would increase the ability of fire suppression personnel to both safely and effectively limit the size and severity of wildland fires while allowing for the reintroduction of fire to these areas under more moderate weather conditions. Firefighter safety would be improved with the removal of the overhead snags as they pose one of the greatest hazards to firefighters. Suppression efficiency would be improved within the treatment areas by creating an environment where wildfires would burn at lower intensities and where firefighting production rates would be increased because less ground fuels would need to be cleared for fireline construction and backfiring operations. Treated areas would provide a safer and more efficient environment for fire crews to stop wildland fires that could potentially spread and destroy private property, communities, watersheds, and wildlife.

Alternative 2

The scope of analysis and the effects of past, ongoing and future foreseeable actions under Alternative 2 would be identical to those discussed for Alternative 1. Under Alternative 2, none of the activities proposed under Alternative 1would be implemented with the exception that hazard trees could be felled along roads currently open to the public. The hazard trees would be felled and left in place as part of road maintenance. No fuels treatments, site preparation, or reforestation would occur.

Direct, Indirect, and Cumulative Effects to Safety

The hazard trees would be felled and left in place as part of road maintenance. This would provide for safe travel in these areas, however, large areas of untreated burned areas with brush and standing stags would exist. The access to these areas would be inhibited by hazard trees and downed logs. In the event of a wildfire, this limited access to areas would slow firefighter access for direct attack suppression methods. Hazard trees/snags are a major safety issue for firefighters.

Direct, Indirect, and Cumulative Effects to Condition Class

As snags continue to fall, the surface fuel loading throughout the project area would continue to increase. Increased surface fuels would result in increased flame lengths, fireline intensities, and resistance-to-control problems leading to increased firefighter risk. Lives, property, and natural resources in and around the Bald Project area would continue to be at risk from future 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. Fire Regime Condition Classes would remain at their current levels. In the event of a wildland fire in the project area, under future fuel loading conditions and 90th percentile fire weather, large-scale loss of key ecosystem components would result. Twenty years in the future, these conditions would be more pronounced without some type of fuels reduction treatment that reduces fire hazard in the area. The cumulative effects of Alternative 2 would create an increase in fire behavior over time and negative fire effects on the landscape

Direct, Indirect, and Cumulative Effects to Reburn Potential and Resistance to Control

Existing stand conditions would persist and develop unaltered by active management. Down woody material would continue to accumulate at a rate that is greater than decomposition, contributing to the surface fuel layer. Standing snags would persist and the site would be rapidly colonized by grasses, forbs, and shrubs (Russell et.al 1998; Collins and Roller 2013), which can further add to hazardous surface fuel conditions (Albini 1976). These surface fuel conditions can leave recently burned areas prone to repeat fire in relatively short succession (5-15 years) (Coppoletta, personal communication, 2015)

It is a reasonable to expect sites to develop comparable to sites that were previously left un-salvaged post wildfire. On these sites, grasses and shrubs, such as ceanothus and manzanita, have occupied the site while standing snags dominate the overstory of the high severity burn areas. The extent of shrub vegetation dramatically increased as a result of high severity fire during the initial fires. Shrub fuels would be well established within 5 to10 years, based on shrub regeneration observed in past local fires like the 2000 Storrie Fire, 2008 BTU Complex (Coppoletta 2015), 1999 Lookout, Pidgeon, and Bucks Fires, and the 2008 Rich Fire. Within one study, the shrub cover was generally high, with approximately 60 percent of both stand replacing patches and individual plots exceeding 60 percent cover. The shrubs averaged three foot tall in these areas (Collins and Roller 2013).

Both grass-forb cover and shrub cover present formidable competition for water and light with naturally established and planted seedlings. Large areas of untreated burned trees would exist. Brush intermixed with grass, forbs, and standing snags would dominate these areas. Over time, these snags would fall resulting in brush fields with high surface fuel loads arranged in a jackstraw pattern. This competing vegetation would likely result in decreased survival of tree seedlings and would definitely inhibit growth for years if not decades. Over time, ladder and crown fuels would re-establish via natural regeneration.

Hundreds of dead trees and very few live trees per acre characterize the forest structure. Snags have the highest fall rates in the first ten years within the smaller diameter classes, while larger snags persist for relatively longer time periods, which are generally documented in existing scientific literature (Cluck and Smith 2007). Nearly all snags would be expected to fall approximately 20 years post-fire contributing to greater fuel loads (Greenlee and Greenlee 2002; Ritchie et al. 2013). The limbs and boles from these fallen trees would accumulate as surface fuels. Over time, this fuel is expected to increase each decade as trees fall over. Studies have suggested that extensive stand replacing, high severity fire in the initial fire leads to an increase in standing snags and shrub vegetation, which would promote more stand replacing, high severity fire in the subsequent re-burn (Thompson and Spies 2010; Collins and Roller 2013; Coppoletta 2015). Surface fuels are projected to be well over 100 tons per acre, increasing the resistance-to-control, and ultimately increasing the potential for a high severity re-burn and high severity fire effects. In the event of a wildfire, this would create serious control problems, high suppression costs, and high volumes of smoke emissions.

In the future the increased shrub densities, high snag densities, and large numbers of down logs across the Bald Project area would impede fire line construction, increase safety hazards, and increase spotting

potential in the event of another wildfire. The Lassen National Forest has direct experience with this as the 2012 Chips Fire burned several hundred acres within the footprint of the 2000 Storrie Fire. While flame lengths and rates of spread in the previously burned area were generally, lower than those observed outside it, numerous standing snags in this area prevented safe direct attack by ground-based fire suppression forces. Additional recent evidence of wildfire control problems in previously burned areas has been verified on the Tahoe National Forest by the 2013 American Fire, which burned in the footprint of the 2008 Westville Fire. Under such conditions, fire containment lines must be constructed far from the fireline where it is safe and practical to do so, ultimately increasing fire size. Increased soil heating from burning logs kills soil microorganisms and reduces soil productivity. Failure to remove dead trees before they deteriorate may have severe consequences when the next wildfire occurs. Predicted flame lengths and fireline intensities are displayed in Table 7.

Table 7 - Fire Behavior Modeling Results, Bald Project Area using 90th Percentile Weather

Natural Recovery Area	Years	Fuel Model	Flame Length (feet)	Rate of Spread (Chains/hour)	Loading (tons/ac)
Timbered stands with no prior treatment and Wildlife Retention Islands	0 to 10	FM 1	6	142	1
	10 to 30	FM 12	11	20	40-50
Eastside pine stands previously treated (thinning and/or underburning). Grey pine/oak woodlands	0 to 10	FM 9L	2	7	4
	10 to 30	FM 9	3-4	9	6-7
Chaparral (manzanita), Sage Flats, and Grasslands	10 to 30	FM 5	7	30	3
	10 to 30	FM 2	8	49	4

Source: Fire behavior outputs from Behave Plus 5.0.5. Note: Fuel models were chosen to represent the primary fuel types and surface fuel conditions that would be found throughout the project area over time.

Under Alternative 2, flame lengths could exceed 8 feet after ten years in the timbered, non-treated areas. These increased flame lengths, fireline intensities, and resistance-to-control are a direct result of fire burning in dead and down logs, branches, and shrubs. Fires burning in stands under 90th percentile weather conditions are expected to result in serious control problems. Fires would be too intense for direct attack on the head by persons using hand tools, heavy equipment, and aircraft retardant. Firelines may not be relied on to hold the fire. Fires would present serious control problems like torching out, crowning, and spotting. Firefighters would have to employ indirect suppression methods. This would allow fires to become larger, more expensive, and potentially more hazardous for firefighters and the public. Associated smoke from a large, intense wildland fire could create both nuisance and health concerns in nearby communities for considerable durations (days or weeks). Under Alternative 2, the increased flame lengths, fireline intensities, and resistance-to-control would be expected to continue and become more problematic in the future.

Alternative 3

Direct, Indirect, and Cumulative Effects to Safety

Removal of hazard trees along roads would provide for safe travel along forest roads. Firefighter safety would not be improved due to the amount of standing snags, remaining throughout the project area. Limited access to areas within the project area would slow firefighter access for direct attack suppression methods.

Direct, Indirect, and Cumulative Effects to Condition Class

No other actions would occur in the fire perimeter. Therefore, the effects for Alternative 3 are the same as those discussed under Alternative 2

Direct, Indirect, and Cumulative Effects to Reburn Potential and Resistance to Control

Existing stand conditions would persist and develop unaltered by active management. Down woody material would continue to accumulate at a rate that is greater than decomposition, contributing to the surface fuel layer. The effects would be the same as those discussed under Alternative 2.

Air Quality

The project area is located in the Shasta and Lassen County Air Quality Districts and is part of the Northeast Plateau Air Basin. Directly to the southwest of the project area is the Thousand Lakes Wilderness and to the south of the project area is the Lassen Volcanic National Park. Both of these areas are class one air sheds. The community of Fall River Mills and McArthur lies to the north of the project area. The community of Little Valley is to the east of the Bald project.

Alternative 1

Direct, Indirect, and Cumulative Effects

Under Alternative 1, prescribed fire would occur following mechanical salvage and fuels treatments. These areas would be treated as part of the district's prescribed fire program and, as such, all burning would be take place on permissive burn days. Depending on weather conditions and timing of other projects, it could take between 3 to 5 years to treat these areas following completion of salvage harvest. Underburning would take place in the fall and spring, machine pile burning and landing pile burning would take place in the fall. Currently, Shasta and Lassen County meet National Air Quality Standards (NAAQS).

Treatment of fuels under Alternative 1 would result in decreased smoke production and associated emissions in the event of a wildland fire. This decrease in emissions would help to reduce smoke related impacts to nearby communities. Short-term impacts from smoke and associated particulate matter from the proposed prescribed fire treatments, combined with emissions from other vegetation burning on public and private land, is possible. However, as discussed earlier, these possible impacts would be mitigated by

adherence to the SMP and CARB. In addition to these safeguards, a daily Air Quality Conference Call is conducted during the prescribed fire season. They are attended by representatives of the Air Quality Management Districts, the California Air Resources Board, Geographical Area Coordination Center meteorologists, and agencies that are conducting prescribed fire operations. These calls help ensure that burning only occurs when atmospheric conditions are conducive to good smoke dispersion and that the cumulative effects of all prescribed burning remain at levels that are within the provisions of the Clean Air Act.

Fugitive dust could result from logging operations such as skidding and hauling during dry seasons. It would be mitigated by standard contract requirements for road watering or other dust abatement techniques.

Past actions affecting air quality for the past five years in the project area include the burning of some landing piles, miscellaneous hand piles, and prescribed underburning that has occurred on both federal and private lands. This burning occurred on permissive burn days. There has also been some dust created in the area from hunting, fire wood gathering, and other recreational uses. . Environmental factors such as wind events and storms diminish (that move or remove the particulates from the air) the impacts from smoke events are short term (less than two weeks) and are not cumulative. There have been no large fires in the project area, but in 1999, 2002, 2008, 2009, 2012, and 2014 the air quality was impacted from large fires burning elsewhere in northern California and Oregon. These smoke events depending on the prevailing winds and the high-pressure system aloft lasted from two-to-three days to one-to-two weeks. Again, due to the prevailing (from the south to south west) flow of winds and precipitation events dispersing the smoke, there were no cumulative impacts from smoke.

Alternative 1 would not increase the amount of prescribed fire activities in the area above what has been implemented for the last five years and would not impact the air quality of the area, when combined future actions, beyond what has occurred during this time.

Alternative 2 and 3

Direct, Indirect, and Cumulative Effects

Alternative 2 and Alternative 3 would not create any short-term impacts to the local areas from prescribed fire. The air quality within the project area would remain within national and state levels for visibility, particulate levels, and pollutants. The project area's air quality could be affected by pollutants from downwind population centers such as the city of Redding, by agricultural, and adjacent private forest activities producing seasonal dust and smoke, as well as recreational activities using dirt roads in and around the project area.

However, as surface fuel loadings increase over time, the risk of a major air quality impact from a large wildland fire burning in the area would be increased under Alternative 2 and Alternative 3. The amount of smoke created, in the event of a large wildland fire burning in the project area, could be increased for several reasons. There could be more acres burned in a shorter period of time and the fire would burn

under hotter and drier conditions. Therefore, the amount of fuel consumed would increase and fuels would burn that would otherwise have been removed under Alternative 1.

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 (2-3 weeks), especially during summertime conditions. Summertime inversions have negatively affected the area during years when large wildland fires burned in northern California, including 1987, 1992, 1999, 2000, 2002, 2008, and 2009.

Threatened, Endangered, and Sensitive (TES) Wildlife Species - Terrestrial and Aquatic

Due to the project area being outside the range of the species, lack of suitable habitat, unoccupied habitat in the project area, or no effects to existing habitat , it has been determined that the action alternatives would have no effect on the following Federally Listed ,threatened or endangered species (or their designated critical habitat) or Forest Service Sensitive species:

Terrestrial: Northern bald eagle, great gray owl, willow flycatcher, California spotted owl, greater sandhill crane, yellow rail, Sierra Nevada red fox, Pacific fisher, American marten, California wolverine, Townsend's big-eared bat, Shasta hesperian snail, and western pond turtle.

Aquatic: Delta Smelt, Conservation fairy shrimp, vernal pool fairy shrimp vernal pool tadpole shrimp , Central Valley Spring-run chinook salmon , California Central Valley Steelhead , winter-run chinook salmon , Shasta crayfish , California red-legged frog , Sierra Nevada yellow-legged frog , Pacific lamprey , Goose Lake redband trout , Hardhead , Eagle Lake Rainbow trout , Foothill yellow-legged frog , Cascades frog , Kneecap lanx , Topaz juga , Scalloped juga , Montane peaclam , Great Basin ramshorn , California floater , and Nugget pebblesnail .

Sensitive species analyzed in detail for the Bald Fire Salvage and Restoration project were northern goshawk, pallid bat, fringed myotis, western bumblebee, and black juga. Summaries of the analyses of effects of the action alternatives and effects determination for these species are given below.

Direct, Indirect, and Cumulative Effects to Northern Goshawk

Alternative 1: The Bald Fire rendered a large area unsuitable as goshawk nesting habitat due to the high severity nature of the fire and the loss of dense canopied, mature forest. Included was the loss, due to large patches of high severity fire, of two known goshawk nest territories. The salvage treatments under the proposed action may cause minor short-term reductions in foraging opportunities for northern goshawks, but in combination with tree planting would enhance the re-establishment of forest conditions in the long-term. The degree of the short-term effects would be minimized to some extent by the snag retention, large woody debris guidelines, and consideration for the retention of understory vegetation and other vegetative communities within treatment areas.

Within the fire perimeter, the primary actions that could represent cumulative effects are fire salvage and reforestation actions on private lands that were burned, and fuelwood harvest on USFS lands. Limited fire

salvage is ongoing at the time of this writing, and reforestation will occur on BLM timberlands within the fire footprint. This would represent a short-term reduction in foraging habitat on BLM lands, since salvage would remove most or all standing snags more quickly than they would otherwise topple. Similar to the effects on USFS lands, much of non-USFS timberlands burned at high severity and little green forest remains. Snag habitat retention on USFS lands through wildlife patch retention and untreated areas would help compensate for some of the losses on non-USFS lands. The cumulative effects of the loss of burned forest habitat, which is marginal for goshawk to begin with due to lack of adjacent nesting, would not constitute a substantive cumulative effect.

> **Determination:** Based on analyses of direct, indirect and cumulative effects, it was determined that the proposed activities within Alternative 1 of the Bald Fire Salvage and Restoration project may affect individuals of northern goshawks, but is not likely to result in a trend towards federal listing or loss of species viability.

Alternative 2: Analyses of direct, indirect, and cumulative effects indicated that no direct effects to current habitat conditions that would result from this alternative. Indirect and cumulative effects include a continuation of current vegetative trends across the analysis area. No substantive reductions in burned or green goshawk forest habitat on USFS lands as a result of management activities. Hazard trees along approximately 4,736 acres of roadside corridors could be subject to being felled and left in place as downed logs. Such logs and accessible snags within the fire perimeter would be subject to being removed as fuelwood by woodcutters. Both activities would cause a minor reduction in the overall total of burned forest habitat, with most of the fuelwood activity confined to roadsides or other accessible areas. Such activities would affect relatively few of the burned acres on USFS lands. Over the majority of the burned acres, snags would remain until they naturally fall due to decay. Vegetation would go through natural recovery and regeneration, and there would be little or no disturbance to foraging goshawks.

Existing levels of large woody debris and snags would be maintained and may provide short-term foraging opportunities to the northern goshawk, particularly adjacent to suitable, unburned forest habitat. Natural regeneration would be expected to take much longer as compared to the proposed action to re-establish forested conditions in the project area, especially given the very large patch size of high severity fire in which no conifer seed source would be available to initiate natural reforestation. As with Alternative 3 over the large area of the fire, forest regeneration that eventually develops into mature forest preferred by goshawk would be expected to take much longer compared to the proposed action since trees would not be re-planted by hand, and large patches of high intensity burned areas would lack a conifer seed source.

Alternative 3: In this alternative, similar to the No Action, there would be no substantive reductions in burned forest habitat on USFS lands as a result of management activities. Hazard tree abatement would thus cause a minor reduction in the overall total of burned forest habitat on USFS lands within the Bald Fire. Such activities would affect 15 percent (relatively few) of the 31,324 acres burned on USFS lands and over the majority of the total burned acres snags would remain until they fell naturally due to decay.

Vegetation would go through natural recovery and there would be little potential of disturbance to foraging goshawks since all activities occur along already open roads.

As discussed above under Alternative 2, existing levels of large woody debris and snags would be maintained and may provide short-term foraging opportunities to the northern goshawk, particularly adjacent to suitable, unburned forest habitat. Natural regeneration would be expected to take much longer as compared to the proposed action to re-establish forested conditions in the project area, especially given the very large patch size of high severity fire in which no conifer seed source would be available to initiate natural reforestation. Over the large area of the fire, forest regeneration that eventually develops into mature forest preferred by goshawk would be expected to take much longer compared to the proposed action since trees would not be re-planted by hand, and large patches of high intensity burned areas would lack a conifer seed source.

Determination: Given the results of these analyses, it was determined that the proposed activities within Alternative 3 of the Bald Fire Salvage and Restoration may affect individuals of northern goshawks, but is not likely to result in a trend towards federal listing or loss of species viability.

Direct and Indirect Effects to Pallid Bat and Fringed Myotis

Alternative 1: Bats, including pallid bat and fringed myotis, have been shown to respond positively to wildfire, including high-severity wildfire. Observations of increased bat activity after disturbance (such as timber harvest, thinning or prescribed fire) could be related to decreased amount of clutter in the forest canopy, increased abundance of insect prey, or increased quantity and/or quality of roost habitat as a result of trees killed or damaged by fire. The Bald Fire accomplished all three of the above factors: it reduced clutter, it would increase insect abundance within the burned footprint, and it resulted in thousands of acres of snags.

The ecological importance of fire-created snag habitat and early seral forest stages were recognized in the design of this alternative The integrated design features (IDFs) related to snag retention and reforestation would serve to retain many of the features that are thought to make burned areas valuable as bat habitat (snags, and an abundant understory vegetation leading to an increase in insects), while still allowing multiple-use objectives to be met within the burned area. While salvage operations and removal of fire-killed trees would reduce habitat for potential prey species such as wood-boring and bark beetles, the combination of snag retention and unharvested areas, as well as the increase in understory vegetation would still provide for greater insect prey abundance than what likely occurred pre-fire.

The direct effects to pallid bats are potential disturbance to roosting individuals during salvage/fuels operations. Pallid bats are considered sensitive to roost site disturbance (Zeiner et al 1990), and may locate their roosts in lower portions of snags with basal scars (Baker et al 2008). Thus, there is potential for the flushing of this species from roost trees as mechanical operations occur adjacent to a roost snag. Direct mortality to bats is unlikely since the species is sensitive to mechanical disturbance and would likely abandon roost sites prior to tree falling. Therefore, potential for direct effects of this project, while present, are likely negligible for this species.

The primary potential for direct effects to fringed myotis is disturbance to roosting individuals during salvage operations. Fringed myotis are very sensitive to roost site disturbance (O'Farrell and Studier 1980). There is potential for the flushing of fringed myotis from roost trees as salvage operations occur adjacent to a roost snag. There may also be some potential for mortality if roosting trees are removed while bats are roosting within them, though this is unlikely to adults as sensitivity to disturbance would likely cause the bats to abandon roost sites prior to tree falling. Due to salvage harvest occurring in the first spring and summer following the fire, occupancy of fire-killed trees by fringed myotis may be lower than what would be expected in later years. Roost placement in snags is often behind exfoliating bark and in crevices resulting from lightning strikes and from broken tops (Rabe et al 1998), Weller and Zabel 2001). Use of fire-killed trees as roosts would thus likely increase in years post-fire as bark loosens and structural defects start to accumulate within standing snags. In addition to tree roosts, Lacki and Baker (2007) found fringed myotis in xeric regions of Oregon and Washington to commonly roost in crevices of rocks within outcrops and boulder fields. Therefore, potential for direct effects of this project, while present, are likely negligible for this species.

On-going projects to be considered within the cumulative effects area include salvage and reforest operations on BLM, an assumption that State and private lands would salvage and reforest their burned forests, and fuelwood harvest on USFS lands. Siegel et al (2013) in their monitoring of black-backed woodpeckers in the Peterson and Wheeler fires on the Lassen and Plumas NFs, respectively, noted woodcutting to be pervasive mostly along open roads of both fires. Thus, public fuelwood gathering is expected to occur immediately along roads in in relatively flat areas, along user-created roads, along post-harvest skid trails, meadow edges, and other features that allow easy access. As part of the design of this project, retention islands were not placed within about 150 feet of ML2 or greater roads because snags would be considered a safety hazard. Thus retained snag patches would be removed from roadsides and are less accessible. In addition, the presence of stumps along roadside corridors discourages lengthy off road travel. Inevitably some retained snags would still be removed by fuelwood harvesters, but most of the fuelwood harvest should be localized to areas that are accessible, as indicated in the Siegel et al (2013) study.

Studies indicate that pallid bats roosted in large trees greater than 100 cm dbh (about 39 inches) in diameter (Baker et. al. 2008). Fringed myotis roosted in large trees 58.5-167 cm (about 23-66 inches) in diameter (Weller and Zabel 2001). On the nearby Eagle Lake Ranger District, the average diameter of the roost trees was approximately 30 inches dbh, and the smallest diameter conifer roost tree was a 23.5-inch dbh ponderosa pine. The Lassen national Forest has a fuelwood diameter restriction of 20 inches dbh on snags of commercial tree species would help retain larger diameter trees preferred by pallid bats. Thus, firewood cutting should not result in a substantial decrease in snags or potential pallid bat roost trees across the USFS lands involved in the project.

> **Determination:** As a result of analyses of direct, indirect and cumulative effects, it was determined that the proposed activities within Alternative 1 of the Bald Project may affect individuals of pallid bats or fringed myotis, but were not likely to result in a trend towards federal listing or loss of species viability.

Alternative 2: As discussed previously, pallid bats and fringed myotis have been shown to respond positively to wildfire (Buchalsky et al 2013). Observations of increased bat activity after disturbance (such as timber harvest, thinning or prescribed fire) could be related to decreased amount of clutter in the forest canopy, increased abundance of insect prey, and increased quantity and/or quality of roost habitat as a result of trees killed or damaged by fire. The Bald Fire advanced all three of the above factors by reducing green tree canopy (clutter), increasing insect abundance associated with vegetation regrowth after the fire, and resulting in thousands of acres of newly burned snags. Buchalsky et al 2013 suggests that an increased abundance of flying insects played an important role in observed increases in bat activity after a mixed-severity wildfire in mixed-conifer forests of the Sierra Nevada. They considered the occurrence of fire on the landscape to be an important process for the maintenance of forest bat communities.

In this No Action Alternative, there would be no substantive reductions in burned forest habitat on USFS lands as a result of management activities. Hazard trees along roads would be subject to being felled and left in place as downed logs as part of normal road maintenance. Such logs and accessible snags would however be subject to being removed as fuelwood by woodcutters. Although firewood gathering would cause a minor reduction in understory vegetation within the localized areas affected, such activity would affect relatively few of the 31,324 burned acres on USFS lands. Nearly all of the burned snags would remain until they fell over due to decay, and vegetation would go through natural recovery. The factors created by wildfire that result in increased bat activity (reduced canopy clutter, increased insect production and increased snag availability) would all remain unaffected in this alternative, which would sustain these factors in greater amounts and for longer into the future than would Alternatives 1 and Alternative 3.

Given the large patches of high severity fire within the Bald Fire area, the lack of reforestation activities in the No Action would substantially delay a return of forest cover to burned areas that are distant to an existing conifer seed source. There would be a substantial delay in growing a new cohort of bat roost trees within the fire footprint.

Alternative 3: The effects of Alternative 3 are similar to those discussed under Alternative 2. The difference being that in Alternative 3, hazard trees along roads that are of saw timber size would be felled and removed, and sub-merchantable hazard trees would be felled, piled and burned or left in place. Both activities would cause a minor reduction in understory vegetation within the localized areas affected. Compared to the No Action Alternative 2, the felling and removing as well as potential pile burning would cause a slight reduction in understory vegetation due to the effects of burn piles and the creation of landings for the processing of trees for removal. However, such activities would affect approximately 4,736 acres (15%), a small proportion of the 31,324 burned acres on USFS lands. Over the majority of the burned acres, snags would remain until they toppled due to decay, and vegetation would go through natural recovery. As a result, the factors created by wildfire that may result in increased bat activity would remain unaffected in this alternative on approximately 85 percent of the burned area on USFS lands and sustain these factors in greater amounts and for longer into the future than would Alternative 1.

Determination: Given the above analysis, it was determined that the proposed activities within Alternative 3 of the Bald Fire Salvage and Restoration Project may affect individual pallid bats, but is not likely to result in a trend towards federal listing or loss of species viability.

Direct, Indirect, and Cumulative Effects to Western Bumble Bee

Alternative 1: Management actions or events that increase the diversity and abundance of native flowering plants on the landscape would benefit western bumblebees as well as other pollinator species. The Bald Fire, by causing widespread mortality to forested stands and thus increasing the potential regrowth of flowers as part of the early successional ground vegetation of USFS lands, would result in a greater abundance and variety of flowering plants compared to what existed prior to the fire (DellaSalla et al 2014, Swanson et al 2014). As has been found elsewhere (Bogusch et al 2015, Taylor and Catling 2011, Grundel et al 2010), this greater abundance and diversity in floral resources should benefit western bumble bees as well as other pollinator species.

Alternative 1 may cause disturbances to foraging individuals and occasional mortality, but due to the mobile nature of this species and its ability to fly away from mechanical disturbances; direct mortality is expected to be minimal.

It is expected that an abundance of floral resources would remain available for western bumblebee after project implementation. A number of measures have been incorporated into the project design to maintain and enhance for vegetative diversity. Reforestation strategies include considerations to encourage hardwoods and enhance meadow and riparian function. Within treatment units, 20 percent of each unit would be left as wildlife retention areas where snags and ground vegetation are retained in their natural condition and reforestation does not occur. Similarly, natural recovery areas make up 54 percent of the burned USFS landscape and these areas would not be treated. All of these strategies serve to retain and promote understory vegetation beneficial to western bumblebees. Over the long term, understory vegetation would re-sprout or seed back into these retention islands and natural recovery areas and bumblebee habitat would eventually reduce to the amount expected across a predominately forested area.

The cumulative effects of post-fire treatment actions on adjacent non-USFS lands to bumblebee habitat would be minimal. The Forest Service portion of the cumulative effects area maintains substantially more non-forest ground cover vegetation, and would provide the most important bumble bee habitat within the fire perimeter for both the short and moderate term as per project design (as described above under direct and indirect effects).

Private firewood gathering on public lands is an on-going and foreseeable future activity within the cumulative effects area. The effects of this activity after or during the timeframe in which the proposed action is being implemented would not represent a substantive effect to bumble bee habitat because firewood removal does not reduce available floral resources. While there may be a minor amount of disturbance or removal of understory vegetation around firewood collection sites, such disturbance or reduction would be very localized (around individual snag sites) and would not reduce the burned acreage available as habitat.

Determination: As a result of analyses of direct, indirect and cumulative effects, it was determined that the proposed activities within Alternative 1 of the Bald Project may affect individuals of western bumble bee, but was not likely to result in a trend towards federal listing or loss of species viability.

Alternative 2: The Bald Fire, by causing widespread mortality to forested stands, would result in a greater abundance and variety of flowering plants compared to what existed prior to the fire (DellaSalla et al 2014, Swanson et al 2014). As has been found elsewhere (Bogusch et al 2015, Taylor and Catling 2011, Grundel et al 2010), this greater abundance and diversity in floral resources would benefit this species as well as other pollinator species. The No Action does not have any reforestation or site preparation activities therefore the understory that develops naturally would persist within all areas of the fire for a greater duration than compared to the Proposed Action.

Private firewood gathering on public lands is an on-going and foreseeable future activity within the cumulative effects area. The effects of this activity after or during the timeframe in which the proposed action is being implemented would not represent a substantive effect to bumble bee habitat because firewood removal does not reduce available floral resources. While there may be a minor amount of disturbance or removal of understory vegetation around firewood collection sites, such disturbance or reduction would be very localized (around individual snag sites) and would not reduce the burned acreage available as habitat that is being retained.

Alternative 3: Due to the high mobility of this species, and the reduced number of acres being treated, there would be minimal potential for direct impact of project activities to individual bumblebees and fewer effects than in the proposed action. The potential for indirect effects of this alternative to western bumblebees and their habitat would be similar to the No Action alternative because site preparation or reforestation would not occur, and those activities are the primary negative effect to bumble bees and their habitat. Hazard trees along roads would be felled and removed under this alternative. Disturbance to understory vegetation would occur during the harvest along roadside corridors from logging machinery and the creation of landings to temporarily store and process harvested trees. This harvest would occur on approximately 15 percent (4,736 acres) of the project area. Since no site preparation and reforestation would occur, the effects are expected to be minimal.

Personal-use fuelwood harvest would occur within the fire footprint. Because the roadside salvage would remove many of the trees that fuelwood harvesters would potentially access under the No Action, fuelwood harvest would represent less of a cumulative effect under this alternative than the No Action. However, there may still be a minor amount of disturbance to or reduction of understory vegetation due to fuelwood harvest as a result of off-road vehicle traffic. Cumulative effects of activities on private timberlands within the Bald footprint would be as discussed within Alternative 1. There would be no substantive cumulative effects of these actions on western bumblebee habitat on USFS lands under this alternative.

Determination: As a result of analyses of direct, indirect and cumulative effects, it was determined that the proposed activities within Alternative 1 of the Bald Project may affect individuals of western bumble bee, but was not likely to result in a trend towards federal listing or loss of species viability.

Direct, Indirect, and Cumulative Effects to Black Juga

The black juga is an aquatic mollusk that occupies perennial stream and spring habitat. The black juga, as presently known taxonomically, is known to occupy habitat in perennial waters in Beaver Creek, upstream of the project area and fire perimeter. Within the project area, there are approximately 5.1 miles of perennial Beaver Creek, which, absent aquatic mollusk surveys in the area, were considered as potential suitable habitat for this species in this analysis.

Alternative 1: There is no potential for direct effects to black juga or potential suitable habitat from the proposed actions as there are no activities occurring in perennial reaches of Beaver Creek (potential suitable habitat) within the project area.

There is a risk of short-term increased sediment production from ground disturbing activities (primarily salvage and fuels treatments) proposed within the Upper Beaver Creek subwatershed that contains potential suitable habitat for the black juga. The risk of short-term increased sediment production is expected to be low and minimized with integrated design features, including but not limited to, minimal ground disturbing activities proposed within the Riparian Conservation Areas (RCAs) along the perennial reaches of Beaver Creek (e.g. 11% of the total RCA acres), combined with deferred livestock grazing of perennial reaches containing riparian vegetation affected by the fire until desired vegetative conditions are established.

Cumulatively, alternative 1 is expected to have a low potential for additional incremental negative indirect effects on black juga and its potential suitable habitat. This is because the beneficial action of deferring livestock grazing along the mainstem of Beaver Creek, including portions of the Beaver Creek springs area where the species occurs upstream of the fire/project area (approximately 5.4 total perennial stream miles), is combined with actions designed to minimize the risk of short-term increases in sediment from the primary ground disturbing activities (vegetation treatments).

There may be a cumulative and localized beneficial effect to water surface shade along approximately 5.4 miles of potential suitable habitat, including around the Beaver Creek springs black juga populations upstream of the project area, with potential for riparian vegetation conditions to improve from deferral of livestock grazing until desired vegetation conditions are met.

> **Determination:** Given the results of the analysis, it was determined that the proposed activities within Alternative 1 of the Bald Project "may affect individuals, but not likely to trend toward a loss of viability or Federal listing" for the black juga.

Alternative 2: Direct effects are the same as discussed under Alternative 1.No indirect effects to potential suitable black juga habitat (perennial Beaver Creek) are anticipated from increases in sediment as any felling of hazard trees that might occur along roads would be left in place.

Alternative 3: Direct effects are the same as discussed under Alternative 1. Indirectly there is a slight risk for increasing sediment because hazard trees felled along roads within the perennial Beaver Creek RCAs (approximately 26 acres) would be removed creating ground disturbance that might result in contributions of sediment to Beaver Creek. The risk for increases in sedimentation is much lower than Alternative 1,

however, as no vegetation treatment actions are proposed within the Upper Beaver Creek watershed within the project area, with the exception of limited hazard tree removal and fuels treatments in RCAs associated with roads that cross ephemeral and intermittent channels. As with Alternative 1, there is also the potential for a reduction in sediment to Beaver Creek over the short term. Deferral of livestock grazing of riparian vegetation along Beaver Creek proper would eliminate potential sediment from being generated due to direct disturbance of streambanks recently disturbed by the fire.

Cumulatively, alternative 3 is expected to have a very low potential for additional incremental negative indirect effects on black juga habitat. This is because the beneficial action of deferring livestock grazing along the mainstem of Beaver Creek, including portions of the Beaver Creek springs area upstream of the project area where the species occurs (approximately 5.4 total perennial stream miles), is combined with actions (hazard tree removal and associated fuels treatments) that are limited in scope.

There may be a cumulative and localized beneficial effect to water surface shade along approximately 5.4 miles of potential suitable habitat, including around the Beaver Creek springs black juga populations, with potential for riparian vegetation conditions to improve from deferral of livestock grazing until desired vegetation conditions are met.

> **Determination:** Given the results of the analysis, it was determined that the proposed activities within Alternative 3 of the Bald Project "may affect individuals, but not likely to trend toward a loss of viability or Federal listing" for the black juga.

Management Indicator Species (MIS) – Terrestrial and Aquatic

The MIS whose habitat would be directly or indirectly affected by the Bald Project (identified as Category 3 within the MIS reports) are carried forward in this analysis, which would evaluate the direct, indirect, and cumulative effects of the action alternatives on the habitat of these MIS. The MIS selected for project-level MIS analysis for the Bald Project are:

> **Terrestrial:** hairy woodpecker (snags in green forest ecosystem component) and black-backed woodpecker (snags in burned forest ecosystem component)
>
> **Aquatic:** aquatic macroinvertebrates (perennial riverine/lacustrine habitat) and Pacific Tree (chorus) frog (wet meadow habitat)

Summaries of the analyses of potential effects of the action alternative on analyzed MIS species and their habitats are provided below.

Direct and Indirect Effects to Hairy Woodpecker (Snags in Green Forest Ecosystem Component)

After the Bald Fire, approximately 987 acres of medium and large diameter snags in green forest ecosystem component remained within the Bald Project area. Additional similar habitat exists on other ownership within the fire footprint, but since most of these lands are drier and with smaller trees and more

shrublands than is present on USFS lands, large expanses of suitable hairy woodpecker habitat are not present there.

Alternative 1: Alternative 1 would reduce snags and/or downed logs on approximately 350 acres (35%) of the remaining habitat. Cumulatively, a small but unknown additional amount would be removed because of harvest on state, private and to a lesser extent BLM lands, as well as a small amount of fuelwood cutting on USFS lands. These additional habitat removals are expected to be minimal because of drier site conditions on other ownership indicates habitat does not predominate there. Habitat along USFS roads is susceptible to fuelwood cutters, but would already be harvested during hazard tree removal so remaining habitat is largely inaccessible. In summary, approximately 65 percent of green tree snags available for hairy woodpeckers would remain present across the landscape.

Alternative 2: There is a potential loss of approximately 108 acres of this habitat component along roads due to the combined activities of road maintenance and public firewood gathering. This loss would amount to an 11 percent reduction of the remaining viable habitat left intact because it is inaccessible and no treatments are proposed. Additional habitat removals expected on BLM, state and private lands would be minimal.

Alternative 3: There is an expected loss of approximately 108 acres of this habitat component along roads due to the combined activities of the proposed roadside hazard removal and public firewood gathering. This loss would amount to an 11 percent reduction of the remaining viable habitat left intact because it is inaccessible and no treatments are proposed. Additional habitat removals expected on BLM, state and private lands would be minimal.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Hairy Woodpecker Trend

As a result of the action alternatives, there would be a small expected change in “Snags in Green Forest Ecosystem Component”. This change amounts a 35 percent reduction of that habitat type (350 of 987 acres) within the Bald Project area. Given the ubiquity of this ecosystem component across the bioregion, this small change at the project level would not alter the stable bioregional trend in the ecosystem component, nor would it lead to a change in the distribution of hairy woodpecker across the Sierra Nevada bioregion.

Direct and Indirect Effects to Black-backed Woodpecker (Snags in Burned Forest Ecosystem Component)

After the Bald Fire, approximately 5,769 acres of medium and large diameter burned snags ecosystem component existed within the USFS portion of the fire. A small amount of similar habitat is present on other ownership within the fire footprint, but since most of these lands are drier, smaller tree size and more shrublands than is present on USFS lands, large expanses of suitable black-backed woodpecker habitat are not present there.

Alternative 1: Alternative 1 would reduce snags on approximately 3,646 acres (63 %) of the available habitat. Cumulatively, a negligible amount would be removed because of harvest on state, private and to a lesser extent BLM lands, as well as a small amount of fuelwood cutting on USFS lands. These additional

habitat removals are expected to be minimal because of drier site conditions and shrublands on other ownership indicates habitat does not predominate there. Habitat along USFS roads is susceptible to fuelwood cutters, but snags within these areas would be harvested during hazard tree removal and the remaining habitat is largely inaccessible. In summary, approximately 37 percent of medium and large diameter burned snags ecosystem component available to black-backed woodpeckers in addition to other habitat provided by retention islands would remain present across the landscape.

Alternative 2: There is a potential loss of approximately 222 acres of this habitat type along roads may be lost due to the combined activities of road maintenance and public firewood gathering. This loss amounts to a 4 percent reduction of the remaining available habitat left intact because it is inaccessible and no treatments are proposed. Negligible habitat removals are expected on BLM, state and private lands because drier site, smaller trees, and more shrublands indicate habitat does not predominate there.

Alternative 3: There is an expected loss of 222 acres of this habitat type along roads would be lost due to the combined activities of the proposed hazard tree removal and public firewood gathering. This loss amounts to a 4 percent reduction (222 of 5,769 acres) with most of the remaining 96 percent of available habitat left intact because it is inaccessible and no treatments are proposed. Negligible habitat removals are expected on BLM, state and private lands because drier site, smaller trees, and more shrublands indicate habitat does not predominate there.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Black-Backed Woodpecker Trend

The Bald Fire created approximately 5,769 acres of “Snags in Burned Forest Ecosystem Component”. Alternative 1 would result in a loss of approximately 63 percent of this recently created habitat. Approximately 2,121 acres (37%) would be retained in the untreated areas. In addition to these estimated to be lost, approximately 23 acres would be lost from actions on adjacent BLM, state and private sands, which are drier, have smaller tree sizes, and more shrublands than USFS ownership and thus function minimally as habitat. Given that from 2006 to 2013 wildfires created an estimated 168,761 acres of burned forest black-backed woodpecker habitat, the combined reductions of nearly 3,700 acres of “Snags in Burned Forest Ecosystem Component” would not alter the stable trend of this of ecosystem component, nor would it lead to a change in the distribution of black-backed woodpecker across the Sierra Nevada bioregion.

Direct and Indirect Effects to Aquatic Macroinvertebrates (Riverine/lacustrine Habitat)

Overall, the potential effects would be undetectable and/or of low risk for the habitat factors analyzed because there would be no direct change to stream flows and there would be a very high proportion of untreated RCAs associated with perennial features (90 percent of RCAs for stream/82 percent for RCA lakes) which would minimize the potential for short term increases in sedimentation. Additionally, there could be potential improvement to sedimentation and localized water surface shade over the short term due to increased riparian plant growth and vigor expected along perennial stream reaches where livestock

would be deferred from grazing (potentially up to 5.4 stream miles within and upstream of the project area).

Alternative 2: There are no proposed actions and therefore there are no direct or indirect effects that would result in cumulative effects to perennial features.

Alternative 3: Overall, the potential effects would be undetectable and/or of very low risk for the habitat factors analyzed because there would be no direct change to stream flows and there would be a very high proportion of untreated RCAs associated with the perennial features (93% of RCA for stream/92% for lakes) which would minimize the potential for short term increases in sedimentation. Additionally, there could be potential improvement of reduced sediment and localized water surface shade over the short term due to increased riparian plant growth and vigor expected along perennial stream reaches where livestock would be deferred from grazing (potentially up to 5.4 stream miles within and upstream of the project area).

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Aquatic Macroinvertebrate Habitat Trend

As there would be no direct change in stream flow, no change in water surface shade (though some potential for localized improvement along approximately 5.4 miles with deferred grazing), and low risk of increased sediment, the Bald Project action alternatives (Alt 1 and 3) would not alter the existing status and trend in the riverine/lacustrine habitat (aquatic macroinvertebrates) across the Sierra Nevada bioregion.

Direct and Indirect Effects to Wet Meadow Habitat (Pacific Tree (Chorus) frog)

Alternative 1: Overall, the potential effects would be undetectable and/or of low risk for the habitat factors analyzed because there would be no net loss or change in wet meadow acres, upwards of 97 acres could potentially improve in herbaceous vegetation height/ground cover with deferred grazing from the project area over the short term, and no change in meadow hydrology is anticipated from proposed vegetation treatments within 309 acres of wet meadow RCAs (or 31 percent of the total existing RCA acres associated with wet meadows).

Alternative 2: There are no proposed actions and therefore there are no direct or indirect effects that would result in cumulative effects.

Alternative 3: Overall, the potential effects would be undetectable and/or of extremely low risk for the habitat factors analyzed because there would be no net loss or change in wet meadow acres, upwards of to 97 acres could potentially improve in herbaceous vegetation height/ground cover with deferred grazing from the project area over the short term, and no change in meadow hydrology is anticipated from hazard tree removal in 126 acres of wet meadow RCAs (or 13% of the total existing RCA acres associated with wet meadows).

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Pacific Tree (Chorus) Frog Trend

With no change in total wet meadow acres or meadow hydrology, combined with the potential positive short term increase in herbaceous vegetation/ground cover on up to 97 of the 61,247 acres of wet meadow currently estimated on National Forest System lands in the Sierra Nevada bioregion, the proposed Bald Project action alternatives (Alt 1 and 3) would not alter the existing trend in wet meadow habitat, nor would they lead to a change in the distribution of Pacific tree frogs across the Sierra Nevada bioregion.

Botanical Resources

There is currently one Forest Service Region 5 Sensitive plant species known to occur within the Bald Project area: *Eriastrum tracyi* (Tracy's eriastrum). There is one occurrence of this species, which is located within a hazard tree removal treatment unit in the vicinity of Coble Spring. There are no known USDI FWS Threatened or Endangered plant species occurrences or Designated Critical Habitat within the Bald Project boundary.

Alternative 1

Direct Effects

There is one documented occurrence of *Eriastrum tracyi* along the shoulder of road 35N14 within a proposed hazard tree removal treatment unit. With the implementation of project IDF's, this occurrence would be protected through flag and avoid methods from all project-related activities. However, this species was not known to the LNF until 2009 and may occur along other roads and in areas with suitable habitat throughout the project boundary where floristic surveys have not been conducted in recent years. If there are other *Eriastrum tracyi* occurrences within or adjacent to treatment units, individuals of this species may be impacted by project activities. Direct effects may be sustained by potential habitat or any *Eriastrum tracyi* occurrences missed by previous surveys where mechanical equipment is used in hazard tree removal, area salvage harvest, fuels treatments, and reforestation activities. However, these effects are expected to be short-term and minimal with the incorporation of IDF's and in consideration of the inherent tolerance of many annual species to short-term ground disturbance.

Indirect Effects

Disturbance caused by hazard tree removal, salvage harvest, fuels treatments and site preparation for reforestation may create new areas of bare mineral soil for this species to colonize which may be beneficial to *Eriastrum tracyi*. The habitat of *Eriastrum tracyi* might be improved by the introduction of disturbance to soils and removal of competing plants. However, the encroachment of more aggressive annual plants such as non-native grasses may preclude an otherwise improved condition of the habitat, depending on the potential introduction and rate of spread of these plants.

Reforestation activities would result in an accelerated re-establishment of tree canopy cover and could shade out plants within *Eriastrum tracyi* occurrences over the long-term, as the species is primarily

known from sites where plants receive full sun. However, Bald Project IDFs stipulate no conifers would be planted within 25 feet of known rare plant occurrences, including any new occurrences located before or during reforestation activities. Therefore, adverse effects from reforestation activities would be limited to potential habitat and any new occurrences that may be present in the project area that are not discovered before or during implementation.

At high enough soil concentrations, Sporax® can be toxic to plants. However, project IDF's stipulate that Sporax® would not be applied within 25 feet of Sensitive plant occurrences. There would be no effects to the known *Eriastrum tracyi* occurrence within the project area; however, *Eriastrum tracyi* plants that may be present within treatment units and not discovered before or during implementation may be affected by the application of Sporax®.

Eriastrum tracyi occurrences may be affected by an increase in invasive plant species or other undesirable non-native species as a result of project activities. The Bald Project Invasive Plant Species Risk Assessment reports a moderate risk of weed spread associated with the implementation of Alternative 1. However, project IDFs are designed to reduce the risk of invasive plant establishment and spread, through flag and avoid methods, equipment washing and post-project monitoring. Therefore, *Eriastrum tracyi* occurrences are not expected to sustain extensive project-related indirect effects from invasive plants.

Overall, indirect effects to *Eriastrum tracyi* plants may occur as a result of project-related activities from soil disturbance, changes in forest vegetation structure, the use of Sporax® and spread of invasive plants; some of these effects are expected to be beneficial, while potential adverse effects would be reduced with the implementation of project IDFs.

Cumulative Effects

Current inventories of Sensitive plant species capture the aggregate impact of past human actions and natural events that have led to the current inventory of these species. Past human actions and natural events are therefore implicit within existing conditions within the project area. Cumulative effects for *Eriastrum tracyi* are spatially bounded by the Bald Project area and temporally bounded by a 20-year time frame. Cumulative effects would result when the direct and/or indirect effects of Alternative 1 on *Eriastrum tracyi* add incrementally to the effects of past, present, and reasonably foreseeable future actions. Ongoing projects with the potential for the highest impact to *Eriastrum tracyi* include vegetation management on private lands and LNF road maintenance activities. Other actions, such as railroad maintenance, fuelwood cutting, public recreational use, and Christmas tree cutting may contribute only incidental effects on *Eriastrum tracyi*, if any. Future actions such as timber harvest, site preparation, machine piling, pile burning, reforestation activities, and livestock grazing may contribute future impacts to *Eriastrum tracyi* occurrences and habitat.

Past, ongoing and reasonably foreseeable future actions may add cumulatively to the direct and indirect effects of Alternative 1. The implementation of Alternative 1 may result in direct effects to unknown *Eriastrum tracyi* occurrences and potential habitat, but these effects are expected to be minimal and short-term. Short-term indirect effects from the reduction in canopy cover and soil disturbance may be

beneficial to *Eriastrum tracyi* occurrences, while long-term adverse indirect effects from reforestation activities and invasive plant establishment on potential habitat for *Eriastrum tracyi* may occur; however, these effects would be minimized with the implementation of Bald Project IDF's. Although project effects may add cumulatively to the effects of past, ongoing and future actions on *Eriastrum tracyi*, these effects would not lead to a loss of viability for this species within the Bald Project area or across the LNF for at least the next 20 years.

Alternative 2

Direct Effects

There would be no direct effects to *Eriastrum tracyi* other than those associated with ongoing activities.

Indirect Effects

Indirect effects from Alternative 2 would be those associated with post-fire habitat succession and the future risk of invasive plant establishment and spread. Post-fire habitat succession would favor shrub and forb species prior to the re-establishment of a tree canopy. Delayed establishment of tree canopy cover would constitute a beneficial indirect effect to *Eriastrum tracyi*; however, this effect would be at least partially offset by the establishment and cover of shrubs that may compete with this species for light and resources. The Invasive Plant Species Risk Assessment for the Bald Project determined that current habitat vulnerability to invasive plants was high. There are several known invasive plant occurrences within the project area, which have the potential to spread into suitable habitat for *Eriastrum tracyi.* Overall, *Eriastrum tracyi* may sustain detrimental indirect effects from invasive plants and partially beneficial effects from post-fire habitat succession under Alternative 2.

Cumulative Effects

The scope of analysis and the effects of past, ongoing and future foreseeable actions under Alternative 2 would be similar to those discussed for Alternative 1, with the exception of the effects of post-fire habitat succession and future livestock grazing. No direct effects would occur to *Eriastrum tracyi* occurrences; therefore, past, ongoing and reasonably foreseeable future actions would add cumulatively only to the indirect effects of Alternative 2. Post-fire habitat succession would continue and non-hazard trees killed by fire would be left in place and eventually fall over, resulting in an accumulation of fuel loads, which may provide barriers to livestock and protect *Eriastrum tracyi* habitat. However, these fuel loads may prevent the potential introduction and establishment of *Eriastrum tracyi* in some areas. *Eriastrum tracyi* may sustain detrimental indirect effects from invasive plants and partially beneficial effects from post-fire habitat succession and a reduction in future impacts from livestock grazing. Therefore, *Eriastrum tracyi* may sustain negative effects with the implementation of Alternative 2, but it is not expected to affect the viability of this species within the Bald Project area or across the Lassen NF for at least the next 20 years.

Alternative 3

Direct Effects

Direct effects to occurrences of *Eriastrum tracyi* and potential habitat would be similar to those discussed under Alternative 1, but to a lesser extent since project activities would occur on a much smaller footprint. Direct effects may be sustained by potential habitat or any unknown *Eriastrum tracyi* occurrences; however, these effects are expected to be short-term and minimal with the implementation of project IDFs.

Indirect Effects

Indirect effects from Alternative 3 would be those associated with the felling of roadside hazard trees, post-fire habitat succession, the use of Sporax® and the risk of invasive plant introduction and establishment. The impact of these effects on *Eriastrum tracyi* would be similar to those associated with Alternative 1, but to a smaller degree since the footprint of the treatment area would be considerably less; therefore, the threat of invasive plant spread into native plant communities from project-related activities would be reduced. Indirect effects to *Eriastrum tracyi* occurrences and habitat may occur as a result of project-related activities from soil disturbance, post-fire habitat succession, the use of Sporax® , and spread of invasive plants; some of these effects are expected to be beneficial, while potential adverse effects would be reduced with the implementation of project IDFs.

Cumulative Effects

The scope of analysis and the effects of past, ongoing and future foreseeable actions under Alternative 3 would be similar to those discussed for Alternative 1, with the exception of the effects of future livestock grazing. Cumulative effects from livestock grazing may be reduced under this alternative if the accumulation of fuel loads outside of the hazard tree units protects *Eriastrum tracyi* from trampling and defecation by livestock. These heavy fuel loads may provide *Eriastrum tracyi* with protection from livestock trampling, but may also prevent this species from potentially establishing in other areas disturbed by fire. Therefore, future impacts on Sensitive plants from livestock grazing may occur under Alternative 3, but these effects are expected to be less than those that may occur under Alternative 1. Past, ongoing and foreseeable future actions may add cumulatively to the direct and indirect effects of Alternative 3. The implementation of Alternative 3 could result in direct effects to *Eriastrum tracyi*, but these effects are expected to be minimal and short-term. Indirect effects from soil disturbance, post-fire habitat succession, the use of Sporax® and spread of invasive plants may occur, but some of these effects are expected to be beneficial, while potential adverse effects would be reduced with the implementation of project IDFs. Although project effects may add cumulatively to the effects of past, ongoing and future actions on *Eriastrum tracyi*, these effects would not lead to a loss of viability for this species within the Bald Project area or across the LNF for at least the next 20 years.

Soils

Alternative 1

Direct and Indirect Effects

Ground-based mechanical treatments have the potential to cause detrimental disturbance to soil in the post-fire environment. On-site direct effects from the proposed action are expected to be minimal with the project (IDFs) in place. Overall soil cover is expected to increase as a result of tractor salvage. During the felling and moving of trees limbs, bark and needles break off and cover the soil surface. A tractor salvage unit that burned at high vegetation burn severity in the 2012 Chips Fire on the Lassen NF was monitored for soil cover before and after salvage harvest. Results showed a sizable reduction the amount of bare ground after salvage harvest, with the majority of the monitored points having greater than 50% ground cover after salvage activities occurred. A 50 % ground cover would give a moderate erosion hazard in units, which presently have high erosion hazard due to low soil cover after the fire, and lowers the risk of erosion. In addition, on skid trails over 20% slope, approximately 75% soil cover is required in addition to water barring to minimize erosion.

The potential for activities to generate additional soil cover in the form of woody debris in areas with moderate and high soil burn severity is considered a net benefit for burned areas, but the loss of vegetation resulting from mechanical operations is a short-term adverse impact. After fuel treatments have occurred, natural regeneration as well as planting would increase vegetation cover in the long-term.

Ten years of soil monitoring on the forests of the Herger-Feinstein Quincy Library Group (HFQLG) pilot project (which includes the Lassen NF) have demonstrated the effectiveness of Forest Service implementation methods in preventing detrimental soil effects resulting from vegetation management activities in the Northern Sierra Nevada and Southern Cascades. Similarly, Best Management Practices (BMP) monitoring during the same period have demonstrated that the Lassen has been highly effective in its protection of soils and water quality through proper implementation of BMPs (HFQLG, 2011).

Soil erosion and impaired hydrologic function have a general potential to create indirect effects. Indirect effects of erosion and compaction are off-site effects upon watershed hydrology and/or water quality. Damaged soil hydrologic function, via compaction, can lead to increased runoff, which can affect the quantity, timing, and flashiness of stream flows during precipitation events. The direct effects associated with proposed activities are expected to be mitigated by use of integrated design features (IDFs) protecting both soils and hydrology, so indirect effects would be accordingly minimal.

Cumulative Effects

Based on limited field observations and a review of past projects, there is a minor degree of persistent porosity loss (compaction). The adverse effects of the proposed action are expected to be minimal due to IDFs that would minimize the detrimental compaction that may be expected in areas with landings and skid trails, and remediates areas that may exceed the LRMP standard.

In improving soil cover for areas currently lacking it, there would likely be a moderate short-term benefit from project activities in reducing overall erosion potential within the treatment units, while soil productivity and hydrologic function are maintained. In the long-term, as vegetation is planted and comes in naturally, soil cover would approach the high soil cover that normally occurs on the unburned landscape within the project area.

The proposed action would maintain soil productivity and function within required standards. Therefore, the proposed action in combination with past, ongoing, and reasonably foreseeable future actions would not produce adverse cumulative effects to the soil resource.

Alternative 2

Direct, Indirect, and Cumulative Effects

Direct effects of the No Action alternative would be minimal on the soils, as soil disturbing project activities would not take place except to cut down hazard trees along roads during road maintenance.

Indirect effects of the No Action alternative would be the continued short-term erosion, particularly for steeper areas with moderate and high soil burn severity, until hydrophobicity diminishes and ground cover naturally increases. In the long-term, areas with moderate and high soil burn severity would have high fuel loadings, with a corresponding elevated hazard of detrimental soil effects in the event of wildfire.

Soil cover for erosion protection would gradually increase as low growing plants establish and spread. This would occur more slowly than under Alternative 1where groundcover increases more quickly due to debris and branches adding to soil cover during salvage and fuels activity. Debris from dead trees would fall and provide some soil cover. Present compaction levels and soil hydrologic function would remain unchanged. Organic matter dynamics and nutrient cycling would continue to recover naturally, once vegetation becomes re-established. Some areas would be left lacking surface cover, while other areas would have high concentrations of fuels putting soils at greater risk for adverse effects from the next fire.

Alternative 3

Direct, Indirect, and Cumulative Effects

This alternative would treat approximately 15 percent of the project area. Where treatments occur the effects would similar to those described above under Alternative 1 for the removal of hazard trees with mechanical harvest followed by machine piling of fuels generated in removal of the trees. No further fuels work would occur. The 85 percent of the project area left untreated would recover naturally with the effects discussed above in Alternative 2.

Hydrology

Three of the five watersheds; Bald Mountain, Negro Camp Gulch, and Lower Beaver Creek, within the project area are internally drained and lack connectivity with channels downstream. The Middle Beaver

Creek and Upper Beaver Creek Watersheds are externally drained, with waters flowing through Beaver Creek and into the Pit River. The only perennial stream within the project area is Beaver Creek

There are a small number of springs, wet meadows, potential wetlands, seasonal pools, and small reservoirs within the project area (both named and un-named). Those mapped according to the US Fish and Wildlife Service's National Wetlands Inventory (USFWS, 2014) include Moon Springs, Coble Springs, Negro Camp springs, reservoir, and wetland, Sheep Flat, Willow springs, Gibb Springs, Beaver Creek, and Beaver Creek wetlands.

Alternative 1

Direct and Indirect Effects to Stream Flow

Transpiration rates would not change from the post-fire condition as a result of the salvage and fuel reduction activities proposed in Alternative 1. The trees to be removed are already dead or dying, treatments would not immediately change transpiration in the project area. Over time as vegetation reestablishes and the plantations develop, transpiration rates would return to the pre-fire levels. Stream flow would be expected to increase in the short-term and return to pre-fire levels in the long term. Replanting would help to quickly reestablish vegetation and lower peak flows over time.

Hydrophobicity as a result of the fire in the moderate to high burned soils has the potential to increase surface flow and decrease infiltration leading to increased peak runoff. The ground disturbing activities in Alternative 1 would help break up these hydrophobic soils, thereby reducing these negative effects from the fire.

Compaction resulting from the use of heavy equipment could increase runoff and raise peak flows. The potential one mile of temporary road would not cross stream channels or be located within the RCA and therefore would have negligible effect to flows. The implementation of BMPs and adherence to Wet Weather soil moisture requirements would minimize project related compaction. An IDF requires remediation of unit soils if the LRMP standard of 15 percent areal extent detrimental porosity loss is exceeded. Taken together, negligible effects to flows are anticipated.

Direct and Indirect Effects to Streambank Stability

There would be minimal direct or indirect effects to streambank stability from Alternative 1 as there is no mechanical treatment within the RCA for Beaver Creek, the only perennial stream, and there is a minimum of 25 feet no mechanical equipment buffer along all other channels. With hand treatments, no trees providing bank stability would be removed and no live trees would be removed. These measures would protect streambank stability. In addition, 90 percent groundcover would be required for skid trails in the RCA, thus lowering the potential for erosion.

Pile burning post salvage would not occur within 25 feet of a channel or riparian vegetation to protect bank stability.

Beaver Creek, the only perennial channel within the project area, would be buffered from project activities with a 300 foot no treatment zone with the exception of minor (approx. 14 acres) hand treatment.

The tributaries to Beaver Creek, in the Upper and Middle Beaver Creek Watersheds, would have site-specific IDFs, as well as BMPs, to protect them from bank degradation, including a 25 foot no mechanical equipment buffer adjacent to the channel. Most of these channels are ephemeral, with a few intermittent channels.

Field monitoring, to-date, following major precipitation events has not shown any major erosion or bank undercutting within these drainages.

Direct and Indirect Effects to Water Quality

Risks of water quality degradation driven by increases in sediment delivery from Alternative 1, beyond that which would already occur because of the Bald Fire, are negligible. No mechanical treatments are planned within the RCA of Beaver Creek, the only perennial stream within the project area. A small number of acres (approximately 14) could have fuels treated by hand but this minor treatment is unlikely to impact water quality.

Up to one mile of temporary road could be constructed. Temporary roads would not be placed in RCAs and therefore would have no impact to stream channels. These roads would be decommissioned after use.

In the Middle and Upper Beaver Watersheds, where water quality problems could affect impaired bodies downstream and their beneficial uses, there are only a few areas where RCAs are being treated. The existing slope gradients adjacent to stream channels are moderate to low. Furthermore, with implementation of IDFs and BMPs for the soil moisture and groundcover, effects from the project on sediment delivery are expected to be negligible. The portions of the Project area in the Bald Mountain, Lower Beaver, and Negro Camp watersheds are not surficially connected to any waterbodies in other watersheds, but are instead internally drained and could not transport sediment downstream.

Temperature rates would not change from the post-fire condition as a result of the salvage and fuel reduction activities proposed in Alternative 1. All channels within treatment units except the 14 acres of hand treatment along Beaver Creek are seasonal in nature. Stream channel shading in seasonal channels has little influence on water temperature further downstream in late summer and fall, when elevated water temperatures are most likely to occur. By the time water temperature is of greater importance, such as late summer, the seasonal streams are no longer carrying water. Additionally, tree removal is limited to dead or dying trees that would provide little shade in the future.

Piling and burning of material near stream courses could contribute ash to streams. Ash can change the pH and other chemical properties of water if contributed in sufficient quantity. Treatments within RCAs are expected to result in a large amount of breakage and a corresponding increase in groundcover. IDFs restrict piling within 25 feet of aquatic features and limit the timing of pile burning within the RCA. Together, these would reduce the risks of ash from pile burning moving into channels. The increased

groundcover produced by the project activities would aid in filtering out potential sediment from both the Bald Fire and Project activities before it reaches stream channels.

Borate compounds that would be applied to cut stumps of conifers greater than 24 inches in diameter to reduce the risk of root diseases would not be applied within 25 feet of live stream courses, meadows/wetlands, or sensitive plant locations, reducing risk to water quality from use of the compound. The timing of borate compound application would also be during dry season conditions when there is little likelihood of runoff events.

BMP Practice 2-12 requires that servicing and refueling activities that may be needed by mechanical equipment during project implementation would be located away from RCAs. Suitable locations for such activities are to be designated and agreed to prior to project implementation.

Direct and Indirect Effects to Down Woody Debris

Alternative 1 with the incorporation of IDFs and wildlife retention areas would meet the RCO for large woody debris within RCAs. Eight to ten of the largest snags per 100 linear feet would be left in the RCAs. These would also provide a reservoir of future down woody debris that would add to future channel complexity and sediment regulation. Alternative 1 would reduce the fuel loading in RCAs, thereby decreasing the fire hazard. Down woody debris also holds moisture in place, thereby limiting evaporation, increasing infiltration, and keeping some moisture on the ground later into the year.

Direct and Indirect Effects to Springs, Small Reservoirs, and Wetlands

Adverse effects to the Aquatic Features are expected to be negligible. No treatment is proposed around Moon Springs, Coble Springs, Gibb Springs, and Beaver Creek wetlands. Treatment in proximity to Beaver Creek and Sheep Flat is minimal. There is a minimum of a 25-foot mechanical buffer on all other aquatic features within treatment units. In addition, IDFs require eight to ten large logs be left on site where they exist and that planting of conifers would not occur within 20 feet of riparian plant communities. If riparian vegetation does not naturally regenerate, riparian species may be planted. These IDFs are expected to protect, and if necessary, improve riparian conditions in these areas.

Alternative 2

Direct and Indirect Effects to Stream Flow

Hydrophobicity as a result of the fire in the moderately to highly burned soils would cause minor increases in surface flow and decreased infiltration. However, this is a short-term effect, as the hydrophobicity is expected to disappear in approximately two years.

As the quantity of down wood increases from falling snags, the hydrologic connection between the burnt areas and hydrologic features would decrease. This corresponds to the speed and quantity of runoff decreasing in time, which would decrease peak flows and increase base flow. The effect of the hydrophobicity would decrease in time, as the effects from the increasing number of down snags would increase.

Changes in flows would be the same as seen under the post-fire existing conditions due to the high degree of vegetation mortality from the fire. Over time as vegetation reestablishes, the transpiration rates would return to the pre-fire levels. Stream flow would be expected to increase in the short-term and return to pre-fire levels in the long term.

Direct and Indirect Effects to Streambank Stability

There would be minimal direct or indirect effects to streambank stability from Alternative 2. Without the removal of any snags, channel stability could be compromised in isolated areas, due to high concentrations of woody debris.

Direct and Indirect Effects to Water Quality

The primary water quality concerns after a fire include increases in sediment, and increases in pH from ash being flushed into the waterbody. Initially, the risk of sediment and ash flushing into waterbodies is high due to the lack of ground cover. Over time, vegetation regrowth and increased down woody material would aid in filtering out potential sediment before it reaches stream channels.

Temperature rates would not change from the post-fire condition. All channels with the exception of Beaver Creek are seasonal in nature. Stream channel shading in seasonal channels has little influence on water temperature further downstream in late summer and fall, when elevated water temperatures are most likely to occur. By the time water temperature is of greater importance, such as late summer, the seasonal streams are no longer carrying water.

Direct and Indirect Effects to Down Woody Debris

The positive and negative effects of down woody debris are the same as discussed under Alternative 1.

Direct and Indirect Effects to Springs, Small Reservoirs, and Wetlands

Since no actions would be taken under this alternative, the aquatic features in the Project area would not be damaged or helped by management actions.

Alternative 3

Direct and Indirect Effects to Stream Flow, Streambank Stability, Water Quality Springs, Down Woody Debris, Small Reservoirs, and Wetlands

Direct and indirect effects to hydrologic resources from Alternative 3 would be minimal. Treatments in RCAs would occur from the road prism, therefore effects to stream channels or any aquatic features would be minimal. Trees to be removed are dead or dying, so no measureable effects to streamflow are expected. With the IDFs, which restrict equipment operations near streams, no direct or indirect effects to channel stability are expected to occur. Ground disturbance from roadside hazard removal would be relatively minimal since most roads proposed for hazard removal are not near stream channels and treatments in RCAs would occur from the road prism. No measureable effects to water quality would be expected from this alternative.

The positive effects of down woody debris are the same as discussed under Alternative 1.

Outside the road hazard units, no other actions would occur in the fire perimeter. Therefore, the effects in these areas for Alternative 3 are the same as those discussed under Alternative 2.

Cumulative Effects - All Alternatives

Cumulative watershed effects (CWE) include past, present, and reasonably foreseeable future ground disturbing activities within the analysis area. Cumulative watershed effects can occur on site or downstream of land disturbing activities. These effects may be either beneficial or adverse, and result from additive changes in watershed structures and processes caused by multiple land management activities or natural events (such as wildfire) within a watershed. The key steps in a cumulative effects analysis are to identify the beneficial uses of concern, determine the cause-effect relationships of an alternative on the beneficial uses, and determine the magnitude and significance of the environmental consequences resulting from an alternative in relation to other past, present, and future actions. The significance of effects should be determined based on context and intensity. Factors used to define context and intensity of effects include their magnitude, geographic extent, duration, and frequency. Changes in flow regimes, especially peak flows, and sediment introduced to streams can combine to upset the dynamic sediment transport/stream flow equilibrium conditions.

Wildfires as well as management practices can alter soil condition. This may affect infiltration rates and increase the amount of disturbed soils within a watershed. Modification of ground cover can also change run-off rates and erosion processes. All of these factors have the ability to create CWEs. The BMPs and IDFs are tools to minimize adverse CWEs, and to ensure that beneficial uses of waterbodies are maintained.

Past activities within the project area include wildfire activity as well as resource management on both Forest and adjacent lands. Ongoing activities include existing road infrastructure and related maintenance, fuelwood cutting, and dispersed recreation. Salvage logging on BLM lands (approximately 450 acres) within the fire footprint began shortly after the fire ended in late 2014, and have continued into 2015. Foreseeable future activities include fuels treatments within portions of the eastside Underburn Project that did not burn in the Bald Fire.

Equivalent Roaded Acres

The Pacific Southwest Region (Region 5) of the Forest Service has adopted the Equivalent Roaded Acres (ERA) model as a method of assessing the risk of adverse CWEs. Under this method, the watershed is rated by soils, streams, roads, fire history, past activities, and given a number showing susceptibility to adverse CWEs from both natural events and management activities. This model is designed as a preliminary indicator for managers to determine whether past and present land management disturbances in a given watershed approach or exceed a threshold of concern (TOC), which is given as a percent of the watershed area. The TOC is set for each watershed based on how sensitive the watershed is to impacts. For this analysis, a threshold of concern (TOC) of 18 percent is used to identify potential risks for adverse impacts to the watershed. When ERAs approach or exceed a given watershed's TOC, further field work

would be necessary to ascertain the risk of land management activities adversely adding to those effects and resulting in detrimental impacts to beneficial uses. This fieldwork occurred periodically after storm events in the winter of 2014-2015 and in April 2015.

The ERA methodology has both strengths and weaknesses. The modeling is readily duplicated, computationally simple, and easily understood. It also incorporates rates of management disturbance and recovery times associated with those disturbances, an attribute which is missing in many other CWE models. Conversely, it is an empirical model that has no basis in physical or biological processes. It cannot consider the location of features, soil types and conditions, or the distribution and types of vegetation. It does not address physical or biological processes in stream channels, nor does it account for the time lag associated with moving sediment delivered from a given activity downstream. Recovery times in the ERA model apply only to onsite impacts.

As this project is proposed to address the effects of the Bald Fire, the largest number of treatments are proposed in the watersheds, which experienced the most effects from the fire. While the ERA from the Project is modeled with all activities occurring in 2015, in reality, some salvage could occur in 2016 thus lowering the effects for 2015. Other activities, such as fuel reduction and planting, would occur over the next five to ten years.

Table 8 shows the ERA for the existing condition, broken down by pre-fire ERA and the ERA from the Bald fire. Table 9 provides a summary of ERA values under each alternative for the Bald Project. The Middle Beaver Creek and Negro Gulch subwatersheds are over threshold and considered to be at a very high risk of cumulative effects under every alternative, which is primarily due to the large percentage of the watershed area (over 65%) that burned at moderate-to-high severity.

Table 8 – Summary of Prefire ERA and ERA from the Bald fire by Watershed

HUC-12 Watershed	ERA Threshold	ERA Before Fire	Fire ERA	Combined ERA
Bald Mountain Reservoir	18	3	3	6
Lower Beaver Creek	18	5	8	13
Middle Beaver Creek	18	2	**18**	**20**
Negro Camp Gulch	18	5	**23**	**28**
Upper Beaver Creek	18	6	8	13

Table 9 - ERA changes and modeled recovery risk from adverse CWEs over time

HUC-12 Watershed	2015 ERA	2020 ERA	2025 ERA
Alternative 1			
Bald Mountain Reservoir (Risk of CWE)	**6** (Low)	**4** (Low)	**2** (Low)
Lower Beaver Creek (Risk of CWE)	**17** (High)	**11** (Moderate)	**5** (Low)
Middle Beaver Creek (Risk of CWE)	**26** (Very High)	**19** (Very High)	**7** (Low)
Negro Camp Gulch (Risk of CWE)	**35** (Very High)	**26** (Very High)	**10** (Moderate)
Upper Beaver Creek (Risk of CWE)	**18** (High)	**14** (Moderate)	**7** (Low)
Alternative 2			
Bald Mountain Reservoir (Risk of CWE)	**6** (Low)	**4** (Low)	**2** (Low)
Lower Beaver Creek (Risk of CWE)	**13** (Moderate)	**8** (Moderate	**3** (Low)
Middle Beaver Creek (Risk of CWE)	**20** (Very High)	**14** (High)	**4** (Low)
Negro Camp Gulch (Risk of CWE)	**28** (Very High)	**21** (Very High)	**7** (Low)
Upper Beaver Creek (Risk of CWE)	**13** (Moderate)	**9** (Moderate)	**4** (Low)
Alternative 3			
Bald Mountain Reservoir (Risk of CWE)	**6** (Low)	**4** (Low)	**2** (Low)
Lower Beaver Creek (Risk of CWE)	**16** (High)	**10** (Moderate)	**4** (Low)
Middle Beaver Creek (Risk of CWE)	**25** (Very High)	**18** (Very High)	**6** (Low)
Negro Camp Gulch (Risk of CWE)	**33** (Very High)	**25** (Very High)	**10** (Moderate)
Upper Beaver Creek (Risk of CWE)	**13** (High)	**11** (Moderate)	**5** (Low)

Alternative 1

Internally Drained Watersheds (Bald Mountain, Negro Camp Gulch, and Lower Beaver Creek)

Bald Mountain Reservoir is considered low risk for adverse CWEs. Negro Camp Gulch is considered to be at very high risk of adverse CWEs, primarily from the fire. With the combined ERA numbers, Lower Beaver Creek Watershed is below the 18 percent TOC, but still is considered to be at high risk for adverse CWEs under Alternative 1 (Table 9). As discussed under direct and indirect effects above, IDFs are in place to minimize effects from the project. These include a 25-foot no mechanical equipment buffer along channels, a prohibition of equipment on slopes over 20 percent within RCAs, and a requirement to leave 90 percent groundcover along skid trails in RCAs. All of these help to disconnect treatments from the stream channels, in order to minimize impacts from the project. In addition, eight to ten of the larger snags would be left along channels for future large wood recruitment. These and other IDFs would decrease onsite effects from the project as discussed above in the direct and indirect effects section. Following preliminary analysis, it was decided that in the steeper areas with rhyolitic soils (highly erosive) of the Negro Camp Gulch and Lower Beaver Creek Watersheds, fuel treatments would be limited to mastication, grapple piling, and other less ground disturbing techniques.

Due to the lack of connectivity with channels downstream, project activities can have no effect on downstream beneficial uses.

Over the next ten years, as the area revegetates (both naturally and by planting), the effects from both the fire and project are modeled as decreasing, along with the risk of adverse CWEs. Within ten years, all the watersheds are modeled to be below the TOC, except for Negro Camp Gulch, which would be at a moderate risk. In reality, it would be expected that the true risk would be low within a few years as the area is revegetated and groundcover is in place to protect the soils.

Externally Drained Watersheds (Middle and Upper Beaver Creek)

The Middle Beaver Creek and Upper Beaver Creek Watersheds are externally drained, with waters flowing through Beaver Creek and into the Pit River. Both are modeled to be at very high risk of adverse CWEs (Table 9). After preliminary analysis, as with Negro Camp Gulch, as discussed above, treatments were dropped or modified on the steeper, more sensitive slopes and the permitted fuels treatments in these areas were reduced to allow only low impact methods such as grapple piling, and mastication. In addition, the 25-foot no mechanical entry buffer around the seasonal channels and the 300-foot no mechanical entry buffer around Beaver Creek (planned treatments are approximately 14 acres of hand treatments) would help disconnect the mechanical treatments from the channels.

Further fieldwork occurred after preliminary analysis to examine the channels downstream of the proposed treatment areas, particularly in the Middle Beaver Creek Watershed. Downstream of the proposed treatments, the topography becomes less steep and many of the seasonal channels tend to be low gradient and poorly defined. As of April 2015, few impacts from the flows of the previous winter were seen. The channels are predominately stable. Where they go through meadows, the grasses are growing back, further adding to bank stability. Given BMPs, IDFs for the treatments, and the low gradient of the

channels downstream of the Project area, it is unlikely that the Project would impact downstream beneficial uses.

Alternative 2

Alternative 2 is the present existing condition. There are no additional, adverse CWEs from the Project, as seen in Table 9. Trees would be dropped under road maintenance agreements already in effect and left in place. Some of the watersheds are modeled to be at high to very high risk of adverse CWEs in 2015 due to effects of the fire. As vegetation grows, the effects from the fire would decrease and within ten years the modeled risk of adverse CWEs are low for all watersheds.

Alternative 3

Alternative 3 has risk ratings between those of Alternative 1 and Alternative 2 because the treatments acres would be fewer and treatments are limited to hazard tree removal along the roads and railroad grades. This alternative has minimal impact on channels as all mechanical treatments in RCAs occur from the road prism.

As with Alternative 1, the watersheds modeled to be at high risk are the ones that had the most acres burn in the fire. Within ten years, the Middle Beaver Creek Watershed's modeled risk of adverse CWEs drops to low and the Negro Camp Gulch's drops to moderate. The only watershed with a different risk rating than Alternative 1 is Upper Beaver Creek, which is rated as very high risk under Alternative 1 and rated high risk of CWE under Alternative 3. As with the other alternatives, within 10 years, the area would revegetate and risks of effects would be low for these watersheds.

Cultural Resources

Numerous sites have been identified within the treatment areas. Standard Resource Protection Measures (SRPM) would be employed as integrated design features and applied to all cultural resources within the project area for all the alternatives. Application of SRPMs would eliminate any adverse effects to cultural resources. This undertaking would be consistent with stipulations in the Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation.

Alternative 1

Direct and Indirect Effects

Alternative 1 would enhance cultural resource values by reducing fuel loads and the potential risk of trees falling and damaging archaeological features, artifacts and the stratigraphic integrity of the deposit. By reducing the surface fuels, historic properties would be afforded substantial protection and reduce the risk of high-intensity wildfires and subsequent damage from fire suppression activities. These two activities can substantially affect site integrity, destroy historic values, and make site interpretation difficult. Implementation of the proposed action would reduce the risk from potential future wildfires and falling fire-killed and fire-injured trees.

Cumulative Effects

Within the project area, past, ongoing, and reasonable foreseeable activities include logging, recreation use, road maintenance, and travel. Off-highway vehicle (OHV) and recreational use is expected to continue and may increase due to removal of brush by the fire. General recreation use may change because of the Bald Fire, for example, development of new trails or dispersed camping areas in locations formerly covered with brush and debris. The current project could interact with recreational activities by increasing site or artifact visibility, thus making sites more vulnerable to looting.

Alternative 2

Direct, Indirect, and Cumulative Effects

Cultural resources (artifacts and features) are used in conjunction to examine the nature of human survival, interactions, and way of life. When artifacts and features are destroyed, valuable information is lost, which directly affects interpretations and site management of these resources. Future fire suppression efforts could potentially cause additional damage to surface and subsurface artifacts, destroy the stratigraphy of the site, and alter the significance of historic properties.

Falling trees could potentially affect a majority of the sites within the fire boundary under Alternative 2. Tree fall can affect sites by damaging features, compacting and displacing the soil that contains artifacts, and breaking and displacing artifacts. Root balls may bring artifacts to the surface potentially exposing them to looters, mixing archaeological materials from different times, and complicating interpretation.

Over time, the No Action Alternative would lead to increased fuel loading in the form of brush and other heavy woody debris increasing the potential for future severe wildfire, which increases the risk to sites from damage during suppression activities. Larger diameter fuels burn longer and hotter than duff and brush leading to increased residence time, which can cause harm to both prehistoric and historic resources.

Alternative 3

Direct, Indirect, and Cumulative Effects

Historic properties identified within or near the areas designated for roadside hazard tree removal have been flagged to denote location for avoidance or treatment. No adverse effects from the project activities would occur to historic properties as a result of implementing Alternative 3 with the integrated design features (IDFs). However, a majority of the historic properties in the project area would still have the potential of being impacted from falling trees, which can damage surface artifacts and increase the potential for catastrophic wildland fires as discussed under Alternative 2.

Range

The Bald Fire directly affected the rangeland resource. In severely burned areas of the fire, the understory herbaceous vegetation was completely consumed. In lightly or moderately burned areas, aerial portions of herbaceous vegetation were burned but regrowth is expected

Livestock management was directly affected by the Bald Fire because of the damage caused to structural improvements, including boundary and pasture fences, corrals, riparian fences, and spring developments. Indirectly, livestock management continues to be affected post-fire due to the needed repairs or reconstruction of many of these structures before livestock can graze the allotments. Such repairs are necessary to keep livestock out of burned areas until desired vegetative conditions are reached and suitable for grazing.

Livestock grazing would be deferred in the burned area until ecological conditions are at least stable and in satisfactory condition. Fences would be repaired prior to livestock returning to allotments to control use within the burned area and other identified sensitive areas.

Alternative 1

Direct and Indirect Effects to Range Resources

Direct effects from the proposed action would mostly come from proposed fuels treatments involving prescribed burning. Broadcast burning of small debris created by salvage operations would remove accumulations that could affect establishment of herbaceous vegetation. Burning would remove excess cover, allowing more light to reach the ground, warm the soil, and improve conditions for seeds to germinate and herbaceous plants to reestablish. Broadcast burning usually results in a mosaic burn pattern, which leaves some material for soil protection, helps stabilize the soil, and provides protection for young plants. Pile burning does not provide the same beneficial effects as broadcast burning. Piles are localized and tend to be more intense. However, there are no negative effects to rangelands from pile burning.

Salvage of commercial size material and biomass removal of fuels would not have direct effects to rangelands. Reforestation and planting activities also would have no direct effects to rangelands.

Indirectly, salvage and fuel treatment activities could affect rangelands by adding to existing ground disturbance. Movement of equipment could disturb soils where new vegetation might be trying to reestablish, adding to the length of time for rangeland vegetation to recover to a desired condition. Reforestation and planting activities would eventually create new overstory cover, which in the long-term would begin to shade out understory herbaceous vegetation. During the limited time before the overstory begins to dominate the area an increase in herbaceous vegetation may supply some additional forage for livestock grazing. The amount is limited, but can provide an opportunity to distribute livestock into areas they typically might not graze, which could result in lighter grazing in some riparian or meadow areas.

Cumulative Effects

Pre-fire many areas within the project area had become overgrown and understory vegetation was either non-existent or less productive. Past thinning and fuels treatments within the project area have opened up the canopy encouraging an understory response. This has led to increased transitory forage. The recent Bald fire had a negative cumulative effect as the area burned at high intensity, a majority of the forage resource was temporarily removed. The proposed activities in Alternative 1 would individually have

various effects to rangelands. They may extend the timeframe for recovery of the rangelands to satisfactory conditions by adding disturbances to the ground. However as discussed above this disturbance is short term. . Cumulatively, changes in distribution of herbaceous vegetation across the allotment may help improve overall range conditions by providing new areas of transitory range for better distribution of grazing pressure after grazing is allowed to return.

Direct and Indirect Effects to Livestock Management

Proposed treatment activities would have little to no direct effect to livestock management. As described above, the greatest effect to livestock management was from the fire itself. No treatments are proposed in the Bald Mountain and Bear Valley allotments. Only portions of one salvage unit and one fuels unit are within the Bainbridge Allotment. The Bainbridge Allotment is part of a four-pasture rotation grazing system that allows flexibility in management that can be adjusted to minimize potential conflicts between treatment activities and grazing. Activities proposed under Alternative 1 are concentrated within the Willow Springs Allotment.

Indirect effects to livestock management relate primarily to the amount of time it may take to accomplish proposed activities. Proposed activities are designed to start the process of recovering the burned area to a functioning, healthy, and productive condition. Consequently, the Willow Springs Allotment would be rested from grazing until desired conditions are reached within the burned area. The sooner the treatments are accomplished, the sooner vegetative conditions can recover, and ultimately conditions would allow for grazing to return. In the meantime, the permittee's overall ranching operation would be affected, because this allotment provides important summer forage as part of the year-round maintenance of their livestock. Loss of this part of their annual forage source for an extended time could seriously affect the sustainability of their operation.

Timing of the proposed activities is also important for scheduling repairs necessary for structural improvements, particularly fences. Nearly the entire length (7 miles) of the primary division fence in the Willow Springs Allotment is within the burned area. This fence is critical for managing livestock, providing the means to control livestock when they use different areas of the allotment. Fence reconstruction or repair would be delayed until after salvage operations to minimize repeated repairs and to avoid the unsafe conditions created by many dead trees left standing after the fire and prior to salvage and fuels treatments. Safety is a concern for any type of livestock management activities that might occur prior to proposed treatments. Treatments would remove hazards from falling trees or limbs that could be dangerous to workers conducting repairs, monitoring, gathering, and any number of other activities in the burned area.

In the long-term, salvage and fuels treatments would improve accessibility for fence maintenance as well as livestock movement and distribution throughout the allotment. Treatments would minimize the potential for concentrations of large or jack-strawed areas of burned material that hinder livestock from scattering across the area.

Additional traffic on travel routes to and from treatment areas could have some impact to livestock operations in unburned areas of the active allotments if activities occur during the grazing season. The same travel routes may be used by permittees to monitor livestock distribution and movement in unburned areas of their allotment, where traffic from salvage-related activities may also occur.

Cumulative Effects

Cumulatively, the proposed action extends the initial effects from the fire over a longer period, as it relates to livestock management, especially on the Willow Springs Allotment. However, treatment activities would also help shorten vegetative recovery time so that when areas within the burn have reached desired conditions, livestock grazing would be returned. Treatment would contribute to healthier vegetative diversity, condition, and vigor sooner than with no treatments. Removal of aerial as well as ground fuels would reduce safety hazards and lessen the need for repeated repair of fences within the burned areas, in both the short and long-term.

Alternative 2

Direct, Indirect, and Cumulative Effects to Range Resources

There would be no direct or indirect effects of Alternative 2 to rangelands. In areas of high or extreme fire severity, herbaceous vegetation would recover where opportunity provided the necessary conditions for individual plants to establish. It would most likely be very sparse and slow. The amount of fuels remaining on the ground may limit the success of herbaceous vegetative recovery.

In lightly or moderately burned areas, herbaceous vegetation would probably recover relatively quickly, provided conditions were favorable. The potential for a viable seed source and plants that survived the fire would be better than in higher severity areas. However, the lack of prescribed fire for treating fuels could contribute to the potential for future fires causing continual setback in vegetative recovery.

Treatment of hazard trees during road maintenance would not affect rangelands due to location of hazards that would be removed being limited to roadsides.

Since there would be no direct or indirect effects to the rangeland resource under Alternative 2, there would be no cumulative effects.

Direct and Indirect Effects to Livestock Management

Direct effects under Alternative 2 would primarily impact livestock management on the Willow Springs Allotment. Without additional treatments to remove burned standing trees or remove fuels created by the fire, the burned area would be very hazardous for any livestock management activities. Over the short and long-term, standing dead trees would be hazards to permittees when repairing and maintaining fences, as well as while gathering, trailing, and performing other livestock management activities. The potential for excessive numbers of burned trees to fall on fence lines would require continual and repeated maintenance.

Once livestock are allowed to return to the allotments, excessive fuels remaining on the ground would hinder livestock movement and distribution. Cattle would not be easily distributed across the entire range resulting in uneven use of suitable forage and possible areas of undesirable use levels. As hazard trees are felled and left in place along roadsides, the additional accumulation of debris would also hinder movement of livestock away from roads into forage areas, possibly leading to more animal/vehicle incidents, especially along well-travelled routes.

Indirectly, by not implementing any treatment activities within the burn, it would be very unpredictable when livestock grazing could return to the allotment. Recovery of herbaceous vegetation would be slower than if treated, extending the time before desired conditions for grazing are met. Fences could be repaired but as stated above, under hazardous conditions. Understandably, incentive for the permittee would be low for committing resources and time to repair structural improvements without knowing when they might be able to graze the allotment.

Cumulative Effects

If chosen, implementation of Alternative 2 would create a hazardous environment for both resources and humans. Felling of roadside hazard trees during road maintenance would address the concerns for people traveling through the area on main roads. However, it does not take into account that on-going management, whether by forest employees, contractors, permittees or cooperators, does not occur only along well-travelled roads.

Implementation of Alternative 2 would result in possible loss of a long-time ranching operation due to uncertainty about future grazing on the Willow Springs Allotment. The uncertainty caused by a lack of commitment to implement activities to restore the natural resources affected by the fire.

Alternative 3

Direct, Indirect, and Cumulative Effects to Rangeland Resources

The effects of Alternative 3 are similar to those discussed under Alternative 2.

Direct, Indirect, and Cumulative Effects to Livestock Management

The effects of Alternative 3 are similar to those discussed under Alternative 2 with the exception that hazard trees identified along ML2 and higher roads would be felled. Commercial sized hazards would be removed. . This would partially reduce the debris, which acts as a barrier for livestock movement when they travel along a road, aiding in better distribution and better use of forage.

However, it does not alleviate the hazards of standing burned trees throughout the burned area that create a danger to permittees, specialists, or other publics. The greater issues about safety, sustainable use of resources, including local ranching operations still exist under Alternative 3.

Recreation and Visuals

Alternative 1

Direct and Indirect Effects to Recreation

Removal of snags throughout the project area would reduce the risks to the recreating public. The National Forest System (NFS) roads in this area are heavily utilized by the public for travel and recreational uses including: hunting, fishing, hiking, camping, woodcutting, and sightseeing.

Effects for recreation are generally localized to specific areas during the implementation time frame so changes in the overall ability for the public to participate in recreation opportunities are considered minor. Access along roads may be interrupted or delayed for brief periods during implementation of the proposed treatments, most notably during tree removal. Public use may be limited if short-term closures occur. No recreation facilities are proposed to be closed as a result of this alternative so overall opportunity is unaffected and no long-term effects are anticipated.

Smoke and heavy equipment used in mechanical treatments may temporarily affect the sights, sounds, smells, and other physical and social qualities (collectively hereafter, qualities) that make recreation areas/routes desirable for use. Contractors and Forest Service personnel working in the vicinity of roads and trails may detract from the sense of separation or solitude. Overall, these effects are considered short term and do not represent the finished project which is a mosaic of treatment and non-treatment areas leading to a diverse and reforested landscape.

It is unlikely that hunting and wildlife viewing opportunities would be affected by implementation. Lack of vegetation and cover, as a result of the fire, has displaced some wildlife, but these species would likely return over time as grasses, forbs, and brush come back. Reforestation would speed up the recovery time for cover provided by large-tree canopy. Utilization of multiple reforestation methods would result in a diversity of canopy structures, which may actually increase wildlife encounters.

Direct and Indirect Effects to Recreational Access

Removal of roadside hazard trees would improve public safety and reduce instances of blocked routes due to fallen trees. Treatment of activity-generated surface fuels would reduce the risk of subsequent wildfire starts from the roadway. The Forest Standards and Guidelines (LRMP 4-24 – 4-25) directs personnel to “Remove hazard trees in developed recreation sites and along roads and trails”. The Removal of Danger Trees along Roads proposed in this alternative is consistent with this direction.

Several main travel routes, including County Road 111 and NFS 35N10 (22 Road), pass through the fire perimeter. The Lassen Backcountry Byway follows the 22 Road through the Project Area. Multiple routes designated under 36 CFR 212.51 for motor vehicle use are within the project area. The proposed treatments should have no effect on the amount of recreation opportunities available in the long term, but can have effects on the quality of experience for some Forest visitors on the short term. Temporary road closures, re-routing, smoke, and noise are some of the short-term effects that can be anticipated. Effects

are site specific and should only affect a small percentage of routes at a time as the Project is implemented.

Approximately 2.2 miles of existing non-system routes would be upgraded to standard and added to the NFS system as ML2 roads. Reclassification of these roads would not change the recreation opportunity, as they did not exist as legal driving routes before or after the proposed actions. These routes are currently closed to motor vehicle use. Adding them to the system does not affect access opportunity.

Direct and Indirect Effects to Visual Resources

Although the Bald Fire burned in a mosaic fashion, of the 31,324 acres burned on NFS lands, approximately 25,000 were burned under moderate or high severity. In high severity burn areas, the landscape has been dramatically altered. It is unlikely that VQOs can be met in the traditional sense (e.g., that green trees would be maintained as the dominant visual feature). The desired visual conditions under this alternative are “landscapes dominated by site-appropriate trees with variable densities and structure that provide diverse wildlife habitat and forest products” as well as “ecological services that benefit the local community”. Reforestation of severely burned areas would expedite the re-establishment of forested areas, improve visual quality, and provide a mixture of vegetation types and age classes. By treating the slash and surface fuels through piling and burning, vegetation would occur that provides visually pleasing contrast to surrounding features and landforms. The overall result of the proposed treatments would be an improved visual quality. The majority of what can be perceived as negative effects to the visual resource occurs during implementation. While the treatments are being carried out, seeing control lines, treatment edges, ground disturbance, and untreated slash is expected in the foreground distance zone. Scenes of treatment during this initial implementation phase do not represent a completed treatment; effects to scenic quality are based on completed treatments. This initial treatment appearance is short term in duration.

At the conclusion of treatment, visual signs of activity (i.e., cut stumps or track and tire marks on the ground) may still be evident in the short term but are anticipated to remain characteristic to the landscape. Evidence of burning on trees and various ground features may be prevalent, but such sights are naturally occurring in forests where wildfire regimes are common. When growth of shrubs, grasses, and forbs is underway, the majority of evidence left behind by management activities is not anticipated to be evident to the casual forest visitor.

Hazard tree removal treatments that occur throughout the project area would alter the appearance of the immediate foreground. Stumps would be visible initially, but would become less obtrusive as “green up” occurs. Reforestation along the roadways would be consistent with the surrounding areas to blend treatment lines from the fore to middle ground.

The majority of the treatment areas fall under a VQO of Modification (management activities may dominate but must borrow from the characteristic landscape). The mosaic nature of the fire has left patches of unburned and low severity burned areas within the project boundary. These islands, geologic

features, and differing treatment types would allow variation and incorporate natural landscape characteristics.

The rest of the Project falls under a VQO of Maximum Modification (management activities may dominate the characteristic landscape). The treatments in these areas would also integrate with the natural landscape. The mosaic nature of the fire and the variety the proposed treatment types would carry across VQOs.

Cumulative Effects to Recreation and Visuals

Although there may be some decrease in use in the short term, recreation activities would likely continue in the Project area. The management activities proposed under this alternative, along with those already listed under the Connected Actions listed above, would result in some short term effects of noise, traffic, and smoke associated with treatment activities. Some temporary and short-term displacement of recreationists during the time when treatment occurs can be anticipated. Standards and guidelines are in place to minimize effects of the project on recreation and scenic resources. Vegetative treatments and road building and decommissioning associated with this Project and past, present, and foreseeable activities already listed would have no cumulative effects to recreation resources and overall recreation opportunities. Effects from the proposed treatments, especially since they vary in size and space and occur within a disturbed area, would seem minimal in comparison to the disturbance of the Bald Fire itself. Over the long term, the proposed treatments would improve the visual impacts from the fire.

Alternative 2

Direct and Indirect Effects to Recreation

Under Alternative 2, hazard trees representing an imminent threat along roads and trails could be felled for public safety as directed in the LRMP (4-24 – 4-25). Due to the sheer number of roadside hazard trees and the amount of available personnel, safety road closures may be put in place until hazards can be removed. Downed trees may partially or fully block roads. This would reduce or deny access for hunting, camping, OHV riding, and firewood cutting. Blocked routes may encourage cross-country travel and resource damage as vehicles attempt to drive around the blockages. Pedestrians and equestrians may move farther into unsafe, burned areas to circumvent downed trees.

Alternative 2 would not change the present road related experience (i.e., access or opportunity for driving) Users would continue to notice a mosaic of charred, blackened, and green trees. The physical experience of the post-fire environment would remain unchanged. Existing ground fuels along with those associated with the cut trees would continue to accumulate along the roadway.

Access and opportunity for recreation would not be affected, but some uses may decline under this alternative. In studying the effects of fire on recreation demand in Montana, Hesseln, Loomis and Gonzalez-Caban (2004) found that as burned area increased and the amount of burned area viewed increased, recreation demand decreased suggesting size and extent of burns affect visitation. Taylor and Daniel (1984) found that camping was the recreational activity most affected by severe fire.

Direct and Indirect Effects to Recreational Access

There would be no changes to the road system under Alternative 2.

Direct and Indirect Effects to Visual Resources

Alternative 2 would result in no immediate change to the existing condition. Swathes of blackened and fire-killed trees would remain in the fore and middle ground along with smaller patches of unburned vegetation. No variations in treatment would occur except at Project boundaries. Untreated areas and debris may delay natural regeneration of vegetation and would increase the potential for subsequent fires.

Alternative 2 would result in no immediate change to VQOs within the project area. The Bald Fire dramatically changed the appearance of the landscape, and VQOs can no longer be met in the traditional sense (e.g. that green trees would be maintained as the dominant visual feature). The quality of scenery would change overtime, as vegetation continues to grow and become dense. Within the burned area, favorable landscape views such as topography and other natural features would be visible from roads for the long term. The desired visual condition of "landscapes dominated by site-appropriate trees with variable densities", listed in the Purpose and Need for this project, would be delayed.

Cumulative Effects

There would be no action to treat vegetation or fuels under this project, other activities in the area such as road maintenance, fire suppression, firewood cutting, dispersed camping, and other recreational activities would continue. Hazard trees along roads and NFST trails could be felled and left in place as part of road maintenance as directed in the LRMP.

Roads maintenance activities have the potential to limit access at the time and place it occurs, but overall, is beneficial to recreation in the access it provides and user comfort it brings to the driving and sightseeing experience. Wildfires can affect scenery resources for years into the future depending on soils, aspect, and vegetation species composition. A study by Vaux, Gardner, and Mills (1984) on the impact of fire on forest recreation suggests higher intensity fires had negative effects on recreation values but also caution that the impact of fire was not always negative among their respondents, and preferences of recreationists change over time.

Alternative 3

Direct and Indirect Effects to Recreation

Effects for recreation are generally localized to specific areas, in this case the roadside corridor, during the implementation time frame so changes in the overall ability for the public to participate in recreation opportunities are considered minor. Access along roads, including the Lassen Backcountry Byway, may be interrupted or delayed for brief periods during operations, most notably during tree removal. Public use may be limited if short-term closures occur.

Smoke, dust, and heavy equipment used in mechanical treatment may temporarily affect the qualities that make recreation areas/routes desirable for use. These effects are considered short-term in nature and

would result in a safer transportation infrastructure. Removal of larger trees would reduce the amount of fuel on the ground decreasing the chance of future roadside fire starts.

Direct and Indirect Effects to Recreational Access

Effects related to transportation would be the same as in Alternative 2.

Direct and Indirect Effects to Visual Resources

Hazard tree removal treatments that occur within the roadside corridor would alter the appearance of the immediate foreground. The majority of what can be perceived as negative effects to the visual resource occurs during implementation. The sight of control lines, treatment edges, ground disturbance, and untreated slash can be anticipated. Stumps would be visible initially, but would become less obtrusive as "green up" occurs.

In this alternative, there would no immediate change to the existing condition in the middle and background scenery. Landscape features and swathes of blackened and fire-killed trees would remain. No variations in treatment would occur except at the project boundaries. The changes in those areas would continue to show noticeable treatment lines. Untreated areas and debris may delay natural regeneration of vegetation and would increase the potential for subsequent fires.

There are no expected changes to the VQOs within the project area. Since the Bald Fire, VQOs can no longer be met in the traditional sense. As vegetation returns, the quality of scenery would change over time, but the desired visual condition of "landscapes dominated by site-appropriate trees with variable densities", listed in the Purpose and Need for this project, would be delayed.

Cumulative Effects

Although there may be some decrease in use in the short term, recreation activities would likely continue in the Project area. The management activities proposed under this alternative would result in some short-term effects of noise, traffic, and smoke associated with treatment activities. Some temporary and short-term displacement of recreationists during operations can be anticipated.

Transportation activities associated with this Project and past, present, and foreseeable activities already listed would have no significant cumulative effects to recreation resources and overall recreation opportunities.

Transportation

Alternative 1

Direct and Indirect Effects

For the short term during the sale contract, depending on the length and timing of the project, there would be potential of erosion from the construction of temporary roads. There would be standard provisions in

the contracts to require erosion control measures in case seasonal closures are needed. For the long-term temporary roads would be decommissioned after haul operations or post sale activities are completed.

In the short-term, there would be a direct effect of increasing traffic due to the movement of equipment, materials and personnel into and out of the project area. Increased traffic could impact the safety of the public and workers using the roads in the area. Traffic management measures would minimize these impacts. With the use of standard contract provisions for traffic control, effects would be negligible.

A well-managed and maintained road system provides for safe and efficient public access and worker safety. The road maintenance activities and hazard tree removal proposed would improve both access and safety.

Cumulative Effects

All past actions have led to the existing transportation system which includes county roads, NFS roads, non-system routes on NF lands, roads located on State and other government lands, and private lands which are owned and operated by timber management companies. Active management of the transportation system would improve public access and firefighter safety, as well as minimizing adverse environmental effects and reducing future maintenance costs.

Alternative 2

Direct, Indirect, and Cumulative Effects

Under this alternative, no treatments would be performed and the existing road system within the project area would remain as is. There would be no direct or cumulative effects. National Forest System roads may need to be closed for public safety due to numerous snags that would pose a danger to users. Without any planned hazard tree removal, these roads would effectively close to public and administrative use though the large accumulation of potential tree fall. Without access for maintenance, some of these roads could possibly deteriorate to the point where they would no longer be accessible to high clearance vehicles, including fire suppression equipment. This would limit ingress/egress for firefighting ground resources and would therefore reduce firefighter safety.

Alternative 3

Direct, Indirect, and Cumulative Effects

Effects to the transportation system for Alternative 3 would be the same as those discussed above under Alternative 1.

Summary Comparison of Alternatives

Alternative 1 was developed to address all components of the Purpose and Need as outlined in Chapter 1 of this document. These desired conditions include:

1. Reduce public safety hazards in high use areas including National Forest System roads.
2. Recover the economic value of fire-killed trees.
3. Reduce surface fuel load to levels, which facilitate site preparation for planting, minimize the difficulty of suppressing future wildfires, and protect forest resources.
4. Implement reforestation including maintaining vegetative diversity.
5. Manage road infrastructure for project implementation.

Alternative 3 was developed based on scoping comments to address safety hazards along forest roads. Table 10 below compares acres treated and how each responds to the desired conditions of the Purpose and Need for the Bald Project.

Table 10 - Comparison Alternatives for the Bald Project

	Desired Condition Met	Alternative 1	Alternative 2	Alternative 3
Road Hazard Tree removal	1, 2, 3, 5	4,815 acres	0 acres	4,736 acres
Area Salvage	1, 2, 3	3,632 acres	0 acres	0 acres
Volume removed	2, 3	39.3 mmbf	0 mbf	23.0 mmbf
Area Fuels	1, 3	5,499 acres	0 acres	0 acres
Artificial Reforestation	4,	12,200 acres	0 acres	0 acres

mmbf = million board feet