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Service

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Final Environmental Assessment

Chip-munk Recovery and Restoration Project

Mt. Hough Ranger District, Plumas National Forest
Plumas County, California

The Chip-munk Recovery and Restoration Project (Chip-munk Project) is located approximately 5 miles west of Greenville, California near Butt Valley Reservoir and the communities of Seneca and Caribou within the Mt. Hough Ranger District, Plumas National Forest, California. The legal description includes all or portions of: T25N, R6E, sections 23, 24, and 26; T25N, R7E, sections 1, 2, 4-8, 10, 11, and 17-20; T26N, R7E, sections 1, 2, 4, 7-9, 10-19, 20-27, and 30-36; T26N, R8E, sections 2-9, 10, 11, 14-23, and 26-34; T27N, R7E, sections 22, 25-27, and 33-36; T27N, R8E, sections 20, and 28-35; Mount Diablo Base Meridian (MDBM).

For Information Contact: Katherine Carpenter
39696 Highway 70, Quincy, CA 95971
(530) 283-7619
http://www.fs.fed.us/nepa/fs-usda-pop.php/?project=41149

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SUMMARY OF CHANGES

Two minor changes are incorporated in this Final Environmental Assessment and tracked throughout this document: 1) jackpot burning the skyline salvage units only (up to 929 acres) to meet fuels objectives, and 2) constructing approximately 4 miles of temporary roads to permit removal and utilization of material. Maps were added to show the location of these activities (Figures 2 and 3) Resource sections that were edited to incorporate this change include: Economics and Social Environment, Transportation, Forest Vegetation, Fire, Fuels, and Air Quality, Wildlife, and Soil and Water Resources. Appropriate associated specialist reports or input incorporated by reference were also updated.

Additional edits were made to misspelled words, missing and additional spaces between words, punctuation, and grammar. Numerous edits were made to literature cited throughout this document and additions and deletions were made to literature listed in the Reference section of this EA. Only edits made beyond the above mentioned changes are discussed below.

The Background section, just below, includes a sentence regarding the Chips Fire's western half being almost completely within the Storrie Fire (2001) footprint and containing several land allocations that do not allow for salvage harvest activities. Thus the amount of acres that could potentially be carried forward into any salvage project is limited.

In the Proposed Action section, the acres of treatment by logging system were specified and two references to design criteria tables were inserted to assist the reader in locating design criteria in this document.

Four Alternatives Considered but Eliminated from Detailed Study were added. These include: Alternative C, regarding high vegetation burn severity and logging system tiers; Alternative D, regarding removal of roadside hazard trees relative to burn severity; Alternative E, regarding the Clear Creek watershed exceeding the Threshold of Concern and the effects of skyline logging systems; and Alternative F, regarding comments received from the John Muir Project and the Center for Biological Diversity.

In the Safety section, one correction was incorporated: the project title "Chips Fire Pacific Gas and Electric (PG&E) Right of Way Salvage Timber Project" was changed from "PG&E Right of Way Salvage Project",

The Economics and Social Environment section received two corrections in Table 15:"Additional Operation Cost" was updated to $5,200,000 and "Percent Above Value" was changed to 38 percent.

In the Fire, Fuels, and Air Quality section a statement was added regarding the use of a follow-up treatment of jackpot burning in the skyline logging units only and the table of predicted emissions was updated to include the emissions estimates related to jackpot burning.

In the Wildlife section, the Region 5 Forest Service Sensitive Species list was updated on July 3, 2013 and the species on this July list were included in the EA published for comment. The date that "Federal Endangered and Threatened Species that may be affected by Projects on the Plumas National Forest" was accessed April 8, 2013. The Limited Operating Period (LOP) was added for Sierra Nevada yellow-legged frogs which is "no activity within a stream mile of Sierra Nevada yellow-legged frog detections from October 1, or the first wetting rain (more than ¼ inch precipitation), until April 15th. From April 15 to October 1, if a weather system resulting in more than ¼ inch of precipitation occurs in project area, operations must be suspended until a dry period of 72 hours occurs, unless the district biologist determines there will be no effect to frogs. A paragraph was added summarizing the size and composition of watershed s in the project analysis area. The number of Northern goshawk Protected Activity Centers (PACs) was updated-116 PACs. A few sentences were added highlighting four scientific references concerning spotted owls and black-backed woodpeckers in burned forests: Bond et al. 2009, Lee et al. 2012, Siegel et al. 2013, and Bond et al. 2012. A few sentences were added to elaborate on current and future black-backed woodpecker mitigations.

The Soils and Water Resources sections includes a "Wild and Scenic Rivers Act of 1968" heading and brief paragraph, brief discussion regarding rehabilitating temporary roads after project implementation, and discussion about other ongoing projects within the Chips Fire perimeter.

In the Botanical Resources section all discussions regarding Quincy lupine (*Lupinus dalesiae*) were deleted to reflect the Region 5 Forest Service Sensitive Species list adopted July 3, 2013.

Appendix A, the Economic Analysis, was updated to incorporate additional costs of jackpot burning and 4 miles of temporary roads.

Appendix B was updated to include all terrestrial and aquatic Limited Operating Periods (LOPs) applicable to the Chip-munk Project and incorporated a few minor editorial changes.

SUMMARY

The Plumas National Forest proposes to remove roadside fire-killed and fire-injured hazard trees, recover the economic value of fire-killed trees, and re-establish forested conditions by planting native conifer seedlings in the area of the Chips Fire. Three actions necessary for implementation and connected with recovering the economic value of fire-killed timber include: 1) constructing landings, skid trails, and approximately 4 miles of temporary roads to permit removal and utilization of material; 2) treating approximately 10 acres of green trees to implement skyline logging operations; and 3) constructing and reconstructing water drafting sources to water roads during implementation.

The project area is located near Butt Valley Reservoir and the communities of Seneca and Caribou within the Mt. Hough Ranger District, Plumas National Forest, California. This action is

needed because: 1) the Forest Service is required to maintain roads for access and safety; 2) the Forest Service has a role to play in providing a wood supply for local manufacturers and sustaining a part of the employment base in rural communities; 3) the Sierra Nevada Forest Plan Amendment (SNFPA) provides for salvage logging following wildfires for the objective of recovering economic value from fire-killed trees (USDA 2004b, page 52); and 4) USDA policy considers post-fire salvage harvest the functional equivalent of a regeneration harvest and directs forests to make a best effort to re-establish forested conditions within 5 years after salvage harvest (FSM 2471 and 2472).

The proposed action would remove roadside hazard trees providing access and safe travel for Forest Service personnel and Forest visitors; provide timber for the wood products market, potentially creating or maintaining 158 jobs, and contribute an estimated $5.5 million of earned employee related income. Salvage timber harvest activities would alter vegetation types and site preparation and reforestation activities would return these areas to conifer stands; protect and maintain key sensitive species habitat areas through project design-specifically Northern goshawk and California spotted owl Protected Activity Centers (PACs).). PACs would not be salvaged, disturbance in PACs would be limited, and impacts resulting from the Chip-munk Project are expected to contribute to cumulative impacts on certain sensitive wildlife species. See Table 72 for a summary of wildlife species determinations. The proposed action would not alter the existing trend in the ecosystem component, nor would it lead to a change in the distribution of Black-backed Woodpecker across the Sierra Nevada bioregion. The proposed action would increase soil cover that exists in all units treated for roadside safety hazards or for recovery of salvage timber and decrease the potential for accelerated erosion in the treated units. The proposed action may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for *Cypripedium fasciculatum* (clustered lady's-slipper), *Lewisia kelloggii ssp. Hutchisoni*, and *Lupinus dalesiae* (Quincy lupine).

In addition to the proposed action, the Forest Service also evaluated the no action alternative (Alternative B) and four alternatives considered, but eliminated from detailed study.) Based upon the effects of the alternatives, the responsible official will decide whether to implement the Chip-munk Recovery and Restoration Project (Chip-munk Project) as described in the proposed action or not to implement the project at this time.

INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into five parts:

- Introduction: The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- Comparison of Alternatives, including the Proposed Action: This section provides a more detailed description of the agency's proposed action. This discussion also includes possible mitigation measures.
- Environmental Consequences: This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the Proposed Action and the No Action Alternative, a baseline for evaluation and comparison.
- Agencies and Persons Consulted: This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- Appendices: The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Mt. Hough Ranger District Office in Quincy, California.

Background

The Chips Fire began on July 29, 2012, in the Chips Creek drainage in the Plumas National Forest (PNF). This fire grew to 76,333 acres, burning in both the Plumas and Lassen National Forests and on private lands. The Chips Fire was contained on August 31, 2012; the cause is still under investigation. The Chip-munk Project pertains only to the areas burned in the Mt. Hough Ranger District (MHRD) of the Plumas National Forest.

The Chips Fire burned approximately 52,106 acres on the MHRD (48,934 acres of NFS land and 3,172 acres of private land) in a mosaic of intensity including unburned or very low, low, medium, and high fire intensity. As a result, there are areas where tree mortality is 100 percent while other areas still support a green tree component. Within the boundary of the Plumas National Forest, the Chips Fire left 25 percent or 13,102 acres (12,723 acres of NFS land and 308 acres of private land) of forested land in a deforested vegetation condition[1], with the possibility of further mortality extending into stands with lower burn severity due to other post-fire stresses such as drought or insect attack.

The Mount Hough Ranger District proposes to conduct roadside hazard tree removal (1,788 acres), salvage dead and dying timber (3,675 acres), and site preparation and reforestation (3,675 acres) activities over approximately 5,464 acres (Figure 1). However, land designations and the landscape itself limit the areas in which treatment can be proposed. Land designations within the Plumas National Forest and the Chips Fire perimeter include: developed recreational sites, Inventoried Roadless Areas (IRAs), semi-primitive non-motorized vehicle areas, northern goshawk Protected Activity Centers (PACs), California spotted owl PACs, peregrine falcon eyrie, suitable willow flycatcher habitat, bald eagle management areas, Riparian Conservation Areas (RCAs), Old Forest Emphasis (OFE) areas, National Wild and Scenic Rivers, and special interest areas. Nearly the entire western half of the Chips Fire reburned in the Storrie Fire (2001) footprint and is within several land allocations that do not allow for salvage timber harvest; therefore limiting the total amount of acres included for treatment in the Chip-munk Project.

[1] Based upon data received from the Remote Sensing Applications Center (RSAC) at Salt Lake City, Utah. The 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 PNF obtained the GIS data from ftp://fsweb.rsac.fs.fed.us/RAVG/Region5/2012/Chips/.

Purpose and Need for Action

Need 1: Safe Travel Along Roadways

Need for Action: There is a need for safe ingress and egress for vehicles and people traveling on roads within the project area.

Rationale: As a result of the fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. It is not uncommon for high, gusty winds associated with winter or summer storms to suddenly blow down many hazardous trees at one time, posing an unacceptable risk to area residents, forest workers, and visitors. It is important to remove these hazardous trees in a timely, efficient, and cost-effective manner so that safe access to affected areas can be restored and normal National Forest operations can be resumed.

The Forest Service is required to maintain roads for access and safety, and the agency routinely removes hazardous trees as part of road maintenance (23 CFR 500.108; 36 CFR 212.4; FSM 7700; FSH 6709.11 27.62d; Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region, 2012; Plumas National Forest: Mt. Hough Ranger District Marking Guidelines for Fire-Injured Trees within the Chip-munk Roadside Safety and Hazard Tree Designation, 2013).

Need 2: Raw Material for Wood Products Manufacturing

Need for Action: There is a need for employment in the wood products sector in communities in and around the project area. Fire-killed timber provides a good source of raw material for local mills.

Rationale: The Forest Service plays a role in providing a wood supply for local manufacturers and sustaining a part of the employment base in rural communities [SNFPA Record of Decision (ROD) 2004, page 4]. The SNPFA provides for salvage logging following wildfires for the objective of recovering economic value from fire-killed trees (SNFPA ROD 2004, page 52).

Need 3: Healthy, Sustainable, Forest Conditions

Rationale: The Chips Fire burned thousands of acres with high severity resulting in deforested conditions where seed source of desired species is insufficient to naturally regenerate these areas. Without human intervention, shrub species will dominate these areas for decades and delay re-establishment of forested conditions. The early establishment of conifers through reforestation would expedite forest regeneration and the development of forested conditions.

In addition, as it relates to wildfires, it is current Agency policy (FSM 2471 and 2472) to consider post-fire salvage harvest the functional equivalent of a regeneration harvest and to make a best effort to re-establish forested conditions within five years after salvage harvest. Refer to Table 8 for design criteria regarding site preparation and reforestation.

In meeting the aforementioned needs, the proposal must achieve the following purposes:

1) reduce potential soil erosion and the loss of soil productivity caused by loss of vegetation and ground cover;
2) protect and maintain critical wildlife habitat;
3) manage development of fuel profiles over time; and
4) recover the value of timber killed or severely injured by the disturbance (USDA 2004b, page 52).

Management Direction Specific to Fire Salvage

Management proposals by the PNF are determined by direction contained in the Plumas National Forest (PNF) Land and Resource Management Plan (PNF LRMP) as amended by the SNFPA Final Environmental Impact Statement (FEIS) and ROD (USDA 2004a, 2004b).

The SNFPA 2004 ROD supports ecosystem restoration following catastrophic events.Restoration activities are appropriate in all land allocations with goals of restoring habitat, maintaining appropriate long-term fuel profiles, 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 (USDA 2004b, page 6).

The SNFPA ROD errata (USDA 2004c), clarifies timber salvage direction in the SNFPA ROD (2004b, pages 52 and 53). Salvage harvest of dead and dying trees may be conducted to recover the economic value of this material and support objectives for reducing hazardous fuels, improving forest health, re-introducing fire, and/or re-establishing forested conditions (USDA 2004b, page 52). For large post fire restoration projects (contiguous blocks of moderate to high fire severity of 1,000 acres or more), do not conduct salvage harvest in at least 10 percent of the total area affected by fire. The Chip-munk Project has incorporated “snag retention areas” where salvage harvest would not occur (USDA 2004b, pages 52).

Use the best available information for identifying dead and dying trees for salvage purposes as developed by the Pacific Southwest Region Forest Health Protection Staff (USDA 2004b, page 52). Hazard trees proposed for felling have been identified using the Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region (USDA 2012a) and Plumas National Forest: Mt. Hough Ranger District Marking Guidelines for Fire-Injured Trees within the Chip-munk Roadside Safety and Hazard Tree Designation (USDA 2013a). Tree hazards include dead or dying trees, dead parts of live trees, or unstable live trees (due to structural defects or other factors) that are within striking distance of people or property (a target). Hazard trees have the potential to cause property damage, personal injury or fatality in the event of a failure.

In addition, there is no set diameter limit within the SNFPA ROD (USDA 2004b) for trees with 100 percent mortality or snag removal for salvage; therefore all large trees (greater than 30 inches dbh) with 100 percent mortality may be removed as salvage. During salvage operations, retain all

large hardwoods on the westside except where 1) large trees pose an immediate threat to human life or property or 2) losses of large trees are incurred due to prescribed or wildland fire. Large montane hardwoods are trees 12 inches or greater dbh (USDA 2004b, page 53). Snag retention levels may be determined on an individual project basis for vegetation treatments. When determining snag retention levels and locations, land allocation, desired condition, landscape position, potential prescribed burning and fire suppression line locations, and site conditions (such as riparian areas and ridge tops) would be considered, avoiding uniformity across large areas. A general guideline for large-snag retention in westside mixed conifer and ponderosa pine types is four of the largest snags per acre, while red fir forest types is six of the largest snags per acre (USDA 2004b, page 51).

Outside of the Wildland Urban Interface (WUI) defense zones, salvage harvests are prohibited in PACs and known den sites, unless a biological evaluation determines that the areas proposed for harvest are rendered unsuitable for the purpose they were intended by a catastrophic stand-replacing event (USDA 2004b, page 53). According to the SNFPA ROD (USDA 2004b, page 37) the Forest Service is to evaluate habitat conditions after a stand-replacing event within a 1.5-mile radius around the activity center to identify opportunities for re-mapping the PAC. If there is insufficient suitable habitat for designating a PAC within the 1.5-mile radius, the PAC may be removed from the network.

Riparian Conservation Areas (RCAs) are managed to support populations of native and desired non-native plant, invertebrate, and vertebrate riparian and aquatic dependent species (USDA 2004b, pg. 42). Project specific RCA design criteria address management strategies, goals, objectives, and standards & guidelines (USDA 2004b, pages. 32-34,52-53, and 62-66), Riparian conservation areas (RCA) widths are described in Table 3, Table 4, and Table 5 in the Salvage Timber Harvest section of this EA. RCA widths may be adjusted at the project level if a landscape analysis has been completed and a site-specific Riparian Conservation Objective (RCO) analysis demonstrates a need for different widths (USDA 2004b, page 42).

Proposed Action

In order to meet the purpose and need, the Forest Service proposes six groups of activities: roadside hazard tree treatments; salvage timber harvest treatments; areas treated by skyline logging systems including removal of green trees; constructing landings, skid trails, and temporary roads; water draft site construction and reconstruction; and reforestation treatments (Figure 1, Figure 2, and Figure 3). A detailed description of the specific activities for each of the above listed groups is located in Chapter 2 of this EA.

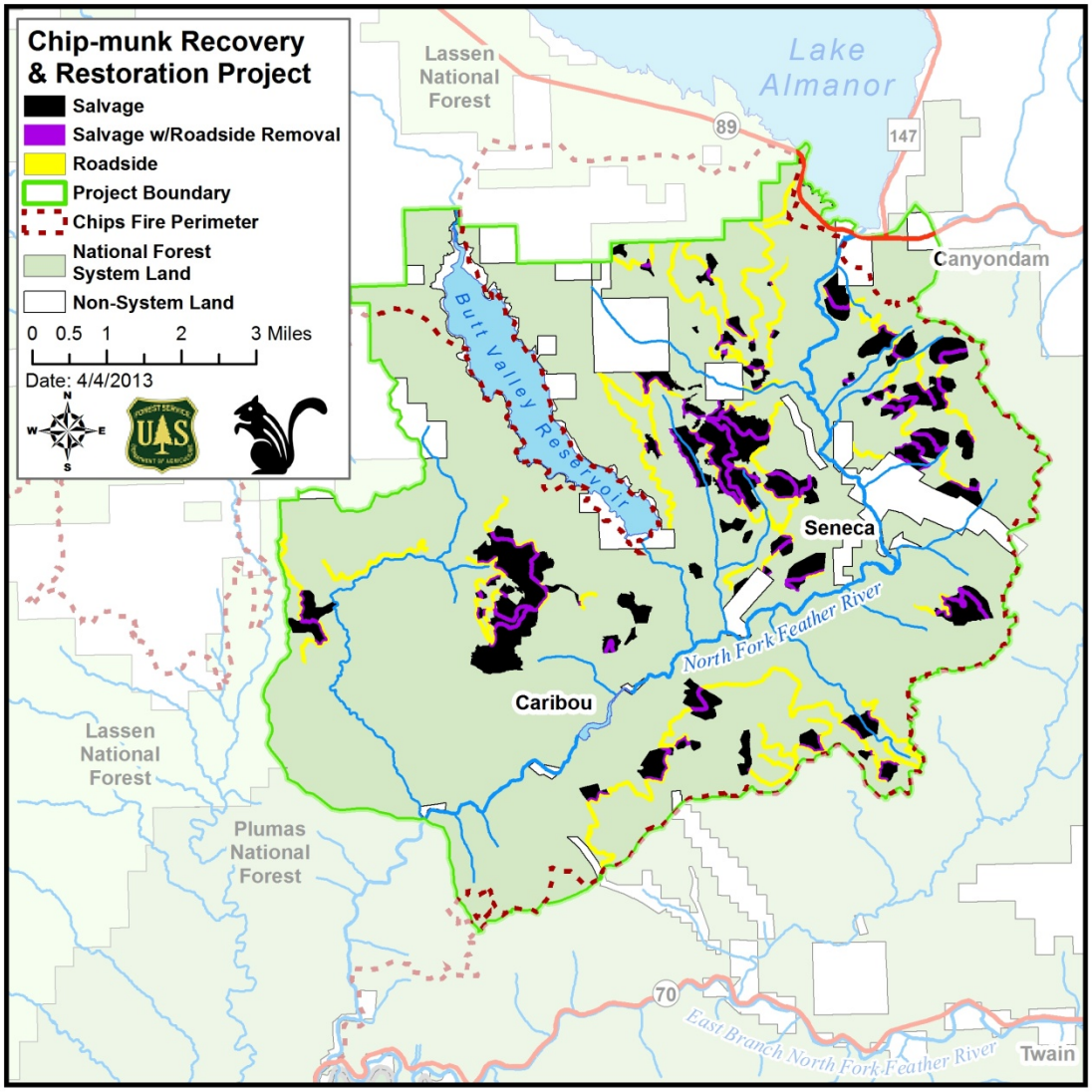


Figure 1. **Chip-munk Project Proposed Action Map.**

Remove Roadside Fire-killed and/or Fire-injured Hazard Trees

Fire-killed and fire-injured conifer trees would be felled and removed along roadways within the Chips Fire perimeter (up to 1,788 acres). Approximately 514 acres of Riparian Conservation Areas (RCAs) within 150 feet from the road prism and within a roadside treatment unit would be included for hazard tree removal. Refer to Table 1 for design criteria regarding roadside hazard tree removal.

Recover Economic Value of Fire-killed Timber

Fire-killed conifer trees would be felled and removed (up to 3,675 acres of which up to 2,726 acres would use ground-based logging systems and up to 929 acres would use skyline logging

systems) outside of roadside hazard tree removal areas. Approximately 949 acres of Riparian Conservation Areas (RCAs) within salvage treatment units would be included to recover the economic value of fire-killed trees. Refer to Table 2 for design criteria regarding salvage timber harvest activities. Of the 3,675 salvage acres listed above, 844 acres are salvage units that include roadside hazard tree removal. Refer to Table 1 for design criteria regarding roadside hazard tree removal.

Temporary roads, old skid trails, and old, abandoned landings exist on the landscape and would be utilized as much as possible during project implementation. These roads, skid trails, and landings are needed and used to permit the removal and utilization of material. These existing facilities would need some reconstruction activities to meet implementation and safety standards.

Approximately 4 miles oftemporary road construction is proposed. Additionally, some skid trails and landings may be required for project implementation. After project completion, these temporary features would be sub-soiled and culverts, if any, removed. Refer to Table 6 for design criteria regarding access.

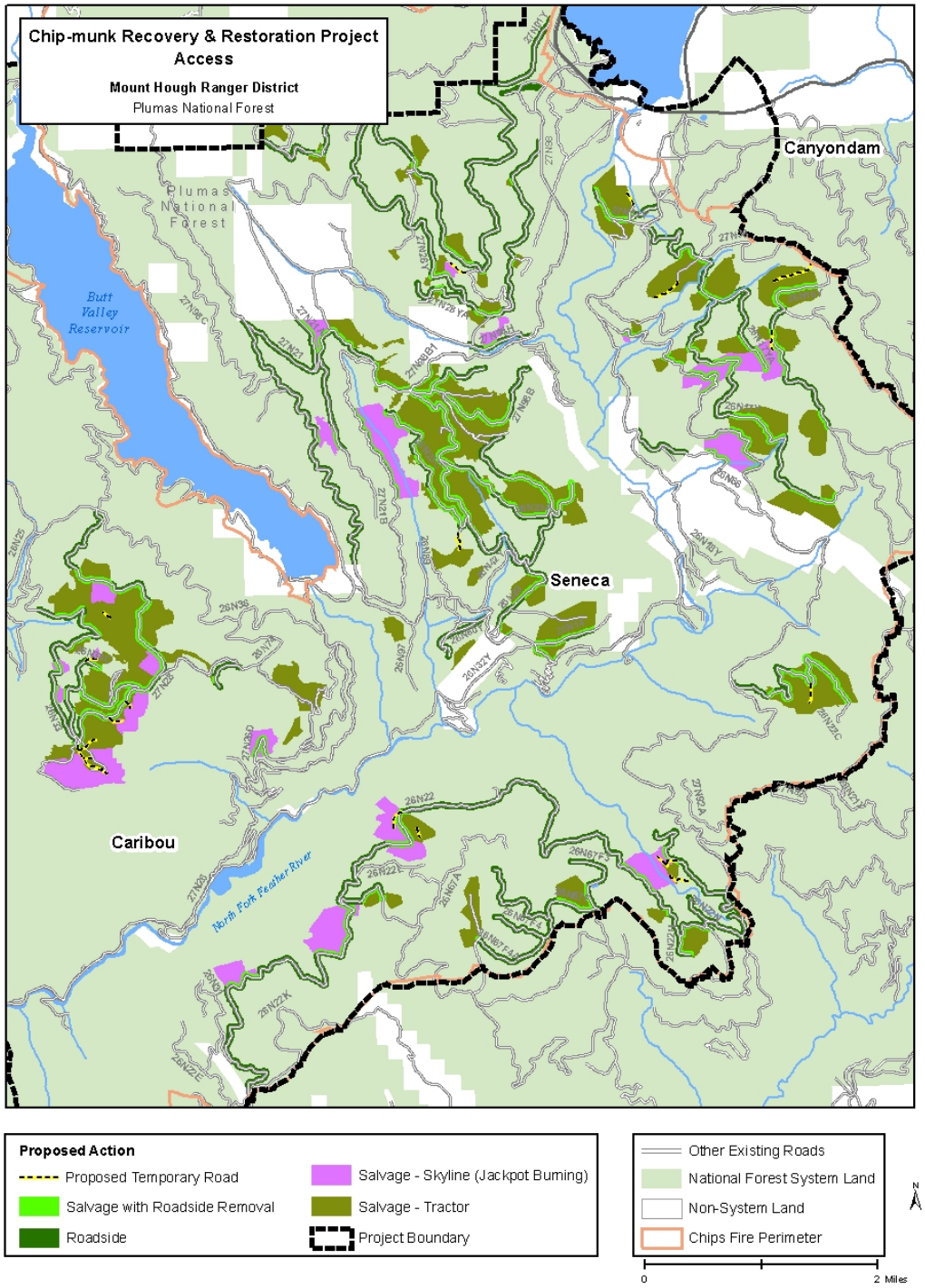


Figure 2. **Chip-munk Project Proposed Temporary Road Construction.**

Areas Treated by Skyline Logging Systems

In addition to salvage of dead and dying trees using skyline systems, approximately 10 acres of live **green trees** will be felled and/or removed incidental to logging. Some green trees will need to be cut in order to open corridors through which the salvaged timber can be yarded to landings. These areas are planned within moderate and/or low burn severity areas and would require

removal of fire-killed, fire-injured, and green trees. Refer to Table 2 for design criteria regarding salvage timber harvest and skyline logging systems.

Water Drafting Sources

Three water sources (basins along flowing streams from which water is pumped to water trucks and utilized on project haul routes) would be constructed or reconstructed. Two of these water sources currently exist and would be reconstructed to meet Best Management Practices (BMPs). One additional new water source would be constructed. Refer to Table 7 for design criteria regarding water source construction and reconstruction. Refer to Figure 5 for proposed water source locations.

Re-establish Forested Conditions

Reforestation includes site preparation and planting of native conifer seedlings in areas of moderately high and high vegetation burn severity, up to 3,675 acres. Areas targeted for site preparation and reforestation are identical to those areas proposed for salvage timber harvest. Refer to Table 8 for design criteria regarding site preparation and reforestation.

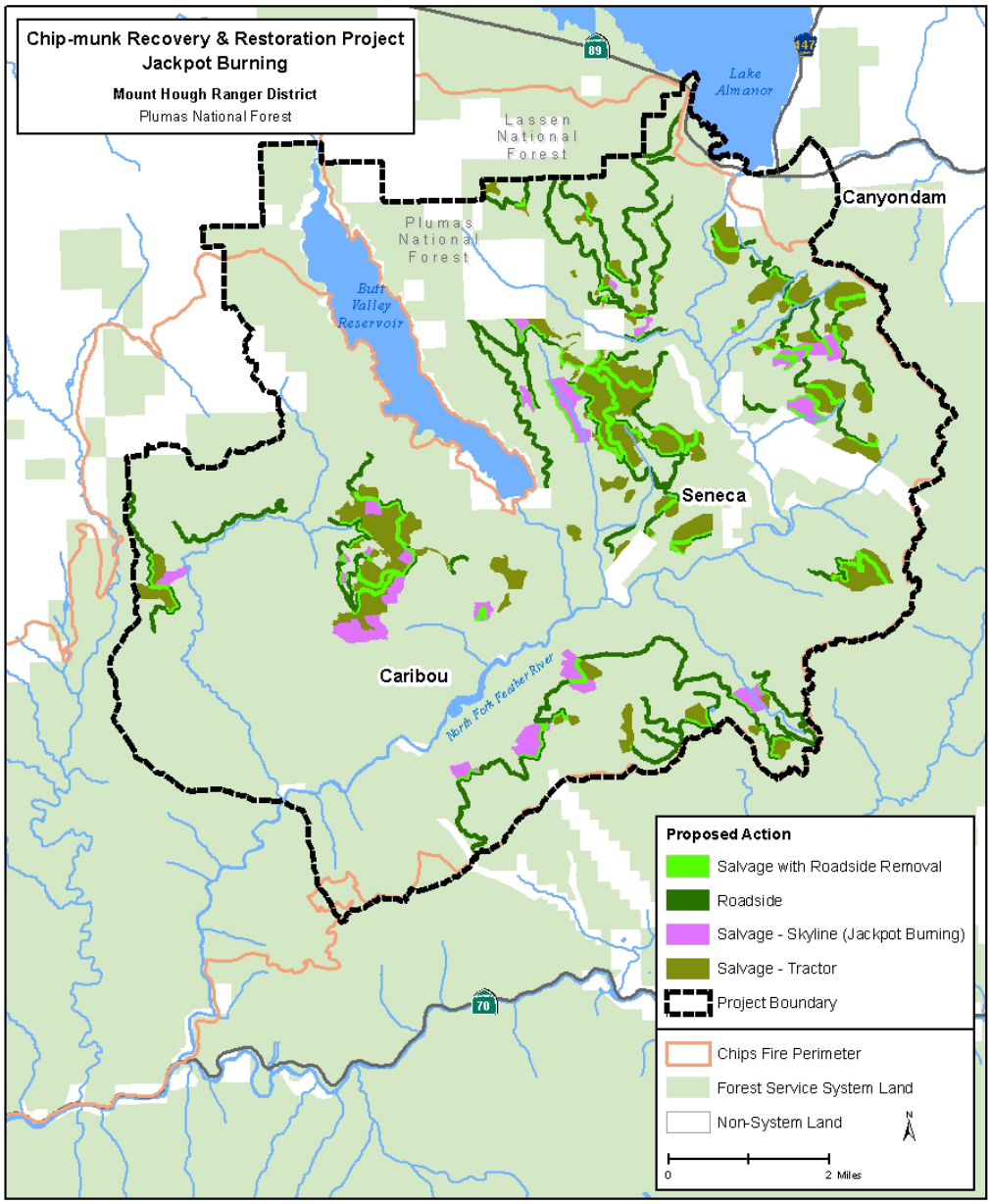


Figure 3. **Chip-munk Project Proposed Jackpot Burning within Skyline Salvage Treatment Units.**

Decision Framework

Given the purpose and need, the deciding official reviews the proposed action and the other alternatives in order to make the following decisions:

- whether to implement this proposal as described ,
- whether there is sufficient evidence and analysis for making a finding of no significant impact (FSH 1909.15, Chapter 41.1), or
- whether to take no action at this time.

Public Involvement

Figure 4. **Forest Service personnel with members of the public attending a Chips Fire field trip, October 2012.**

As part of the public involvement process, the agency announced community field trips and meetings to capture public concerns prior to the start of project planning. A community field trip to the Chips Fire area was held Saturday, October 13, 2012. Three in-town community meetings were also held:

- Monday, October 15, 2012, 6 – 8 p.m. at the Greenville High School/Indian Valley Elementary School cafeteria, 225 Grand St;
- Wednesday, October 17, 2012, 6 – 8 p.m. at the Quincy library conference room, 445 Jackson St.; and
- Thursday, October 18, 2012, 6 – 8 p.m. at the Gansner Bar Campground amphitheatre in the Feather River Canyon.

The proposal was listed in the Forest Schedule of Proposed Actions on January 14, 2013. The proposal was provided to the public and other agencies for comment during scoping in January and February 2013. The Mt. Hough Ranger District received nine comment letters from

individuals, organizations, and interested parties. Using the comments from the public, the interdisciplinary team developed a list of issues to address. Refer to the Issues section of this EA below for more information.

Issues

Issues (cause-effect relationships) serve to highlight effects or unintended consequences that may occur from the proposed action, providing opportunities during the analysis to reduce adverse effects and compare trade-offs for the responsible official and public to understand. Issues are best identified during scoping early in the process to identify the environmental effects to consider and develop proposals that minimize environmental impacts. However, due to the iterative nature of the NEPA process, additional issues may come to light at any time.

An issue should be phrased as a cause-effect statement relating actions under consideration to effects. An issue statement should describe a specific action and the environmental effect(s) expected to result from that action. Cause-effect statements provide a way to understand and focus on the issues relevant to a particular decision.

There is no set of standard issues applicable to every proposal, so it is important for the Responsible Official to consider a variety of laws, regulations, executive orders, and input, with the help of the interdisciplinary team. The Responsible Official approves issues to analyze in depth by the interdisciplinary team in the environmental analysis (FSM 1950.41). It is often helpful to group similar issues by common resources, cause-effect relationship, common geographical area, or those linked to the same action.

The Forest Service separated the scoping comments into two groups: Category A and Category B issues. Category A issues were defined as those directly or indirectly caused by implementing the proposed action. There were no Category A issues identified. A list of Category B issues and reasons regarding their categorization can be found in the project record.

Category B issues included those: 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; 4) conjectural and not supported by scientific or factual evidence; or 5) the comment could not be phrased as a cause-effect relationship.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares two alternatives considered for the Chip-munk Project. It includes a description of each alternative considered and a map for the proposed action. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives isbased upon the

environmental, social, and economic effects of implementing each alternative (i.e., the amount of erosion or cost of helicopter logging versus skidding).

Alternatives

Alternative A – The Proposed Action

Roadside Hazard Timber Harvest

Fire-killed and/or fire-injured conifer trees would be felled and removed (up to 1,788 acres). Approximately 514 acres of Riparian Conservation Areas (RCAs) within 150 feet from the road prism and within a roadside treatment unit would be included for hazard tree removal. Hazard guidelines are designed to remove trees that present themselves as an imminent threat, as defined under Hazard Tree Guidelines For Forest Service Facilities and Roads in the Pacific Southwest Region (USDA 2012a) and Plumas National Forest: Mt. Hough Ranger District Marking Guidelines for Fire-Injured Trees within the Chip-munk Roadside Safety and Hazard Tree Designation (USDA 2013a). Hazards include conifers **that may strike** the road prism that also meet the following conditions. Table 1 displays the design elements for roadside hazard activities under alternative A. Figure 1 displays an illustration of proposed activities for the Chip-munk Project.

Salvage with Hazard Tree Removal

‘Salvage with hazard tree removal’ includes fire-killed and/or fire-injured conifer trees of salvage treatment units within 100 to 150 feet of roadside hazard treatment units (up to 844 acres). The roadside unit would be considered for hazard and salvage timber harvest activities. The hazard guidelines are applied to conifers that present themselves as imminent threats to roadways and structures (USDA 2012a). The salvage guidelines apply to conifers that are not hazards, but are designated for removal under the salvage guidelines. Refer to Table 1 and Table 2 for design criteria regarding roadside hazard and salvage timber harvest activities, respectively.

Table 1. Design elements for roadside hazard activities for alternative A.

Criterion	Design	Justification	Source
Vegetation Burn Severity	Harvest activities would occur within 150 feet from the road prism along 95 miles of National Forest System and Plumas County roads within the Chips Fire perimeter. With a 150 foot buffer this totals to approximately 1,788 acres of roadside hazard timber harvest. Logging systems are described below.	Conifer trees on the Plumas National Forest generally grow 150 feet tall. Roadside hazard trees within the project area are generally expected to be 150 feet or less from the road prism.	
	No upper diameter limit would be used.	There is no upper diameter listed for roadside hazard trees. Trees must be directionally felled into the treatment unit.	SNFPA ROD (USDA 2004b) Hazard Tree Guidelines For Forest Service Facilities and Roads in the Pacific Southwest Region (USDA 2012a) Plumas National Forest: Mt. Hough Ranger District Marking Guidelines for Fire-Injured Trees within the Chip-munk Roadside Safety and Hazard Tree Designation (USDA 2013a)
	Roadside hazard trees occur within all severity types.		
Hazard Guidelines	Designate conifers less than 40.0 inches dbh for removal if it meets a probability of mortality (Pm) of 0.70 or greater.		
	Designate conifers greater than or equal to 40.0 inches dbh for removal Pm of 0.90 or greater.	When determining snag retention levels, retaining some mid- and large diameter live trees that are currently in decline to serve as future replacement snags and to provide wildlife structure (foraging,	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Snags and Down Woody Material (P51).

Criterion	Design	Justification	Source
		nesting, roosting and resting sites).	
	Designate conifers greater than or equal to 40.0 inches dbh within protected activity centers (PACs) for removal only if completely dead.	When determining snag retention levels and locations, consider land allocation, desired condition and landscape position while retaining some mid- and large diameter live trees that are currently in decline to serve as future replacement snags and to provide nesting structure,	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Snags and Down Woody Material (P51).
Ground-based Logging System	Hazard trees 10 inches dbh and greater would be removed as a sawlog product. Hazard trees of 4-9.9 inches dbh would be felled and treated as described below. Hazard trees less than 4 inches dbh would be left standing.	Large trees are merchantable. Hazard trees less than 4 inches dbh may fall onto the road, but are manageable to remove by hand.	
	Within 50 feet of roadways, hazard trees less than 10 inches dbh and project created slash would be hand or grapple piled and burned.	To reduce surface fuels to meet project specific standard and guideline.	
	Greater than 50 feet from roadways, hazard trees less than or equal to 9.9 inches dbh and project created slash would be lopped and scattered to a depth of less than 18 inches.	To reduce surface fuels to meet project specific standard and guideline. To increase ground cover to provide more soil protection.	PNF LRMP Standards and guidelines
	Ground-based equipment would operate from National Forest System (NFS) or temporary roads. In general, motorized equipment would not leave road surfaces to treat hazard trees. In limited instances where felled hazard trees are not accessible from a road, mechanical equipment would be allowed only on slopes less than 35 percent.	To prevent soil erosion along roadways and soil compaction within treatment unit.	FSH 2409.15, Chapter 61.32 BMP 1.9

Criterion	Design	Justification	Source
	Exceptions may be made for short pitches (less than 100 feet) where slopes exceed these limits, district watershed staff shall be available for consultation as needed.		
	Skidding harvested trees along roads would be allowed, subject to written agreement, and only in limited instances where such skidding is preferred to prevent environmental resource impacts. After skidding, the road would be restored to previous condition, including the same quality and quantity of road drainage features and the same level of compacted surface. Skidding on roads would involve approval with the Forest Road Engineer and the District Hydrologist, both before and after skidding activities.	Skidding along NFS roads is an exception and request must be made to permit activity. Skidding along roads is critical in areas with steep slopes, little to no road shoulder, and where a temporary, unclassified, non-system road would parallel an existing road template. The road surface becomes uncompact allowing sediment from the road to move into creeks and streams. There are other methods to remove timber along roadside treatment units that does not require skidding on the road.	FSH 2409.15, Chapter 61.32(c) BMPs 1.10 and 2.4
	Incidental removal of green trees may occur.	To allow for landing and unclassified, non-system temporary road and skid trail construction	29CFR 1910.266 OSHA Federal Register Final Rules 60:47022-47037 (1995, September 8). Amends the logging operations standard. [See Paragraph (h)(6)(ii) -- Loading .]
	Exclude equipment from unstable slopes (landslide-prone areas or unstable mined lands).	To minimize accelerated soil erosion and sedimentation and water quality degradation. To reduce risk in areas with high erosion hazard rating or	BMPs 1.6 and 1.9 Locations provided on Sale Area Map.

Criterion	Design	Justification	Source
		areas prone to landslides.	
Riparian Conservation Area (RCA) Equipment Constraints	Ground-based mechanical equipment operations would not occur on slopes steeper than 25 percent in RCAs.	To protect water quality and maintain the physical structure and condition of stream banks to minimize erosion. Design projects to protect and maintain critical wildlife habitat.	SNFPA ROD (USDA 2004b), Management Goals and Strategies, Aquatic, Riparian and Meadow Ecosystems and Associated Species, Goals and Riparian Conservation Objectives (P32-33). Management Standards and Guidelines, Salvage (P52). BMPs 1.8 and 1.9 Clean Water Act Section 208FSH 2409.15, Chapter 61.32(c)
	Riparian Conservation Area widths are presented in Table 3. No landings would be located within RCAs.	To protect water quality and minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species. Maintain habitat to support viable populations of plant and wildlife species.	SNFPA ROD (USDA 2004b), Management Goals and Strategies, Aquatic, Riparian and Meadow Ecosystems and Associated Species, Goals (P32-33). Management Standards and Guidelines, Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges (P62-66). BMPs 1.8 and 1.12
	Equipment exclusion zones within RCAs would be established based on stream type and potential habitat for aquatic wildlife	Design projects to protect and maintain critical wildlife habitat, and to protect water quality and stream	SNFPA ROD (USDA 2004b), Management Standards and Guidelines,

Criterion	Design	Justification	Source
	(e.g., Sierra Nevada yellow-legged frog). Equipment exclusion zones are provided in Table 3.	channel condition. Maintain habitat to support viable populations of plant and wildlife species.	Salvage (P52). BMPs 1.8 and 1.19 Management Goals and Strategies, Aquatic, Riparian and Meadow Ecosystems and Associated Species, Goals (P32-33).
	In the advent that the riparian zone is wider than equipment exclusion zone widths presented in Table 3, extend the exclusion zone width to 25 feet beyond the outer or upslope extent of the actual or potential extent of riparian vegetation, or to the inner channel slope break.	To protect water quality and riparian habitat, ensuring that biotic community composition and structural diversity of riparian habitat supports viable populations of riparian- and aquatic-dependent species, and desired ecological functions.	SNFPA ROD (USDA 2004b), Management Goals and Strategies, Riparian Conservation Areas (P42-43). BMPs 1.8 and 1.19
	All hazard trees harvested within RCA equipment exclusion zones for perennial and intermittent streams would require full suspension per the widths presented in Table 3. Drop and leave hazard trees in RCA equipment exclusion zone if full suspension is not possible.	Design projects to protect and maintain critical wildlife habitat. To protect water quality and stream channel condition. To prevent excessive impacts to habitat for aquatic- or riparian-dependent plant and animal species. To ensure biotic community composition and structural diversity of riparian habitat supports viable populations of riparian- and aquatic-dependent species, and desired ecological functions.	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Salvage (P52). BMPs 1.8 and 1.19 SNFPA ROD (USDA 2004b), Management Goals and Strategies, Riparian Conservation Areas (P42-43). Management Standards and Guidelines, Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges (P62-66).
	Drop and leave hazard trees 30 inches diameter	To prevent excessive disturbance of critical	BMPs 1.19, SNFPA ROD

Criterion	Design	Justification	Source
	and greater within the equipment exclusion zone along all perennial streams and intermittent streams above 3,500 feet elevation.	riparian habitat and protect stream channel condition.	(USDA 2004b), Management Standards and Guidelines, Salvage (P52), Management Goals and Strategies, Aquatic, Riparian and Meadow Ecosystems and Associated Species, Goals (P32-33). Management Standards and Guidelines, Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges (P62-66).
	For ephemeral streams, end-lining or cable yarding (one-end suspension) may be used to yard products from the equipment exclusion. Material would not be end-lined across any stream channel.	To protect water quality and stream channel condition. Maintain habitat to support viable populations of plant and wildlife species	BMPs 1.8, 1.10 and 1.19 Management Goals and Strategies, Aquatic, Riparian and Meadow Ecosystems and Associated Species, Goals (P32-33).
	In the outer RCA (i.e., outside the equipment exclusion zone) where full suspension is not required, end-lining or cable yarding (one-end suspension) may be used to yard products that have been directionally felled.	To protect water quality and stream channel condition	BMPs 1.8, 1.10, and 1.19
	Furrows in soil created by end-lining or cable yarding would be filled or re-contoured.	To protect water quality	BMPs 1.10 and 1.17
	In general, motorized equipment will not leave road surfaces to treat hazard trees. Motorized equipment would be	To protect water quality	BMPs 1.8 and 1.10

Criterion	Design	Justification	Source
	permitted to leave road surfaces in outer RCA zone under limited instances to retrieve felled trees that are not accessible from the roadway.		
	For limited instances when skid trails are necessary to retrieve fallen hazard trees, locate skid trails at angles acute or perpendicular to stream channels (not parallel to stream).	To protect water quality	BMPs 1.8 and 1.10
	Equipment would not be permitted to turn around within RCAs.	To protect water quality	BMPs 1.8 and 1.10
	Lop and scatter fallen hazard trees less than 10 inches dbh and slash incidental to treatment to a depth of less than 12 inches along sensitive streams that currently exhibit low ground cover due to the fire. For these designated sensitive streams, this treatment would occur in areas that are 1 foot above the annual high water mark and throughout the RCA equipment exclusion zone. For all other streams, fallen hazard trees less than 10 inches dbh and slash incidental to treatment within the RCA equipment exclusion zone would be hand-piled and burned.	To protect water quality and improve soil cover. Design projects to to reduce soil erosion and the loss of soil productivity caused by the loss of vegetation and ground cover. Provide for adequate ground cover in the short term and accelerate the dispersal of coarse woody debris.	LRMP standards and guidelines BMPs 1.8 and 1.22 SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Salvage (P52) Locations provided on Sale Area Map.
	Burn piles would not be placed near riparian vegetation to prevent soil scorching. Minimum distances from stream channels to burn piles are presented in Table 3.	To protect water quality and riparian vegetation. Design prescribed fire treatments to minimize disturbance of riparian vegetation in RCA's.	BMPs 1.8 SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges (P62-66).

Salvage Timber Harvest

Fire-killed and/or fire-injured conifer trees would be felled and removed (up to 3,675 acres). Approximately 949 acres of Riparian Conservation Areas (RCAs) would be included for salvage timber harvest. Salvage marking guidelines are designed to identify trees with a very high probability of mortality (≥90 percent). Table 2 displays the design elements for salvage timber harvest activities under alternative A. Figure 1 displays an illustration of proposed activities for the Chip-munk Project.

Table 2. Design elements for salvage timber harvest activities for alternative A.

Criterion	Design	Justification	Source
Vegetation Burn Severity	Harvest activities would occur in moderately high and high vegetation burn severity areas up to 3,675 acres within the project area. Logging systems are described below.	To balance forest restoration goals with the objective of recovering economic value, areas of low burn severity will not be included in salvage timber operations.	SNFPA ROD (USDA 2004b, p. 52)
	No upper diameter limit would be used.	There is no upper diameter listed for salvage trees.	SNFPA ROD (USDA 2004b)
Marking Guidelines	Designate removal of conifers under 40.0 inches dbh that have a 90 percent probability of mortality (Pm 0.90) or greater.		
	Designate removal of conifers 40.0 inches and greater only when completely dead.	When determining snag retention levels, retaining some mid- and large diameter live trees that are currently in decline to serve as future replacement snags and to provide wildlife structure (foraging, nesting, roosting and resting sites).	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Snags and Down Woody Material (P51).
	During salvage operations, conifers under 40.0 inches dbh that fade and meet a Pm of 0.90 may be designated for removal.		
	Conifers greater than 40.0 inches that were not completely dead during timber marking, but die during removal activities will be left standing unless they are a hazard to operations. Trees 40.0	When determining snag retention levels, retaining some mid- and large diameter live trees that are currently in decline to serve as	SNFPA ROD (USDA 2004b), Management Standards and

Criterion	Design	Justification	Source
	inches dbh and greater removed for operability or safety would be replaced with a tree of the same size and species.	future replacement snags and to provide wildlife structure (foraging, nesting, roosting and resting sites).	Guidelines, Snags and Down Woody Material (P51).
Ground-based Logging System	Trees 12 inches dbh and greater would be removed as sawlog product on up to 2,746 acres.		
	Ground-based equipment would be restricted to slopes less than 35 percent. Exceptions may be made for short pitches (less than 100 feet) where slopes exceed these limits, District watershed staff shall be available for consultation as needed.	To reduce soil displacement and prevent erosion.	PNF LRMP Standards and Guidelines BMPs 1.9
	Exclude equipment from unstable slopes (landslide-prone areas or unstable mined lands). Project generated slash would be lopped and scattered and subsequently treated under reforestation as site preparation (Table 8).	To prevent initiating mass wasting.	BMPs 1.6 and 1.9 Locations provided on Sale Area Map.
	Incidental removal of green trees may occur.	To allow for landing and unclassified, non-system temporary road construction.	
Skyline Logging System	Harvest and remove trees greater than 16 inches dbh, up to 929 acres as sawlog product.		
	Project generated slash would be lopped and scattered to a depth of less than 18 inches in height.	To increase ground cover in order to prevent runoff and/or erosion.	PNF LRMP standards and guidelines BMPs 1.11 and 1.22
	Skyline yarding would require one end suspension with full suspension over all streams. Full suspension zone widths are provided in Table 5. Consult with forest aquatic biologist if full suspension zone widths cannot be met.	To reduce furrowing caused by yarding timber. To avoid damage to banks, beds, and riparian vegetation, and turbidity from stirred up bottom sediments. Design projects to protect and maintain	BMPs 1.8, 1.11, and 1.19 SNFPA ROD (USDA 2004b), Management Goals and Strategies, Aquatic,

Criterion	Design	Justification	Source
		critical wildlife habitat.	Riparian and Meadow Ecosystems and Associated Species, Goals and Riparian Conservation Objectives (P32-33). Management Standards and Guidelines, Salvage (P52).
	Tail trees for skyline corridors would be positioned at least 25 horizontal feet from the stream bankfull edge.	To protect water quality and stream channel condition	BMPs 1.8, 1.10 and 1.19
	Skyline corridors would avoid patches of large diameter live conifers and large diameter snags when feasible for operations	Design projects to protect and maintain critical wildlife habitat and to sustain a generally continuous supply of snags and live decadent trees suitable for cavity nesting wildlife across the landscape. Course woody debris (CWD) is within range of natural variability, and is sufficient to sustain stream channel physical complexity and stability.	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Snags and Down Woody Material, Salvage (P51-52). Management Standards and Guidelines, Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges (P62-66).
RCA Equipment Constraints	Riparian Conservation Area widths are presented in Table 4 and Table 5. No landings would be located within RCAs.	To protect water quality and minimize impacts to habitat for aquatic- or riparian-dependent	BMPs 1.8 and 1.12. SNFPA ROD (USDA

Criterion	Design	Justification	Source
		plant and animal species. Maintain habitat to support viable populations of plant and wildlife species.	2004b), Management Standards and Guidelines, Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges (P62-66). Management Goals and Strategies, Aquatic, Riparian and Meadow Ecosystems and Associated Species, Goals (P32-33).
	Ground-based equipment would be restricted to slopes less than 35 percent.	To reduce soil displacement and prevent erosion. To protect water quality and maintain the physical structure and condition of stream banks to minimize erosion. Design projects to protect and maintain critical wildlife habitat.	LRMP standards and guidelines BMPs 1.8 and 1.9. SNFPA ROD (USDA 2004b), Management Goals and Strategies, Aquatic, Riparian and Meadow Ecosystems and Associated Species, Goals and Riparian Conservation Objectives (P32-33). Management Standards

Criterion	Design	Justification	Source
			and Guidelines, Salvage (P52).
	Equipment exclusion zones within RCAs would be established based on stream type and potential habitat for aquatic wildlife (e.g., Sierra Nevada yellow-legged frog). Equipment exclusion zones are provided in Table 4.	Design projects to protect and maintain critical wildlife habitat, and to protect water quality and stream channel condition. Maintain habitat to support viable populations of plant and wildlife species. To ensure biotic community composition and structural diversity of riparian habitat supports viable populations of riparian- and aquatic-dependent species, and desired ecological functions.	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Salvage (P52). BMPs 1.8 and 1.19 Management Goals and Strategies, Aquatic, Riparian and Meadow Ecosystems and Associated Species, Goals (P32-33). Management Standards and Guidelines, Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges (P62-66).
	In the advent that the riparian zone is wider than equipment exclusion zone widths presented in Table 4, extend the exclusion zone width to 25 feet beyond the outer or upslope extent of the actual or potential extent of riparian vegetation, or to the inner channel slope break.	To protect water quality and riparian habitat, ensuring that biotic community composition and structural diversity of riparian habitat supports viable populations of riparian- and aquatic-dependent species, and desired	BMPs 1.8, 1.18 and 1.19 SNFPA ROD (USDA 2004b), Management Goals and Strategies, Riparian Conservation Areas (P42-

Criterion	Design	Justification	Source
		ecological functions.	43).
	Trees harvested within RCA equipment exclusion zones would require full suspension per the widths presented in Table 4.	Design projects to protect and maintain critical wildlife habitat. To reduce erosion and runoff potential and protect water quality and stream channel condition. To ensure biotic community composition and structural diversity of riparian habitat supports viable populations of riparian- and aquatic-dependent species, and desired ecological functions.	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Salvage (P52). BMPs 1.8 and 1.19 SNFPA ROD (USDA 2004b), Management Goals and Strategies, Riparian Conservation Areas (P42-43).
	Do not harvest trees 30 inches diameter and greater within the equipment exclusion zone and full suspension zone along all perennial streams and along intermittent streams above 3,500 feet elevation.	Maintain habitat to support viable populations of plant and wildlife species. To protect water quality and stream channel condition. To prevent excessive impacts to habitat for aquatic- or riparian-dependent plant and animal species.	BMPs 1.19, SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Salvage (P52), Management Goals and Strategies, Aquatic, Riparian and Meadow Ecosystems and Associated Species, Goals (P32-33).
	Drop and leave trees 30 inches diameter and greater felled for safety or operability within the equipment exclusion zone along all perennial streams and along intermittent streams above 3,500	Maintain habitat to support viable populations of plant and wildlife species. To protect water quality and stream channel	BMPs 1.19, SNFPA ROD (USDA 2004b), Management Standards

Criterion	Design	Justification	Source
	feet elevation.	condition. To prevent excessive impacts to habitat for aquatic- or riparian-dependent plant and animal species.	and Guidelines, Salvage (P52), Management Goals and Strategies, Aquatic, Riparian and Meadow Ecosystems and Associated Species, Goals (P32-33).
	In the outer RCA (i.e., outside the equipment exclusion zone) where full suspension is not required, end-lining or cable yarding (one-end suspension) may be used to yard products that have been directionally felled.	To protect water quality and stream channel condition	BMPs 1.8 and 1.10
	Furrows in soil created by end-lining or cable yarding in the outer RCA would be filled and/or re-contoured.	To protect water quality	BMPs 1.10 and 1.17
	Material would not be end-lined across any stream channel.	To protect water quality and stream channel condition	BMPs 1.8, 1.10, and 1.19
	Allow mechanical equipment to travel into the outer RCA zone (outside the equipment exclusion zone) to retrieve harvest trees and bring them to skid trails.	To protect water quality	BMPs 1.8 and 1.10
	Within the outer RCA (outside the equipment exclusion zone), locate skid trails at angles acute or perpendicular to stream channels (not parallel to stream). Allow skidders to enter the outer RCA on these skid trails.	To minimize catchment areas for runoff toward the skid trails. To protect water quality.	BMPs 1.8 and 1.10
	No equipment would be permitted to turn around while off a skid trail in RCAs.	To minimize soil displacement and protect water quality.	BMPs 1.8 and 1.10
	Burn piles would not be placed within areas of riparian vegetation. Minimum distances	To prevent scorching of riparian vegetation and protect water	BMP 1.8 Management

Criterion	Design	Justification	Source
	from stream channels to burn piles are presented in Table 4.	quality. Design prescribed fire treatments to minimize disturbance of riparian vegetation in RCA's.	Standards and Guidelines, Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges (P62-66).
Snag Retention	Retain four to six of the largest snags per acre within RCAs and snag retention areas within treatment units.	In Sierra mixed conifer types and ponderosa pine forest types, retain four to six of the largest snags per acre. In the red fir forest type, retain six of the largest snags per acre.	SNFPA ROD 2004 (USDA 2004b) Management Standards and Guidelines, Snags and Down Woody Material (P51).
	In RCAs, retain four to six of the largest snags every 75 feet along perennial streams every 150 feet along intermittent streams, and every 225 feet along ephemeral streams.	Design projects to protect and maintain critical wildlife habitat. To ensure snag retention levels provide wildlife structure across the landscape (foraging, nesting, roosting and resting sites). To ensure course large woody debris is within range of natural variability, and is sufficient to sustain stream channel physical complexity and stability.	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Snags and Down Woody Material and Salvage (P51-52), Management Standards and Guidelines, Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges (P62-66).

Criterion	Design	Justification	Source
	Snag retention areas outside RCAs of about 10 acres in size would be designated, a minimum of 370 acres distributed in the largest clumps possible throughout treatment units.	Design projects to protect and maintain critical wildlife habitat. To ensure snag retention levels provide wildlife structure across the landscape (foraging, nesting, roosting and resting sites).	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Snags and Down Woody Material and Salvage (P51-52).
	Primary selection criteria for snag retention areas are areas near California spotted owl and northern goshawk PACs, and along treatment unit boundaries. No harvesting would occur within snag retention areas.	When determining snag retention levels and locations, consider land allocation, desired condition and landscape position while to provide for sufficient quantities of large snags.	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Snags and Down Woody Material and Salvage (P51-52).
	Incidental removal of snags within snag retention areas may occur to allow for operability and safety. Snags removed for operability or safety within snag retention areas would be replaced with a snag of the same size and species.	Design projects to protect and maintain critical wildlife habitat. To ensure snag retention levels provide wildlife structure across the landscape (foraging, nesting, roosting and resting sites).	SNFPA ROD (USDA 2004b), Management Standards and Guidelines, Snags and Down Woody Material and Salvage (P51-52).
Down Woody Material Retention	Generally retain an average of 10 to 15 tons of large down woody material per acre. Emphasize retention of wood that is in the earliest stages of decay. Large, un-merchantable cull logs would be left on the ground.	Determine down woody material retention levels on an individual basis, based on desired conditions. Emphasize retention of wood in the largest size classes and decay classes.	Management Standards and Guidelines, Snags and Down Woody Material (P51)..

Criterion	Design	Justification	Source
Landing Piles and Fireline	Excess fuels on landings would be piled, firelines constructed around the piles, and the piles burned. Firelines would be hand or machine line as appropriate and would incorporate existing roads, landings, skid trails, rock fields, bare areas, and other features where logical and feasible.		

Table 3. Riparian Conservation Area (RCA), equipment exclusion zone and burn pile restriction widths (fullbank width, measured horizontal from both sides of stream channel) in RCAs for ground-based mechanical equipment operations under roadside hazard actions.

			Equipment Exclusion Zone	
Stream Type	**Riparian Conservation Area (RCA) buffer width**	**Minimum distance to burn pile**	**Slope ≤ 25%**	**Slope >25%**
Perennial stream	300 feet	40 feet	100 feet	300 feet
Intermittent stream over 3,500 ft. elevation	150 feet	40 feet	100 feet	150 feet
Intermittent stream below 3,500 ft. elevation	150 feet	25 feet	50 feet	150 feet
Ephemeral stream	100 feet	25 feet	25 feet [a]	100 feet

a – For Clear Creek watershed, the equipment exclusion zone width for ephemeral streams would be 50 feet.

Table 4. Riparian Conservation Area (RCA), RCA snag retention and equipment exclusion zones, and burn pile restriction widths (fullbank width, measured horizontal from both sides of stream channel) in RCAs for ground-based mechanical equipment operations under salvage timber actions.

Stream Type	Riparian Conservation Area (RCA) buffer and RCA snag retention zone widths	Minimum distance to burn pile	Equipment Exclusion Zone: Slope ≤ 35%	Equipment Exclusion Zone: Slope >35%
Perennial stream	300 feet	40 feet	100 feet	excluded
Intermittent stream over 3,500 ft. elevation	150 feet	40 feet	100 feet	excluded
Intermittent stream below 3,500 ft. elevation	150 feet	25 feet	50 feet	excluded
Ephemeral stream	100 feet	25 feet	25 feet[a]	excluded

a – For Clear Creek watershed, the equipment exclusion zone width for ephemeral streams would be 50 feet.

Table 5. Riparian Conservation Area (RCA), RCA snag retention and full suspension zone widths (fullbank width, measured horizontal from both sides of stream channel) in RCAs for skyline salvage timber actions.

Stream Type	Riparian Conservation Area (RCA) buffer and RCA snag retention zone widths	Full suspension zone
Perennial Stream	300 feet	75 feet
Intermittent Stream over 3,500 ft. elevation	150 feet	75 feet
Intermittent Stream below 3,500 ft. elevation	150 feet	50 feet
Ephemeral Stream	100 feet	25 feet

a – RCA equipment exclusion zones are not applicable to skyline operations because motorized equipment does not leave roads or constructed landings. No landings would be constructed within RCAs.

Access

Approximately 8.5 miles of non-system roads currently exist and would be reconstructed to temporary road standards in order to provide access to treatment units. Approximately 4 miles of temporary roads would be constructed. Table 6 displays the design elements for access actions under alternative A.

Table 6. Design elements for access actions for alternative A.

Criterion	Design	Justification	Source
Temporary Roads and Landings	Existing roads, skid trails, and landings would be utilized where possible.	To reduce the extent of detrimental disturbance to soils.	
	Temporary roads, skid trails, and landings would be constructed entirely within a proposed treatment unit.	Resource specific surveys inventoried proposed treatment units.	
	All landings would be subsoiled to a minimum of 18 inches in depth, reforested, and closed following the completion of harvest.	To reduce soil compaction and improve water infiltration of disturbed areas,	
	Similarly, the first 200 feet of skid trails (measured from the landing) and utilized non-system roads (measured from its intersection with the National Forest system road) would be subsoiled, reforested, and closed. The full length or area of all utilized non-system roads, landings, and skid trails would be treated	Precipitation and runoff is adequately drained and dispersed to prevent erosion.	
	Existing culverts along utilized non-system roads would be removed.	Refer to Appendix B for Best Management Practices (BMPs) and Standard Management Requirements (SMRs) specific to unclassified, non-system temporary roads, skid trails, and landings.	

Criterion	Design	Justification	Source
	Incidental removal of green trees may occur.	To allow for skid trail and landing construction, and unclassified, non-system temporary road reconstruction.	

Water Sources

Three water sources (basins along flowing streams from which water is pumped to water trucks and utilized on project haul routes) would be constructed or reconstructed. Two of these water sources currently exist and would be reconstructed to meet Best Management Practices. One additional new water source would be constructed. Table 7 displays the design elements for water source construction or reconstruction under alternative A.

Table 7. Design elements for water source construction or reconstruction for alternative A.

Criterion	Design
Construction or Reconstruction of Water Sources	Water sources will be constructed or reconstructed per Best Management Practice 2.5, contained in the Region 5 amendment to FSH 2509.22, Chapter 10. Completed water sources will consist of basins, generally less than 1000 sq. ft. in size and less than 8 feet deep, located adjacent to perennial stream channels. The water source will be located outside of the normally flowing stream channel and a diversion mechanism installed so that a portion of stream flow can be diverted to the basin during project operations. A return flow channel, which delivers overflow from the water source back to the main stream channel will be provided. See BMP 2.5 for permissible diversion flow amounts.
Approaches to Water Sources	To protect water quality, routes that provide water truck access to each water source will be constructed or reconstructed so that precipitation and runoff from the route will be directed away or adequately buffered from the stream channel. The approach route may also be surfaced with gravel to further prevent erosion and potential water quality impacts. The water drafting plan containing more details is located in Appendix B.

Reforestation

Reforestation includes site preparation and planting of native conifer seedlings in areas of moderately high and high vegetation burn severity, up to 3,675 acres. All site preparation and reforestation activities near sensitive areas around RCAs will be consulted with the District and/or Forest Wildlife Biologist and Fisheries biologist prior to implementation. Table 8 displays the design elements for reforestation under alternative A.

Table 8. Design elements for reforestation for alternative A.

Criterion	Design
Reforestation of Fire-killed Stands	Reforestation would be accomplished through a combination of planting and natural regeneration. Areas that burned with moderately high to high vegetation burn severity resulting in inadequately stocked forest land would receive preference for planting, up to 3,675 acres.
Site Preparation/Release for Planting	Site preparation activities objectives include reducing and managing future fuel profiles, mitigating hazards to planting crews, and reducing competitive vegetation. Activities include a combination of: Fall non-merchantable (less than 12 inches) material that limit operability or pose a safety risk in reforestation units Larger material (greater than 12 inches) may be removed for operability or safety if it is unavoidable Hand or grapple piling of material Material too large to be moved by hand or on ground too steep for mechanical piling may be contoured felled and/or lopped and scattered and jackpot burned (jackpot burning is proposed in skyline salvage units only) Burning piled vegetation Removal of competitive vegetation i.e. brush species Manual grubbing of competing vegetation down to mineral soil five feet in diameter around the planting site (usually within five years of planting) Retain large diameter downed logs where feasible
Tree Species	The proper conifer species mix for the site would be used for reforestation. Examples of some of the species to be planted could include ponderosa pine, Jeffrey pine, and rust resistant sugar pine.
Planting Spacing	One hundred to three hundred trees per acre would be planted in spaced clusters.

Alternative B – The No-Action Alternative

No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No roadside hazard tree removal; salvage timber harvest; green tree removal associated skyline logging systems; temporary road, skid trails, and landings construction, reconstruction, or maintenance; water source improvements; or watershed improvement activities would be implemented to accomplish project goals.

Mitigation Common to All Alternatives

Mitigation measures were developed to ease some of the potential watershed impacts, specifically reducing equivalent roaded acres (ERA), the proposed action may cause. The mitigation measures may be applied to the Proposed Action Alternative.

Modeling determined for the Clear Creek watershed that the 2012 Chips Fire caused the watershed to exceed the threshold of concern for cumulative watershed effects, affirming the observation that the fire is the primary disturbance that has affected watershed condition. An increase in ERA for a watershed indicates increased concentration of surface runoff, which could result in detrimental changes to sedimentation rates and stream channel condition that could subsequently have effects on downstream water quality and beneficial uses. The proposed action would add additional disturbance in this watershed, but project design features and Best Management Practices would assure that watershed response after treatment would be similar to the post-fire response.

Approximately 165 acres of skyline salvage units were dropped from the original Chip-munk proposal when the watershed threshold concern came to light. Additional watershed improvement activities were added to the proposal to improve water quality in the Clear Creek watershed.

These improvement activities are proposed within the Clear Creek watershed only and include:

- Gravel specific road surfaces at approximately 20 road/stream crossings to reduce sediment delivery from the road to the stream. Gravel would be three inches deep, compacted, and extend 90 feet on each side of each stream crossing structure.
- Currently NFS road 26N23C is closed and several culverts remain in place. This road is proposed as a haul route for the Chip-munk Project. To protect water quality, these culverts would be removed after project implementation, effectively obliterating and decommissioning NFS road 26N23C.
- The culvert currently in place at the intersection of Clear Creek and Seneca Road needs upgrading. Installing a new, larger culvert would facilitate one of the three water draft sources as well.
- Protect all system OHV trails from impacts from logging operations. If trails are damaged, conduct repairs to return trails to a usable condition.

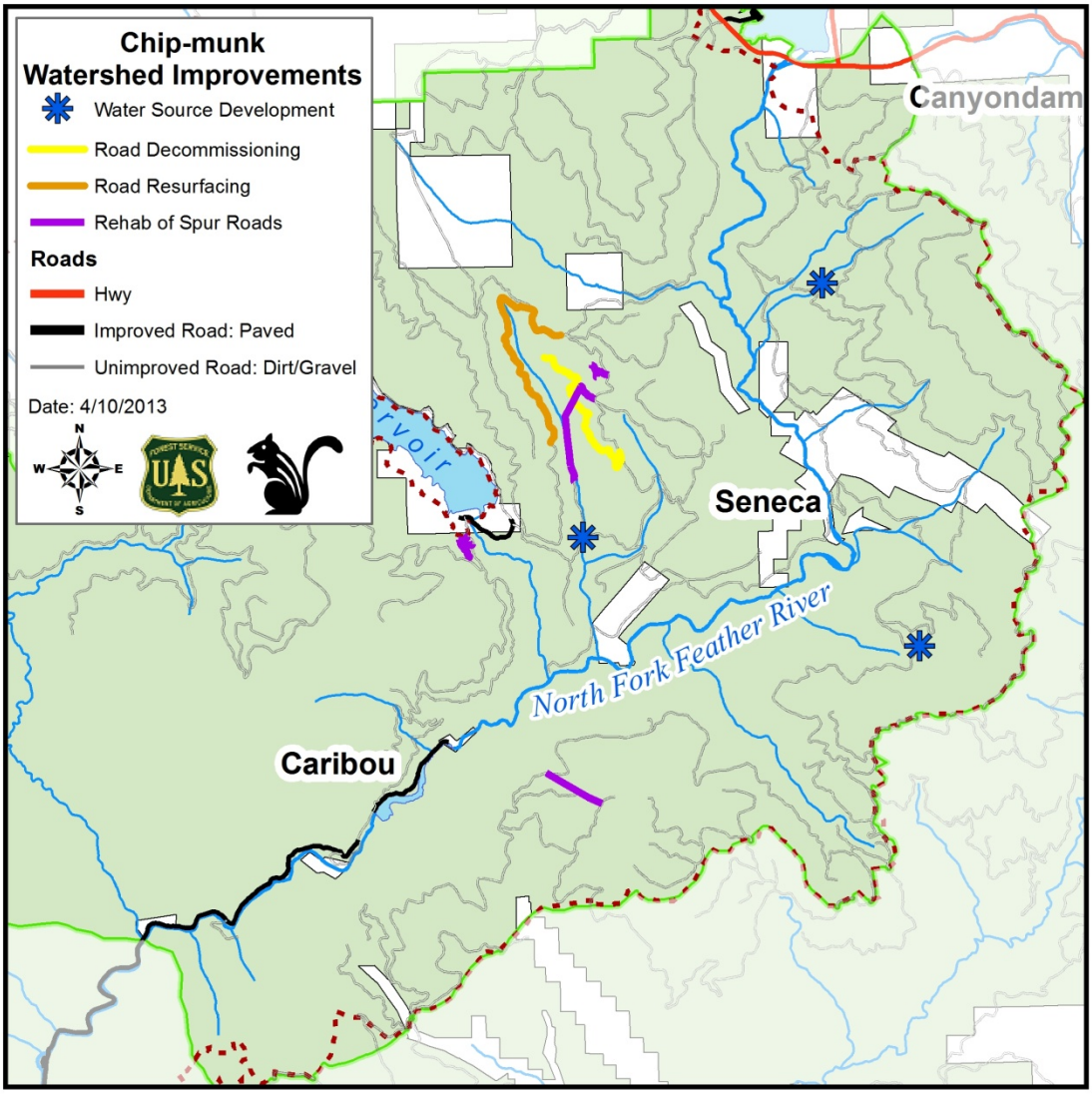


Figure 5. **Chip-munk Project Proposed Watershed Improvement Activities**

Alternatives Considered, But Eliminated from Detailed Study

Alternative C – High Vegetation Burn Severity and Logging Systems (Tiers)

The Chips Fire burned over 75,000 acres on both the Plumas and Lassen National Forests as well as adjacent private lands. Of the total acreage, approximately 54,000 acres burned on the Mount Hough Ranger District, Plumas National Forest. Under the 2004 Sierra Nevada Forest Plan Amendment ROD salvage guidelines (USDA 2004a), the Mount Hough Ranger District considered the area for fire salvage and reforestation opportunities.

Although an approximate 54,000 acres burned on the Mount Hough Ranger District, not all of it was available for salvage and reforestation. Due to the mixed fire severity nature of the Chips Fire, not all of the acreage burned at high severity. There is no ecological sense to salvage and reforest areas that burned at low severity. Consequently, only areas that burned at 50 percent or greater basal area mortality were considered for salvage. In addition, not all the area that burned had conifer stands. Some of the areas affected by the Chips Fire were in non-conifer ecosystems such as meadows or chaparral. Furthermore, due to the economic constraints of fire salvage, CWHR size class of four or higher with a CWHR density of moderate (“M”) or dense (“D”) were further analyzed for salvage.

Nearly the entire western half of the Chips Fire reburned in the Storrie Fire (2001) footprint and is within several land allocations that do not allow for salvage timber harvest; therefore limiting the total amount of acres included for treatment in the Chip-munk Project.

Land designations within the Plumas National Forest and the Chips Fire perimeter include: developed recreational sites, Inventoried Roadless Areas (IRAs), semi-primitive non-motorized vehicle areas, northern goshawk Protected Activity Centers (PACs), California spotted owl PACs, peregrine falcon eyrie, suitable willow flycatcher habitat, bald eagle management areas, Riparian Conservation Areas (RCAs), Old Forest Emphasis (OFE) areas, National Wild and Scenic Rivers, and special interest areas. As a result, the acreage of potential salvage was reduced from about 54,000 acres to an estimated 4,672 acres.

Within the 4,672 acres, the areas for potential salvage were further stratified by logging systems and feasibility (Table 9).

Table 9. Acres of potential salvage timber harvest in the Chips Fire perimeter.

Logging System	Acres
Tier 1	
Tractor	1,201
Tier 2	
Skyline	1,386
Tier 3	

Tractor	236
Skyline	534
Helicopter	637
Tier 4	
Skyline	337
Tier 5	
Tractor	45
Skyline	296

The different tiers were based upon several factors including feasibility, implementation ease, and public safety. Treatment areas in 'Tier One' had the highest potential for operability due to adequate volume, access, and operational feasibility. Areas in 'Tier Five' had a combination of low volume, access issues, and/or higher operational feasibility risks.

The majority of the 4,672 acres were considered, but not analyzed for treatment. Much of the acreage was left untreated to retain post-fire biological legacies such as snag components and chaparral recruitment to balance out areas proposed for salvage. In addition, many of the areas that were not further considered for treatment had issues regarding access, feasibility, and/or lower volume. Due to the nature of fire salvage, economic constraints can be highly sensitive due to the relatively rapid deterioration of merchantable material after a fire. For instance, helicopter operations are sensitive to volume. Areas that barely meet minimum volume requirements for helicopter logging may not be viable in the long term as the volume decreases due to wood deterioration. Designing a proposed action that is expeditious in nature is important in facilitating treatment. This was also echoed during public meetings where there was a general expression that the Forest Service should focus on areas with the best access with a high probability of being sold for a quick "turnaround". As a result of ecological, economical and feasibility factors, these acres were considered, but not analyzed in detail.

Alternative D – Roadside Hazard Tree Removal

Approximately 5,122 acres of roadside hazard tree removal was proposed in the original Chip-munk scoping materials provided to the public in January 2013. Approximately 3,300 acres of roadside hazard tree removal treatments were dropped from the Chip-munk Project proposed action.

Designing a proposed action that is expeditious in nature is important in facilitating treatment. Approximately 1,100 acres of these treatments overlapped with high or moderate vegetation burn severity, but were not main roadways and were not connected to other roads. About 12 acres of these treatments overlapped with closed roads. Approximately 2,200 acres of roadside hazard tree removal treatments overlapped with low vegetation burn severity. The majority of these roads were included in the Chips Fire Roadside Hazard Tree Removal Project decision. Further, low vegetation burn severity areas proved to have very few hazard trees. Therefore, approximately 3,300 acres of roadside hazard tree removal treatments were considered, but not analyzed in detail.

Alternative E – Clear Creek Watershed Exceed Threshold and Skyline Logging Systems

Approximately 165 acres of skyline salvage units were dropped from the original Chip-munk proposal when the watershed threshold concern became evident. Additional watershed improvement activities were added to the proposal to decrease the Clear Creek watershed Equivilent Roaded Acre (ERA) values.

Modeling determined for the Clear Creek watershed that the 2012 Chips Fire caused the watershed to exceed the threshold of concern for cumulative watershed effects, affirming the observation that the fire is the primary disturbance that has affected watershed condition. An increase in ERA for a watershed indicates increased concentration of surface runoff, which could result in detrimental changes to sedimentation rates and stream channel condition that could subsequently have effects on downstream water quality and beneficial uses. The 165 acres of skyline salvage treatments were dropped to decrease ERA values. The proposed action would add additional disturbance in this watershed, but project design features and Best Management Practices would assure that watershed response after treatment would be similar to the post-fire response. Further, mitigation measures were added to the proposed action to further decrease ERA values. Refer to the Mitigation Measures section of this EA for more details.

Alternative F – John Muir Project and Center of Biological Diversity

The John Muir Project and Center for Biological Diversity submitted a written comment letter during scoping.The organizations requested that the Forest Service withdraw the Chip-munk Project proposed action and promote a proposed action and preferred alternative in an Environmental Impact Statement that would: a) fell roadside and trailside hazard trees, but leave felled trees over 15 inches in diameter in the forest as downed logs to provide large downed log habitat for small mammals, amphibians, and invertebrates; b) not engage in any salvage logging, site preparation for artificial replanting, or replanting.

This alternative was considered, but eliminiated from detailed study of it’s similarity to the No-Action Alternative. Under the No-Action Alternative hazards would be felled, but not removed or untreated roads would be closed or signed stating hazards exist along roadways. Further, under the No-Action Alternative salvage, site preparation, and reforestion would not be proposed. Therefore this alternative was considered, but eliminated from detailed study.

Environmental Consequences

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

Affected environment sections have been divided by resource areas, where as environmental consequence sections have been divided by resource areas and then by alternative. Further, effects analyses that are required by law are discussed per alternative.

This chapter describes aspects of the environment likely to be affected by the proposed action and alternatives. Also described are the environmental effects (direct, indirect, and cumulative) that would result from undertaking the proposed action or alternative. Together, these descriptions form the scientific and analytical basis for the comparison of effects in Chapter 2.

The following resource specialist analyses are incorporated by reference: Chip-munk Recovery and Restoration Project Forest Vegetation Report (Maurice Huynh)(USDA 2013b); Chip-munk Recovery and Restoration Project Wildlife Biological Assessment/Biological Evaluation (Matthew Johnson and Tina Hopkins)(USDA 2013c); Management Indicator Species Report for the Chip-munk Recovery and Restoration Project (Matthew Johnson and Tina Hopkins)(USDA 2013d); Chip-munk Recovery and Restoration Project Migratory Bird Species Report (Matthew Johnson)(USDA 2013e); Chip-munk Recovery and Restoration Project: Biological Evaluation of Potential Effects to Threatened, Endangered, and Sensitive Plant Species (Jim Belsher-Howe)(USDA 2013f); A Cultural Resource Inventory of the Chip-munk Recovery and Restoration Project Area (Doug Baughman)(USDA 2013g).

Past, Present and Reasonably Foreseeable Future Actions

According to the Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations, “cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR §1508.7).

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking

this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

The cumulative effects analysis in this EA is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR §220.4(f)) (July 24, 2008), which state, in part:

> "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR §1508.7)"

In determining cumulative effects, the past, present, and future actions displayed in Appendix D were added to the direct and indirect effects of the proposed action and alternatives.

Safety

Affected Environment

There are approximately 189 miles of roads in the Chips Fire perimeter accessible to the public and forest workers (Table 10). These individuals are at risk from dead and dying trees located along roads, because they deteriorate, become unstable, and eventually fall. Falling trees may hit individuals, their cars or may trap people in the area. The influence of fire increased the annual snag fall rate from 8 percent in unburned conditions to an annual rate of 20 percent in burned conditions in Eastside Pine Forests (Landram et al. 2002). Annual fall rates vary by species and diameter. Fall rates were greater for smaller diameter classes. It takes just 6 years for 50 percent of the Jeffrey Pine and Ponderosa Pine to fall. It takes 8 years for 50 percent of the white fir to fall. The fall rates appear to be slow at first and then to increase as time goes by and then to decrease again. Fire killed trees may also have structural damage from fire scarring of the bole and burned roots. In addition to roadside hazards, dead trees pose hazards to hikers, loggers, slash crews, tree planters, and workers conducting future prescribed burns or projects to improve seedling survival and growth on both National Forest and private lands.

Table 10. Miles of roads in the Chips Fire perimeter.

Road Ownership	Miles
COUNTY, PARISH, BOROUGH	16.85
NATIONAL FOREST SYSTEM ROAD	162.58
CLOSED	2.19
PRIVATE	4.77
STATE HIGHWAY	2.16
Grand Total	**188.56**

Environmental Consequences

Alternative A (Proposed Action) – Direct, Indirect, and Cumulative Effects

Alternative A removes roadside hazards and reduces hazards away from roads in the Chip-munk Project area. Similarly alternative A removes dead and dying hazard trees from 95 miles of roads. In the salvage recovery units, dead and dying trees are retained in the snag retention areas, RCAs,

and in resource protection areas, posing a risk to workers and the public in these areas. Risks from falling snags would remain along some streams and where dispersed recreation occurs.

Along roadsides the vast majority of trees with structural defects, likely to cause failure in all or part or the tree that may fall and hit the road prism would be removed.

There is a short-term risk to loggers and crews from dead trees that are currently unstable, and smaller snags that deteriorate quickly. In the Stream Fire, it was observed that numerous snags along roads, particularly along paved roads fell during and immediately after the fire (Lazzarino, personal communication, 2008).

Danger to the public from falling snags would be reduced along roads. As was observed through the Antelope Fire hazard tree removal projects, trees that were left because they were partially green have since died and are now hazards (Lazzarino, personal communication, 2008).

The ability for fire suppression resources to access the areas within the Chips Fire perimeter and prevent any further loss of stands in an event of a wildfire is greatly increased.

There is a short term increased risk of vehicle accidents under the action alternative due to the increased traffic from logging. The number of log trucks, crew vehicles, and individual cars and trucks would increase substantially during the next 1 to 2 years to accomplish the work required under the alternatives. This increase would affect safety on the NFS roads within the fire area as well as Highway 70/89. Upwards of 100 log truck loads per day would be hauling from the Chips Fire area from National Forest System lands during the late summer and fall of 2013 and possibly 2014. The risk of a collision is greatest where trucks are entering or exiting the highway. The Forest Service requires safety signing as part of the administration of timber sale contracts, which alerts the public to traffic hazards.

Cumulative Effects

Under the proposed action alternative the roads would remain open, allowing wood cutting, recreation, road maintenance, the Chip-munk Project, Chips Fire Roadside Hazard Tree Removal Project, Chips Fire Pacific Gas and Electric (PG&E) Right of Way Salvage Timber Project, Lassen National Forest’s Poker Chip Project, and reforestation work to continue. Wood cutting by locals provides needed firewood to supplement the use of gas, and electricity to heat homes during the winter. On-going recreation includes fishing and dispersed camping.

The purpose and need of the Chips Fire Roadside Hazard Tree Removal Project was to provide for safe travel along five main roads within the fire area. Under this project, approximately 250 acres of fire-killed and fire-injured trees expected to die within three years are removed resulting in a reduction of standing snags near the roadway. The Chips Fire PG&E Right of Way Salvage Timber Project purpose would be to salvage timber along PG&E transmission lines, up to 250 acres, as well as along roads used to access this infrastructure (USDA 2013l). The Lassen National Forest’s Poker Chip Project also includes an additional 1,589 acres of roadside danger

tree removal, 547 acres of salvage timber harvest, and 3,296 acres of reforestation. Since roadside hazard and danger tree removal activities are limited to 150 to 200 feet on either side of the road, these effects are localized and restricted to roadsides. Between the Lassen and Plumas National Forests, there is approximately 67,617 acres of NFS lands within the Chips Fire perimeter. Approximately 3,627 acres of roadside hazard or danger tree removal is proposed or currently being implemented within the Chip Fire perimeter. This is approximately five percent of public lands within the analysis area. Additionally, salvage timber harvest, site preparation, and reforestation activities are proposed by the Lassen and Plumas National Forests. Cumulatively, salvage timber harvest activities total 4,472 acres and site preparation and reforestation activities total 6,971 acres. This is approximately seven percent and ten percent, respectively, of additional treatments to NFS lands. Therefore, approximately 22 percent of the NFS lands within the Chips Fire perimeter would be treated. This calculation represents the maximum and furthest extent of measurable effects on forest vegetation that would occur as a result of implementing these projects. Since the removal of hazardous, fire-killed and fire-injured trees would only occur along roadsides and in high vegetation burn severity areas (salvage timber harvest activities) under these projects, the effects would be limited to these areas, and subsequently, dispersed across the 76,332 acre analysis area resulting in a minimal scale of effects. Due to the limited and dispersed nature of these effects, these activities would not substantially affect forest vegetation, fuel loading, fire behavior, air quality, or wildlife species or habitat on the stand or landscape level.

Reforestation work would be allowed to continue. Releasing of the planted trees would be allowed to take place. Stocking exams and survival surveys would be permitted. Subsequent reforestation efforts that might need to occur would also be allowed to occur.

In summary, the alternative A would have a positive cumulative effect on public and forest worker safety and the ability to maintain roads in the Chips Fire area.

Alternative B (No Action) – Direct, Indirect, Cumulative Effects

Under alternative B, all dead and dying trees would be retained on the Mt. Hough Ranger District, posing a very high risk to the public and forest workers as time goes on. The public would be at risk from snags falling into roads as they drive by. Activities such as fishing and camping would be dangerous where snags are numerous.

If additional reforestation were undertaken, tree-planting crews would be at great risk of injury or death from falling snags. Small snags would pose a risk in approximately one to three years. Larger snags may become a high risk after two or more years, by six years over half of the snags may have fallen (Landram et al. 2002). Future seedling tending, thinning, and prescribed burning would be high-risk endeavors, and may be precluded due to the risk to workers.

On the Storrie Fire of August, 2000 on the Lassen National Forest, the deteriorated timber resulting from delay created such extreme safety risks that a timber sale contract was cancelled after it was awarded (Franco, personal communication, 2009). In this case, the Romeo #2 Fire

Salvage Sale was one of three fire salvage sales awarded from the Storrie Fire (Franco, personal communication, 2005). Logging on the sale started 3 years after the fire. After three days of cutting trees using feller bunchers (machines that cut trees and lay them on the ground), the timber sale purchaser shut down his operations because crumbling portions of trees were hitting the feller buncher. Eighty to ninety percent of the trees being cut were breaking off, leaving only 8 to 12 feet of the lower portion of the tree intact. Some trees were as large as 30 inches diameter. The agreement to cancel the contract noted that "field operations indicated that the included trees are too unstable to safely harvest with mechanical harvesters" and "due to the recurring problem of trees falling on top of the harvesters while the tree is being cut and placed on the ground, there is a danger that one of the trees will come through the roof of the harvester".

This example illustrates the safety risk posed to workers, including firefighters, working in the vicinity of high levels of snags. Fire fighters typically need to fell snags near firelines. This activity would be unacceptably dangerous, resulting in the fire fighters retreating to areas of low to no snags for effective and safe fire fighting.

The safety risks posed by breaking and falling snags would ultimately preclude safe fire fighting, tree planting, fuel treatment and other uses by humans of the fire area. Log truck traffic would not increase under this alternative, and this alternative would not contribute to cumulative effects on safety from traffic accidents.

There would be no additional vehicle traffic due to the operations. The Forest may be forced due to safety concerns to close the roads that would not receive treatment until such time as enough appropriated dollars would be obtained to treat the roadside hazards internally or by writing another environmental analysis to treat the roadside hazards alone without the recovery. This would mean that the purpose and need for recovering the economic value of trees killed by the Chips Fire would not be fulfilled. Nor would the purpose and need to improve public safety by removing hazard trees along roadside areas.

Cumulative Effects

Under alternative B the roads would likely have to be closed once trees began to fall at such a rate that they cannot safely be treated by the road crew. The Chips Fire Roadside and Hazard Tree Removal Project and the Lassen National Forest's Poker Chip Project would abate hazards across 1,839 acres within the Chips Fire perimeter. Additionally, salvage timber harvest, site preparation, and reforestation activities are proposed by the Lassen and Plumas National Forests. Cumulatively, salvage timber harvest activities total 797 acres and site preparation and reforestation activities total 3,296 acres. Therefore, approximately 9 percent of the NFS lands within the Chips Fire perimeter would be treated.

Mining operations, wood cutting, recreation, road maintenance, and reforestation work would be limited or not occur at all. Miners and recreation users would have to find alternative ways to enter the project area either through alternative routes or by hiking into the Chips Fire area.

Reforestation activities would not be allowed to occur in the recovery units for safety reasons after one year. No seedling release would occur unless it happened in the next year. The reason is that it has been the Forest's experience that the trees begin to fall in concentrations approximately one year after the fire (Lazzarino, personal communication, 2008). After that time road maintenance would not occur, which could have very serious watershed affects. Corky Lazzarino, Resource Maintenance Team Leader wrote a declaration for the Moonlight Roadside Safety and Hazard Tree Removal Project. She testified that after a fire burns through an area the interval of road maintenance in the fire perimeter changes to an annual cycle because culverts plug quickly. This yearly maintenance schedule occurs for several years (Lazzarino, personal communication, 2008). If the road maintenance were not to occur due to road closure for safety reasons then "there could be increased soil movement in the high severity areas, some rockfall would occur, and trees and debris would fall into the drainages and culvert pipe inlets. There would also be increased flashy runoff from the high severity burn areas. It is predictable that the majority of the culverts would clog in the first year or two, and the roads would wash out as the culverts failed. The resulting damage would create a severe impact to the watershed and wildlife, as well as to downstream residences."

There are special use permits within the Chips Fire perimeter as well as a lot of public enthusiasm around Butt Valley Reservoir and mining.

In summary, alternative B would have a detrimental effect to public and forest worker safety and the ability to maintain roads in the Chips Fire perimeter causing unnecessary damage to resources and potential closing off the area to mining, recreation use and future project work including reforestation, fuels reduction, and roadside hazard work.

Economic and Social Environment

Introduction

Analysis Framework: Statute, Regulatory Environment, Forest Plan, and Other Direction

The guidance for economic and social environment is provided in the Plumas National Forest Land and Resource Management Plan (USDA 1988a) and Record of Decision Final Sierra Nevada Forest Plan Amendment USDA Forest Service Pacific Southwest Region (USDA 2004b). Guidance provided state the role of the Plumas National Forest is to contribute to the local economy by providing timber for harvesting and milling into lumber.

Effects Analysis Methodology

This economic analysis focuses on those revenues and treatment costs associated with implementing fuel reduction treatments and forest health activities, in the Chip-munk Project

area. The purpose of this economic analysis is to present the potential revenues and costs associated with the alternatives for comparison purposes.

This analysis does not include monetary values assigned to resource outputs such as wildlife, watersheds, soils, recreation, visual quality, or fisheries. It is intended only as a relative measure of differences between alternatives based on direct costs and values used.

Employment opportunities can have direct, indirect, or induced effects on the local economy. Direct effects are associated with the primary producer. For example, the manufacturing of lumber from the Chip-munk Project area would have a direct effect on employment opportunities. Indirect effects account for employment in service industries that serve the lumber manufacturer. These industries may include logging, trucking, and fuel suppliers. Induced effects are driven by wages, and are circulated through the local economy for food, housing, transportation, and other living expenses. The sum of direct, indirect, and induced effects is the total economic impact in terms of jobs and monetary outputs. It was assumed for this analysis that 10 to 15 jobs are created per million board feet of timber harvested. This number includes direct, indirect and induced jobs. It was assumed for this analysis that most products from the Chip-munk Project area would be processed locally due to high hauling costs of products. Likewise, it is also assumed that most employment would largely be derived from Plumas County for the timber harvesting activities.

Timber harvest values used in this economic analysis were based on the pond values (delivered log prices) of local mills from the State Board of Equalization. Harvest costs and road improvement costs were developed from the latest timber sale appraisal values. Reforestation treatments are based on the latest service contract prices and Knutson-Vandenberg sale area improvement plans. The “IMPLAN” software program was utilized in the input/output analysis for monetary outputs to the local economy.

Geographic and Temporal Bounds

The Chip-munk Project economic analysis boundary is Plumas County. The project is contained within the county. The nearest mill is within Plumas County where the timber will be manufactured and where the greatest effect on jobs can be realized within the labor force of the county.

Analysis Methodology

The social and economic figures were obtained from State and Federal maintained databases. The most current reports were run as well as several years earlier in order to correlate with current year’s information. Statistics were obtained from the U.S. Census Bureau, America Community Survey, Censtats, Business and Industry, Bureau of Labor Statistics, Bureau of Economics Analysis, and California Department of Finance.

Affected Environment

The Plumas National Forest contributes to the regional economy in two primary ways: (1) through the generation of income and employment opportunities for residents of the immediate area, and (2) through direct and indirect contributions to local county revenues. The Plumas National Forest also contributes in secondary ways, such as through production of goods and services in local and regional markets. Although some economic effects are dispersed over a broad area, the most substantial impacts are felt locally in Butte, Plumas, Lassen, Sierra, and Yuba Counties. Table 11 shows the percentage of Plumas National Forest land in local counties. The National Forest System lands account for approximately 72 percent of Plumas County. Consequently, management of National Forest System lands has a notable effect on the regional economy of Plumas County.

Table 11. Percentage of National Forest System Lands by County (Based on GIS Data)

County	County Acres	Beckwourth Ranger District (acres)	Feather River Ranger District (acres)	Mount Hough Ranger District (acres)	Total National Forest System Lands in Each County (acres)	National Forest System Lands within Each County (percent)
Butte	1,072,708	0	143,517	0	143,517	13.4
Lassen	3,022,136	39,686	0	1,635	41,320	1.4
Plumas	1,672,778	448,365	183,210	579,196	1,210,771	72.4
Sierra	615,514	14,794	33,522	0	48,316	7.8
Yuba	411,695	0	33,734	0	33,734	8.2
Totals	**6,794,830**	**502,844**	**393,984**	**580,831**	**1,477,659**	**21.7**

Industry/Employment

The two employment sectors most related to forest planning processes are the timber industry and tourism. Forest planning processes can positively affect the farm industry (logging operations), manufacturing (mills), transportation (trucks and railroad) and utilities (biomass power plants). They are very difficult to quantify, in terms of both total employment and their relative importance to local economies, because state and federal statistical gathering agencies generally do not break down employment data specific to logging and lumber; rather it is lumped under farm manufacturing and transportation industries.

The timber industry resides within two industries, (1) Farm and (2) Manufacturing. According to the Bureau of Economic Analysis, Farm and Manufacturing earnings in Plumas County represent 11.73 percent of the major industries in Plumas County. Earnings in these two industries have decreased and are experiencing negative growth. Employment in farm and manufacturing represents 7.87 percent of the jobs in Plumas County. The personal income in 2011 was $39,339.

The total personal income for Plumas County was $778 million and the personal income related to timber harvest and manufacturing is 9 percent of the personal income. Output for all industries in Plumas County is $1.1 billion. There are six employers in logging operations, and seven employers related to forestry services totaling 104 jobs. There are two large mills in the local area within distance of the project area combined employment is under 500 employees. The value of the mills total production is at $91 million. Total employee compensation is $16 million.

Plumas County labor statistics reflect a seasonal labor force with employment up during the warmer months. In the winter unemployment rises as the timber harvesting season stops, thus contributing to the unemployment rate as reflected in Table 12 and Table 13. The housing downturn has had an impact on the unemployment rates in Plumas County; nearly doubling the unemployment rate during the months when normal employment rates go up. This project can have a significant effect on the numerous industries' employment in the local labor force and transient labor force.

Table 12. Bureau of Labor Statistics, Plumas County Unemployment Rate

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2007	12.3	12.6	12.2	9.8	7.4	6.3	6.7	6.1	5.8	6.4	8.2	10.3
2008	14.2	14.2	14.0	11.6	8.3	7.9	7.8	7.7	7.3	9.1	12.0	14.0
2009	18.9	19.5	20.8	17.8	16.2	15.3	14	13.9	13.6	14.6	16.7	18.9
2010	21.5	22.2	21.9	18.8	15.8	14.1	13.6	13	12.9	13.6	16.6	18.4
2011	20.9	21.2	20.5	18.2	15.6	14.4	13.4	12.9	12.4	12.6	14.2	15.8
2012	18.1	18.8	19	16.8	14.5	13.6	13.2	12.7	12	12.1	13.5	14.9

(p) preliminary

Table 13. Bureau of Labor Statistics, Plumas County Labor Force (number of County employees)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2007	9363	9268	9220	9799	10188	10740	11023	11007	10475	10178	9763	9583
2008	9400	9375	9356	9705	10090	10447	10703	10559	10260	10232	9983	9843
2009	10033	10209	10125	10152	10180	10416	10561	10141	10033	9788	9549	9442
2010	9469	9618	9632	9831	10225	10535	10826	10777	10437	10075	9767	9596
2011	9595	9533	9532	9438	9661	10100	10504	10519	10260	10056	9669	9546
2012	9528	9499	9530	9294	9323	9407	9551	9506	9310	9204	9241	9264

(p) preliminary

Energy

Plumas County has two co-generation plants and two biomass power plants operating within a reasonable haul distance. The Wendell facility is 35 megawatt plant and when operating at full capacity uses 550 bone dry tons/ day or 37 truckloads. The Wendell facility sells to PG&E approximately 30 megawatts a day at full capacity. Presently they cannot produce full capacity due to the lack of biomass material and due to cost for haul. The Westwood facility is a 10

megawatt plant that employs 10 to 19 people. The Westwood facility when operating at full capacity uses 200 bone dry tons/day. Currently they are not in production mode and are not taking biomass.

County, State and Federal Taxes

Forest contributions to local county revenues come from three sources: (1) Payments in Lieu of Taxes, a standard rate, (2) *Receipt Act* payments or payments from the *Secure Rural Schools and Community Self-Determination Act of 2008* ,a fixed rate, (3) timber yield taxes that fluctuate based on timber sold.

Payments in Lieu of Taxes

The Bureau of Land Management administers the Payments in Lieu of Taxes, which apply to many different types of federally owned land, including National Forest System lands. Payments in Lieu of Taxes compensate counties for the loss of property tax revenues due to nontaxable federal land in the county.

Secure Rural Schools and Community Self-Determination Act

The *Secure Rural Schools and Community Self-Determination Act* 2008, offers counties an alternative to the *Receipt Act*. A county may choose to continue to receive payments under the *Receipt Act* or to receive its share of the state's full payment amount under the *Secure Rural Schools and Community Self-Determination Act*. Table 14 reflects Plumas County's payments for the past several years. These monies are very important to the county program and the smaller counties depend on receipt of these funds.

The Secure Rural Schools and Community Self-Determination Act payments were extended through 2013. This Act provides payments to counties regardless of the amount of timber harvested. The payment is based on a 7-year rolling average. If the Act terminates then payments will revert back to the Receipt Act. Payments for Receipt Act are 25 percent of the timber cut value from the National Forest System lands contained within the county.

Table 14 list payments made to counties based on acres of National Forest System lands with the county boundary.

Table 14. Secure Rural Schools and Community Self-Determination Act Full Payment Amounts to Counties for Fiscal Years 2001-2012

	Butte	Lassen	Plumas	Sierra	Yuba
2001	$866,419	$3,751,241	$7,024,648	$1,788,350	$231,268,
2002	$873,350	$3,781,250	$7,080,847	$1,802,657	$233,118
2003	$883,830	$3,826,626	$7,165,816	$1,824,289	$235,915
2004	$895,320	$3,876,372	$7,258,972	$1,848,005	$238,982
2005	$915,912	$3,965,528	$7,425,928	$1,890,509	$244,479
2006	$925,071	$4,005,183	$7,500,187	$1,909,414	$246,924

2007	$923,173	$3,996,963	$7,484,795	$1,905,495	$246,417
2008	$832,565	$3,604,665	$6,750,168	$1,718,472	$222,231
2009	$749,308	$3,244,198	$6,075,151	$1,546,625	$200,008
2010	$675,302	$2,923,783	$5,475,136	$1,393,872	$180,254
2011	$536,006	$594,100	$986,093	$1,106,534	$143,073
2012	$417,701	$1,912,410	$3,581,219	$877,029	$128,154

Timber Yield Taxes

The third source of revenues to local government is the timber yield tax, which is administered by the State Board of Equalization. The Forest does not pay this tax; instead, it is paid by private timber operators, based on the amount of timber harvested in a given year on both private and NFS lands. The tax is 2.9 percent of the value of the harvested timber. The taxes are collected by the state, and approximately 80 percent is returned to the counties from which the timber was harvested. The amount of revenues disbursed to the counties can be affected by decisions about the amount of timber to be offered for sale each year on the Forest. In Table 15 the percent of volume produced on NFS lands in Plumas County reflects a downward trend since 1994; the recent wildfires are spurring an upswing in recent years which explain the increase in the last few years reported.

Table 15. Plumas County Percent of Volume from National Forest System Lands

Year	Percent
1994	37%
2005	15%
2006	22%
2007	11%
2008	10%
2009	29%
2010	42%
2011	28%

Source: California Board of Equalization

Plumas County in 2005 produced 107,817 mmbf of timber which is 6 percent of the volume produced in the State of California as documented in the California Department of Finance. According to the California Board of Equalization 15 percent of the volume from Plumas County came from NFS lands including the Forest Service; a total of 16 mmbf.

Timber Harvest Trends

The harvest of trees provides commercial and noncommercial wood products, such as saw-logs and biomass, to the local economy. Local sawmills that rely, at least in part, on logs from National Forest System lands include Sierra Pacific Industries in Quincy and Collins Pine Company in Chester. Figure 6 displays the volume of timber harvested on the PNF since 1978. The Plumas National Forest since the mid 1990's has not established a new sustainable harvest of

timber. Timber volume sold has been variable and represents a third of the volume sold two decades ago. The unsteadiness of supply affects the industry's ability to maintain jobs, capital investments and facilities such as mills. In order to maintain the local industry it is important that the Plumas National Forest provides a sustainable and predictable amount of timber to the market. In 2010 and 2012 green timber harvested from PNF was approximately 23 mmbf. Local sawmills have processed most of this volume although mills as far away as Weaverville and Roseburg have bid or purchased timber from the Forest.

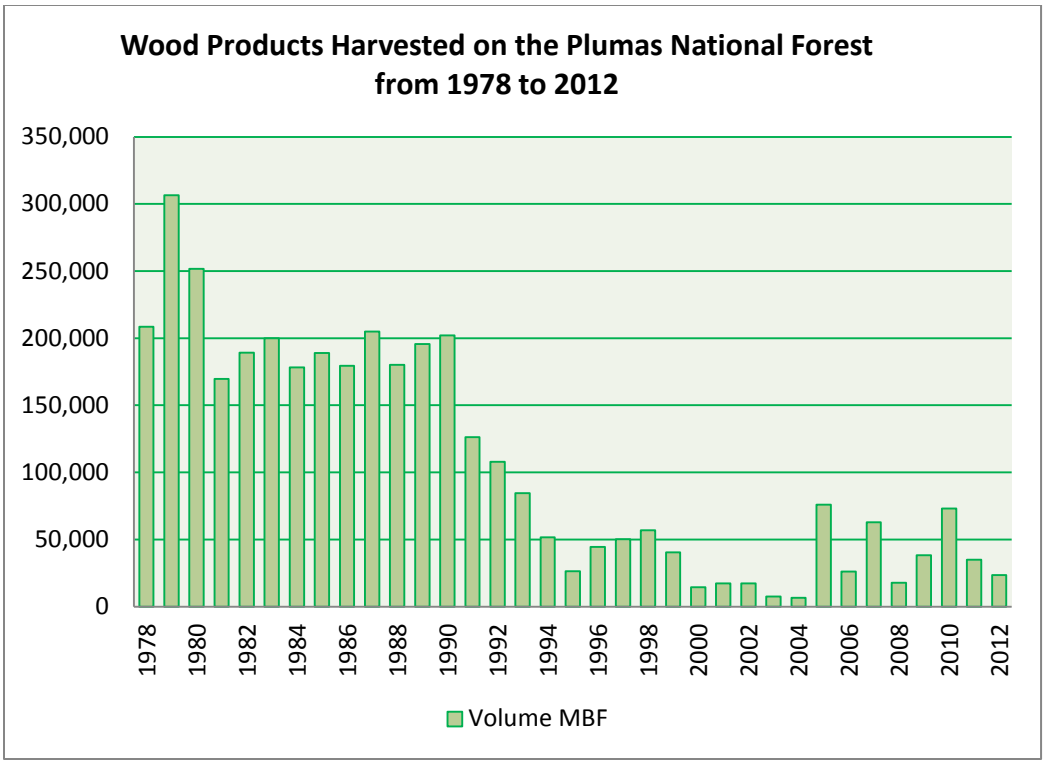


Figure 6. **Annual Amount of Wood Products Sold on the Plumas National Forest from 1978 to 2012**

The harvest of dead trees also provides commercial and noncommercial wood products to the local economy, such as saw-logs and firewood; however, the value of fire-killed trees is lost rapidly. The value of fire-killed trees is lost rapidly because the sapwood begins to rot within 1 to 2 years, heartwood within 3 to 5 years, and small diameter logs crack, making them unsuitable for lumber.

Insects (primarily beetles), stain and decay fungi, and weather all act as deterioration agents in fire-killed timber. Insect activity usually precedes fungal activity and provides a mechanism for introducing fungi that accelerate sapwood deterioration. Fungal decay, once introduced, will deteriorate the sapwood ahead of any insect damage. Decay causes reductions in strength properties of wood, rendering the wood useless from a structural standpoint, and thus decreasing useable log volume. Insects such as ambrosia beetles and round-headed borers, among others,

introduce stain fungi and create boring holes that destroy the structural integrity of wood. In addition to the deterioration caused by stain, decay, and insects, weather checking also contributes to loss. Weather checking is cracks that form vertically in the wood as the tree dries out. With time, the cracks go deeper into the log. In the portion of the log that is checking, the log is unusable for manufacturing boards. The window of opportunity for recovering value is therefore short.

Recreation Industries

This project will promote forest resiliency for the recreation businesses in the area and potentially protect the business investment around the area from Belden north to Chester. Butte Lake is a recreation site for fishing and camping and visited by residents and non-residents. The area is managed by PG&E. Lake Almanor is at the northern boundary of the project area. Lake Almanor is a second resident location for vacation homes and is a destination location for residents and non-residents.

Plumas County Recreation industry's output in 2007 was $10.4 million and commodity demand was $3.4 million. Total employment compensation is $4.7 million. Plumas County collected $800,000 with the 9 percent Transient Occupancy Tax (TOT) for 2010. The employment generated by visitor spending in Plumas County in 2010 represented 1330 jobs however this is a decrease by 180 jobs from 2007 the year of large wildfires in the county and a year before the economy took a downturn.

The number of jobs created due to tourism in 2010 was approximately 13 percent of the labor force for Plumas County. Personal income represents 3.5 percent of the county's total personal income. Recreation industry is important to the local economy. Wildfires and the effects of wildfire have a direct impact to the industry and the earnings for both local businesses and the local government. The campgrounds within the project area in 2008 had gross receipts of $54,834 this represents 26 percent of the gross revenues for public campground facilities on the Mt. Hough Ranger District. Fire deters from the recreational experience for at least a few years after the fire as the area is less desirable to recreate. In 2011 the gross receipts for all the campgrounds on Mt. Hough Ranger District was $281,386 a decrease in 2012 of approximately $17,000. Campgrounds had to be closed during the wildfire suppression activities for the Chips Fire and the decrease in revenues may be in part due to the wildfire closure. It is important to have the area safe for recreational activities and remove some of the standing dead material.

Environmental Consequences

Alternative A– Proposed Action Direct and Indirect Effects of recovery of fire killed trees and reestablish forest conditions

Economic effects are determined by the value of products and services for each alternative (which includes the no action alternative) considered in this analysis. The level and mix of goods and services available to the public varies by alternative. The number of potential jobs to the county whether they are maintained or created. The effects discussed in this section include estimated government expenditures for cost of services and revenues from the value of timber.

Direct monetary effects are discussed in terms of net cash value to the U.S. Treasury, including the costs associated with implementing the treatments; and direct, indirect, and induced job opportunities. In general, the monetary value of each alternative depends on the amount and method of timber harvest, type of treatment and the acreage planned for treatments. Alternative A recovers fire killed trees and fire killed hazard trees along the haul routes and along certain segments of the roads within the project area.

The anticipated timber volume, value, costs, service treatment costs, and jobs, are displayed in Table 16. The revenue generated would also depend on the availability of logging equipment, haul distances to available mills, and fuel prices. This analysis assumes equipment cost (not full ownership of equipment), and hauling to the closest mill. However, haul to other mills is feasible as evidenced by past and current timber sales.

Table 16. Economic effects of proposed action

Revenue/Cost Employment	
	Alternative A
Sawlog Volume	46 to 69 MMBF
Sawlog Value (cost deducted)	$8,400,000
Additional Operation Cost	$5,200,000
Percent above Value	38%
Potential Advertised Value to the Government	965,000
Reforestation Costs	$1,800,000
Potential Direct and Indirect Jobs	158
Potential Employee Income	$5,500,000

Salvage harvesting and reforestation treatments would generate 158 direct and indirect jobs certainly sustaining or creating jobs. The proposed action alternative would create additional employment opportunities in service industries (such as logging supply companies, trucking companies, and fuel suppliers) that serve the timber industry. The local economy, driven by wages would improve stability for the small communities throughout the county. Wages paid to workers would circulate through the local economy for food, housing, transportation, and other living expenses. Harvesting and restoration/enhancement treatments would generate potential

income of $5,500,000 with alternative A. Some of the other industries to benefit from activities associated with alternative A are retail, newspaper, data processing, banks, real estate, waste management, college, doctors, hospitals, child care services, lodging, electric power, and gas distribution.

Alternative A will have a positive effect on the overall economic activity in Plumas County. This project would help provide stability and revenue to the manufacturing industry, farming industry (logging operators), transportation (haul trucks and equipment), and indirect industries (housing, food, education, etc.). Approximately 107 industries in Plumas County would receive an indirect positive effect from this project. Table 17 describes the potential outputs by industries throughout Plumas County. Commercial logging will see a total output of $10,975,000 and the total for all industries will be $34,536,000.

Table 17. Activity's output impacts on expenditures by industry in Plumas County for Alternative A

Industry	**Direct Effects**	**Indirect Effects**	**Induced Effects**	**Total**
Commercial Logging	$8,853,000	$2,121,000	$1,300	$10,975,000
Support activities for forestry	$8,485,000	$101,000	$806	$8,587,000
Manufacturing (sawmill)	$8,373,000	$618,000	$7,700	$8,999,000
Transportation	$661,000	$98,000	$20,000	$779,000
Other Industries	0	$1,167,000	$4,029,000	$5,196,000
Total value to Plumas County Economy	$26,372,000	$4,105,000	$4,059,000	$34,536,000[2]

Values generated through Implan software an Economic Modeling Program

Alternative A – Cumulative Effects Salvage Timber Harvest

The cumulative effects for this alternative will be a positive effect to the overall economic activity in the local county. This project would help sustain employment for families and generate harvest revenues for local businesses and provide the state and county timber yield taxes. The collection of taxes would help the county provide services such as road maintenance and education. The saw-timber provided by the proposed action alternative contributes to the stability of local economy by providing a supply of wood products to local industries dependent

[2] The Direct Effects in Table 22 represents the impacts for the expenditures and/or production values specified as direct final demand changes.
Indirect Effects Represents the impacts caused by the iteration of industries purchasing from industries resulting from direct final demand changes.
Induced Effects Represents the impacts on all local industries caused by the expenditures of new household income.

on forest management activities. State taxes generated from the project through the industries will be $1,318,000. The Federal taxes generated from the project through all the industries will be $2,772,000. The total earnings for Plumas County for all major industries are $1,876,000,000 and a project which may generate $35,000,000 is significant to Plumas County. Refer to appendix A of this EA for the complete economic analysis by alternative.

Alternative B – Direct and Indirect Effects

Under alternative B, no treatments would be implemented. There would be no implementation costs. Under the no action alternative, no funds would be generated for the U.S. Treasury or returned to local counties through the receipt tax. No additional employment opportunities or wages paid to primary and service industry employees would circulate through the local economy.

The no action alternative would result in a negative effect on the local industries that depend on service contracts or a steady supply of timber, as well as counties that use timber yield taxes to fund county programs. Local industries would have notably reduced opportunities related to forest management activities such as timber harvesting and forest health projects. Additionally, the local economy would not receive benefits from associated employment, such as in food, lodging, and transportation businesses. The unemployment rate could potentially stay constant throughout the year, at double the national unemployment rate. The income loss for families would trickle throughout the local economy affecting many of the local industries in a negative way.

The economic resiliency of Plumas County is low. The major industries manufacturing lumber, the logging operators, transportation, the Forest Service and the county are all inter-connected and represent nearly 40 percent of employment. If manufacturing of lumber is diminished or stopped, then all of these industries would be affected by the lack of production by the mill. There is not another industry which can carry the community through economic lows.

Alternative B —Cumulative Effects

Throughout northern California, cumulative years of reduced timber harvesting activities (including those on federal lands) have resulted in the loss of infrastructure to complete such activities. The loss of such infrastructure, including local mill closures and corresponding loss of logging companies could significantly reduce or eliminate future economic and environmental opportunities from National Forest System lands. The Plumas National Forest is unique in that the infrastructure is still in place; however these industries in the county are experiencing numerous years of negative growth and are faced with lay-offs, mill closures, and operators liquidating equipment. The loss of this industry will have a negative effect on managing NFS lands in a cost effective manner. The continuation of current conditions under Alternative B

would preclude and/or notably limit opportunities for long-term employment and rural community stability.

Comparison of Alternatives

The recovery of fire killed trees and reestablishment of forest conditions will allow local communities to have access to material that can be utilized in the market as lumber. This timber will help maintain jobs and possibly create new jobs. Potentially 158 jobs created or maintained with an estimated $5,500,000 of earned income.

The county labor force comprises of 9,500 positions with an unemployment rate of 19 percent as of March 2012. This project will take at least three to five years to implement with four to six timber sale contracts. The season to harvest material due to weather is approximately 8 months. This project represents 4 percent of the workforce related to direct and indirect industries. The work involved will create jobs throughout the years to implement the project thus sustaining the labor force and enhancing the local economy with the influx of work, manufactured products, and new capitol as money induced moves through the economy thus stimulating a depressed local economy.

In comparison the no action alternative would leave timber to go unutilized out on the landscape jeopardizing future timber stands. The timber would not be available for manufacturing by the sawmill hence a continuance of the unemployment rate of 12 percent to 19 percent. Local contractors will not be able to realize opportunities to work and the added value of the lumber will not be realized.

Compliance with the Forest Plan and Other Direction

The Chip-munk Project is in compliance with the Plumas National Forest Land and Resource Management Plan (USDA 1988a). Alternative A provides timber for manufacturing lumber, thus sustaining and or creating jobs. The Chips Fire had approximately 10,000 acres burn at high fire severity on the Plumas National Forest. The recovery of the timber represents approximately 50 percent of the area and the other untreated area of high fire severity will not be treated and will stay on the landscape.

The recovery and utilization of this timber represents 40 percent of the volume harvested for Plumas County. It is an important project to businesses and families. The timber sale contract will not be encumbered with additional treatments as the additional treatment will be identified as non-essential Knutson-Vandenberg Act (KV) activities. The timber sale will be above value by 39 percent; meaning the value of the timber is greater than the cost to remove the material.

Transportation

Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction

The Forest Service has general direction to reduce impacts on resources caused as stated in the Plumas National Forest Land and Resource Management Plan (USDA 1988a). In addition there is general direction to operate roads at the minimum standards providing utility and resource protection. The Sierra Nevada Forest Plan Amendment Record of Decision, 2004 reinforces the standards and guidelines with the Land and Resource Management Plan.

Effects Analysis Methodology

The geographic area analyzed for effects on the transportation system (analysis area) is the Chip-munk Project area.

Geographic and Temporal Bounds

The analysis area for Chip-munk Project is the project area. Roads within the project area may be used as haul routes for implementation and harvesting of timber as well as removal of roadside hazards. The project will take three to five years to implement.

Analysis Methodology

A transportation analysis, as it pertains to the activities proposed was conducted. The transportation system for the Chip-munk Project area was evaluated. The use of the interdisciplinary process for identifying road system needs and roads with resource damage includes a travel analysis consistent with legal requirements (36 CFR 212 Subpart A-Administration of the Forest Transportation System, 16 U.S.C. 551, 23 U.S.C. 205).

Affected Environment

Transportation System

There are approximately 117 miles of existing National Forest System (NFS) roads in the project area that will be used in part or total for haul. The system roads are inventoried, mapped, constructed to a specific design level, and categorized into a maintenance schedule.

Three major arterial routes access or are adjacent to the project area, California State Highway 89, California State Highway 70 and 27N26. Two collector roads access the project area. The project area is considered to have a fully developed arterial and collector road system and has 208 miles of National Forest System roads (NFS).

Maintenance levels are identified by design vehicle use and type. The following miles of roads by maintenance level categories will be used in part within the Chip-munk Project area:

- 3.67 miles of Level 1 roads assigned to intermittent service.

- 90.62 miles of Level 2 roads managed for limited passage of traffic.
- 20.48 miles of Level 3 roads managed for safe travel by a prudent driver in a passenger car.
- 0 miles of Level 4 roads where management direction requires the road to provide a moderate degree of user comfort.
- 8.38 miles of Level 5 roads managed for high degree of user comfort.
- 3.3 miles of County Roads 306 and 317.

In addition to the existing classified roads, there are unclassified roads, abandoned roads, and skid trails in the project area. These unclassified roads, abandoned roads, and skid trails are not part of the annual road maintenance schedule and budget.

Environmental Consequences

Alternative A– Proposed Action Direct and Indirect Effects of recovery of fire killed trees and reestablish forest conditions

The Plumas National Forest Transportation System within the project area will have roads used to haul timber. The project will enhance, maintain and make some improvements. The Plumas National Forest Transportation System will remain the same in size. The Chip-munk Project will not add additional roads to the system and only existing roads will be used. These roads will receive maintenance before and after haul and will improve due to this maintenance. The removal of hazard trees will improve access into the area and improve safety for drivers.

The 27N98 road will have segments of spot rock near culverts and stream crossings. The 26N25 road will receive repair due to storm damage. A half mile of 26N23C road will be decommissioned to protect resources.

The following additional direct effects based on that analysis have been identified:

- Maintenance (i.e. brushing, rocking, culvert resizing) will be done before and after treatment to bring existing classified roads into compliance with current maintenance standards and to provide access to treatment areas. Road maintenance is necessary to reduce erosion and sedimentation and to provide for public safety.
- Four miles of temporary road construction is needed to access project units where existing road access is absent. Otherwise existing unclassified roads will be reconstructed for access to units.
- Harvest landing construction and reconstruction are needed to facilitate removal of wood products.

The Chip-munk Project will cause more traffic on the roads but congestion should not be a problem. Roads during haul will require greater attention by drivers as haul trucks will be traveling on the road ways for a temporary period of time.

Alternative A – Cumulative Effects Salvage Timber Harvest

The NFS road system is not having any changes to it with the exception of the decommissioning of the 26N23C a half mile of road. The NFS road system will not have any changes in the future so there are no cumulative effects.

Alternative B – Direct and Indirect Effects

No changes or corrections would be made to the NFS road system. Roads causing sedimentation issues would not get addressed and fixed.

Alternative B —Cumulative Effects

The NFS road system is not having any changes to it.

Comparison of Alternatives

Alternative A would allow the Plumas National Forest maintain roads through a timber sale contract. Hazard trees will be removed for safety and to prevent road blocks by trees falling into the roadway, preventing access into the area. Traffic will increase on the roads but there are no anticipated road congestion issues. All drivers including truck drivers will need to drive with caution.

There would be no changes to the NFS road system in the no action alternative. Roads may continue to have deferred maintenance due to budget constraints.

Compliance with the Forest Plan and Other Direction

The purpose of the NFS road system is to provide suitable conditions for passage at minimum standards while providing utility and resource protection. The road system shall minimize adverse effects on watershed and wildlife resource values. Roads near streams have the greatest probability of intercepting, concentrating, and diverting flows from natural flow paths these were reviewed by the Burned Area Emergency Rehabilitation Team (BAER). Road/stream crossings have the potential to fail and divert water and the BAER team has proposed road improvements at locations where the probability is high for resource damage.

Temporary roads would be eliminated, closed, or obliterated in accordance with the 1988 Forest Plan, as amended, and the Plumas National Forest Public Motorized Travel Management Final Environmental Impact Statement (FEIS)(August 2010) and Record of Decision (ROD)(September 2010) (USDA 1988a and b; USDA 2010 a, b). To protect watershed

resources, the desired conditions for roads that would be retained and improved (through road reconstruction and maintenance) include the following:

Roads that are needed are maintained and improved to accommodate vehicle traffic. The proposed treatments would provide roads that will ensure safe travel for forest users, and provide a transportation system adequate for all resource management needs.

Forest Vegetation

Introduction

The 2013 Chips Fire started on July 29, 2012. By the time the fire was contained on August 31, 2012, the fire had burned approximately 76,333 acres. The fire burned from the Mt. Hough Ranger District on the Plumas National Forest (approximately 49,000 acres) onto the Almanor District of the Lassen National Forest (approximately 19,000 acres) with the rest of acres falling within private and/or other government jurisdictions.

The Chips Fire origin was centrally located within the 2000 Storrie Fire footprint, re-burning about 43 percent of the Storrie Fire area before moving to the north and east. The northeastern portion of the Chips Fire burned into the unburned Belden Project area, which was about to have its Proposed Action released for public scoping.

Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction

The Chip-munk Project is designed to fulfill the management direction specified in the 1988 Plumas National Forest Land and Resource Management Plan (PNF LRMP) (USDA 1988a), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) FSEIS and ROD (USDA 2004a, b). Fuel and vegetation management activities are designed to comply with the standards and guidelines as described in the SNFPA FSEIS and ROD (USDA 2004a, b). The purpose of this analysis will quantify management affects to determine if the Proposed Action meets current standards and guidelines as listed in the guiding documents above.

National Forest Management Act

The National Forest Management Act (NFMA) of 1976, including its amendments to the Forest and Rangeland Renewable Resources Planning Act of 1974 state that it is the policy of the Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans. Both acts also state “insure that timber will be harvested from national Forest System land only where – (ii) there is assurance that such lands can be adequately restocked within five years of harvest.”

NFMA sets policy to maintain appropriate forest cover in accordance with forest plans (16 U.S.C. 1601 (d)) and requires best effort to reforest within 5 years after harvest (16 U.S.C. 1605 (g) (3) (e)). As it relates to wildfires (or any other natural disturbance) that create openings in the forest that need reforestation, it is agency policy to consider salvage harvest the functional equivalent of a regeneration harvest and to make a best effort to recover forested conditions within 5 years after harvest (Forest Service Manual 2470).

Relevant excerpts from NFMA state:

“Reforestation”: Sec. 4. Section 3 of the Forest and Rangeland Renewable Resources Planning Act of 1974, as redesignated by section 2 of this Act, is amended by adding at the end thereof of new subsections (d) and (e) as follows:

"(d)(1) It is the policy of the Congress that all forested lands in the National Forest System shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans. Accordingly, the Secretary is directed to identify and report to the Congress annually at the time of submission of the President's budget together with the annual report provided for under section 8 (c) of this Act, beginning with submission of the President's budget for fiscal year 1978, the amount and location by forests and States and by productivity class, where practicable, of all lands in the National Forest System where objectives of land management plans indicate the need to reforest areas that have been cut-over or otherwise denuded or deforested, and best potential rate of growth. All national forest lands treated from year to year shall be examined after the first and third growing seasons and certified by the Secretary in the report provided for under this subsection as to stocking rate, growth rate in relation to potential and other pertinent measures. Any lands not certified as satisfactory shall be returned to the backlog and scheduled for prompt treatment. The level and types of treatment shall be those which secure the most effective mix of multiple use benefits.”

National Forest System Resource Planning

… (g) As soon as practicable, but not later than two years after enactment of this subsection, the Secretary shall in accordance with the procedures set forth in section 553 of title 5, United States Code, promulgate regulations, under the principles of the Multiple-Use, Sustained-Yield Act of 1960, that set out the process for the development and revision of the land management plans, and the guidelines and standards prescribed by this subsection. The regulations shall include, but not be limited to-

(3) specifying guidelines for land management plans developed to achieve the goals of the Program which-

(E) insure that timber will be harvested from National Forest System lands only where-

(ii) there is assurance that such lands can be adequately restocked within five years after harvest;".

Roadside Safety and Hazard Tree Guidelines

Forest Service Handbook (FSH) 7709.59 Chapter 40, Section 41.7 Hazard Identification and Correction, FSH 6709.11, 27.62d specify the need to remove hazardous trees with structural defects likely to cause failure in all or part of the tree, which may fall and hit the road prism, in a timely, efficient, and cost-effective manner. The Forest Service routinely removes hazard trees to maintain roads for access and safety. The Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region (USDA 2012a) provides direction on hazard tree identification and abatement. In addition, the Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region consider the term "danger tree" as synonymous to hazard tree and uses these two terms interchangeably. However, it does not include identification criteria for recently affected fire-injured trees. It is reasonably anticipated that tree mortality associated with fire-injury may occur for years subsequent to the Chips Fire. Consequently, marking guidelines based upon tree mortality models (Smith and Cluck 2011) were developed and reviewed for this project in conjunction with Pacific Southwest Region Forest Health Protection Staff (USDA 2012a, USDA 2013a). These guidelines would be used to identify dying trees because they are specifically designed for fire-injured trees.

Effects Analysis Methodology

The analysis area used to analyze the direct, indirect and cumulative effects on forest vegetation, fuels and fire is the fire perimeter where the Chips Fire burned. The analysis area is located in predominately Sierra mixed conifer forest ranging in elevation from approximately 2,400 feet near the town of Belden to 6,300 feet near Red Hill. The fire ranged from the Chips Creek drainage to about 15 miles northeast nears the shores of Lake Almanor.

Measurement Indicators

Measurement indicators are used to measure, compare and contrast the effects of the Proposed Action and No-action alternative. Measurement indicators are meant to be understandable, and capable of being quantified or classified, to the extent possible. And they should be responsive to environmental influences and changes in management or treatment activities. The measurement indicators stated below quantify and display effects to forest and landscape stand structure, when relevant to the resource, responses to proposed management activities or lack thereof.

California Wildlife Habitat Relationship Classification

California Wildlife Habitat Relationships (CWHR) vegetation typing (Mayer and Laudenslayer 1988) and fire severity (Miller and Thode 2007) are used to measure cumulative effects of alternatives on landscape structure and diversity. CWHR vegetation type, size class and density is an effective proxy for seral stages and may be used to display the relative distribution of seral

stages because it describes vegetation type, average tree size and canopy cover. In addition, this allows for a congruent analysis of effects on forest vegetation and wildlife habitat. Size classes 0-3 are usually indicative of young, seral stages best described as dominated by seedlings, saplings and pole-sized stands with small trees (Table 18). Larger size classes are often interpreted as mid to later seral stages. Density of forest cover is often expressed in terms of canopy cover (Table 19). Stands consisting of size class 5 over a distinct layer of size class 4 or 3 trees with a minimum of 60 percent canopy cover are classified as CWHR 6D.

Table 18. CWHR Size Classes

	CWHR Size Classes					
	1	**2**	**3**	**4**	**5**	**6**
Diameter Range	<1” dbh	1-6” dbh	6-11” dbh	11-24”dbh	>24” dbh	>40” dbh
Description	Seedlings	Sapling	Pole tree	Small tree	Medium/large tree	Multilayered canopy with dense cover

Table 19. CWHR Density and Canopy Cover

	CWHR Density Classes				
	S	**P**	**M**	**D**	**“Blank”**
Canopy Cover	10-24%	25-39%	40-59%	>60%	<10%
Description	Sparse cover	Open cover	Moderate cover	Dense cover	No cover, but definitely forest

Trees Per Acre and Size Class Distribution

Trees per acre (TPA) and size class distribution are inter-related measurement indicators where trees of different diameters are grouped together in similar size classes. This distribution is useful in illustrating stand structure and development, regeneration and wildlife structure components. The number and distribution of TPA by diameter class is an important unit of measure because it shows the effect of treatments on different size trees. The diameter classes are based upon:

- Regeneration (live trees)
- Surviving mid/overstory (live trees)
- Snag retention (dead trees)
- Forest products (dead trees)

Basal Area

Basal area is a measure of stand density or stocking. Stand density is a quantitative measure of the area occupied by trees, usually measured in terms of well-spaced trees relative to an optimum or desired level of density. A desirable level of stocking is oftentimes considered that which maximizes timber production or other management objectives. Basal area is the cross section area

of a tree stem in square feet measured at breast height (4.5 feet above ground). Although TPA is a very useful indicator of stocking, it doesn't describe the size of the trees. For example, a stand comprised of 100- six inch TPA is very different than a stand of 100 16-inch trees. Conversely, two stands of the same basal area but with vastly different TPA vary greatly in structure. Stocking for an area, usually on a per-acre basis, is the sum of the basal areas for all trees in the area.

Basal area can also be used to determine whether a stand has reached a threshold. For example Sartwell (1975) states that mountain pine beetle outbreaks appear to occur when basal area is in excess of 150 ft^2. Landram (2004) also uses basal area to develop forest health risk thinning guidelines for the Plumas National Forest. Basal area has also been used to describe historical stand density (Battagalia and Shepherd 2007). In addition, marking prescriptions often use target basal area in directing timber markers which trees to designate for removal in thinning projects.

Fire Severity

Fire severity was mapped utilizing Landsat TM satellite imagery and RdNBR classification, andis commonly used to describe the effects of the wildfire on forest vegetation including vegetation type, size class, and density (Miller et al. 2009b, Miller and Thode 2007, Safford et al. 2008). Based upon field observations and experience, areas that burned at less than 25 percent basal area mortality can be described as experiencing low severity fire. Fire behavior was largely low intensity surface fires that killed primarily understory and small diameter trees with some midstory torching. Some areas may not have burned at all. Areas that had 25 – 50 percent basal area mortality would be considered having moderate severity fire. These areas experienced surface fires which killed a substantial component of the understory with increased torching of the midstory and increased mortality of the midstory. Moderately high to high fire severity includes areas with 50 percent or greater basal area mortality. Fire behavior and subsequent severity is largely characterized by both passive and active crown fires. The understory and midstory were killed along with the vast majority of the overstory.

Proposed treatments are often based on fire severity and post fire vegetation conditions. Fire severity and relative amounts that would be treated are used to quantify size and scale of treatment effects across the post-fire landscape.

Geographic and Temporal Bounds

The analysis area of this vegetation report is geographically bounded by the perimeter of the Chips Fire. The fire is the common event that has altered the forest vegetation within the project area. The economic recovery of Chips Fire killed trees is a main purpose and need for the project. All units analyzed for salvage, site preparation and reforestation efforts lay within the fire perimeter.

For the purpose of the vegetation analysis, the temporal bounds include a 30-year horizon for future effects because modeling indicates that, within 30 years, the treated stands would approach

stocking levels corresponding with forest development. In addition, past stand replacing fires on the Mt. Hough Ranger District such as the Elephant fire (1981) that was treated with similar management actions (salvage fire-killed timber and reforestation) developed into young forested stands (sapling and pole size trees) within 30 years. This stand development is commensurate with the modeling performed in this analysis.

Analysis Methodology

Field inventories were conducted on stands within the Chips Fire perimeter from years 2007 and 2009 to measure attributes of forest vegetation. Forest stands were inventoried using the Common Stand Exam protocols for the USDA Forest Service Pacific Southwest Region (citation needed). These stands are within the Chips Fire perimeter and are representative of the project area and the areas to be treated in the proposed action. Data were collected on live and dead trees. These data were used in the following analysis, data tables, graphs and charts and are incorporated by reference.

Field inventory data from the treatment units was stratified by fire severity to best represent the range in average conditions between higher and lower fire severity. This data was used as input to the Forest Vegetation Simulator (FVS) and the Fire and Fuels Extension (FFE). FVS a forest growth model that predicts forest stand development (FVS 1997; Dixon 1994). FVS-FFE is a well-established tree and stand growth model that is supported and maintained by the Forest Service. A specifically calibrated variant of FVS is available for the Sierra Nevada (Western Sierra Nevada, CA variant).

Weather data from portable remote automated weather stations (RAWS) was used as inputs into the FVS-FFE model. Portable RAWS are often placed within the vicinity of wildfires to better predict weather patterns for firefighters. It provides very site specific measurements of temperature, fuel moisture, relative humidity, wind speed, etc. FVS-FFE fuel moisture inputs were derived from the District Fire Ecologist using historical data and trends (Kinateder, personal communications, 2013).

Stand development over time is modeled using pre-fire field inventories, existing stand conditions, and post-fire observations. Salvage harvest and reforestation actions are then modeled in order to provide estimates of future fuels, snags and stand development based on realistic and predictable inputs. The model was used to quantify existing conditions and to predict the effect of alternative treatments on forest development. Model results are used to highlight relative differences, not absolute conditions. No future activities, fires, or natural regeneration events are included in growth simulations due to the variable and unpredictable nature of such events.

A Geographic Information System (GIS) was used to analyze effects on forest vegetation on the landscape scale by using fire severity data, pre-fire CWHR data compiled by the VESTRA Resources, a private contractor in 2000. Vegetation coverage and the post-fire vegetation typing was completed by the project GIS coordinator. Post-fire vegetation conditions were reclassified

using GIS vegetation inventories, fire severity and post-fire field observations. Current, post-fire forest vegetation was reclassified using a post-fire vegetation conversion guideline, which can be found in the Chip-munk Project Forest Vegetation Report (USDA 2013b). In general, forest conifer vegetation types that experienced 25-75 percent in basal area mortality were adjusted in density of vegetation. Conifer areas that exhibited higher than 75 percent basal area mortality were re-typed as montane chaparral (MCP) with a size class of "1" (1-6" dbh) and a density of "null". In addition, conifer areas that had 50 percent or higher basal area mortality were considered to be in a deforested vegetation condition. It is different than the professional definition of the term deforestation, which connotes a permanent change in land use. Deforested vegetation condition describes a temporary condition of the forest vegetation after a wildfire has burned at such high severity that not enough trees were left alive for the forest to naturally regenerate and function normally (USDA 2013h). It is a signal that reforestation treatments are required to re-establish forest cover promptly. As a rule, this describes a resulting forest with less than 20% canopy cover. A follow-up diagnosis followed by a silvicultural prescription is required to complete the final assessment and determine type of management activities that are needed to recover the area.

Affected Environment

The project area ranges from approximately 2,400 to 6,000 feet, with the majority of proposed salvage units in between 4,000 and 6,000 feet. The forests affected by the Chips Fire lay pre-dominantly within the wet, productive west-side forests of the Sierra Nevada. The landscape within the project area consisted primarily of pine-dominated Sierra mixed conifer forests, true fir forests and plantations. Before the Chips Fire event, approximately half the project area (east of Butt Valley Reservoir and the North Fork of the Feather River) was under analysis with the Belden Project. Forest health and fuels reduction was one of the primary Purposes and Needs.

Prior to the Chips Fire

As with many areas in the Sierra Nevada, the landscape has been heavily influenced over the last 150 years by past management activities that include mining, grazing, harvesting, fire exclusion, large high-severity fires and more recent drought-related mortality during the late 1980's and early 1990's. At the stand level, the combination of past management activities, fire exclusion and extensive drought related mortality had created relatively homogeneous areas typified by small trees existing at high densities (Oliver et al. 1996). In addition, most of these stands were comprised of shade-tolerant species such as white fir. Desirable conifer shade intolerant species such as ponderosa and sugar pine appeared to be fading from the landscape. These high stand densities and high fuel loads created by density dependent and drought related mortality created overstocked stands with high accumulations of ladder and canopy fuels.

CWHR

As mentioned earlier, CWHR distribution is an effective way of describing vegetation characteristics on a landscape scale. The table below (Table 20) describes the CWHR distribution in the project area prior to the Chips Fire. Figure 7 show how different CWHR vegetation types were distributed across the landscape.

Table 20. CWHR Distribution Within Project Area Prior to Chips Fire (Acres)

Vegetation Type				**CWHR Density Class**					
				D	**M**	**P**	**S[1]**	**Total**	**Percent of Total**
Non-Forest2				132	19		11,118	11,269	15%
Hardwood Forest3				2,252	747	761	66	3,826	5%
Conifer Forest4	14,926	29,979	11,540	3,257	59,702	80%			
Total	**17,310**	**30,744**	**12,301**	**14,441**	**74,797**				

1 Null size classes have less than 10 percent canopy cover

2CWHR Type AGS, MCH, MCP, MRI and WTM

3CWHR Type MHW, MHC and ASP

4CWHR Type JPN, PPN, SMC, LPN, RFR and WFR

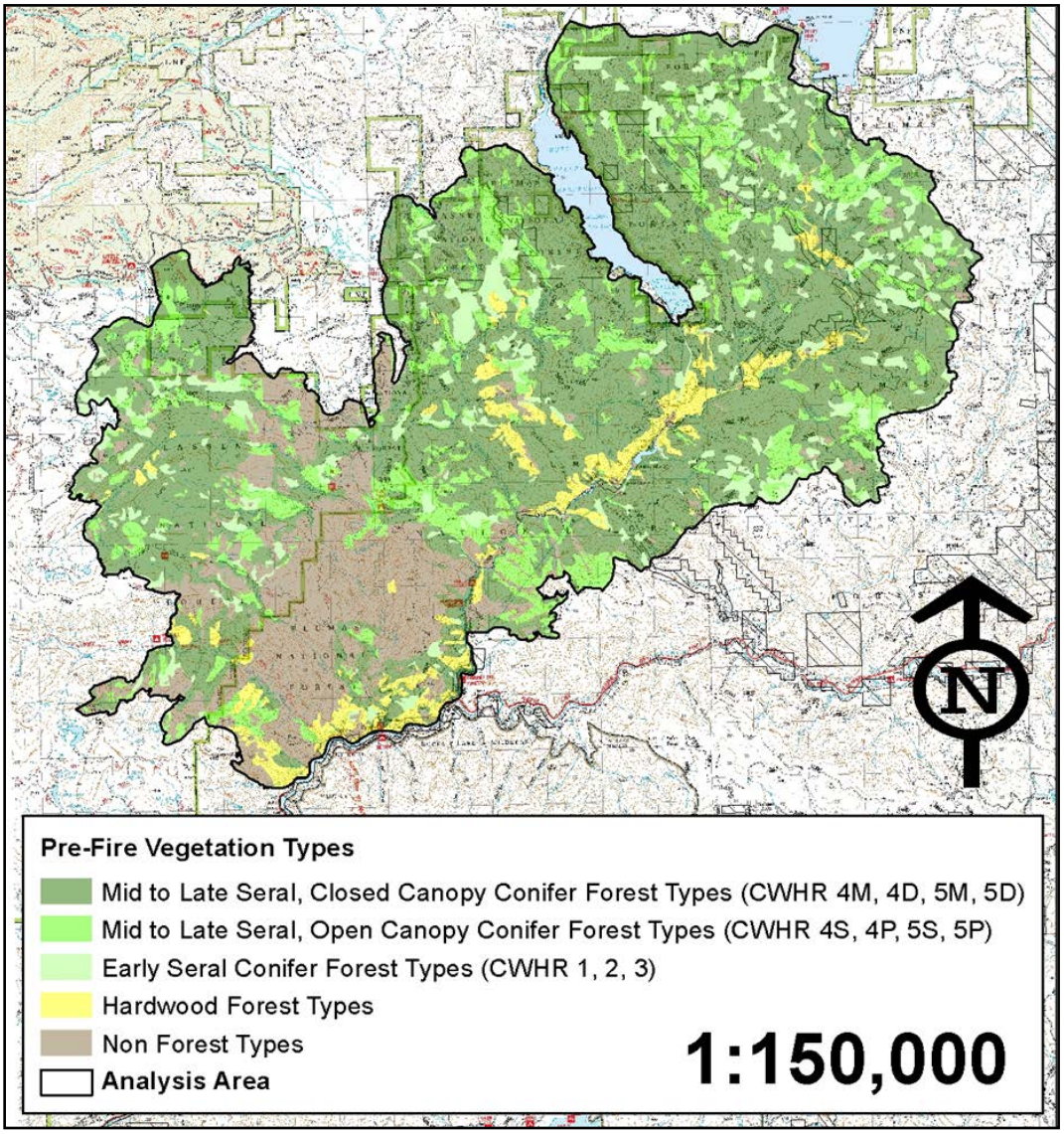


Figure 7. **Vegetation types within the analysis area prior to the Chips Fire**

The majority of the project area (80 percent) prior to the fire was conifer forest type, especially in the higher D and M density (Table 20, Figure 7). Non-forest types (15 percent) were next prevalent with hardwood forests being the least represented (5 percent). Size class distribution is shown in Table 21.

Table 21. CWHR Size class distribution within the project area prior to the Chips Fire

Vegetation Type	**CWHR Size Class**							
	0	**1**	**2**	**3**	**4**	**5**	**Null**	**Total**
Non-Forest	9151	476	144	7			1,491	11,269
Hardwood Forest				786	2214	826		3,826
Conifer Forest	285	0	345	5153	28725	25194		59,702
Total	**9,435**	**476**	**489**	**5,946**	**30,939**	**26,020**	**1,491**	**74,797**

For conifer forests, the most common size class was size class four and then five. That indicates that most conifer stands within the project area were considered to be comprised of mid-seral to late seral stage forests prior to the fire.

Impacts from the fire to the conifer forest are especially important. Conifer forest types provide some of the most beneficial uses to a variety of wildlife as well as a source of resource and economic value to local communities. Conifer forest may take decades to develop from young, seral stands to mature forests characterized by larger diameters and higher canopy cover. Many Forest Service sensitive species such as Northern goshawk and California spotted-owl are considered late-successional forest dependent. Most Protected Activity Centers (PACS) for goshawk and spotted owl tend to cluster around and within size class five and four. Disturbance events such as insects, disease or fire have the potential to adversely affect these more developed conifer stands, putting many of these afore mentioned values, benefits and wildlife species at risk. Please see the Wildlife section for further discussion regarding habitat needs.

Trees Per Acre and Size Class Distribution

The discussion regarding TPA and size class distribution within the Chip-munk Salvage project area will focus on conifer forested stands. Conifer stands are where salvage activities are purposely planned. Post fire salvage and reforestation treatments are not focused on non-forest and hardwood forest vegetation types. Based on field observations of past fires and post-fire recovery projects on the Plumas, any effects on these vegetation types would be incidental, negligible in size and scale and highly dispersed.

Due to the Chips Fire behavior and proposed salvage activities, the areas within the Project analysis area were broken into three separate categories (Table 22):

- low to moderate (50 percent and less basal area mortality) fire severity,
- moderately high to high fire severity (50 percent and greater basal area mortality) tractor ground and
- Moderately high to high fire severity skyline (cable yarding) ground.

There are no proposed salvage activities on low to moderate severity areas; however, there may be some safety mitigation activity (roadside hazard). Approximately 2% of areas that burned at low to moderate fire severity would be affected by roadside hazard treatments.

Table 22. Live Trees Per Acre and Size Class Distribution Prior to the Chips Fire

Category	Diameter Class (Inches)								Total
	1-5.9	6-9.9	10-11.9	12-15.9	16-19.9	20-23.9	24-29.9	30-99	
Low to moderate	162	44	19	33	22	11	8	7	295
High-Tractor	202	48	22	33	15	9	6	4	339
High-	138	55	5	28	10	9	13	8	266

Skyline									

As stated earlier, prior to the fire, most of the stands in the Chip-munk analysis area were dominated by smaller trees ranging from approximately 138-202 TPA in the 1-5.9” size class with a total TPA ranging from about 266-339 TPA. On average, there are less trees per acre in the larger size classes as smaller size class as trees grow from understory to mid-story to upper-story.

Basal Area

Along with TPA, basal area is a good indicator of total stand volume. Table 23 shows the stocking of the various land bases within the Project area.

Table 23. Basal area within the project area prior to the Chips Fire

Category	Basal Area
Low to moderate	227
High-Tractor	175
High-Skyline	214

Stands within the project area prior to the Chips Fire, range from about 175-227 ft^2 of basal area per acre. Stands that later burned at low to moderate fire severity had the highest basal area. These stands also appear to have the most TPA (Table 22). Most of the volume of these stands appears to be in the smaller size classes.

Post Chips Fire

Fire Severity

As discussed earlier, fire severity may be used as it describes the effects of the wildfire on forest vegetation, which in turn affects vegetation type, size class and density. Effects of past, present and future projects that focus on post-fire treatment (such as roadside hazard tree removal projects and fire-salvage projects) correspond to fire severity and therefore, relative percentages of fire severity affected by treatments is a relevant indicator to measure landscape diversity.

The fire severity that resulted from the Chips Fire burned a mosaic across the project area (Figure 8). Some areas burned at extremely high intensity, resulting in 90-100 percent basal area mortality, while other areas burned at extremely low fire severity. The varying degrees in burn severity and basal area mortality could be attributed to many reasons. The timing of burning with topography, aspect, vegetation type, stand density and firefighting resources could account for the heterogeneous bun.

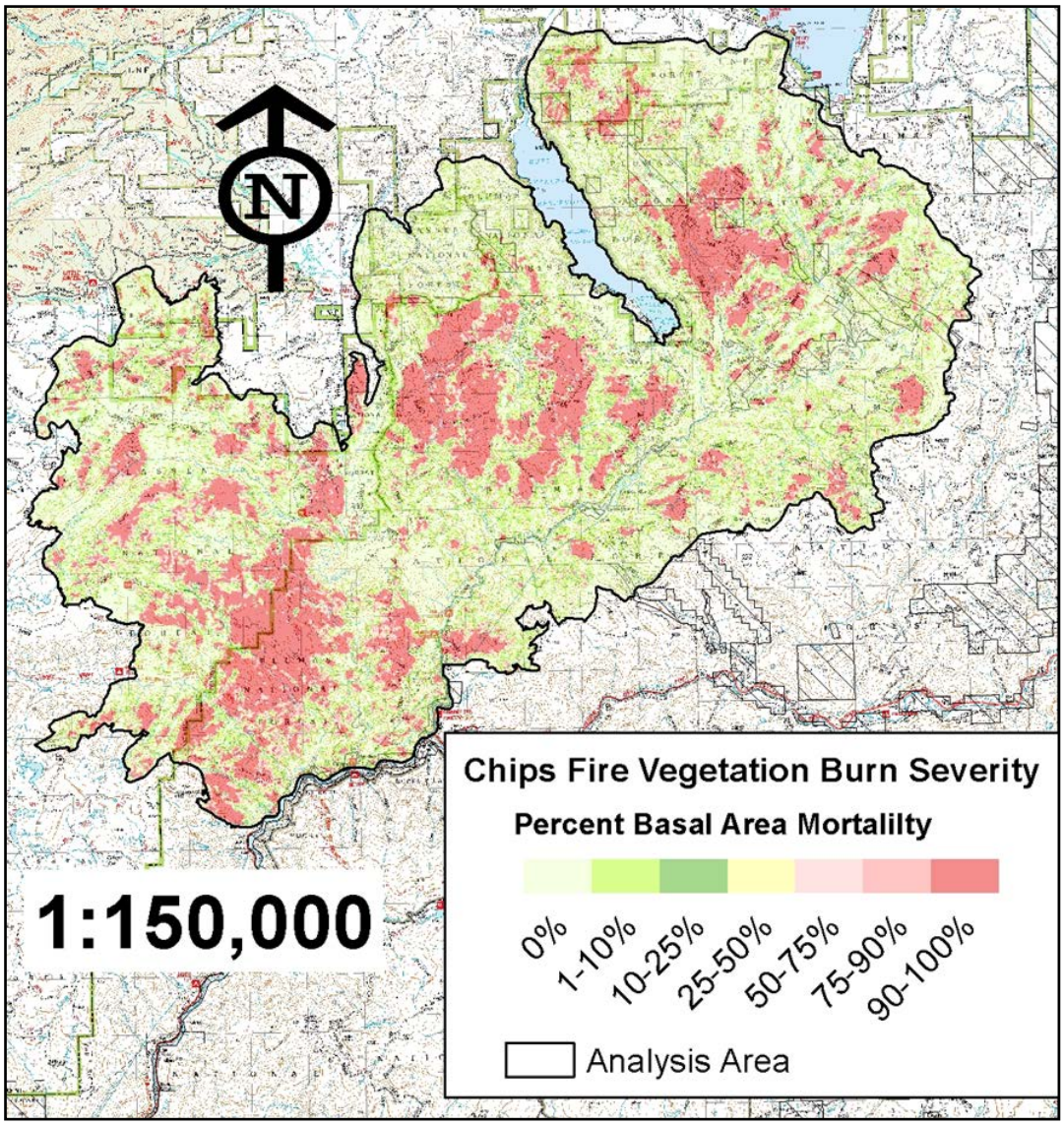


Figure 8. **Fire severity in the project area from the Chips Fire**

Table 24 displays the acres of forest type that burned at fire severity. Most of the project area (38 percent) is considered unburned (0 percent basal area mortality). However, 20 percent of conifer forests did burn at moderately high to high severity. These areas tend to be later reclassified as deforested vegetation condition or have a substantial reduction in canopy cover class. Approximately 25 percent of conifer forest burned at low to moderate severity (0-10 percent to 25-50 percent basal area mortality). Overall, including hardwood and non-forest types (but excluding LAC, BAR and RIV non-forest types), approximately 30 percent burned at moderately high to high severity.

Table 24. Acres of forest types that burned in the Chips Fire

	Basal Area Mortality							
Forest Type	**0%****	**0-10%*****	**10-25%**	**25-50%**	**50-75%**	**75-90%**	**90-100%**	**Grand Total**
Non-Forest*	2,030	742	507	804	1,005	978	5,204	11,270
Hardwood Forest	1,762	668	246	256	196	124	576	3,828
Conifer Forest	26,975	10,606	4,091	3,887	3,081	2,065	8,997	59,702
Grand Total	30,767	12,016	4,844	4,947	4,282	3,167	14,777	74,800

*Does not include non-vegetation types including BAR, RIV or LAC

**Primarily areas of no basal area mortality within the fire perimeter

***Denotes stands or areas that exhibited very little basal area mortality

CWHR

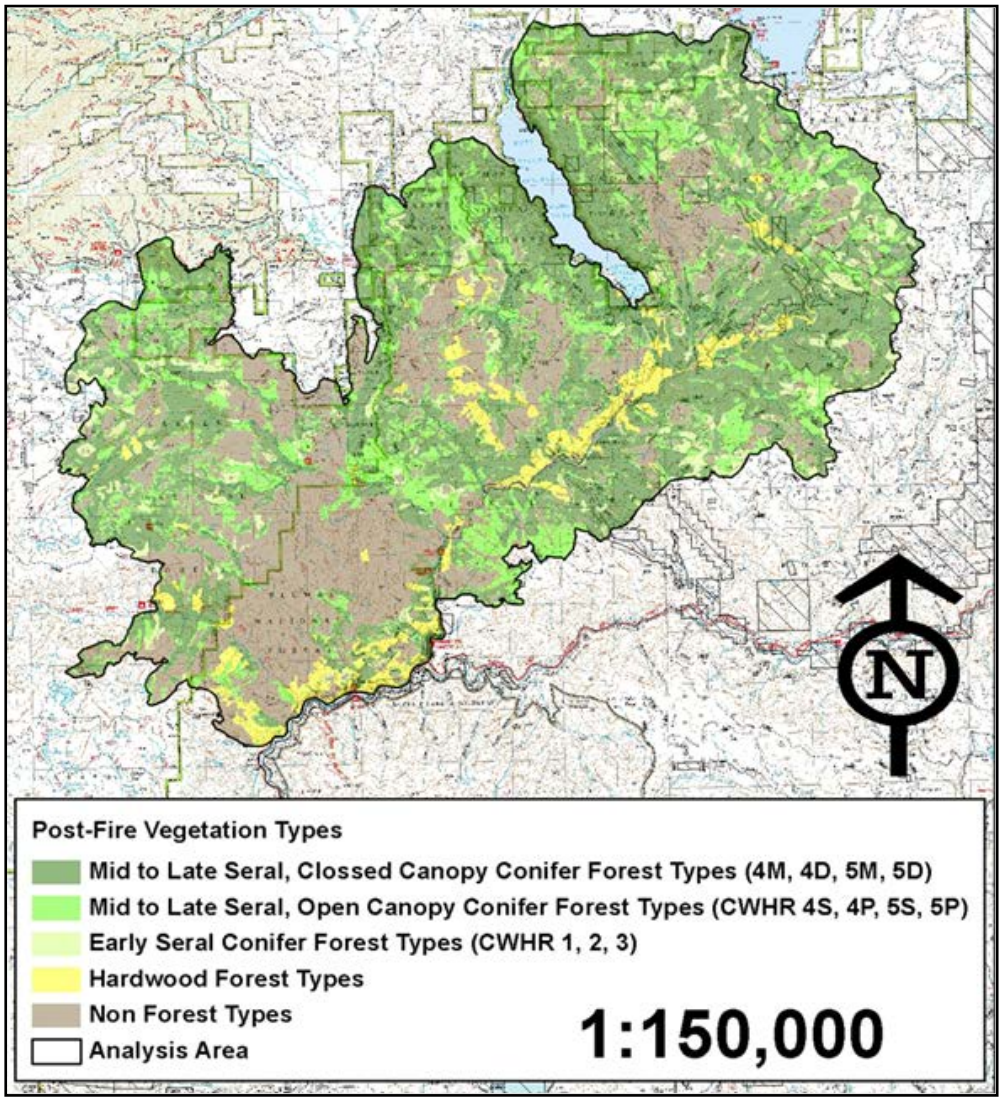


Figure 9. **Vegetation types within the analysis area after the Chips Fire**

As expected, the Chips Fire altered the vegetation types and their distribution within the project area. Figure 9 shows the distribution of vegetation within the project area after the Chips Fire.

Depending upon the existing vegetation prior to the fire, burning conditions and average diameter, vegetation types were altered in various ways. Fire obviously consumes vegetation so density is usually reduced after a fire and/or size classes change. Table 25 and Table 26 list the resulting distribution of CWHR density and size after the Chips Fire.

Table 25. CWHR density distribution after the Chips Fire (Acres)

Vegetation Type	CWHR Density Class						
	D	M	P	S	Null^	Total	Percent of Total
Non-Forest*	110	12	10	2	22,196	22,331	30%
Hardwood Forest**	1770	551	647	159	700	3,826	5%
Conifer Forest***	11,162	20,839	10,175	6,282	183	48,640	65%
Total	13,042	21,402	10,832	6,443	23,079	74,797	100%

^Null size classes have less than 10 percent canopy cover

Table 26. CWHR Size class distribution within the project area after the Chips Fire

Vegetation Type	CWHR Size Class							
	0	1	2	3	4	5	Null	Total
Non-Forest	9,151	476	144	7			1,491	11,269
Hardwood Forest				786	2,214	826		3,826
Conifer Forest	285	0	345	5,153	28,725	25,194		59,702
Total	**9,435**	**476**	**489**	**5,946**	**30,939**	**26,020**	**1,491**	**74,797**

Just as important as the acres of change in size class and density after the fire is the actual overall shift in vegetation type distribution across the project area. For example, before the Chips Fire, non-forest types accounted for only 15 percent of the project area (Table 27). After the fire, non-forest types became almost a third of the project area. There is almost a 100 percent increase in non-forest vegetation (Table 27). This is a very large increase in non-forest vegetation types, considering that it came at the expense of conifer and hardwood forested stands. It is the magnitude in change that the Chips Fire that may be a cause for concern. This substantial loss of conifer and hardwood forest could be of negative affect to wildlife that need mid to later seral stages as well as the distribution of these forest stand types.

Table 27. CWHR distribution changes in response to Chips Fire

			Pre-Fire		Post-Fire		
Forest Type	**CWHR Size**	**CWHR Density**	**Acres**	**Percent of Acres**	**Acres**	**Percent of Acres**	**Overall Percent Change**
Conifer Forest Types	0, 1	All	285	0%	183	0%	-36%
	2	All	345	0%	239	0%	-31%
	3	All	5,153	7%	3,745	5%	-27%
	4	D	5,819	8%	4,285	6%	-26%
		M	14,379	19%	10,531	14%	-27%
		P	7,144	10%	6,007	8%	-16%
		S	1,383	2%	3,176	4%	130%
		Total	28,725	38%	23,999	32%	-16%
	5	D	8,554	11%	6,473	9%	-24%
		M	14,051	19%	9,490	13%	-32%
		P	2,405	3%	2,998	4%	25%
		S	184	0%	1,514	2%	722%
		Total	25,194	34%	20,475	27%	-19%
Hardwood Forest Types		**Total**	3,826	5%	3,826	5%	0%
Non-Forest Types		**Total**	11,269	15%	22,331	30%	98%

Trees Per Acre and Size Class Distribution

As stated earlier, the discussion regarding TPA within the Chip-munk Salvage project area will focus on conifer forested stands. Conifer stands are where salvage activities are purposely planned. Affects to non-forest and hardwood forest types is not intended and will most likely be small and incidental.

Due to the Chips Fire behavior and proposed salvage activities, the areas within the Project analysis area were broken into three separate categories (Table 28):

- Low to moderate (50 percent and less basal area mortality) fire severity where no salvage activities are planned to occur,
- Moderately high to high fire severity (greater than 50 percent basal area mortality) tractor ground and
- Moderately high to high fire severity skyline (cable yarding) ground

Again, there are no proposed salvage activities on low to moderate severity areas; however, there may be some safety mitigation activity (roadside hazard).

Table 28. Live Trees Per Acre and Size Class Distribution after the Chips Fire

Category	Diameter Class (Inches)								Total
	1-5.9	6-9.9	10-11.9	12-15.9	16-19.9	20-23.9	24-29.9	30-99	
Low to moderate	89	31	15	28	19	11	9	7	209
High-Tractor	14	3	2	3	1	1	1	1	26
High-Skyline	10	0	2	1	0	1	1	1	16

The areas that burned low to moderate versus areas that burned moderately high to high severity show large differences in live trees after the Chips Fire (Table 28). The small amount of TPA of trees in the lower diameter range reflects that there is potential for pockets of trees to survive. In addition, areas proposed for fire salvage experienced basal area mortality ranging from 50 to 100 percent. These predicted values mirror that range of mortality. Again, predicted values do not reflect absolutes, but display differences due to environmental variables. The main point is that areas that burned at less fire severity have more residual TPA overall, but especially in the lower diameter classes. Areas that burned at higher fire severity, that are being considered for salvage activities, show a much larger reduction in TPA overall and within the diameter classes (Table 29). Moderately high to high severity areas have an almost 100 percent reduction in live trees as a result of the Chips Fire.

Table 29. Live trees per acre changes after the Chips Fire

	Overall Percent Change								
Category	1-5.9”	6-9.9”	10-11.9”	12-15.9”	16-19.9”	20-23.9”	24-29.9”	30-99”	Total
Low to moderate	-45%	-30%	-23%	-16%	-11%	-3%	1%	-3%	-29%
High-Tractor	-93%	-93%	-89%	-91%	-94%	-92%	-90%	-81%	-92%
High-Skyline	-93%	-100%	-54%	-98%	-100%	-94%	-94%	-92%	-94%

Basal Area

As expected, overall stand volumes were also reduced as a result from the Chips Fire, with stands in the low to moderate category having the least loss of volume (Table 30). Stands in the low to moderate category, on average, still have basal areas above 200 ft^2, which according to Region 5 guidelines (Landram 2004), puts it at an elevated risk to forest health issues such as insects and fire. Areas that burned at moderately high to high severity are considered “under-stocked” as a result of the Chips Fire.

Table 30. Basal area within the project area after the Chips Fire

Category	Basal Area	Percent Change
Low to moderate	206	-9%
High-Tractor	18	-90%
High-Skyline	13	-94%

Environmental Consequences

The environmental consequences section of this report aims to look at direct, indirect and cumulative effects of the Proposed Action (Alternative A) and the No-Action (Alternative B) alternatives. The discussion of effects for forest vegetation will talk in terms of the measurement indicators, when relevant, described earlier. The effects will be discussed on their own and over time, as well as compared and contrasted to each other.

Direct Effects

These are effects on forest vegetation that are directly caused by treatment implementation or, as with Alternative B (no action), a lack of treatment or action.

Indirect Effects

These are effects on forest vegetation that are in response to the direct effects of treatment implementation or, as with Alternative B (no action), a lack of treatment.

Cumulative Effects

Direct effects would likely be limited to the project implementation phase. Indirect effects would last beyond the implementation period and occur within the temporal bound of the cumulative effect analysis as described above under “Geographic and Temporal Bounds”.

In order to understand the contribution of past actions to the cumulative effects of the Proposed Action and No-action alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. Focusing on individual actions would be less accurate than looking at existing conditions because there is limited information on the environmental impacts of individual past actions and it is not reasonably possible to identify each and every action over the last century that has contributed to current conditions. By looking at current conditions, the Forest Service is sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. The Council on Environmental Quality issued an interpretive memorandum on June 24, 2005, regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.” For these reasons, the analysis of past actions in this section is based on current environmental conditions.

Cumulative Effects Common to the Alternative A and Alternative B

As mentioned above, this cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. By looking at current conditions, the Forest Service is sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. The analysis of past actions in this section is based on current environmental conditions.

Past Projects

The cumulative effects of past management practices; fire exclusion and high-mortality fires (Appendix D) have largely shaped forest structure prior to the Chips Fire. On public and private lands, past harvest activities focused on removal of dominant and co-dominant trees and retention of biomass and even-aged management. Post fire, areas that burned at moderately high to high fire severity is now dominated by dead trees with little surface fuel other than litter, twig fall and down burned logs. It is likely to become dominated by shrub species within the next decade. Overall, past harvesting which focused on removal of live dominant and co-dominant trees, retention of biomass and no treatment of surface fuels combined with completely untreated reserve areas may have contributed to high severity fire patches of fire in the analysis area.

Since 1996, commercial thinning from below, removal of biomass, with and without prescribed fire, has been the principal silvicultural treatment implemented on public lands in the analysis area. This silvicultural treatment has been used to establish several fuel treatments within the analysis area (Kingsbury Rush Defensible Fuel Profile Zone (DFPZ) and Canyon Dam Project). These areas were treated to meet desired conditions in terms of potential fire behavior and tree mortality. During the Chips Fire, all of these treatments were impacted by the fire (Bauer, personal communication, 2013). Spot fires in the Canyon Dam project were contained and parts of the Kingsbury Rush DFPZ were used for back-firing/burnout operations (Bauer, personal communication, 2013). Today, these treated areas typically have many live trees, some newly created snags and surface fuels composed primarily of litter fall from scorched trees. Overall, past fuel treatments contributed to patches of lower fire severity within the analysis area.

Wildfire Suppression and Fireline and Burned Area Emergency Rehabilitation (BAER) Efforts

Suppression tactics taken during the Chips Fire affected forest vegetation and fuels. The tactics included air drops of water and retardant, back burning, construction of control lines by bulldozers and hand crews, live and dead tree falling and construction of staging areas, safety zones, escape routes and drop points. These suppression tactics altered forest vegetation largely through removal of vegetation and/or fuel accumulations or re-arrangement of fuels. Due to the linear, localized and dispersed effects of these activities, there is a negligible effect on remaining forest vegetation and fuels.

In addition, fire line and BAER rehabilitation efforts were implemented to reduce negative effects of these activities within the fire areas. Fire suppression rehabilitation activities include rehabbing roads, helispots, safety zones and water sources to pre-incident conditions; applying erosion control measures such as waterbar construction to dozer and handlines, pulling vegetative debris back onto control lines and removing debris deposited in stream channels as a result of suppression efforts.

BAER treatments within the analysis area included improvement of drainage structures, including culverts, to accommodate increased flows and debris resulting from the Chips Fire. These fireline and BAER rehabilitation treatments are also localized and dispersed across the landscape and have negligible to no measurable effects on forest vegetation, fuel loading, fire behavior, fire severity, or air quality.

Roadside Safety Projects

The Chips Burned-Area Report (USDA 2012b) states that there is a potential for roadside hazard trees threatening the life and safety of road users, obstructing of roadway drainage courses and denying road access. The Chips Roadside (CE) was planned and implemented to address immediate hazards to commonly used routes within the project area. The Lassen National Forest also intends to propose roadside hazard treatment (Poker Chip Project). The total amount of acres proposed between the two projects is 1,811 acres. Under these projects, fire-killed and fire-injured trees expected to die within three years are removed resulting in a reduction of standing snags near the roadway. Since these projects are limited to 150 to 200 feet on either side of the road, these effects are localized and restricted to roadsides, approximately three percent of public lands within the analysis area. This calculation represents the maximum and furthest extent of measurable effects on forest vegetation that would occur as a result of implementing these projects. Since the removal of hazardous, fire-killed and fire-injured trees would only occur within striking distance of roads and facilities under these projects, the effects would be limited to these areas and subsequently, dispersed across the 74,797 acre project analysis area resulting in a minimal scale of effects (2 percent). Due to the limited and dispersed nature of these effects, these activities would not substantially affect forest vegetation, fuel loading, fire behavior, or air quality on the stand or landscape level.

Post-fire salvage projects

The Poker Chip Project is a fire salvage project proposed by the Almanor Ranger District, Lassen National Forest that plans to salvage 547 acres. This project includes harvesting fire-injured trees in the interest of capturing the value of those trees which were substantially damaged by the fire and likely to die in the near future. Most trees harvested would be dead (or dying), fire-killed trees. Post-salvage planting is also planned. The contributions of this project to cumulative effects include a localized reduction in snags, in snag recruitment from fire-injured trees and in high burn severity forest structure and enhanced establishment of conifer seedlings across the analysis area

in order to re-establish forested conditions. This project would affect 0.8 percent of public lands within the analysis area and represent some of the smallest contribution towards cumulative effects to forest vegetation, fuel loading, fire behavior, or air quality within the analysis area. Due to the size, scale and dispersal of such activities, these localized effects would be minimal when considering the extent of the analysis area.

Reforestation projects

Site preparation and reforestation of 426 acres on the Plumas National Forest where no salvage harvest is proposed may begin in the analysis area as early as fall 2013, but most likely spring 2014. There are also 371 acres where planting with no site preparation activities would occur. These 371 acres would occur in 2013 and 2014. The Lassen National Forest is proposing an additional 3,296 acres of reforestation (Poker Chip Project, USDA 2013i), of which, 2,749 acres would occur in areas with no salvage treatment. The combined acreage of reforestation without salvage would affect six percent (4,093 acres) of public lands. Site preparation activities would occur one season prior to planting. The objective of site preparation is to manage future fuel profiles to reduce long term fire risk to plantations, mitigate hazards to reforestation personnel and to reduce competitive vegetation. Activities such as hand fall, grapple pile, hand pile and burn may be used to meet site preparation objectives. A combination of low density wide spaced cluster planting is proposed on the Plumas National Forest affected lands while the Lassen intends to plant using conventional spacing. Manual release treatments would occur within one to two years following planting. The net cumulative effect would be the enhanced establishment of conifer seedlings across the analysis area in order to re-establish forested conditions.

Post-fire Salvage and Reforestation on Private timberlands

Approximately 2,465 acres are planned or have occurred for salvage harvest in project area. Based on current activity, private fire salvage projects occur mostly on areas that burned from low to moderate to moderately high to high fire severity. This results in a notable reduction in densities of fire-killed and fire-injured trees on private lands. It is reasonably assumed based on state forest practice regulations and private timber practices that these areas would be re-planted and managed for maximizing tree growth.

Future Forest Health Projects

Future forest health projects that may occur within the analysis area include the Long Valley Project (2016) and the Belden Project (2017). These projects would include area thinning treatments which would involve timber harvesting. Potential silvicultural prescriptions would involve thinning from below to reduce hazardous accumulations of ladder and canopy fuels, promoting shade intolerant species and reducing stand density. These projects would focus on generally harvesting smaller and medium live trees, generally retaining high quality large diameter trees of desired fire resilient species and retention of high quality snags. These treatments would likely be modified to avoid areas affected by the fire; particularly areas that

burned with moderate to high severity. Other activities may include fuel reductions in existing plantations and improving aspen stand health. Contribution to cumulative effects would include localized reduction of stand densities through timber harvest focusing on the removal of trees less than 30 inches diameter and the removal of snags. No treatment units from either the Long Valley or Belden projects would overlap with treatment units in Alternative A. The contribution of these projects to cumulative effects would be negligible since 1) treatments would occur in low severity to non-burned areas, 2) prescriptions would be focused on maintaining mature forest cover and reducing hazardous fuel conditions and 3) the units are geographically disparate and dispersed from the action alternative.

Christmas Tree and Firewood cutting

Due to partial to complete scorch of most small trees (less than 10 inches in diameter) Christmas tree cutting would likely be limited within the analysis area; any negative effects from Christmas tree cutting would be highly dispersed and negligible. Firewood cutting will likely be limited to roadways as firewood cutters prefer not to cut trees that have blackened bark and are only allowed to cut standing dead trees within 100 feet of the roads. After the Chips Fire, PG&E did engage in power line hazard reduction. Numerous trees were dropped adjacent to Forest Service roads, especially the Forest Service Road 27N26. This area is generally closed to firewood cutters, but was temporarily opened up to firewood cutters for a limited time period (ended February 28, 2013). As of the moment, the Red Hill area will remain closed to firewood cutters indefinitely. In general, the quality for firewood will deteriorate over time, making other areas in the Chips Fire undesirable for firewood cutting over time. Overall, Christmas trees cutting and fuel wood cutting, would have a negligible effect on future stand and landscape-level forest vegetation, fuel loading, fire behavior, fire severity, or air quality due to the limited, highly localized, but largely dispersed nature of these activities. As a result cumulative effects would be negligible and immeasurable on a per acre basis.

Recreation

Dispersed recreation use is moderate in the project area. Season of use is generally May through November, with activities including camping, hiking, hunting, horseback riding, off highway vehicle riding, fishing, firewood cutting, wildflower viewing, by individuals and small groups. Project related impacts to activities and specific infrastructure such as; roads, OHV routes, single track trails, hiking trails and campgrounds are analyzed in the Recreation section.

There are two developed campgrounds located on the east shore of Butte Valley Reservoir, within the project boundary. Both of which are operated by Pacific Gas and Electric (PG&E). There are no planned actions associated with the Chip-munk project in these facilities. There are two Forest Service developed campgrounds located along Caribou Road, within 2 miles of the project boundary. These two facilities are located outside the project boundary and there are no planned

actions in these facilities associated with this project. Recreation in the project area should have very little cumulative effects.

Alternative A – Direct and Indirect Effects of Roadside Hazard Tree Removal

Roadside hazard tree removal is proposed in Alternative A and is designed to insure safe travel routes on Forest Service System Roads for public, special use permitees, private landowners, employees, contractors, recreational users and any visitor who drives these roads to access private and/or National Forest Lands. Alternative A proposes to treat 1,788 acres for roadside hazards. The purpose is to remove currently hazardous trees (dead trees and live trees with structural defects) and trees that are predicted to die from fire-injuries (and will therefore become hazardous in the near future), which may fall and hit the road prism in a timely, efficient and cost-effective manner.

In the context of recreation resource management, hazard is some exposure to the possibility of loss or harm. With reference to trees, it is the recognized potential that a tree or tree part will fail and cause injury or damage by striking a target. It is often been common practice to refer to such trees as “hazard” or “danger trees”. The distinction has been that hazard trees are near structures and danger trees are along the road. Properly speaking, dangers trees are synomous with hazard trees and will be simply referred to as hazard trees (USDA 2012a). All standing trees, alive or dead, within areas occupied by people, structures and property present some level of hazard. Potential for failure by itself does not constitute a hazard. Hazard exists when a tree of sufficient size and mass to cause injury or damage is within striking distance of any object of value (people, property, etc.). Hazard increases with increasing tree defect, potential for failure, potential for damage and target value. Management actions are taken to mitigate the hazard when risks are unacceptable. It is the responsibility of the land manager to discover and correct any unreasonably dangerous conditions to minimize the potential for injury to invited users or damage to their personal property.

The Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region provides direction on hazard tree identification and abatement (USDA 2012a). In addition, since it is reasonably anticipated that tree mortality associated with fire-injury may occur for years subsequent to the Chips Fire, the project will also use the “Marking Guidelines for Fire-injured Trees in California” (Smith and Cluck 2011) which is based upon tree mortality models from the latest scientific research by Pacific Southwest Region Forest Health Protection Staff and Fire Sciences Laboratory at the Rocky Mountain Research Station (Hood et al. 2010; Hood et al. 2007; Hood 2008; Ryan and Reinhardt 1988). Both of these guidelines were discussed and reviewed by District staff during a field examination with Danny Cluck, Forest Health Protection staff entomologist (Cluck, personal communication, September 19, 2012). Further recommendations were also provided in a subsequent report (USDA 2013a). Cluck and his

coauthors (USDA 2012a) also noted the current drier than normal conditions may lead to increased moisture stress for fire affected trees and that additional mortality within the Chips Fire should be expected for the next three to five years. In addition, guidelines developed by the Pacific Southwest Region Forest Health Protection Staff also take into account pre and post-bud flushing in conifers in determining potential mortality. As mentioned earlier, flushing will be taken into consideration in implementing these mortality guidelines. If flushing is not taken into account, it may incorrectly estimate probability of mortality (Hanson 2009).

Within roadside treatment areas, all trees of merchantable size that meet the marking criteria of the Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region (USDA 2012a) and the Marking Guidelines for Fire-Injured Trees in California (Smith and Cluck 2011) would be harvested. In the Design Criteria, different probability of mortality (Pm) is used, dependent upon diameter of the tree and overlap with PACs. Trees 40.0” and greater in dbh would only be marked for removal if they meet a Pm of 0.90 or are completely dead if they stand within a PAC. All conifers under 40.0” dbh will be designated for removal if they meet a Pm of 0.70. A high failure potential is applied to all hazard trees as well. Dependent upon the season, the marking guidelines would either use a pre or post-flushing based mortality threshold.

The roadside hazard tree removal as implemented through the marking guidelines would result in reduced snags and green trees with defects within striking distance of roads and facilities. It would also reduce the amount of fire-injured trees that would likely die resulting in reduced snag recruitment within striking distance of roads and facilities. The purpose and spirit of the marking guidelines is to remove those trees that are current hazards due to structural defect (includes dead trees) and those that are predicted to die and become hazards in the near future in order to protect forest visitors and improve safety and access. The marking guidelines will retain those trees that are not deemed a current or future potential hazard in order to provide continuous forest cover that maintains high visual quality and enhances ecological and recreational values. This balance would provide healthy forest cover in a natural-appearing setting, which functionally and aesthetically satisfies visitors while providing for safety and access to the area.

Many factors contribute to the rate at which snags may fall. Among these are tree size, species, cause of mortality, occurrence of severe weather events, soils and climate. The Chips Fire combines many of the factors that have been reported to cause higher and faster fall rates of snags.

The cause of mortality has been shown to be a factor in snag fall rates. Sixty-two percent of all acres in the Chips and Antelope Complex fires burned at high severity. Based on 30 years of local experience and observation from district staff of snag fall in the Will (1979) and Elephant (1982) fires, it is noted that fire-killed stands tended to have higher and faster rates of snag fall than the “natural background mortality” snag fall. Russell et al. (2006) shows that ponderosa pine has a

snag fall rate of seven to ten years, while Douglas-fir has a snag fall rate of 12-16 years, of which both species are common in the project area. Coupled with the Chambers and Mast study (2005) that suggests an increase in burned snag fall rate after three to seven years and the need to abate potential hazards is reasonable.

The majority of roadside hazard tree removal (72 percent) would occur within low to moderate fire severity (Table 31). Based on modeling data (Table 32), the predicted high estimate of the number of dead merchantable roadside hazard trees that may be designated for removal in low to moderate severity burned areas would be approximately 19 TPA. Also, most of the trees in the low to moderate fire severity roadside would be under 20” dbh. Therefore, burned snag removal should be minimal relative to the amount of tree cover within these low to moderate fire severity areas. Whereas roads traveling through high severity areas, may have more trees per acre designated for removal due to the large amount of fire-killed and/or fire-injured trees that are within striking distance of the road.

Table 31. Acres of fire severity affected by roadside hazard

Fire Severity				
Low to Moderate Severity		**High Severity-All Logging Systems**		**Total**
Acres	**Percentage**	**Acres**	**Percentage**	**Acres**
1,279	72%	510	28%	1,789

Approximately 29 percent of roadside hazard treatment units are considered moderately high to high fire severity. Due to the higher fire severity, roadside hazard areas that fall within moderately high to high fire severity would remove approximately 85 TPA Table 32) , with most trees being under 20” dbh. Considering that these numbers represent the *potential* amount of trees that are considered dead and meet one criteria for removal and that these trees must have potential target to be designated for removal, the number of trees per acre actually designated for removal would vary greatly depending on the site, vegetation type and fire severity.

Table 32. Dead trees per acre after the Chips Fire (before any treatment actions)

Category	**Diameter Class (Inches)**								**Total**
	1-5.9	**6-9.9**	**10-11.9**	**12-15.9**	**16-19.9**	**20-23.9**	**24-29.9**	**30-99**	
Low to moderate	67	14	4	7	4	1	1	1	101
High-Tractor	175	43	39	14	15	8	5	4	306
High-Skyline	129	55	4	30	14	9	13	8	269

Based upon timber cruise data from a similar roadside hazard tree removal project in similar mixed conifer forest that burned with high severity in the Chips Fire (the Fork and Ohio Roadside Timber Sale), , actual hazard trees removed per acre, were far less than the projected potential (Table 33). Data in Table 33 shows that within high fires severity areas, only 45 trees per acre were actually designated for removal after considering the potential target. Trees within roadside

hazard units that meet mortality guidelines, but do not pose a risk e.g. they will not reach a road or other target will be retained, unless they also lay within a salvage unit. Conifers under 40.0 that meet a Pm of 0.70 may be designated for hazard tree removal. However, conifers 40.0” dbh and greater must meet a Pm of 0.90 or be completely dead if they stand within a PAC. Trees less than 10” dbh will be removed in a separate service contract. Consequently, the stated effects to dead trees may actually be quite lower when marking and Hazard Tree Guidelines are implemented in the field.

Table 33. Dead trees per acre (TPA) actually designated for removal through timber sales from a burned, roadside hazard project

Number of TPA Designated for Removal (Diameter Class in Inches)								Total
1-5.9	6-9.9	10-11.9	12-15.9	16-19.9	20-23.9	24-29.9	30-99	
0	0	10	16	8	3	4	4	45

These effects are substantiated by past similar post-fire roadside hazard tree removal projects that have occurred on the Mt. Hough Ranger District. Roadside hazard tree removal projects on the Mt. Hough Complex fires (1999), Storrie Fire (2000) Stream fire (2001), Antelope Complex Fire (2007), Moonlight Fire (2007) and Rich Fire (2008) were implemented to provide for public safety along forest roads. Some of these similar projects overlapped with additional salvage proposals that were implemented such as the roadside hazard tree removal project that occurred within the Stream fire, while others did not (roadside hazard tree removal projects associated with the Mt. Hough Complex and Storrie fires. In either case, these projects displayed similar limited and dispersed effects that were restricted to the roadside corridors.

Based on past roadside hazard projects on the Mt. Hough Ranger District, the roadside hazard portion of the project directly reduces the short and long-term risk of injury or death to the public, Forest Service employees and contractors and reduces damage to roads or property along traveled routes within the project area. Removal of hazard trees and the subsequent treatment of activity slash effectively meet the desired conditions within the project by mitigating hazards and providing for public safety along roads and facilities. Effective ground cover would be provided to stabilize soils and reduce erosion potential while not exceeding fuel arrangement leading to hazardous fuel conditions.

Alternative A – Cumulative Effects of Roadside Hazard Tree Removal

Cumulative effects for the roadside hazard tree removal portion of this project rely on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect aggregate impacts of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. Current and proposed fire recovery projects on both public and private lands are considered within the analysis area.

These effects are substantiated by past similar post-fire roadside hazard tree removal projects that have occurred on the Mt. Hough Ranger District. Roadside hazard tree removal projects on the

Mt Hough Complex (1999), Storrie fire (2000), Stream fire (2001), Antelope Complex (2007), Moonlight Fire) 2007 and Chips Fire (2012) were proposed and implemented to provide public safety along forest roads. Some of these similar projects overlapped with additional salvage proposals that were implemented such as the roadside hazard tree removal project that occurred within the Stream fire, while others did not (roadside hazard tree removal projects associated with the Mt. Hough Complex and Storrie fire). In either case, these projects displayed similar limited and dispersed effects that were minimal in scale and did not substantially affect forest vegetation on either the stand or landscape level.

Where the roadside hazard portion of this project may overlap with future projects, subsequent projects would be designed to meet snag retention guidelines as specified in the Plumas National Forest LRMP (USDA 1988a) as amended by the Sierra Nevada Framework Plan Amendment (USDA 2004a). This, in addition to the areas that would remain untreated, would allow for burned forest habitat and snag and large down woody debris components to be maintained where there is little safety hazard posed to the public. Snag retention and recruitment of large down woody debris would continue within these areas.

There are no reforestation activities planned for roadside hazard treatment areas. As a consequence, regeneration along treated roads will rely upon natural seed sources. New vegetation will most likely take the form of either conifer or brush species such as *Arctostaphylos sp* or *Ceanothus sp.* The historical rule of thumb is that most conifers can effectively disperse viable seeds and naturally regenerate areas within one and a half to two tree heights from the seed source (McDonald 1983). Given that most roadside hazard treatment areas will extend to approximately 150’ from the edge of the road prism, this should be within the distance of conifer seed sources. In addition, since most roadside treatment will occur in areas with low to moderate fire severity, the need to regenerate conifers may not be an issue.

Wood cutting activities may occur along roadside hazard treatment units, although the area near Forest Service road 27N26 and Red Hill lookout is currently closed to firewood cutting. Wood cutters will most likely remove dead and down material or fall snags that were not removed during implementation. Wood cutters are not allowed to fall dead trees past 100’ of the road, but there are no restrictions on cutting dead and down. Given past experience and history on the Mt. Hough Ranger District, recently burned areas tend to be popular wood cutting sites, but this usually decreases over time as the quality of the wood deteriorates. Consequently, wood cutters would continue to remove dead trees and material along roads, but the effects would be highly dispersed within the project area and limited to approximately 3 years as the quality of the firewood deteriorates over time.

Alternative A – Direct and Indirect Effects of Salvage Timber Harvest

Alternative A proposes to economically recover fire-killed trees through salvage, approximately 3,675 acres. Of those 3,675 fire salvage acres, about 644 acres may also have hazard trees removed as well. These areas are considered salvage with a hazard treatment component. The determination of hazard trees will use the same guidelines as roadside hazard treatment, described earlier. Any conifers under 40.0” dbh may be designated for salvage if it meets a Pm of 0.90. Conifers 40.0” or greater would only be removed if they were completely dead i.e. “red and dead”.

In general, salvage timber harvest treatments involve harvesting using ground-based and skyline harvest systems. These harvest treatments would share similar effects that include the potential for damage to residual trees and incidental removal of snags and live trees. Other salvage related activities include construction of skid trails, landings and temporary roads to facilitate logging operations; and the creation of activity-generated slash.

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, but care would be taken 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 et al. 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 PNF LRMP (USDA 1988a) 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. Discussion of reforestation direct, indirect and cumulative effects will be discussed later in this report.

In addition to retaining four to six of the largest snags within RCAs, snag retention areas of about 10 acres in size would be designated throughout treatment units. In general, snags would be removed during salvage harvesting. Incidental removal of snags may occur for operability and safety; however, guidelines set forth in the Sierra Cascade Province Timber Theft and Detection Plan would be used to ensure that operability, safety and minimum snag densities would be met. The snags to be retained would receive preference in locations where operability and safety are not anticipated to be issues. Snags within falling distances of roads, landings and heavily used public areas would receive preference for removal. For further discussion regarding dead and live

TPA after salvage activities, please see the "Trees Per Acre and Size Class Distribution" section below.

Existing skid trails, landings and temporary roads would be used, when available, to facilitate the harvesting and removal of forest products. Skid trails, landings and temporary roads could be constructed to facilitate the removal of forest products when existing infrastructure does not exist. Approximately 4 miles of temporary road is proposed to be constructed while an estimated 8.5 miles of existing temporary road will be re-used. Any temporary roads constructed would be decommissioned after use. All harvest operations including the use and construction of skid trails, landings and temporary roads would adhere to the standards and guidelines set forth in the timber sale administration handbook (FSH 2409.15 including Region 5 supplements) and the Best Management Practices as delineated in the Water Quality Management for Forest System Lands in California: Best Management Practices (USDA 2011a) and Standard Management Requirements.

Construction of skid trails, landings and temporary roads would require incidental removal of trees beyond those described for silvicultural purposes. This may include incidental removal of live trees for operability. However, the location and size of skid trails, landings and temporary roads and the trees harvested for the construction of such facilities must be approved and agreed upon by the Forest Service. In addition, the PNF LMRP (USDA 1988a) soil quality standards provides direction that landings and permanent skid trails should not encompass more than 15 percent of timber stands. Live tree removal would be permitted by necessity to allow for such facilities and would be avoided whenever practicable. Therefore, the removal of trees for operability would be an incidental component of harvesting activities, of minimal size and scale and highly dispersed and would have negligible effects on forest vegetation, fuel loading and fire behavior.

Consequently, the design features of Alternative A retain many of the biological legacies associated with the post-fire landscape (Franklin and Agee 2003) while balancing with the Purposes and Needs of the Chip-munk Salvage Project. Salvage treatment and delineation in Alternative A incorporated many considerations of Lindenmayer and Noss's (2006) "components of an ecologically defensible salvage policy" including the use of riparian buffers, limiting ground-based logging to slopes less than 35 percent and providing for the recruitment of future snags through the use of a Pm of 0.90.

Fire Severity

As indicated in Table 24, conifer forest types made up approximately 80 percent (59,702.2 acres) of the project area (74,797.1 acres) prior to the Chips Fire. Out of the project area, 19 percent (14,143 acres) of the conifer forest burned at moderately high to high severity (50 percent and greater basal area). The moderately high to high severity burned conifer stands comprised for only 24 percent (14,143 acres) of the total conifer forest affected by the Chips Fire (59,702.2).

Alternative A of the Chip-munk Project proposes to salvage approximately 26 percent (3,675 acres) of conifer forests that burned at moderately high to high severity

CWHR

CWHR vegetation type, size class and density were re-classified to account for the effects of the fire (Table 27). Although many of these stands are now re-typed as non-forest (Table 27), many structure components of these stands prior to the fire may still remain and therefore, relevant to wildlife habitat needs.

Table 34 shows CWHR distribution prior to the Chips Fire in relation to how much Alternative A proposes to treat. Of interest is the proportion of CWHR size class four and five, density M and D proposed for treatment. These types of stands represented mid to later seral, closed canopy forest. Mid to later seral, closed canopy forests are often used by sensitive wildlife species such as Northern goshawk and California spotted owl. Overall, Alternative A proposes to salvage approximately six percent in CWHR size class four or five, M or D density. The vast majority of these larger size classes remain untouched by salvage treatments.

Table 34. Acres of CWHR (pre-fire) proposed for salvage treatment in Alternative A

			Pre-Fire		**Alternative A**	
Forest Type	**CWHR Size**	**CWHR Density**	**Acres**	**Percent of Acres**	**Acres Treated[1]**	**Percent of Acres Treated**
Conifer Forest Types	0, 1	All	285	0%	0	0%
	2	All	345	0%	3	<1%
	3	All	5,153	7%	179	3%
	4	D	5,819	8%	163	3%
		M	14,379	19%	850	6%
		P	7,144	10%	523	7%
		S	1,383	2%	2	<1%
		Total	**28,725**	**38%**	**1538**	**5%**
	5	D	8,554	11%	356	4%
		M	14,051	19%	1385	10%
		P	2,405	3%	177	7%
		S	184	0%	5	3%
		Total	**25,194**	**34%**	**1924**	**8%**
Hardwood Forest Types		**Total**	3,826	5%	3	<1%
Non-Forest Types		**Total**	11,269	15%	29	<1%

1 – Includes all fire severity types in salvage units

Trees Per Acre and Size Class Distribution

The Chips Fire killed vegetation and changed the relative distribution of live and dead trees in terms of their size classes and densities. Alternative A proposes to remove many of the dead trees in the form of a forest product (sawlog). Direct and indirect effects of Alternative A include removing trees that have a Pm of 0.90 or higher of dying.

Table 35 shows the predicted density of dead trees after salvage activities (does not include low to moderate, where salvage activities are not intentionally proposed) and over time. Site

preparation activities include treating dead trees under 12” dbh through a combination of hand fall, lop and scatter, pile and burn or mechanical grapple pile with the goal of reducing future fuels, increasing safety for reforestation efforts and reducing competitive vegetation such as brush. Jackpot burning would occur in skyline units to meet fuels objectives. Please refer to the effects analysis regarding reforestation for additional discussion.

The overall effect of salvage is a general reduction in the amount of all sound (“hard”) snags within the treatment units. Snag retention areas would have dead tree distributions resembling “existing” conditions (Table 35), with a snag density of approximately 269-306 dead TPA. Table 36 also shows how the current snag density within snag retention areas may change over time. Within the first 10 years, the majority, if not all, snags under 12” dbh are predicted to fall. This seems consistent with studies by Chambers and Mast (2005) and Russell et al. (2006) that suggest fire-killed trees have higher rates of fall.

Table 35. Predicted effects of salvage activities on dead tree stand structure

	Diameter Classes (Inches)								
Time Frame	**1-5.9**	**6-9.9**	**10-11.9**	**12-15.9**	**16-19.9**	**20-23.9**	**24-29.9**	**30-99**	**Total**
Hi Severity-Tractor									
Existing	175	43	21	34	15	8	5	4	306
Post-Harvest	175	43	21	5	3	1	1	1	251
Post Site Prep	13	3	2	4	2	1	1	1	27
10	1	0	0	0	1	0	0	1	4
20	<1	0	0	0	0	0	0	1	3
30	0	0	0	1	1	1	0	1	5
Hi Severity-Skyline									
Existing	129	55	4	30	14	9	13	8	269
Post-Harvest	129	55	4	30	5	1	2	5	239
Post Site Prep	9	4	2	29	5	1	2	4	59
10	0	0	0	19	3	0	1	4	30
20	<1	0	0	8	2	0	1	3	16
30	<1	0	0	1	0	0	1	3	6

Table 36. Predicted effects of snag density within snag patches over time

	Diameter Classes (Inches)								
Time Frame	**1-5.9**	**6-9.9**	**10-11.9**	**12-15.9**	**16-19.9**	**20-23.9**	**24-29.9**	**30-99**	**Total**
High Severity-Tractor									
Existing	175	43	21	34	15	8	5	4	306
10	0	0	0	20	10	6	4	3	44
20	<1	0	0	7	5	4	3	3	23
30	0	0	0	1	1	2	2	2	10
High Severity-Skyline									
Existing	129	55	4	30	14	9	13	8	269
10	0	0	0	19	10	6	10	7	55
20	0	0	0	8	5	4	8	6	33

30	0	0	0	1	1	2	6	6	15

Basal Area

Basal area slowly increases over time in the salvage treatment units (Table 37). The contribution in basal area is most likely as a result of reforestation efforts. However, after 30 years, stands are still considered under-stocked. Given the predicted trend, even with reforestation, it will take a several decades before stands reached a density that is considered stocked.

Table 37. Predicted basal area in salvage treatment units over time

Time Frame	Basal Area
High Severity-Tractor	
Existing	18
10	25
20	35
30	47
High Severity-Skyline	
Existing	13
10	17
20	26
30	39

Alternative A – Cumulative Effects Salvage Timber Harvest

CWHR and Fire Severity

The activities proposed in the Chip-munk Salvage Project are not the only activities occurring in the Chips Fire area (Table 38). In addition to the Chip-munk Project, there are five other Chips Fire-related projects affecting an additional 5,238 acres. Some of the objectives of these projects include economic recovery (salvage), hazard tree reduction, site preparation and reforestation.

Table 38. Proposed and ongoing projects within the project area

Project	Acres
Chip-munk Project[1]	5464
Chips Roadside CE	222
Lassen Salvage	547
Lassen Roadside	1589
PGE Power line	415
Salvage-Non System Lands	2465
Total	**10702**

1 – This includes acres from roadside hazard treatment units

As discussed earlier, the Chips Fire, through its extent and fire behavior, had effects to the distribution of forest vegetation across the project area. The pre and post-fire environment are both factors to consider when proposing activities. Table 39 indicates how conifer and hardwood forests and non-forest vegetation types are affected by the other projects proposed within the project area.

Table 39. Affected vegetation types by burn severity by all vegetation treatment projects ongoing and proposed in the project area.

Vegetation Type	Project	Fire Severity		Total
		Low-Mod	Mod-High	
Conifer	Chip-munk Project[1]	2,012	3,378	5,390
	Chips Roadside	98	102	200
	Lassen Salvage	304	236	540
	Lassen Roadside	1,259	120	1,379
	PGE	343	47	390
	Salvage-Non System Lands	1,823	553	2,376
Hardwood	Chip-munk Project[1]	4	5	9
	Chips Roadside	16	3	19
	Lassen Salvage	0	0	0
	Lassen Roadside	0	0	0
	PGE	0	2	2
	Salvage-Non System Lands	44	1	45
Non Forest	Chip-munk Project[1]	16	49	65
	Chips Roadside	2	0	2
	Lassen Salvage	2	5	7
	Lassen Roadside	94	117	211
	PGE	20	3	23
	Salvage-Non System Lands	32	11	43
	Total	**6,069**	**4,632**	**10,701**

1 - This includes acres from roadside hazard treatment units

The vegetation type most affected by all of the activities is conifer forests (Table 39). As mentioned earlier, CWHR size classes and density serve as an effective proxy in determining forest seral stages. For example, CWHR size class 0-2 often represents early seral stages while CWHR 4M, 4D, 5M and 5D typify later seral, closed canopy forests. That being stated, within the conifer stands that burned at moderately high to high fire severity, there is a wide range of stand attributes that should be considered. CWHR stands 4M, 4D, 5M and 5D usually have stand features such as density and size class that take time to develop which higher severity fires can affect. Within the project area, for conifer forest in CWHR size 4 and 5, about 53,918 acres burned overall (Table 41). Of those 53,918 acres, approximately 9,499 acres were at CWHR density M or D and burned at moderately high to high fire severity (Table 40, highlighted).

Table 40. Acres of conifer forest in CWHR size 4 and 5 that burned within the project area

CWHR Size	CWHR Density	Fire Severity		Total
		Low to Moderate	Moderately High to High	
4	D	4,619	1,200	5,819
	M	11,413	2,965	14,378
	P	5,333	1,811	7,144
	S	1,167	2,16	1,383
5	D	6,922	1,632	8,554
	M	10,349	3,702	14,051
	P	1,884	521	2,405
	S	1,19	65	184
Total		**41,806**	**12,112**	**53,918**

Overall, Alternative A, including the other projects proposed within the project area, affect approximately only 34 percent (3,226 acres) of conifer stands, CWHR 4M, 4D, 5M, 5D, that burned at moderately high to high fire severity within the project area (Table 41). Almost two-thirds of the project area (6,373 acres) within CWHR 4M, 4D, 5M, 5D, that burned at moderately high to high fire severity are not proposed for treatment. All the associated post-fire biological legacies (Franklin and Agee 2003) on these untreated acres would be retained and undergo natural recovery.

Table 41. Acres of conifer forest types in CWHR 4M, 4D, 5M, 5D that burned at moderately high to high fire severity affected by all proposed vegetation treatment projects within the project area

Project	4M	4D	4M, 4D Total	5M	5D	5M, 5D Total	Grand Total
Chip-munk Salvage[1]	752	162	913	1,282	307	1,589	2,502
Chips Roadside CE	35	2	37	26	19	45	83
Lassen Salvage	59	18	76	34	55	88	165
Lassen Roadside	36	21	57	2	4	6	63
PGE Power line	16	4	20	2	11	14	34
Salvage-Non System Lands	125	111	236	111	32	143	380
Total	1,023	317	1,341	1,458	427	1,885	3,226

1 - This includes acres from roadside hazard treatment units

Untreated areas within the Chips Fire will undergo “natural” processes including post-fire snag recruitment, down wood recruitment and brush and conifer regeneration. Predicted affects for these areas should mimic predict effects for the no-action alternative (Alternative B).

Alternative A – Direct and Indirect Effects of Reforestation and Site Preparation ActivitiesPrep

Under Alternative A the Forest would site prepareprep and reforest 3,675 acres within the Chip-munk Project. Site preparationprep and reforestation activities will occur within the same footprint as fire salvage activities, but not roadside hazard. Hence, the acres for both salvage and site preparation and prep/reforestation are the same.

Natural regeneration within the analysis area is to be expected (Collins et al. 2010; Shatford et al. 2007); however, it may be highly variable within site specific locations and within different years post fire. Natural regeneration density may vary by seedlings per acre and/or species (Shatford et al. 2007). In addition, field experience from many local silviculturists and culturists that sites closest to the surviving seed source has the greatest capacity for natural regeneration. In particular the desired shade-intolerant species such as pine have diminished capacity for natural regeneration the farther the distance from the "edge" or seed source increases (McDonald 1983). This observation regarding shade tolerant versus shade-intolerant regeneration is echoed in a study in the Storrie Fire by Crotteau et al. (2013). Collins et al. (2011), in their follow-up study that supersedes the 2010 Plumas-Lassen Administration Study, found the percentage of stand-replacement patches without pine regeneration in to be high (72 percent). Crotteau et a.l (2013) noted that white fir regeneration was dominant in high severity fire areas in the Storrie Fire, even in sites conducive to pine. The areas farther from seed sources, especially those large areas that burned at high severity may regenerate, but would take a longer period (potentially decades) and have more variable success in meeting desired stocking standards. A study by Donato et al. (2012) does suggest that post-fire/early-seral vegetation can support complex biodiversity. However, mid to late seral, open canopy forest vegetation is equally important in terms of landscape diversity. In reforestation, managers can better control density, spacing and desired species versus solely relying on natural regeneration. Collins et al. (2011) concluded in their study that plots that were planted after salvage had the highest pine densities. Consequently a strategy reliant solely on natural regeneration does not insure a desired condition (density, species and arrangement) of forest cover within acceptable temporal bounds.

Considering this and the fact that naturally occurring regeneration may also be damaged by salvage harvest operations (Donato et al. 2006) proposed under Alternative A, reforestation would utilize a wide spaced low density cluster planting design. The cluster planting is designed to establish minimum stocking of desired species appropriate for the native ecological forest type at a density high enough to meet desired stocking levels, but low enough to create desired open canopied forested stands that compliment any natural regeneration that may occur.

A study by Donato and others (2009) appears to indicate a robust hardwood and shrub regeneration response after fires. Again, this can be an important habitat component. The cluster arrangement is also designed to be consistent with natural hardwood and shrub regeneration. The wide spacing patterns (approximately 21-36' for 100-300 seedlings/acre) is congruent with variable seedling survival to produce a planting that mimics the heterogeneity and pattern of a naturally occurring open canopied forest as well as allow room for brush and hardwood natural regeneration. Reforested areas should not resemble a high density squared spaced plantation or "tree farm". Desired species appropriate for the native ecological forest type would be planted such as ponderosa pine, Jeffrey pine, Douglas-fir, rust resistant sugar pine and incense cedar. Species mixes would be dependent on elevation, aspect and seed availability.

Site preparation activities such as manual fall and buck of trees under 12" dbh, grapple pile, lop and scatter and grapple pile and burn are proposed to occur one season prior to planting. Jackpot burning would occur in skyline units. The objective of site preparation is to reduce and manage long term fuel profiles, increase safety for reforestation activities and reduce competitive vegetation prior to planting. Managing fuel profiles is especially important as to reduce risk of loss to wildland fire (USDA 2004a) and will help protect the "investment" of reforestation. While manual release to reduce shrub competition would occur around the immediate proximity of the planted seedlings, these stands are expected to have a notable shrub component in the understory and in areas of low survival; however select microsites would likely support larger trees with reduced shrub understory. This projected stand development is on par with similar post-fire salvage and reforestation projects within the analysis area, such as those plantations established after the Elephant fire (1981), the Big Burn fires (1966, 1972) and the Morton Creek fire (1959).

Alternative A does not include treatment of stumps with borax to limit the spread of Annosus Root Disease (Heterobasidion annosum). Annosum has been documented in both pine and fir stands on the Mt. Hough Ranger District and on the neighboring Lassen National Forest to the north of the analysis area (Woodruff and Kliejunas 2005). There is potential for new infection in any harvest area because airborne spores that colonize freshly cut stumps and root to root contact spread the disease. Infection centers would create localized pockets of dead trees.

In areas where stumps were left untreated on the eastside of the Plumas National Forest, infection rates ranged from 12 to 34 percent (Kliejunas 1989) and past studies on the Shasta Trinity and Modoc National Forests have found between 3 and 17 percent of untreated 18 to 22 inch ponderosa pine stumps and between 8 and 35 percent of 22 to 26 inch ponderosa pine stumps" (Woodruff and Kliejunas2005); however, these studies were from "live" timber harvests. Kliejunas and others (2006) found in their study that none of the dead pine stumps were infected by annosum; however, they caution that fire-killed trees determined by off-color, yellow, or brown needles may still contain live wood tissue which may be colonized. Since most of the areas of high severity have completely incinerated crowns and/or completely killed cambiums, the risk of infection may be reduced since stumps of fire salvaged trees may contain higher levels of dead tissue; particularly since trees would be harvested more than a year after the fire.

Woodruff and Kliejunas (2005) suggest that stand-replacing wildfire may reduce or eliminate the occurrence of the disease in affected areas due to the prolonged time the roots of newly established seedlings take to interact with roots of infected stumps. The wide-spaced planting design would limit the spread of the disease by root to root contact from seedling to seedling or seedling to stump. In addition, since strains of annosum root disease are species specific, proposed mix species plantation would further limit the effects of this disease on newly established plantations. In fact, incidental occurrence through the analysis area may contribute to landscape structure and diversity by creating pockets of variable growth and/or survival. Natural

conifer and hardwood regeneration and brush may also take advantage of mortality pockets, increasing stand heterogeneity as well.

Trees Per Acre, Size Class Distribution and Basal Area

Table 42 indicates increasing basal area over time, with planted trees contributing to density. As seedlings grow taller, they enter the sapling size class (1-5.9” dbh). This appears at year 10. As these saplings grow and die, they redistribute the lower diameter ranges. By year thirty, many of these stands would be considered as CWHR 2S or 3S stands. These activities would promote re-establishment of forested conditions within the project area.

Table 42. Predicted live trees and basal area over time

	Diameter Classes (Inches)								
High Severity-Tractor									
Time Frame	**1-5.9**	**6-9.9**	**10-11.9**	**12-15.9**	**16-19.9**	**20-23.9**	**24-29.9**	**30-99**	**Basal Area**
Existing	14	3	2	3	1	1	1	1	18
10	58	6	2	4	2	1	1	1	25
20	72	9	1	6	4	1	1	1	35
30	59	14	4	5	4	3	1	1	47
High Severity-Skyline									
Existing	10	0	2	1	0	1	1	1	13
10	52	1	0	3	0	0	1	1	17
20	56	6	3	1	2	0	1	1	26
30	32	22	4	6	3	0	1	2	39

Cumulative Effects of Site Preparation and Reforestation

Other projects within the project area also propose to site preparation and reforest. In particular, the Lassen National Forest proposes to reforest 3,296 acres (USDA 2013i) and the Mt. Hough has two proposed projects in the planning phase, Dutch (274 acres) and Muggins (152 acres). There are also two additional reforestation projects, Storrie Fire / Chips Fire Reforestation Project (310 acres) and Chips Fire Reforestation Project (61 acres) that will be ready to implement 2013 and 2014, respectively. However, these projects are only reforestation with no site preparation activities planned. Based upon observations of private lands adjacent to the Moonlight Project (2009), areas where fire salvage occured reforested after sawlog material was removed. It is assumed that all 553 acres of conifer forest that burned at moderately high to high fire severity will be replanted. Therefore, the total amount of lands within the project area proposed for reforestation, including the Chip-munk Project, is 7,950 acres or 11 percent of the project area. Post-fire biological legacies (Franklin and Agee 2003) would be retained in untreated portions of the project area

A study by Stephens and Moghaddas (2005) found “…modifying plantation tree density alone will not reduce the probability of mortality if surface fuel loads remain high enough to kill trees

through scorching of live foliage independent of crown fire". The site preparation treatments proposed are designed in acknowledgement of these findings to reduce and manage future surface fuels. Wide spaced cluster planting will promote lower density open canopy plantations in order to reduce susceptibility of reforested areas to potential high severity fires. In addition, this and another study (Thompson et al. 2007) suggest that young post-fire vegetation, whether naturally or artificially regenerated, is at high risk to high severity reburns, particularly in the early stages of forest development. Managers may have few options in these early successional forest types for reducing the risk of high severity.

Trees planted utilizing the wide-spaced cluster arrangement are expected to have a lower likelihood of propagating a high severity crown fire under 90th percentile weather conditions as their live crowns would be well separated. One to two years following planting, a manual release would occur around the clusters to reduce competition with grasses and brush and enhance tree survival and growth. This reduction of fine shrub, grass and associated surface fuels around the planted clusters would break up the continuity of shrub and surface fuels and would contribute to a reduction in flame lengths and rates of spread in the immediate vicinity of planted trees, leading to decreased potential for torching of individual trees. However, spaces between clusters will most likely be left as is, thereby promoting natural brush regeneration.

Reforestation activities would have a positive long-term effect on vegetation types, by promoting re-establishment of conifer CWHR vegetation types (Sierra Mixed Conifer (SMC) Size Class 1) across areas that would otherwise remain as non-forest vegetation types (Montane Chaparral (MCH) much longer otherwise.

Alternative B – Direct and Indirect

Under Alternative B, none of the proposed activities in Alternative A would take place. However, this does not imply that the current condition will remain static. In fact, no-action simply implies that natural processes will be allowed to occur, whether they are desirable or not.

Existing stand conditions would persist and develop unaltered by active management. Standing snags would persist and the site would be rapidly colonized by grasses, forbs and shrubs within three to five years. It is a reasonable expectation that the site would develop comparable to that of similar local fires that burned in the recent past in areas where salvage did not occur including the Storrie fire (2000), Stream fire (2001), Antelope Complex (2007), Moonlight Fire (2007) and Rich Fire (2008). On these sites, grasses such as cheat grass and shrubs such as *Ceanothus* (*C. cordulatus*, *C. velutinus*) and Manzanita (*Arctostaphylos patula*) species have occupied the site while standing snags dominate the overstory of the high severity burn areas. Shrub fuels would be established within 10 years.

CWHR

Under Alternative B, the current CWHR distribution after the Chips Fire (Figure 9, Table 25, Table 26, and Table 27) would most likely persist for years. Without management activities, such as those proposed in Alternative A, development of non-forest CWHR types back into conifer forest types will take several decades. While natural conifer regeneration after a fire without planting been documented, the size and density can be variable (Shatford et al. 2007), not to mention spacing and species composition. Kozlowski (2002) found that in general, "Natural regeneration of disturbed mature forests to a predisturbance condition often is slow, unpredictable and fraught with difficulties". It is most likely that conifer stands that experienced 75 percent or higher basal area mortality will remain classified as non-forest (CWHR MCP, Table 21) for quite some time.

Fire Severity

Under Alternative B, no harvest activities would occur. Therefore, there would not be treatment of areas that burned at moderately high to high fire severity. As indicated in Table 24, conifer forest types made up approximately 79.8 percent (59,702.2 acres) of the project area (74,797.1 acres). Out of the project area, 18.9 percent (14,143 acres) of the conifer forest burned at moderately high to high severity (50 percent and greater basal area mortality). Ecological and vegetative succession in these areas would occur naturally over time.

Trees Per Acre, Size Class Distribution and Basal Area

There would be no post-fire management activities proposed under Alternative B. As stated earlier, ecological and vegetative succession will occur naturally over time. Figure 10 shows the predicted live TPA and basal area changes over time under Alternative B. As expected, the distribution throughout all the diameter ranges, as well as basal area, in areas of moderately high to high fire severity is predicted to remain low for many decades. Without any tree planting (Alternative A), conifer regeneration will be variable and unpredictable.

The Storrie Fire (2000) serves as the best example of direct and indirect effects as it is where the Chips Fire originally started from. Approximately 25,315 acres of the Storrie Fire burned within the Chips Fire. Unsalvaged areas within the Storrie Fire were characterized by standing snags and dominated by *Ceanothus* brush species. South and west aspects tend to have less shrub cover (estimated 30-50 percent) in an intermix mosaic with areas heavier to grass and forb cover, while north and east aspects are more heavily dominated by brush (estimated 50 percent cover with some sites up to 70 percent cover). Although there was natural conifer regeneration, it was observed to be variable in density, spacing and species composition. Both grass-forb cover and shrub cover presents formidable competition for water and light with naturally established seedlings. This competing vegetation would likely result in decreased survival of tree seedlings and would definitely inhibit growth for years if not decades. Consequently, the site would likely be occupied by brush with an intermix of grass and forbs. In addition, all of the natural

regeneration in the Storrie Fire was killed by the Chips Fire (Figure 10). Essentially, a decade's worth of growth was effectively eliminated.

Figure 10. **Natural regeneration in Storrie Fire before Chips, November 1, 2011 (bottom) and subsequent mortality with the same site after the Chips Fire, August 1, 2012 (top)**

Table 43. Predicted live TPA and basal area over time in Alternative B

Time Frame	Diameter Classes (Inches)								Basal Area
	1-5.9	6-9.9	10-11.9	12-15.9	16-19.9	20-23.9	24-29.9	30-99	
Low to Moderate									
Existing	89	31	15	28	19	11	9	7	206
10	74	28	13	27	19	13	10	9	226
20	59	27	11	24	18	13	12	10	241
30	43	25	11	21	16	13	13	12	253
Moderately High to High Fire Severity -Tractor Ground*									
Existing	14	3	2	3	1	1	1	1	18
10	23	5	2	3	2	1	1	1	24
20	16	7	2	4	3	1	1	1	31
30	14	6	4	5	4	3	1	1	39
Moderately High to High Fire Severity Skyline Ground*									
Existing	10	0	2	1	0	1	1	1	13
10	9	0	2	1	0	1	1	1	13
20	0	6	1	2	1	0	1	1	21
30	0	0	2	8	2	0	1	2	27

*Tractor and skyline ground refer to areas that would have been treated as such in Alternative A.

Although there are many existing dead trees/snags in the project area, many are expected to be down within the first ten years after the fire within higher severity burned areas (Table 44). Russell et al. (2006) show that ponderosa pine has a snag fall rate of seven to ten years, while Douglas-fir has a snag fall rate of 12-16 years, of which both species are common in the project area. Dahms (1949) also found that within a decade, a little more than half of standing, fire-killed ponderosa pine had fallen. Coupled with the Chambers and Mast study (2005), this suggests an increase in burned snag fall rate after three to seven years and the predicted falling of standing dead trees in moderately high to high fire severity areas is cause for safety concerns. .

Another direct and indirect effect of Alternative B is that existing conditions along all traveled roadways within the Chips Fire perimeter would persist and are predicted to alter roadways and create an unsafe environment for forest users, contractors and Forest Service employees. Alternative B poses a serious threat to all persons using the forest in any capacity.

In addition, as dead trees come down, they become down woody debris and potential surface fuels. Dead TPA in the low to moderate fire severity areas have a decrease in the first ten years, but see an increase in the recruitment of dead trees 20-30 years out (Table 44). This is most likely from delayed mortality of currently living trees. Most of the recruitment of dead trees in the low to moderate severity areas comes from the lower diameter limits.

Table 44. Predicted dead TPA over time in Alternative B

Time Frame	Diameter Classes (Inches)								Total
	1-5.9	6-9.9	10-11.9	12-15.9	16-19.9	20-23.9	24-29.9	30-99	
Low to Moderate Fire Severity									
Existing	67	14	4	7	4	1	1	1	99
10	7	3	1	6	4	1	1	1	24
20	13	5	2	6	4	2	1	1	34
30	13	6	3	5	4	2	1	1	35
Moderately High to High Fire Severity-Tractor*									
Existing	175	43	21	34	15	8	5	4	306
10	0	0	0	20	10	6	4	3	44
20	1	0	0	7	5	4	3	3	23
30	0	0	0	1	1	2	2	2	10
Moderately High to High Fire Severity -Skyline*									
Existing	129	55	4	30	14	9	13	8	269
10	0	0	0	19	10	6	10	7	55
20	0	0	0	8	5	4	8	6	33
30	0	0	0	1	1	2	6	6	15

*Tractor and skyline ground refer to areas that would have been treated as such in Alternative A.

Cumulative Effects of Alternative B

Under the no action alternative, the harvesting of fire-killed and fire-injured trees would be limited to the roadside hazard projects currently planned under the Chips Fire Roadside CE. The maximum extent of these activities would be limited to less than 250 acres (Table 38). This would provide for safe travel along main travel routes within a small portion of the project area; however, due to the scale and scope of the project, many road segments of untreated burned areas would exist. Over time, these snags would fall resulting in a hazard to infrastructure and people. The opportunity to treat these roads in a timely, efficient and cost effective manner would be lost under Alternative B.

Under Alternative B, no economic recovery would occur through fire salvage. Cumulatively, under other projects proposed in the project area, approximately four percent of NFS lands (2,773 acres out of 67,577 NFS acres) would be subject to timber harvesting under other completed, current or proposed projects. Timber harvesting to recover economic value of fire-killed trees would not occur on 96 percent of public lands in the analysis area. Areas proposed for treatment under Alternative A would remain untreated and would assume a passive management strategy (no action). Although Alternative A leaves large areas of these fires largely untreated, Alternative B (the no-action alternative) proposes to leave the largest proportion of the landscape untreated.

Alternative B would not propose any reforestation. Cumulatively, the other projects within the project area would reforest five percent of NFS lands within the analysis area. It is expected that all private conifer forest lands that burned at moderately high to high fire severity (553 acres, Table 39) and that was harvested due to the Chips Fire would be reforested.

Under Alternative B accessibility would limit future forest management activities (including cultural treatments to enhance survival and growth of natural regeneration) due to the high cost and safety concerns. Without cultural treatments, survival and growth of natural regeneration that does become established would likely be reduced due to competing vegetation. These sites would be dominated by brush very similar to those effects seen on public lands in the Storrie Fire (2000). This could effectively function as a vegetation type change from forest cover to brush cover for nearly a century based on observations from areas left to naturally regenerate in the Bucks Summit fire of 1926. Over eighty years later, these areas support natural establishment of white fir; however, the area is dominated by brush species and the tree cover is not sufficient to qualify as forest cover.

Much of the areas that burned under high severity will likely become dominated by brush species. Where natural regeneration does not occur in amounts to re-establish forested conditions, the areas would experience a vegetation type change to brush fields that may persist for decades and potentially more than a century. The cumulative effect of failing to re-establish forested conditions could resonate the longest by delaying the development of mature forest conditions which would otherwise provide multiple benefits such as wildlife habitat and future economic opportunities through forest management.

As Collins et al. (2011) concluded in their study of some local fires that tree regeneration densities varied considerably, pine regeneration could be low and areas that were planted after salvage had the highest pine densities. Consequently a strategy reliant solely on natural regeneration most likely would not establish desired levels of stocking or desired species within desirable temporal bounds. As evidenced by the Chips Fire within the Storrie Fire footprint, without site preparation activities to reduce some of this brush and hardwood regeneration, conifer regeneration is at high risk of loss to fires. Please see the previous section under Alternative A – Direct and Indirect Effects of Reforestation and Site Preparation ActivitiesPrepfor more details.

As observed during the Chips Fire, the point of origin started well within the Storrie Fire. The Storrie Fire (2000) provides a very local, recent and relevant example of passive management within a dry pine dominated Sierra Nevada forest with a historically low severity fire regime which burned with uncharacteristically high severity. In 2008, several lightning fires re-burned thousands of acres within the foot print of the Storrie fire sustained by dead and down fuels, snags and brush. This resulted in killing any established natural regeneration as well as trees which had previously survived the Storrie fire. This further compounds the effects of a landscape already deficit in natural regeneration and capacity of live trees available to regenerate the site. In addition, the passive management strategy, effectively in place since 2000, limited fire management suppression and/or containment strategy in 2008. Since brush, standing snags and downed logs dominated the site, the capacity to get fire personnel into the area and engage the fire was limited due to safety concerns; particularly falling snags. Again, a fire started in the

Storrie footprint in 2012. Despite the area having been burned, brush regeneration along with down woody debris from falling snags, led to the Chips Fire burning beyond the Storrie Fire footprint into "green" forest (Dupras, personal communication, 2013). What was different about the Chips Fire, compared to many others in the Sierra Nevada mountain range, is that it burned intensely in an area that had been burned only twelve years ago. In addition, just like in 2008, still standing snags posed serious safety threats to firefighting personnel and resources (Dupras, personal communication, 2013), limiting their safe use on the ground. It is quite plausible that under Alternative B, unsalvaged areas could lead to future surface fuel loading, resulting in "another" Chips Fire scenario. So although natural regeneration will occur under Alternative B, it can be highly variable in regards to species composition, arrangement and density. Natural regeneration may also become susceptible to reburn, resulting in a delay of forest development into later seral forest habitat. As a result, relying upon natural regeneration may not meet desired conditions within an acceptable temporal bound.

Over time, the no action alternative would lead to higher fuel loads from the branches and boles of dead and down trees. Over the long term (more than ten years), not implementing treatments would result in increased surface fuels as standing dead trees fall to the ground (Table 44). However, the majority of fire-killed snags could fall before a decade (Ritchie et al. 2013). Increased surface fuels would result in increased flame lengths leading to increased mortality of residual live trees and naturally regenerated conifers. Ritchie et al. (2013) also came to this conclusion when they found non salvaged areas in their study had approximately four times the ground areas cover by heavy 1,000 hour fuels as compared to "natural" background areas due to snag fall. It is expected that some fires, both human and lighting caused would continue to escape initial attack in more severe weather conditions over the next 20-30 years. Just like in the Storrie footprint of the Chips Fire, these fires are expected to kill natural regeneration and residual larger trees. Overall, the no action alternative would not reduce potential future surface fuels or predicted fire severity. For further discussion regarding future potential fire behavior, please see the "Fuels" discussion of the Chips EA.

A study by Bekker and Taylor (2001) does indicate that historically, higher fire severity area could comprise a substantial proportion of fire effects prior to fire suppression and logging in the nearby area (Thousand Lakes Wilderness, southern Cascades). However, the study area may not represent the project area due to its "smooth" and "undifferentiated topography" which may lead to a large extent of high fire severity (Bekker and Taylor 2010) and the observed fire behavior may just reflect "chance events" (Bekker and Taylor 2001). In addition, most of the project area resides within the Sierra Nevada as opposed to the Cascades. What should appear to be more common in stands such as those found in the project area is surface fire. In a study, Minnich et al. (2000) found that the unmanaged fire regimes in the Sierra San Pedro Martir in Baja California, Mexico served as a proxy for historical fire regimes for California mixed conifer forests. The study found that "…relatively high intense surface fires that denude surface litter, shrubs,

saplings and pole-size stems, forming open forest of mature trees…" were the norm (Minnich et al. 2000). Localized overstory mortality appeared to average approximately 40 acres, with stand replacement burns (less than ten percent surviving forest cover) less frequent (Minnich et al. 2000). The observations by Minnich et al. (2000) were also echoed by Collins and Stephens' (2010) study of the Illilouette Creek basin (Yosemite National Park). Collins and Stephens (2010) found that while stand-replacing patches did make up 15 percent of the total burned area between the two studied fires, it consisted of many small patches (<4 hectares, 10 acres) with few large patches (>60 hectares, 149 acres). The large stand-replacing patches ranged from approximately 149 acres to 222 acres. The Chips Fire certainly had many patches in the order of several hundred acres to approximately 1,000 acres or more. This indicates that although the burn severity was very heterogeneous overall, there were certainly areas where fire burned uncharacteristically at higher severity.

Comparison of Alternatives

Roadside

Under Alternative A, 1,788 acres of roadside hazard tree is proposed to be treated. In addition, there are an additional 844 acres of salvage that will have a hazard tree component as well. Therefore, the total amount of acres where the risk of falling trees is mitigated is 2,632 acres.

Under Alternative B, there would be no (0) acres treated for roadside hazards. There would be no reduction of hazards at all.

Salvage

Under Alternative A, 3,675 acres are proposed for salvage treatment. These areas are intended to promote economic recovery through salvage harvest of fire-killed trees. Alternative B does not propose any salvage tree removal. There will be no economic recovery with Alternative B.

CWHR

Alternative A would salvage mostly in the burned conifer forest types (Table 45), thereby altering that vegetation type through the removal of fire-killed trees. Site preparation and reforestation would occur after these areas as salvaged, therefore returning it to conifer stand. Alternative B does not propose any salvage or reforestation. Please see the "Site Preparation and Reforestation" comparison below for further discussion.

Table 45. Comparison of alternatives: percent of CWHR affected

Forest Type	CWHR Size	CWHR Density	Pre-Fire		Alternative A		Alternative B	
			Acres	Percent of Acres	Acres Treated	Percent of Acres Treated	Acres Treated	Percent of Acres Treated
Conifer Forest Types	0, 1	All	285	0%	0	0%	0	0%
	2	All	345	0%	3	<1%	0	0%
	3	All	5,153	7%	179	3%	0	0%

	4	D	5,819	8%	163	3%	0	0%
		M	14,379	19%	850	6%	0	0%
		P	7,144	10%	523	7%	0	0%
		S	1,383	2%	2	<1%	0	0%
		Total	28,725	38%	1538	5%	0	0%
	5	D	8,554	11%	356	4%	0	0%
		M	14,051	19%	1385	10%	0	0%
		P	2,405	3%	177	7%	0	0%
		S	184	0%	5	3%	0	0%
		Total	25,194	34%	1924	8%	0	0%
Hardwood Forest Types		**Total**	3,826	5%	3	<1%	0	0
Non-Forest Types		**Total**	11,269	15%	29	<1%	0	0

Trees Per Acre

Alternative A would reduce the amount of dead trees due to removal through salvage activities. Alternative B would lose dead trees through natural snag fall. As a consequence, on areas proposed to be treated, Alternative A would leave fewer snags per acres (Table 46).

Table 46. Comparison of alternatives: predicted dead TPA in moderately high to high fire severity areas over time

Logging System	Time Frame	Diameter Classes (Inches)									
		Alternative A					Alternative B				
		1-11.9	12-15.9	16-19.9	20-29.9	30-99	1-11.9	12-15.9	16-19.9	20-29.9	30-99
Tractor	**Existing**	239	34	15	13	4	239	34	15	13	4
	10	1	0	1	0	1	0	20	10	10	3
	20	<1	0	0	0	1	1	7	5	7	3
	30	0	1	1	1	1	0	1	1	4	2
Skyline	**Existing**	188	30	14	22	8	188	30	14	22	8
	10	0	19	3	1	4	0	19	10	16	7
	20	<1	8	2	1	3	0	8	5	12	6
	30	<1	1	0	1	3	0	1	1	8	6

Site Preparation and Reforestation

After the areas proposed for salvage under Alternative A occur, site preparation then reforestation would happen in the same footprint. As a result, the acres of salvage and site preparation and reforestation are the same, 3,675 acres. Alternative B does not propose any site preparation or reforestation.

Over time, reforestation of salvaged units would help these areas return to a conifer condition. Since Alternative B proposes no site preparation or reforestation, regeneration will be variable. Table 47 and Table 48predict that basal and regeneration will be higher in Alternative A. In addition, without site preparation, any natural regeneration in Alternative B, such as the young conifers that burned in the Storrie Fire, remains at high risk of loss to fire as opposed to Alternative A, where site preparation activities aim to reduce fuels.

Table 47. Comparison of alternatives: predicted live TPA in moderately high to high fire severity areas over time

Logging System	Time Frame	Diameter Classes (Inches)									
		Alternative A					Alternative B				
		1-11.9	12-15.9	16-19.9	20-29.9	30-99	1-11.9	12-15.9	16-19.9	20-29.9	30-99
Tractor	Existing	19	3	1	2	1	19	3	1	2	1
	10	66	4	2	2	1	30	3	2	2	1
	20	82	6	4	2	1	25	4	3	2	1
	30	77	5	4	4	1	24	5	4	4	1
Skyline	Existing	12	1	0	2	1	12	1	0	2	1
	10	53	3	0	1	1	11	1	0	2	1
	20	65	1	2	1	1	7	2	1	1	1
	30	58	6	3	1	2	2	8	2	1	2

Table 48. Comparison of alternatives: predicted basal area in moderately high to high fire severity areas over time

Logging System	Time Frame	Basal Area	
		Alternative A	Alternative B
Tractor	Existing	18	18
	10	25	24
	20	35	31
	30	47	39
Skyline	Existing	13	13
	10	17	13
	20	26	21
	30	39	27

Compliance with the Forest Plan and Other Direction

1988 Plumas National Forest Land and Resource Management Plan and 2004 Sierra Nevada Forest Plan Amendment

The Chip-munk Project is designed to fulfill the management direction specified in the (PNF LRMP) (USDA 1988a), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) FSEIS and ROD (USDA 2004a, b). Fuel and vegetation management activities are designed to comply with the standards and guidelines as described in the SNFPA FSEIS and ROD(USDA 2004a, b). Site preparation and reforestation activities through their design and objective would also establish and maintain a pattern of area treatments that is effective in:

- Modifying fire behavior through site preparation activities which will manage current and future fuel profiles.
- Culturing stand structure and composition to generally resemble pre-settlement conditions by incorporating the appropriate species mix in a wide-cluster planting pattern.
- Reducing susceptibility to insect/pathogen drought-related tree mortality through lower density planting.

National Forest Management Act

The Chip-munk Project also meets the National Forest Management Act (NFMA) of 1976, including its amendments to the Forest and Rangeland Renewable Resources Planning Act of 1974 which state that it is the policy of the Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans. Both acts also state "insure that timber will be harvested from national Forest System land only where – (ii) there is assurance that such lands can be adequately restocked within five years of harvest."

Fire, Fuels, and Air Quality

Introduction

In August 2012, the Chips Fire burned approximately 76,000 acres on the Mt. Hough Ranger District of the Plumas National Forest and Almanor Ranger District of the Lassen National Forest. Portions of the Clear Creek, Mosquito Creek, and Lower Yellow Creek watersheds experienced the highest vegetative burn severity resulting in large areas of standing dead trees.

Affected Environment

Prior to the Chips Fire, the landscape in the project area consisted primarily of pine-dominated Sierra mixed conifer forest, montane hardwood forest, and montane chaparral. The western third of the fire area was previously burned in the Storrie Fire of 2000, a large portion of which burned at high severity. The project area ranges from 2,400 feet in elevation along the North Fork Feather River to 6,348 feet at Red Hill.

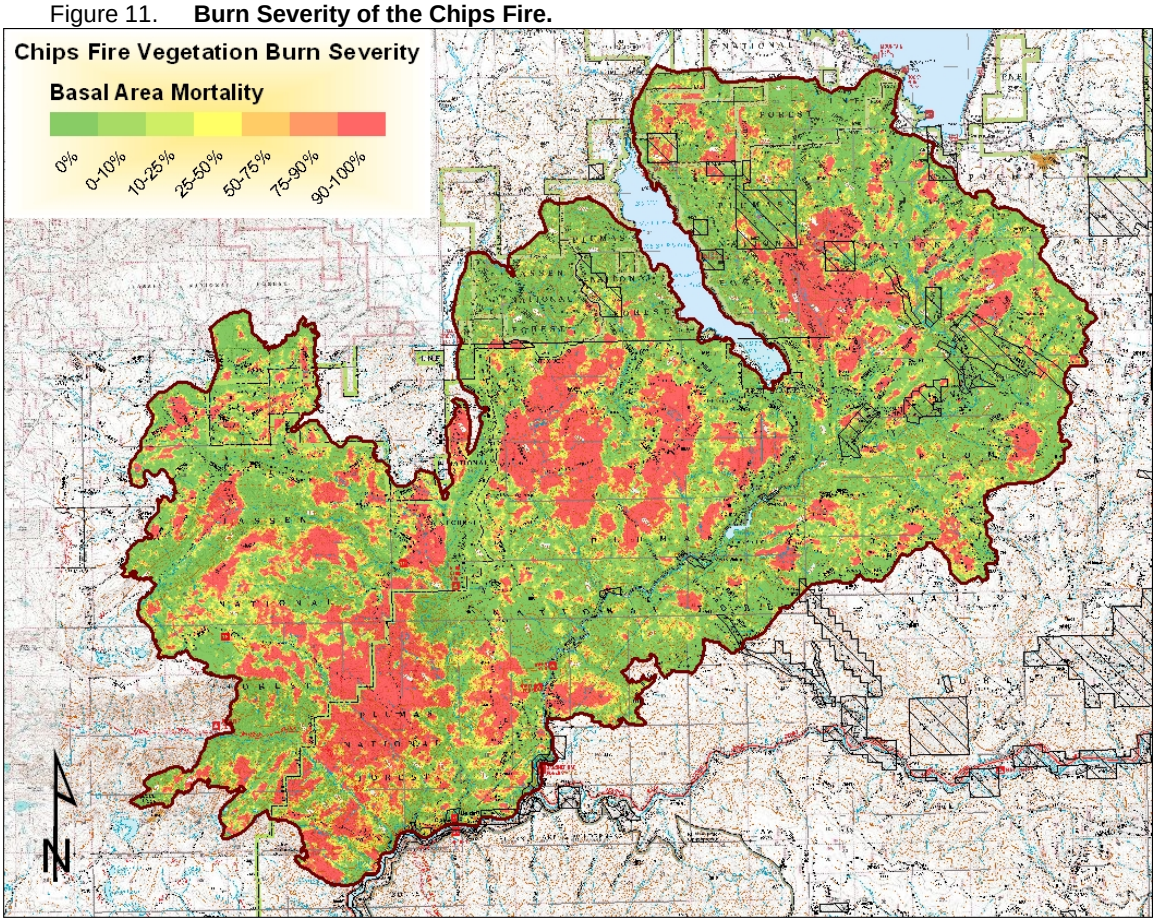
Pre-fire Conditions

As with many areas in the Sierra Nevada, the landscape has been heavily influenced over the last 150 years by past management activities that include mining, grazing, logging, fire suppression, and drought related mortality. At the stand level, the combination of these activities had created relatively homogeneous areas typified by small trees existing at high densities. These high stand densities and high fuel loads are the result of density-dependent and drought-related mortality which created overstocked stands with high accumulations of ladder fuels and canopy fuels. These conditions have contributed to a growing trend in the region for fires that burn with larger areas resulting in high severity effects to forest vegetation (Miller et al. 2009a; Safford 2007). Approximately 25,000 acres, the western third of the fire area, were previously burned in the 2000 Storrie Fire. Much of this area consisted of formerly dense conifer forest that burned at high severity during the Storrie Fire resulting in extensive areas with high snag density and exceptionally high fuel loading in the larger fuel size classes.

Post-fire Conditions

Post-fire conditions were assessed through remote sensing, and field observations. Stand exams exist for portions of the project area that overlapped with planned Belden Project units. The vegetation burn severity of the fire was mapped utilizing Landsat TM satellite imagery and RdNBR classification (Miller and Thode 2007; Safford et al. 2008; Miller et al. 2009b). Areas which burned with low severity typically consumed 50 to 90 percent of existing surface fuels with the majority of trees killed in the less than 10 inch DBH size class; the majority of trees greater than 20 inch DBH have signs of needle scorch, but are still alive. Within the areas burned with moderate severity, pockets, several acres in size are completely killed. Within the high severity class, up to 100 percent of all trees are dead, with most not having any foliage. Due to high consumption of existing surface fuels and a lack of scorched needle foliage, surface fuels and associated ground cover in high severity burn areas is low to non-existent.

Figure 11. **Burn Severity of the Chips Fire.**



As shown in Figure 11, the areas of highest fire severity generally occurred on the south facing slopes of the tributary drainages of the North Fork Feather River Canyon. On the north facing slopes, fire severity was a mix of low and moderate severity with some smaller patches of high burn severity. Extensive areas within the 2000 Storrie Fire area re-burned with high intensity due to the heavy accumulation of dead and down fuels associated with past fire mortality. This

portion of the fire area is not included in the Chip-munk project area. Table 49 quantifies the fire severity that occurred within the analysis area.

Table 49. Fire Severity within the Chip-munk Analysis Area

	Fire Severity (BA Mortality)					Total
	0%	< 25%	25 - 50%	50 - 75%	> 75%	
Analysis Area	23,641	12,288	3,121	2,481	10,398	51,930
Storrie Fire Overlap	8,900	4,810	1,907	1,875	7,822	25,315
Total Chips Fire	32,103	17,198	5,053	4,368	18,149	76,861
Percentage	42	22	6	6	24	100

Air Quality Current Conditions

The Chip-munk Fire Recovery Project area is located in Plumas County, California. Nearby towns, communities, and highways are shown in Table 50. The entire project area is contained in the Northern Sierra Air Quality Management District (NSAQMD) within the Mountain Counties Air Basin. The air quality attainment status for ozone, carbon monoxide, sulfur dioxide, and other compounds is listed in Table 51 below. The attainment status was derived directly from the NSAQMD "Annual Air Monitoring Report" (NSAQMD 2005).

Table 50. Towns, communities, National Parks, and highways in the vicinity of the Chip-munk Fire Recovery Project

Town or Feature	Distance and Direction from Project Boundary
Belden, Canyon Dam, and Highway 70	Within project area
Prattville and Almanor	2 miles north
Rich Bar, Rich Gulch, Virgilia and Twain	1 – 3 miles south
Bucks Lake and Meadow Valley	8 miles south
Quincy	10 miles southeast
Indian Valley including the communities of Greenville, Crescent Mills, and Taylorsville	4 – 7 miles east
Chester and Westwood	8 miles north
Lassen National Park	10 miles north
Jonesville	10 miles northwest
Butte Meadows	15 miles west
Concow, Magalia, and Paradise	>20 miles southwest

Table 52. Attainment designations for Plumas County

Compound	National Attainment Status	State Attainment Status
Ozone (1 hour)	Attainment	Unclassified
Ozone (8 hour)	Attainment	Not applicable
Carbon monoxide	Attainment	Attainment
Nitrogen dioxide	Attainment	Attainment
Sulfur dioxide	Attainment	Attainment
PM_{10}	Unclassified	Nonattainment
$PM_{2.5}$	Unclassified	Nonattainment – only the Portola Valley is in nonattainment for the state $PM_{2.5}$ annual standard

Source: NSAQMD (2004)

Currently, Plumas County is in nonattainment status for particulate matter $(PM)_{10}$ (county wide) and $PM_{2.5}$ (Portola Valley only). According to the NSAQMD 2005 report, the major contributors to both PM_{10} and $PM_{2.5}$ levels include forestry management burns, woodstoves, residential open burning, vehicle traffic, and windblown dust. These problems can be relieved or made worse by local meteorology, winds, and temperature inversions. In addition, large areas in and adjacent to local communities can be heavily impacted by smoke for extensive summer periods (several weeks) due to wildfire as evidenced by the 2008 wildfire season in northern California as well as other past fires (USDA 2003). The community of Quincy is subject to strong inversions and stagnant conditions in the wintertime. Those conditions, coupled with intensive residential wood burning, can result in very high episodic $PM_{2.5}$ levels (NSAQMD 2005). Levels of PM_{10} have been greatly decreased due to a reduction of non-EPA (Environmental Protection Agency) approved woodstoves in existing residences. The NSAQMD (2005) report noted four key points relating to current air quality within the NSAQMD:

1. The NSAQMD's state and federal nonattainment status for ozone is due to overwhelming air pollution transport from upwind urban areas, such as the Sacramento and Bay areas.
2. Improvements in air quality, with respect to ozone, will depend largely on the success of air quality programs in upwind areas.
3. Anticipated growth in local population will add to locally generated pollution levels. Therefore, local mitigations are needed to prevent further long-term air quality degradations. Otherwise, the local contribution may increase to the point where the transport excuse will become less viable, and more emphasis will then be placed on mandated local controls.
4. State and federal land managers anticipate a marked increase in prescribed burning within the next 5 years. This may have a tremendous impact on local PM_{10} and $PM_{2.5}$ levels, unless appropriate mitigations are employed.

Current sources of particulate matter from the burned area include smoke from wildfires, smoke from underburning and pile burning, emissions and dust from standard and off-highway vehicles, dust and emissions from harvest activities occurring on private lands, smoke from campfires, and wind-generated dust from exposed soil surfaces. The amount and duration of these emissions vary by season, with most emissions from wildfires, timber harvest, and recreational activities occurring between May and late August, and emissions from prescribed burning occurring from late September through mid-November.

Analysis Framework

Guiding Regulations

The Chip-munk Fire Recovery Project is designed to fulfill the management direction specified in the Plumas National Forest Land and Resource Management Plan (PNF LRMP) (USDA 1988a), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) FSEIS and ROD (USDA 2004a,b). Fuel and vegetation management activities are designed to comply with the standards and guidelines as described in the SNFPA FSEIS and ROD (USDA 2004a,b).

Plumas National Forest Land Management Plan as amended by the Sierra Nevada Forest Plan Amendment FSEIS and ROD (2004)

The 2004 SNFPA provides management standards and guidelines for salvage in appendix A, part D of the Record of Decision (USDA 2004b). Appendix A, Part D directs the forests to "determine the need for ecosystem restoration projects following large, catastrophic disturbance events" (including wildfire) and that "salvage harvest of dead and dying trees may be conducted to recover the economic value of this material and to support objectives for reducing hazardous fuels, improving forest health, re-introducing fire, and/or re-establishing forested conditions."

Methodology

Geographic Area Evaluated for Impacts

The Chip-munk Fire Recovery Project treatment units are defined as the units where timber salvage harvest, reforestation, and roadside hazard tree removal would occur as described by alternative under the Environmental Assessment. The analysis area used to analyze the direct, indirect, and cumulative effects on fuels and fire is defined as the 76,340 acre area which includes the area burned by the Chips Fire outside of the Storrie Fire footprint, as well as the unburned network of fuel treatments surrounding the fire that were effective in stopping its spread. This analysis area is based on 1) the area burned in a distinct geographic area, 2) impacts to fuels from the wildfire and subsequent effects of vegetation treatments are limited to the analysis area, 3) the area includes fuels complexes occurring within the treatment areas as well as those outside the treatment areas, and represents the furthest measurable extent that effects on fuels and subsequent fires would occur as a result of implementing any of the proposed alternatives, and 4) the area

includes existing fuel treatments that proved effective in limiting the effects and spread of the Chips, Bar, and Rich fires. The analysis area allows for a congruent analysis of fuels and fire at the stand and landscape levels.

The direct, indirect, and cumulative effects analyses are based on a temporal scale. Documented past projects, including timber harvesting, wildfires, watershed improvements, and other activities described in Appendix B were considered past actions within the analysis area. In a broader sense, current vegetation structure and composition reflects the historical management regimes up to the present. This vegetation structure and composition includes attributes of the current landscape including existing vegetation types, fuel treatments, burned areas, past harvest, and plantations.

For the purpose of the fuels and fire analysis, the temporal bounds consider a 30-year horizon for future effects because modeling indicates that, within 30 years, the treated stands would approach fuels and fire conditions similar to untreated stands. These modeling results are commensurate with observations from similar aged fuel treatments elsewhere on the Plumas National Forest.

The air quality analysis considers potential impacts to communities within 20 miles of the project area as these are the communities that would be most impacted by any activities within the alternatives. The temporal bounds of the air quality analysis are limited to the implementation phase of the project as direct, indirect, and cumulative effects would be limited to the timeframe in which proposed activities would occur.

Measurement Indicators

The effects of treatment on fuels, potential fire behavior, and air quality are evaluated using the following measurement indicators for each alternative.

Surface fuel load (tons per acre): The predicted surface fuel loads, as computed by the Forest Vegetation Simulator (FVS) and Fire and Fuels Extension (FFE) are reported under the direct and indirect effects for each alternative. The fuel loads are reported in tons per acre for the following fuel diameter classes: 0-3 inches, 3-6 inches, 6-12 inches, and greater than 12 inches.

Predicted flame length (feet): The predicted (FVS-FFE) length of flame measured in feet. Increased flame lengths can increase fire intensity and the likelihood of torching events and crown fires. Flame length is influenced in part by fuel type, fuel arrangement, fuel moisture, and weather conditions. Fuel type and fire intensity, also, influence production rates, or how fast firelines can be constructed by different suppression resources, including hand crews and mechanical equipment. Flame lengths over 4 feet may present serious control problems—they are too dangerous to be directly contained by hand crews (Schlobohm and Brain 2002; Andrews and Rothermel 1982). Flame lengths over 8 feet are generally not controllable by ground-based equipment or aerial retardant and present serious control problems including torching, crowning, and spotting.

Predicted Particulate Matter (PM)$_{10}$ (tons) and PM$_{2.5}$: Predicted amounts of particulate matter emitted from project is measured by PM_{10} and $PM_{2.5}$ as forest management activities such as pile burning and underburning contribute to these levels.

Analysis Methods

Field inventories were conducted to measure attributes of existing vegetation in the proposed Belden project area, which overlaps approximately 70 percent of the Chip-munk project area. Roughly 50 percent of treatment units within the project area were inventoried pre-burn using the Common Stand Exam protocols for the Pacific Southwest Region (U.S. Department of Agriculture [USDA] Forest Service Region 5). These treatment units are representative of the project area and the areas to be treated in all action alternatives. Data were collected on live and dead trees as well as surface fuels. These data were used in the following analysis, data tables, graphs, and charts and are incorporated by reference.

Field inventory data from the treatment units were used as input to the Forest Vegetation Simulator (FVS) and the Fire and Fuels Extension (FFE), a forest growth model that predicts forest stand development (FVS 1997; Dixon 1994). FVS-FFE is a well-established tree and stand growth model that is supported and maintained by the Forest Service. A specifically calibrated variant of FVS is available for the Sierra Nevada. Data collected pre-fire were “burned” using the FVS-FFE SimFire under fire weather conditions observed during the Chips fire. These outputs were then compared to post-fire field observations for representative accuracy. Stand development over time was then modeled using the modeled and field verified post-fire stand conditions. Salvage harvest, site-preparation, and reforestation actions are modeled in order to provide estimates of future fuels, snags, and stand development based on realistic and predictable inputs. The model was used to quantify existing conditions and to predict the effect of alternative treatments on forest development. Model results are used to highlight relative differences, not absolute conditions. No future activities, fires, or natural regeneration events are included in growth simulations due to the variable and unpredictable nature of such events.

Fire Weather Discussion and Assumptions

The modeling done to simulate the effects of the Chips fire on preexisting field inventory data was done using weather data collected during the Chips fire by portable Remote Automated Weather Stations (RAWS). Portable RAWS are deployed by Incident Meteorologists during large fires to gather site specific weather data in an effort to better forecast fire weather conditions and predicted fire behavior specific to the fire environment. In order to accurately simulate the range of conditions that occurred over the duration of the Chips Fire, resulting in the mosaic pattern of high , moderate, and low burn severity (Figure 11), weather variables representing periods of high, moderate, and low fire activity were identified (Table 53). The modeling of potential fire behavior for all alternatives was done using the high fire activity weather variables (Table 53). When compared to historical fire weather conditions from the closest permanent weather stations,

these data represent the 90th percentile weather conditions, or the severest 10 percent of fire weather conditions occurring during the past 10 fire seasons.

Table 53. Parameters used for fire behavior and effects modeling on the Chip-munk project.

Fire Activity	1-hour dead fuel moisture (% of dry weight)	10-hour dead fuel moisture (% of dry weight)	100-hour dead fuel moisture (% of dry weight)	1,000 hour dead fuel moisture (% of dry weight)	Live woody fuel moisture (% of dry weight)	Live herbaceous fuel moisture (% of dry weight)	20-foot wind speed (MPH)	Air Temperature (°F)
High	**2**	**3**	**6**	**6**	**70**	**30**	**20**	**82**
Moderate	**3.5**	**7.5**	**10.5**	**11.5**	**95**	**45**	**9**	**69**
Low	**15**	**9**	**12**	**6**	**100**	**50**	**9**	**63**

Type and Duration of Effects

Direct Effects. These are effects on forest vegetation, fuels, fire, and air quality that are directly caused by treatment implementation or, as with alternative B (no action), a lack of treatment.

Indirect Effects. These are effects on forest vegetation, fuels, fire, and air quality that are in response to the direct effects of treatment implementation or, as with alternative B (no action), a lack of treatment.

Duration of Effects. Direct effects would likely be limited to the project implementation phase. Indirect effects would last beyond the implementation period and occur within the temporal bound of the cumulative effect analysis described above in Geographic Area Evaluated for Impacts.

Environmental Consequences

No Action Alternative: Alternative B

Direct and Indirect Effects – Alternative B

Existing conditions would persist and develop unaltered by active management. Standing snags would persist and the site would be colonized by grasses, forbs, and shrubs within three to five years. It is a reasonable expectation that the site would develop comparable to that of similar local fires that burned in the recent past where salvage did not occur, including the Mt. Hough Complex (1999) and the Storrie Fire (2000). On these sites, grasses, shrubs, and hardwoods where they existed pre-fire, have occupied the site along with numerous standing and fallen snags within the high severity burn areas, while low and moderate severity burn areas remain mixed conifer forest with patchier brush understory and heavy accumulations of smaller (less than 8” dbh) fallen snags. Across all burn severity classes, within 8 to 12 years post-fire surface fuel

accumulations have developed, as a result of natural snag fall of fire killed trees, to levels that will re-burn at high severity. The results of this were seen in many areas of the Storrie fire that re-burned in the Chips fire, where many areas had greater than 200 tons per acre of surface fuels.

Table 54. Predicted fuel loading (tons per acre) and resulting flame lengths (feet) over the next 30 years for stands receiving no treatment under Alternative B of the Chip-munk Project.

Alternative B	Year			
	2014	2023	2033	2043
0 - 3" Surface Fuels (T/ac)	3.35	10.40	10.84	9.35
3" - 6" Surface Fuels (T/ac)	1.58	4.18	4.10	3.76
6" - 12" Surface Fuels (T/ac)	3.61	8.55	11.89	11.69
> 12" Surface Fuels (T/ac)	1.77	7.83	15.32	19.06
Flame Length (ft.)	0.87	10.29	12.47	15.11

Fuels and Potential Fire Behavior: Immediate and delayed conifer mortality and the resulting snag fall contribute to increasing accumulations of surface fuel as shown in Table 54. These surface fuels increase dramatically as dead limbs, tops, or entire trees fall over the analysis period which thereby increases predicted potential flame lengths in the event of another fire (also shown in Table 54). Over time, shrub species and fallen snags would dominate these areas and would result in a surface fuel loading characterized by an intermix of live and dead shrub fuels up to 6 feet in height with a jackstraw accumulation of down woody fuels. Under the no action alternative, flame lengths are projected to exceed 10 feet within 10 years. Flame lengths over 8 feet are generally not controllable by ground-based equipment or aerial retardant and present serious control problems including torching, crowning, and spotting. These increased flame lengths are a direct result of fire burning in dead and down logs, branches, and shrubs. Under the no action alternative, this general trend in high flame lengths (greater than 10 feet) and corresponding high tree mortality (greater than 90 percent) is expected to continue beyond 30 years into the future. During the Chips fire, suppression efforts attempted under these conditions within the old Storrie Fire burn area were unsuccessful, even with full air support and ground attack, due to excessive spotting and roll-out.

Air Quality: Under the no action alternative, there would be no forest management burning, therefore, there would be no smoke directly generated by management activities. It is expected that there will continue to be lightning and human caused ignitions within the analysis area. Where these wildfires cannot be contained and they burn into heavy fuels, such as in the case of the Chips fire, it is expected that heavy smoke from fire burning in heavy down logs would result. This smoke would be blown to the northeast towards the Almanor Basin, Indian Valley, and Susanville by typically southwest winds during the day. Smoke impacts from the Chips Fire were observed as far away as Reno, NV and southern Idaho. At night, smoke from a fire would settle in these areas and would move down the Feather River Canyon drainage causing impacts to the communities in the Central Valley to the west. Smoke from the Chips fire affected Central Valley communities as far south as Fresno, CA.

Cumulative Effects Common to All Alternatives

Cumulative effects are defined as: "The impact on the environment which results from the incremental impact of the action when added to other past, present, and foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively substantial actions taking place over a period of time" (40 CFR 1508.6). In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Wildfire Suppression and Rehabilitation: Suppression tactics taken during wildfires affected the environment. They included aerial drops of water and retardant, burn-out of fuels along control lines, construction of containment lines by bulldozers and hand crew, live-tree and snag falling, and construction of staging areas, drop points, helicopter landing spots (helispots), and safety zones. These activities alter the environment in several ways: by removing vegetation; by possibly compacting soils; by possibly introducing or spreading invasive species. Such activities generally caused localized effects, but due to the size, scale, and dispersed nature of such activities these effects are considered to be negligible relative to fuels, fire, and air quality within the analysis area.

Fire suppression rehabilitation activities included the following: returning roads, helispots, safety zones, and water sources to the pre-incident condition; applying erosion control measures such as waterbar construction to containment lines; removing debris deposited as a result of suppression efforts from stream channels, and dragging vegetative debris back onto containment lines.

Burned Area Emergency Rehabilitation (BAER) activities were taken to mitigate effects of the fire which might cause an emergency to life, property, or resources. Rehabilitation efforts were concentrated on restoration and improvement of drainage functions to control water to reduce damage to roads and subsequent erosion and off-site sediment deposit. Actions taken for BAER would not have measurable effects relative to fuels, fire, or air quality

Firewood Gathering: The Personal Use Firewood program on the Plumas National Forest is an ongoing program that has been in existence for years and would continue. This program allows the public to purchase a woodcutting permit and remove fuel and firewood from National Forest lands. A 10-year average (1991-2000) indicated that 3,273 permits were issued annually resulting in the annual sale of 10,417 cords of wood on the Plumas NF. Much of this wood material either consists of down logs found in the forest, along forest roads, and within cull decks created by past logging operations, or as standing snags. Limbs and tops left behind by firewood gathering do not contribute significantly to the surface fuels due to the highly dispersed nature of these activities. The Chip-munk Project analysis area is open to woodcutting. Snags and logs would continue to

be removed within 100 feet of Plumas NF system roads, resulting in the cumulative reduction of large fuels and snags across the landscape.

Cumulative Effects – Alternative B

Under Alternative B, NFS lands would not be subject to timber harvesting to recover economic value of fire-killed trees. Treatments on private lands within the analysis area would affect approximately 6,587 acres and approximately 4,885 acres of public lands would be treated under the Poker Chip Project on the Lassen National Forest. Although the action alternative leaves large areas of the fire largely untreated under a passive management strategy, alternative B (the no-action alternative) proposes to leave the largest proportion of the landscape untreated.

Alternative B would not implement reforestation treatments such as site preparation for planting, planting, and subsequent release treatments. Given the anticipated fuel accumulations and shrub regeneration, increased surface fuels would result in increased flame lengths (Table 54) and fire intensity like those seen within areas of the Storrie fire that re-burned during the Chips Fire. Due to the intermix of shrubs and woody fuels, and the large number of snags, accessibility would limit future fire suppression activities due to safety concerns, reduced fireline production capability, and increased spotting. As a result of this accessibility issue and predicted flame lengths in excess of 10 feet (Table 54), it is expected that some fires, both human and lighting caused would continue to escape initial attack in more severe weather conditions over the next 20-30 years. Overall, the no action alternative would not manage fuel loading over time and would not reduce potential future surface fuels or predicted fire severity.

Action Alternatives: Alternative A

Alternative A would implement vegetation management treatments designed to meet guidelines as specified under appendix D of the SNFPA ROD (USDA 2004b) and comply with the National Forest Management Act.

Direct and Indirect Effects of Action Alternative

Effects of Roadside Hazard Tree Removal, Salvage Harvest & Reforestation: Alternative A

The emphasis of treatments under Alternative A is public safety and economic recovery through harvest of fire-killed (dead) trees. Up to 1,788 acres of Roadside Hazard Trees will be removed along Forest travel routes. Up to 3,675 acres of fire-killed trees would be harvested for economic recovery. All of the 3,675 acres of salvage harvest would be reforested.

Roadside Hazard Tree Removal: Fire killed and fire injured hazard trees would be felled and removed within 150 feet of identified roads. Activity generated fuels within 50 feet of the road would be piled and burned. Activity fuels beyond 50 feet from the road would be lopped and scattered to a depth of 18 inches or less. Activity fuels are generally concentrated more heavily

closer to the road because all material to be removed is collected there. Activity fuels further from the road are generally lighter and sparser because fewer trees (only those that can reach the road) are removed from this area. After treatment is complete and piles are burned, fuels will not increase significantly from pre-treatment levels. Some fire-killed and fire-injured trees, those that will not impact road users, would not be removed, and over the next 30 years and beyond would fall and add to surface fuels. Overall, future surface fuel loads and resulting potential flame lengths would be much lower than if no treatment were to take place.

Salvage Harvest: Fire-killed trees greater than 10 inches DBH would be felled and removed. Limbs and tops would be lopped and scattered to 18 inches or less in depth. Removal of the dead trees greater than 10 inches dbh would significantly reduce future surface fuel loading within treated stands compared to the no action alternative and provide an area with relatively few snags for future firefighting personnel engaged in suppression operations. At the landscape scale however, treatments are only proposed for approximately 5 percent of the analysis area and there is little to no connectivity to other fuel treatments so, there is not a significant effect from salvage treatments with regard to fire and fuels.

Reforestation: Recent studies (Stephens and Moghaddas 2005; Thompson et al. 2007) have found an "association of high-severity fire with conifer plantations" and suggest that "young forests, whether naturally or artificially regenerated, may be vulnerable to positive feedback cycles of high severity fire creating more early-successional vegetation and delaying or precluding the return of historical mature-forest composition and structure" (Thompson et al. 2007). Reforestation treatments under action alternatives are designed in acknowledgement of these findings to promote lower density open canopy plantations in order to reduce susceptibility of reforested areas to potential high severity fires. In addition, these studies suggest that young post-fire vegetation, whether naturally or artificially regenerated, is at high risk to high severity re-burns, particularly in the early stages of forest development, and managers may have few options in these early successional forest types for reducing the risk of high severity as evidenced by the 2008 re-burn of the 2000 Storrie fire.

Before planting takes place within salvage harvest units remaining standing and activity generated fuels would be reduced to lower the risk of future high-severity fire and the danger to forest management personnel from snags. Appendix A, Part D of the 2004 SNFPA Record of Decision identifies Forest Wide standards and guidelines for fire and fuels management in young plantations on page 49-50 (USDA 2004b). On tractor harvested units fire killed trees less than 10 inches DBH and surface fuels would be grapple piled and burned resulting in a future fuels profile that could provide fire suppression resources with a strategic benefit (Table 55). On skyline harvested units fire killed trees less than 10 inches DBH would be felled, lopped, and scattered to a depth of 12 inches or less. Modeling indicates that desired conditions of flame lengths 4 feet or less would not be met with the lop and scatter treatment (Table 56). However, as noted earlier, modeling is good at depicting relative differences in treatments, not absolute values;

therefore, these units would need to be evaluated post-treatment for the need to further reduce resulting fuel loads in which case follow-up jackpot burning would be used (in skyline logging units only) to reduce heavy fuel accumulations and continuity.

Trees planted utilizing the wide-spaced cluster arrangement are expected to have a lower likelihood of propagating a high severity crown fire under 90th percentile weather conditions as their live crowns would be well separated. One to two years following planting, a manual release would occur around the clusters to reduce competition with grasses and brush and enhance tree survival and growth. This reduction of fine shrub, grass, and associated surface fuels around the planted clusters would break up the continuity of shrub and surface fuels, and would contribute to a reduction in flame lengths and rates of spread in the immediate vicinity of planted trees, leading to decreased potential for torching of individual trees.

Table 55. Predicted surface fuel loading (tons per acre) and resulting flame length (feet) over the next 30 years for tractor salvage and reforestation treatment units under Alternative A of the Chip-munk project.

Alternative A Tractor Salvage	Year				
	2014	2016	2023	2033	2043
0 - 3" Surface Fuels (T/ac)	10.87	10.83	10.53	9.33	8.15
3" - 6" Surface Fuels (T/ac)	1.90	1.99	2.03	1.88	1.75
6" - 12" Surface Fuels (T/ac)	3.49	3.75	3.87	3.81	3.54
> 12" Surface Fuels (T/ac)	1.65	2.14	2.81	3.36	3.59
Flame Length (ft)	1.80	1.78	2.03	2.07	5.20

Table 56. Predicted surface fuel loading (tons per acre) and resulting flame length (feet) over the next 30 years for skyline salvage and reforestation treatments under Alternative A of the Chip-munk project.

Alternative A Skyline Salvage	Year				
	2014	2016	2023	2033	2043
0 - 3" Surface Fuels (T/ac)	12.31	12.42	12.56	10.92	9.06
3" - 6" Surface Fuels (T/ac)	2.33	2.49	2.98	2.95	2.66
6" - 12" Surface Fuels (T/ac)	3.42	3.92	5.25	6.81	6.90
> 12" Surface Fuels (T/ac)	2.09	2.98	4.85	6.40	7.05
Flame Length (ft)	8.63	8.60	8.81	4.78	7.22

Effects on Air Quality: Alternative A

Air Quality. Emissions for all alternatives are displayed in Table 57. Under alternative A, pile burning would be concentrated in salvage harvest units and disbursed along roadside hazard tree removal units. Jackpot burning would occur within skyline salvage units that do not meet the appropriate fuel loading standards and guidelines in the SNFPA ROD (USDA 2004b, pg 49 - 50). Due to the control over ignition times to favor good smoke dispersion, it is not anticipated that pile or jackpot burning would substantially impact the local communities. At night, smoke from

burning in the project area may settle in basins and drainages such as the Lake Almanor Basin and the Feather River drainage having short term effects to communities in those areas during early morning hours.

All burning would be completed under approved burn and smoke management plans. Piles would be constructed to promote efficient combustion and burned under weather conditions that would allow maximum smoke dispersion. Predicted emissions from smoke production could be spread out over a period of three to five years depending on the implementation timelines of salvage harvest treatments and the occurrence of favorable burning conditions.

Table 57. Predicted emissions for all alternatives.

Alternative	Total PM10 Emissions (tons)		Total PM2.5 Emissions (tons)		Total CH4 Emissions (tons)		Total CO Emissions (tons)		Total PM CO2 Emissions (tons)		Total NMHC Emissions (tons)		Total VOC Emissions (tons)		Total Vehicle Dust Emissionsa (tons)
	Pile Burning	Jackpot Burn	Pile Burning	Jackpot Burn	Pile Burning	Jackpot Burn	Pile Burning	Jackpot Burn	Pile Burning	Jackpot Burn	Pile Burning	Jackpot Burn	Pile Burning	Jackpot Burn	
Alternative A	394	259	335	238	326	162	3,956	2,543	63,116	40,046	228	124	456	304	44
Alternative B (no action)	0		0		0		0		0		0		0		0

Notes: Jackpot Burning emissions would occur only if required to meet fire and fuels standards and guidelines (SNFPA ROD 2004)

PM = particulate matter, CH_4 = methane, CO = carbon monoxide, CO_2 = carbon dioxide, NMHC = nonmethyl hydrocarbon, VOC = volatile organic compound

a. Dust Emissions = emissions (dust) from vehicles used during implementation. Assumes an 80 percent reduction in emissions from road surfaces (1.2 pounds per vehicle mile before watering) through implementation of standard road watering procedures. Vehicle miles assumes 25-mile average round trip on dirt roads per load; number of trips assumes 4 loads per acre treated.

Dust emissions (Table 57) would be spread out during the mechanical treatment implementation period of approximately three to five years. Dust would be mitigated by road watering and other standard management practices described in contracts (sections T-806 and B-5.3). Under alternative A, harvesting and road work would be completed primarily with diesel-powered equipment, including feller bunchers, skidders, tractors, graders, and trucks. This equipment would be inspected to determine equipment (spark arresters, fire extinguishers, and firefighting equipment) compliance with fire safety standards. The condition of emissions control systems of various pieces of equipment would vary by age, maintenance, manufacturer, and past use.

Naturally Occurring Asbestos. Serpentine-based soils do exist within the project area however, there are no activities proposed within those areas other than incidental road usage; these soils have levels of naturally occurring asbestos. California Air Resources provide regulations concerning operations on serpentine based soils. Agriculture operations and timber harvesting is

exempt under California Air Resource regulations (2002-07-029 Asbestos ACTM for Construction, Grading, Quarrying, and Surface Mining Operations, Section 93105, (c) 3. http://www.arb.ca.gov/toxics/atcm/asb2atcm.htm) with the exception of road building. Dust would be mitigated by road watering and other standard management practices described in contracts (sections T-806 and B-5.3)

Climate change considerations. Emissions for all alternatives are displayed in table 4.7. Alternative A would have a short-term direct effect through emissions associated with project activities. These emissions include smoke, dust, and greenhouse gases. However, alternative A would also implement treatments that would reduce the potential for future uncontrolled smoke/greenhouse gas emissions from wildfires by reducing available fuels within the project area. In addition, action alternatives would implement reforestation treatments which would expedite the establishment of forested conditions, thereby enhancing carbon sequestration within the project area. These treatments would have long term beneficial indirect effects.

Forests play a major role in the carbon cycle. The carbon stored in live biomass, dead plant material, and soil represents the balance between CO2 absorbed from the atmosphere and its release through respiration, decomposition, and burning. Over longer time periods, indeed as long as forests exist, they will continue to absorb carbon. Complete, quantifiable information about project effects on global climate change is not currently possible and is not essential to a reasoned choice among alternatives. However, based on climate change science, we can recognize the relative effects of these treatments on the ecosystem carbon cycle.

Given the anticipated increase in large wildfires in California under predicted climate change scenarios (California Climate Action Team, 2009), alternative A proposes beneficial treatments that would reduce the potential for future large scale, high-severity wildfires within the analysis area.

Cumulative Effects of Action Alternative A

The cumulative effects of past projects in the analysis area have been influential on how the landscape has developed into the forest of today. They may be characterized by the conditions that currently exist on the landscape. Present and future projects can be characterized by a shift in land management practices that emphasize values such as, maintenance and enhancement of surviving forest, re-establishment of forested conditions, public safety, economic recovery, and management of wildfire to protect communities and sensitive resources but at the same time allow for its reintroduction as a critical ecological process.

Cumulative Effects

Due to the scope and design of the proposed treatments, cumulative effects of salvage harvesting treatments would include reductions of fire-killed trees in primarily high fire severity areas. Cumulative effects in these areas would include a reduction in snags, and a reduction in surface

fuel and large woody debris recruitment. These effects would, in turn, affect (reduce) fuel loading and potential fire behavior within the treatment units.

The communities of Seneca, Caribou, Canyon Dam, Big Meadows, and Rich Gulch lie within the analysis area and are identified in the Plumas County Community Wildfire Protection Plan (CWPP) as communities at risk. Treatments that reduce fuels and/or modify fire behavior would reduce the risk of re-occurring high severity fire within the wildland urban interface of these communities and the nearby communities of Prattville, Humbug, Keefer, Belden, Virgilia and Twain. These communities are not located within the analysis area; however, within the Plumas County CWPP, are also identified as communities at risk, and are within the same WUI areas as those identified within the Chip-munk Project analysis area.

In addition to the treatments planned on public lands under the Chip-munk and Poker Chip (4,885ac) projects, an additional 6,587 acres of treatments are planned under 14 separate Timber Harvest Plans on private lands within the Chips Fire area. Cumulatively, approximately 22 percent of the acres within the analysis area would be affected by these projects. Conversely, approximately 78 percent of the analysis area would not be affected by any post-fire projects and would continue to develop as described under the no action alternative. Therefore, treatments proposed under alternative A would have no significant cumulative effects to fuels, potential fire behavior or air quality resources.

Comparison of Alternatives

The measurement indicators used to quantify effects by alternative are described in Measurement Indicators. This section briefly describes the location of these indicators used in the analysis and the differences between alternatives for the following measurement indicators.

Surface fuel load (tons per acre) and Predicted flame length (feet): Table 54 through Table 56 display predicted surface fuel loading and resulting flame length over the next 30 years for all alternatives. Under alternative A, surface fuel loads and flame lengths are lower than under the no action alternative. Treatment of surface fuels as site preparation for reforestation on tractor harvested salvage units would have the most significant effect on future fuel loads and fire behavior at the stand level, but due to the limited connectivity to an existing network of fuels treatments is unlikely to have a significant effect at the landscape level.

Predicted Particulate Matter $(PM)_{10}$ (tons) and $PM_{2.5}$: Table 57 displays predicted emissions for all alternatives including PM_{10}, $PM_{2.5}$, PM CH_4, Total CO, Total PM CO_2, Total NMHC, Total VOC, and Total Dust Emissions. Alternative B would have no project related emissions. Under both alternatives, wildfires would continue to occur. While stands treated under Alternative A would have lower emissions than untreated stands in the event of a wildfire, it is impossible to say whether there would be any significant difference in overall wildfire emissions

as a result of choosing either alternative due to the inability to predict the location and conditions under which a wildfire would occur.

Wildlife

Biological Assessment/Biological Evaluation

Introduction

The purpose of this Biological Assessment/Biological Evaluation (BA/BE) is to determine whether the Chip-munk Project would result in a trend toward listing or loss of viability for USDA Forest Service sensitive species, and to document effects on threatened, or endangered species and/or their critical habitat as part of determining whether formal or informal consultation with the United States Department of the Interior Fish and Wildlife Service (USFWS) is needed. This BA/BE is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act [19 U.S.C. 1536 (c), 50 CFR 402] and standards established in Forest Service Manual direction (FSM 2672.42).

The Chips Fire began on July 29, 2012, in the Chips Creek drainage in the Plumas National Forest. The fire grew to 75,431 acres, burning in the Plumas and Lassen national forests and on private lands. The Chips Fire was contained on August 31, 2012. The USDA Forest Service, Plumas National Forest (PNF), Mt. Hough Ranger District (MHRD), proposes to remove roadside fire-killed and fire-injured hazard trees (1,788 acres), recover the economic value of fire-killed trees, and re-establish forested conditions by planting native conifer seedlings (3675 acres). Detailed descriptions of the Chip-munk Project design elements were previously presented (see Alternatives, Including the Proposed Action section). Implementation could begin as early as summer, 2013. All activities proposed would be completed within approximately three to five years.

Five categories of species are considered in this BA/BE (hereafter TES species); threatened, endangered, proposed, candidate and Forest Service sensitive species. Species federally listed as endangered by the USFWS are species currently in danger of extinction throughout all or a significant portion of their range. Species listed as threatened are likely to become endangered within the foreseeable future throughout all or a significant portion of their range. A proposed species is any species that is proposed in the Federal Register to be listed as a threatened or endangered species under the Endangered Species Act (ESA) (50 CFR 402.03). A candidate species is a species for which the USFWS has on file enough information to warrant or propose listing as endangered or threatened. Forest Service sensitive species are designated by the Regional Forester and are species that have known or suspected viability problems due to (1) significant current or predicted downward trends in population numbers or density, and/or (2) significant current or predicted downward trends in habitat quantity or quality for these species.

The Forest Service considers the long-term conservation needs of sensitive species in order to avoid future population declines and the need for federal listing.

This BA/BE report consists of both a Biological Assessment for federally listed wildlife species potentially occurring on the PNF (USDI 2013a, updated September 18, 2011, accessed April 8, 2013) , and a Biological Evaluation for Region 5 Sensitive Species (updated July 3, 2013). Table 58 contains a list of Threatened, Endangered, Proposed, Candidate and Sensitive (TES) species that potentially occur on the PNF and may be addressed in this BA/BE.

Table 58. Threatened, Endangered, Proposed, Candidate and Sensitive Animal Species that potentially occur on the Plumas National Forest.

Threatened, Endangered and Sensitive Species (Scientific Name)	Species Status*	Habitat or Ecosystem Component	Category for Project Analysis**
Invertebrates			
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	FT	Elderberry trees (*Sambucus* spp.)	1
Western bumble bee (*Bombus occidentalis*)	USFS : S	Access to Flowering Plants and Abandoned Rodent Burrows	3
Fish			
Hardhead minnow (*Mylopharodon conocephalus*)	USFS : S, DFG : SSC	Riverine and Lacustrine	3
Amphibians			
California red-legged frog (*Rana aurora draytonii*)	FT	Riverine and Lacustrine	1
Foothill yellow-legged frog (*Rana boylii*)	USFS : S, DFG : SSC	Riverine and Lacustrine	3
Sierra Nevada yellow-legged frog (*Rana sierrae*)	FP, USFS : S, DFG : SSC	Riverine and Lacustrine	3
Reptiles			
Western pond turtle (*Actinemys marmorata*)	USFS : S, DFG : SSC	Riverine and Lacustrine	3
Birds			
Bald eagle (*Haliaeetus leucocephalus*)	USFS : S, SE, USFWS : BCC	Large trees adjacent to riverine and lacustrine	3
California spotted owl (*Strix occidentalis occidentalis*)	USFS : S, USFS : MIS, DFG : SSC, USFWS : BCC	Late Seral Closed Canopy Coniferous Forest	3
Greater sandhill crane (*Grus canadensis tabida*)	USFS : S, ST	Open habitats (grasslands and croplands), shallow lakes, fresh emergent wetlands	2
Great gray owl (*Strix nebulosa*)	USFS : S, SE	Late Seral Closed Canopy Coniferous Forest adjacent to wet meadows	1
Northern goshawk (*Accipiter gentilis*)	USFS : S, DFG : SSC	Late Seral Closed Canopy Coniferous Forest	3
Willow flycatcher (*Empidonax trailii brewsteri*)	USFS : S, SE, USFWS : BCC	Riparian with Dense Willows	2
Mammals			
American marten (*Martes americana*)	USFS : S	Late Seral Closed Canopy Coniferous Forest	3
California wolverine (*Gulo gulo luteus*)	FP, USFS : S, ST	Late Seral Closed Canopy Coniferous Forest	1
Pacific fisher (*Martes pennanti pacifica*)	FC, USFS : S, DFG : SSC	Late Seral Closed Canopy Coniferous Forest	3
Gray wolf (*Canis lupus*)	FE	Generalist: Forest, Grassland, Tundra, Desert	2
Pallid bat (*Antrozous pallidus*)	USFS : S, DFG : SSC	Open, Dry Habitats with Rocky Area	3
Townsend's big-eared bat (*Corynorhinus townsendii*)	USFS : S, DFG : SSC	Mesic Habitats	3
Fringe-tailed myotis (*Myotis thysanodes*)	USFS : S	Hardwood-conifer Open Canopy Forest	3

*__Species Status: FE__ = Federal Endangered, **FT** = Federal Threatened, **FP** = Federal Proposed, **FC** = Federal Candidate,
USFS : S = U.S. Forest Service - Sensitive, **USFS : MIS** = U.S. Forest Service – Management Indicator Species, **SE** = State Endangered,
ST = State Threatened, **DFG : FP** = State Fully Protected, **DFG : SSC** = State Species of Special Concern,
USFWS : BCC = U. S. Fish and Wildlife Service Birds of Conservation Concern, **SOI** = Species of Interest.
** **Category 1:** Species whose habitat is not in or adjacent to the aquatic or terrestrial wildlife analysis areas (Figure 12) and would not be affected by the project. **Category 2:** Species whose habitat is in or adjacent to the aquatic or terrestrial wildlife analysis areas (Figure 12), but would not be either directly or indirectly affected by the project.
Category 3: Species whose habitat would be either directly or indirectly affected by the project.
Note: Sensitive Species identified for analysis are those included on a proposed updated USFS Region 5 update with an implementation date of July 3, 2013. Projects with NEPA decisions after this date are required to use this updated list.

Several TES species identified in the list have been eliminated from further analysis, based on past analysis and concurrence from the USFWS (Rotta 1999, USFWS letter 1-1-99-I-1804 dated August 17, 1999) or due to lack of species distribution and/or lack of designated critical habitat. These species are listed below:

- Winter-run Chinook salmon (*Oncorhynchus tshawaytsha*)
- Conservancy fairy shrimp (*Branchinecta conservatio*)
- Central Valley steelhead (*Oncorhynchus mykiss*)
- Delta smelt (*Hypomesus transpacificus*)
- Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*)
- Central Valley spring-run Chinook salmon (*Oncorhynchus tshawaytsha*)
- Carson wandering skipper (*Pseudocopaeodes eunus obscurus*)
- Critical habitat for vernal pool invertebrates (Butte County)
- Critical habitat for California red-legged frog

In addition, the valley elderberry longhorn beetle, California wolverine, Great Gray Owl, and California red-legged frog were classified as Category 1 above. These species will not be discussed further because habitats that support these species do not occur in the Analysis area (Figure 12), so the project will not directly or indirectly affect these species or their habitats. Greater Sandhill Crane, Willow Flycatcher, and gray wolf were identified as Category 2 above. Habitat for these species occurs within the analysis area, but these species will not be discussed further because the habitat factors for these species would not be directly or indirectly affected by the project; therefore, the project will not affect these species or their habitat. A lone wolf that dispersed from Oregon has traveled near or through the project area but is no longer within California. Species with habitat that would be either directly or indirectly affected by the Chip-munk Project (Category 3, Table 58) are carried forward in this analysis. This BA/BE report will evaluate the direct, indirect, and cumulative effects of the alternatives on these species and their habitats.

Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction

Regulatory Environment

Direction relevant to the Chip-munk Project as it affects terrestrial and aquatic wildlife includes:

Federal Laws

- Bald and Golden Eagle Act of 1940, as amended
- Departmental Regulation 9500-4
- Code of Federal Regulations (23, 36, 50 CFR)
- Endangered Species Act (ESA 1973)
- Forest Service Manual and Handbooks (FSM/H 1200, 1500, 1700, 2600)
- National Environmental Policy Act (NEPA 1969)
- National Forest Management Act (NFMA 1976)
- The Migratory Bird Treaty Act of 1918, as amended
- USFWS Species List (updates through September 18, 2011)

Forest Service direction for TES species incorporated in this BA/BE can be found in the Forest Service Manual (FSM 2670.31, FSM 2670.32). Information regarding threatened, endangered, proposed, candidate and sensitive animals is also obtained through the cooperation of the USFWS and the California Department of Fish and Wildlife (CDFW).

Consultation with USFWS under Section 7 of the Endangered Species Act

Consultation with USFWS is required where endangered, threatened, candidate species, or their critical habitat may be affected by a proposed federal action. Section 7 consultation with the USFWS was not required for the Chip-munk Project. A list of TES species was provided by the Federal Endangered and Threatened Species that may be affected by Projects on the Plumas National Forest, updated September 18, 2011, accessed via USFWS county list web page on April 8, 2013 (http://www.fws.gov/sacramento/ES_Species/Lists/es_species_lists_NF-action-page.cfm; Appendix A of USDA 2013c) and was used for analysis. Based on the analysis conducted in the this BA/BE, it was determined that no effects to listed species would occur from implementation of the he Chip-munk Project, therefore no consultation under Section 7 of the Endangered Species Act of 1973, as amended was required.

California Department of Fish and Wildlife

Input specific to the Chip-munk Project was solicited from the Department of Fish and Wildlife through the public scoping process. However, since no input was received, all past advice from the Department was considered during the planning of the Chip-munk Project.

Forest Management Direction

- ● Plumas National Forest Land and Resource Management Plan (PNF LRMP, USDA 1988a)
- ● Regional Forester (Region 5) policy and management direction
- ● Regional Forester (Region 5) Sensitive Plant and Animal Species List (June 10, 1998), as appended October 15, 2007; updated list July 8, 2013.
- ● Sierra Nevada Forest Plan Amendment (SNFPA) and its implementing Final Environmental Impact Statement (FEIS), Record of Decision (ROD), January 2001 (USDA 2001 a,b)
- ● Sierra Nevada Forest Plan Amendment (SNFPA) and its implementing Final Supplemental Environmental Impact Statement (FSEIS), Record of Decision (ROD), January 2004 (USDA 2004 a,b)
- ● Sierra Nevada Forests Management Indicator Species Amendment FEIS, December 2007 (USDA 2007a)
- ● USDA Forest Service Region 5 Best Management Practices
- ● Clean Water Act of 1948 (as amended in 1972 and 1987)

The Plumas National Forest Land and Resource Management Plan (PNF LRMP) provides Forest specific information on how TES species will be managed (USDA 1988a). These include forest wide goals and policies for Wildlife, Fish and Sensitive Plants (p. 4-4) and Riparian Areas (p. 4-7), Wildlife objectives (p. 4-14, 4-15, and 4-19), forest wide direction and standards and guidelines for Wildlife, Fish and Sensitive Plants (p. 4-29 through 4-32). Management Area specific and species-specific direction and prescriptions will be included in the species discussions below. Direction also is found under other areas (e.g., timber management) that directly or indirectly affect animal species and/or their habitats. This direction is incorporated by reference. The PNF LRMP provides management guidelines that incorporate Regional direction for each species. Current direction for TES species and other wildlife species and their habitats can be found in the PNF LRMP, as amended by Sierra Nevada Forest Plan Amendment (SNFPA) and its implementing Final Supplemental Environmental Impact Statement (FSEIS), Record of Decision (ROD), for Wildlife, Fish, Riparian Ecosystems and riparian-dependent wildlife species (USDA 2004a,b).

Sierra Nevada Forest Plan Amendment: Final Supplemental Environmental

Impact Statement Record of Decision: Forest-wide Standards and Guidelines

Appendix B of the Chip-munk Biological Assessment/Evaluation (USDA 2013c) provides a list of standards and guidelines, that are a subset of all applicable Land and Resource Management Plan direction, and this project is being analyzed for consistency to all applicable Forest Plan standards and guidelines for terrestrial and aquatic wildlife, including Aquatic Management Strategy (AMS) Goals and Riparian Conservation Objectives (RCOs, USDA 2004a,b).

Description of Alternatives

The Chip-munk Project is located approximately 5 miles west of Greenville, California near Butt Valley Reservoir and the communities of Seneca and Caribou within the Mt. Hough Ranger District, Plumas National Forest, Plumas County, California. The project area is within Management Areas 20 and 26 as described in the PNF LRMP. Management direction for these areas is described in the PNF LRMP as amended by the 2004 SNFPA ROD. Two alternatives are discussed in this BA/BE: the Proposed Action (Alternative A), and the No-action alternative (Alternative B). The Proposed Action proposes to improve public safety along roads by removing hazardous trees from approximately 1,788 acres, recovery of the economic value of fire damaged timber on 3,675 acres, and plant native conifer seedlings to recover forested conditions on up to 3,675 acres (Table 59). The proposed action would a minimal effect on the residual live tree size, canopy cover or live-tree basal area through the removal of trees where damage indicates specific probabilities of mortality guidelines are met (USDA 2013a). The following Limited Operation Periods (LOPs) would be implemented within ¼ mile of known active nest sites: American Peregrine Falcon, February 1 – August 31; California Spotted Owl: March 1 – August 15, Northern goshawk: February 15 – September 15, Bald eagle: November 1 – August 31, Sierra Nevada yellow-legged frog: No activity from October 1, or the first wetting rain (more than ¼ inch precipitation), until April 15th within a stream mile of SNYLF's detection. From April 15 to October 1, if a weather system resulting in more than ¼ inch of precipitation occurs in project area, operations must be suspended until a dry period of 72 hours occurs, unless the district biologist determines there will be no effect to frog. Detailed descriptions of the Chip-munk Project are included above (see Alternatives, Including the Proposed Action section). Implementation could begin as early as summer 2013, and all proposed activities would be completed within approximately three to five years.

Comparison of the Alternatives

This section provides a summary of each alternative. All vegetation information is displayed using the California Wildlife Habitat Relationships (CWHR) vegetation codes and serves as the baseline acres for analyses (Mayer and Laudenslayer 1988; Appendix D of USDA 2013c). Forest-wide vegetation typing is updated after fires and forest activities to most accurately represent

available habitat types. Vegetation burn severity data, aerial photos, satellite imagery, and ground validation were used to generate the post-fire CWHR vegetation map used for these analyses. Pre- and post-fire habitat within the Chips Fire boundary is presented in Appendix E of the Chip-munk Biological Assessment/Evaluation (USDA 2013c). California Wildlife Habitat Relationships data for Chip-munk Project treatment units are provided in Table 59. Refer to Appendix D of the Chip-munk Biological Assessment/Evaluation (USDA 2013c) for wildlife habitat relationship strata and wildlife habitat relationship codes). The No-action Alternative (Alternative B) would not treat any of these acres.

Table 59. Summary of California Wildlife Habitat Relationships (CWHR) types within Chip-munk Project treatment units (5,464 acres; all acres are approximate and National Forest System lands only).

	Roadside Hazard - skyline	Roadside Hazard - tractor	Salvage - Skyline	Salvage - tractor	Total
AGS	0	3	0	0	3
BAR	< 1	2	0	0	3
MCP	258	153	751	1862	3024
MHC	3	1	0	0	4
MHW	2	0	3	0	4
MRI 2D	1	0	0	0	1
PPN 3P, 3S, 4S	11	2	2	4	18
PPN 4P, 5P	2	8	2	13	25
PPN 5S	0	0	0	12	12
SMC 2P, 2S, 3P, 3S, 4S, 5S	96	162	61	300	619
SMC 3D, 3M, 4P, 5P	151	95	35	190	472
SMC 4D, 4M	174	99	35	112	420
SMC 5D, 5M	238	184	38	173	633
WFR 2P, 2S, 3P, 3S, 4S, 5S	3	23	1	40	68
WFR 3D, 3M, 4P, 5P	9	25	0	28	62
WFR 4D, 4M	17	12	0	10	39
WFR 5D, 5M	37	19	< 1	< 1	57
TOTAL	**1002**	**786**	**929**	**2746**	**5464**

Note: Acres may vary slightly during the final layout due to topography, stand condition, and rounding, etc.
1 = Seedling Tree <1" dbh, **2** = Sapling Tree 1 - 6" dbh, **3** = Pole Tree 6 - 11" dbh, **4** = Small Tree 11 - 24"dbh, **5** = Medium/Large Tree >24"dbh,
6 = Multi-layered Tree.
D = Dense Canopy Cover (> 60%), **M** = Moderate Canopy Cover (40 - 59%), **P** = Open Canopy Cover (25 – 39%), **S** = Sparse Canopy Cover (10 – 24%). **AGS** = Annual Grassland, **ASP** = Aspen, **BAR** = Barren, **BBR** = Bitterbrush, **DFR** = Douglas-Fir, **EPN** = Eastside Pine, **JPN** = Jeffrey Pine, **LAC** = Lacustrine, **LPN** = Lodgepole Pine, **MCH** = Mixed Chaparral, **MCP** = Montane Chaparral, **MHC** = Montane Hardwood-Conifer, **MHW** = Montane Hardwood, **MRI** = Montane Riparian, **PGS** = Perennial Grassland, **PPN** = Ponderosa Pine, **RFR** = Red Fir, **SCN** = Subalpine Conifer, **SGB** = Sagebrush,
SMC = Sierra Mixed Conifer, **URB** = Urban, **WFR** = White Fir, **WTM** = Wet Meadow (Mayer and Laudenslayer 1988).

Aquatic design features

A landscape analysis has been completed and a site-specific Riparian Conservation Objective (RCO) analysis demonstrates a need for a reduced width of the ephemeral stream buffers (from 150' to 100' (USDA 2004b, page 42) to address fuels concerns. Project Design Features (PDF's) have been developed to mitigate effects to TES species in the Chip-munk Project (Chapter 2). Full suspension within RCA equipment exclusion zones would be required to reduce the threat of direct mortality to plant and wildlife species within RCAs, as well as to minimize soil disturbance, erosion, stream bank damage, and disturbance to critical wildlife habitat. Limitations on the removal of large trees (greater than 30" dbh) within RCA equipment exclusion zones were cooperative developed by the interdisciplinary team to prevent excessive disturbance and degradation of riparian habitat through the removal, or attempted removal, of large diameter trees.

Design criteria for ground-based operation under both roadside hazard tree and salvage treatment units layout two distinct zones within RCAs, the RCA Buffer and the RCA Equipment Exclusion Zone (Appendix G of USDA 2013c). The RCA Buffer (the wider of these two zones) measures 300, 150, and 100 feet on each side of perennial, intermittent, and ephemeral streams, respectively [note the RCA Buffer on ephemeral streams was reduced from that designated in the SNFPA (from 150 to 100 feet) based on landscape and project specific RCO analyses (USDA 2004b)]. Within the RCA Buffer, equipment is excluded from operating within: 100 feet on each side of all perennial streams and along intermittent streams above 3,500 feet elevation, within 50 feet of intermittent streams below 3,500 feet elevation, and within 25 feet of ephemeral streams (Appendix G of USDA 2013c). Aside from varying with stream type (perennial, intermittent, ephemeral) and elevation (less than 3,500 feet, greater than 3,500 feet), the equipment exclusion zone also varies with slope. That is, on steep slopes (roadside hazard tree, slopes greater than 25 percent; salvage, slopes greater than 35 percent) the Equipment Exclusion Zone width equals the RCA Buffer width (Appendix G of USDA 2013c). Design criteria also delineate two distinct zones within RCAs for skyline logging activities (Appendix G of USDA 2013c), the RCA Buffer and a full suspension zone (note, equipment exclusion zone is not applicable for skyline logging activities). Additional design criteria used to protect RCAs and aquatic species during ground-based operations within the Chip-munk Project include (see Appendix G of Biological Assessment/Evaluation):

- All trees harvested within RCA equipment exclusion zones would require full suspension (drop and leave hazard trees in the RCA equipment exclusion zone if full suspension is not possible);
- For Roadside Hazard Tree units, drop and leave hazard trees 30 inches diameter and greater within the equipment exclusion zone along all perennial streams and along intermittent streams above 3,500 feet elevation;

- For Salvage treatment units, do not harvest trees 30 inches diameter and greater within the equipment exclusion zone along all perennial streams and along intermittent streams above 3,500 feet elevation (drop and leave trees 30 inches diameter and greater within the equipment exclusion zone felled for safety or operability);
- For all ground-based operations, burn pile placement restrictions would apply.
- For Salvage treatments, retain 4-6 of the largest snags per acre in RCA Snag Retention Zones.

Effects Analysis Methodology

Geographic Analysis Areas

The treatment area is defined as the units to be treated, which equals approximately 5,464 acres. For the purpose of this BA/BE, the aquatic and terrestrial analysis area (hereafter analysis area) is defined by the 15 subwatersheds surrounding the treatment area (Figure 12; 41,414 acres on NFS lands). The additional larger land base was delineated based on roads being used for project activities including a 150' buffer on either side of the road and drafting sites (waterholes to draw water from). All potential direct, indirect and cumulative effects discussed, occur within the 41,414 acre analysis area. The direct and indirect effects of each alternative, together with the additive or cumulative effects of each alternative, have been considered in evaluating impacts to TES and TES habitat. This threshold of tolerance will be assessed through determination of whether or not the effects to the species may lead to a trend toward listing under the federal Endangered Species Act. Appendix F of the Chip-munk Biological Assessment/Evaluation (USDA 2013c) provides a summary of pre- and post-fire habitat (CWHR) in the Chip-munk Project analysis area.

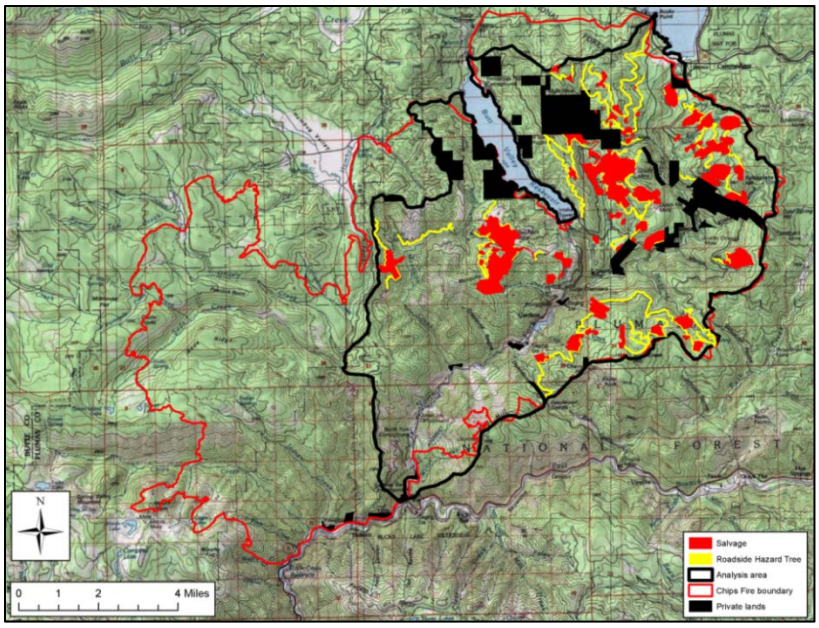


Figure 12. **Chips Fire perimeter, Chip-munk Project treatment units, and aquatic and terrestrial analysis area used to evaluate and disclose the impacts of the Chip-munk Project.**

Specific Assumptions

The following assumptions apply specifically to the BA/BE analysis:

Assumption 1: All standards and guidelines, standard operating procedures (SOPs), project specific design features and mitigations would be fully adhered to and implemented, including the use of the appropriate Limited Operating Periods (LOPs).

Assumption 2: All activities proposed would be completed within approximately three to five years.

Assumption 3: All hardwoods and wildlife inhabited trees (nest trees, roosts, etc.) would be retained unless they pose a safety hazard.

Assumption 4: Analysis assumes occupancy unless project area has been surveyed to protocol and found to be absent of the species.

Assumption 5: Proposed activities have the potential to affect TES species, either directly by the modification or loss of habitat or habitat components, and rarely from direct mortality if nest trees are felled, or indirectly through habitat modification (e.g., changes to canopy cover, age class structure and species composition).

The following assumptions are specific to aquatic wildlife and habitat:

Assumption 6: Aquatic species spend all or significant portions of their life cycles either in or moving through stream and/or riparian habitats.

Assumption 7: Aquatic habitats and associated stream systems can tolerate certain levels of land disturbance. However, widespread or intense land disturbances applied in sensitive areas such as RCAs can substantially impact the immediate area or downstream channel stability and water quality.

Assumption 8: All sub watersheds currently at or predicted to exceed the Threshold of Concern will have the greatest potential for off-site sediment delivery into streams and water bodies.

Assumption 9: Suitable habitat, and associated assumptions, for TES aquatic species is identified for each species in this report.

Assumption 10: Removal of large trees and snags (CWHR size class 5) are the primary cause of disturbance in RCAs during operations, and also are most valuable in regards to coarse woody debris and large down wood recruitment to the stream, and provide some shade (cooler microclimate to stream zone).

Assumption 11: CWHR types in RCA's[3] are equally important in providing large down wood recruitment to the streams, coarse woody debris, and provide some shade and moisture retention

Assumption 12: Areas of low basal area mortality (less than 25 percent) equates to fewer trees meeting the marking guideline compared to areas with higher basal area mortality estimates.

Specific Methodology

The Chip-munk Project was reviewed on the ground, as well as, using aerial photographs, digital orthophoto quadrangles (DOQs), vegetation layer spatial datasets, species specific spatial datasets and known information to help determine suitable habitat for TES. In the field, areas identified as suitable habitat in the analysis area were surveyed. Species nest sites and locations were recorded using Global Positioning System (GPS) and incorporated into spatial datasets. For the analysis of effects, changes to suitable habitat and impacts to management units (i.e., protected activity centers, PACs; nesting territories, etc.) were determined using a spatial dataset of the vegetation layer combined with type of treatments (e.g. mechanical, skyline, salvage, roadside hazard tree removal).

All vegetation information is displayed using the California Wildlife Habitat Relationships (CWHR) vegetation codes and serves as the baseline acres for analyses (Appendix B of USDA 2013c). Forest-wide vegetation typing is updated after fires and forest activities to most accurately represent available habitat types. Vegetation burn severity data, aerial photos, and satellite imagery were used to generate the post-fire CWHR vegetation map used for these analyses. Pre- and post-fire habitat within the Chips Fire boundary is presented in Appendix E of the Chip-munk Biological Assessment/Evaluation (USDA 2013c).

Data Sources

- GIS layers containing the following information: vegetation layer, ownership, aquatic features (streams, springs and lakes, etc.), riparian/aquatic management areas (Riparian Conservation Areas (RCAs), Critical Aquatic Refuges (CARs), and species management layers (e.g., Protected Activity Centers, PACs; Home Range Core Areas, HRCAs), Wild and Scenic and Wild Trout streams, fire severity, CWHR pre- and post-fire vegetation, slope, elevation, gradient, aquatic features.
- Project survey reports and incidental detection records.
- Scientific literature and internal reports.
- Equivalent Road Area (ERAs) as compared to Threshold of Concern (TOC) calculations analyzed at the sub watershed scale.

[3] Analysis revealed a predominance of Conifer (Pines & Firs)/Hardwood forest types within the RCAs, and all forest types were determined to be equally important to aquatic species habitat.

Terrestrial and Aquatic Wildlife Indicators

Direct and Indirect Effects of Roadside Hazard Tree Removal, Timber Salvage Operations, and Re-establishing Forested Conditions

Indicator Measure 1: Acres of suitable habitat modified, lost or fragmented.

Indicator Measure 2: Habitat components modified, lost or fragmented.

Short-term timeframe: 1 year

Long-term timeframe: 25-30 years. This length of time was chosen because numerous factors (e.g., climate change, unforeseeable future projects, demographic changes) make assessment beyond this timeframe speculative**.**

Spatial Boundary: Analysis area.

Methodology: Indicator Measure 1 is comprised of a GIS analysis of the proposed silvicultural treatments in relation to suitable habitat for each species as well as qualitative assessments. Analysis focuses on potential suitable habitat and qualitatively discusses the potential affects to habitat components. Suitable habitat is species specific, for example, goshawk habitat consists of specific nesting and foraging habitat features. Indicator Measure 2 is comprised of a qualitative assessment of snags, structural diversity, down woody debris, prey species and competitors, etc. due to the scarcity of data on these habitat components. We assessed whether Chip-munk Project activities would exceed a species' threshold of tolerance by examining direct and indirect effects of the project on a species basis and coupled these potential effects with species-specific cumulative effects in the analysis area.

Cumulative Effects Analysis

According to the Council on Environmental Quality (CEQ) NEPA regulations, "cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR § 1508.7).

Long-term timeframe: 25-30 years. This length of time was chosen because numerous factors (e.g., climate change, unforeseeable future projects, demographic changes) make assessment beyond this timeframe speculative**.**

Spatial Boundary: Analysis area Figure 12

Terrestrial Wildlife Methodology: In order to understand the contribution of past actions to the cumulative effects of the alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There

are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.

Present and future projects planned that overlap with the analysis area may have cumulative impacts to wildlife, fisheries and amphibians. In this analysis, each present and future project is analyzed by species in order to understand the contribution of present and future projects to the cumulative effects of the alternatives.

Aquatic Wildlife Methodology: The Aquatic Analysis Area is the same as terrestrial wildlife and hydrology analysis area (41,414 acres, 15 subwatersheds, Figure 12). Within each subwatershed in analysis area, past management activities were analyzed to account for the cumulative amount of land disturbance that has occurred within each subwatershed. The project hydrologist completed a Cumulative Watershed Effects (CWE) analysis which Cumulative impacts are addressed using the ERA methodology (USDA 2011a). The watersheds delineated for analysis encompass that portion of the Chips Fire perimeter within which actions are proposed and/or cumulative effects of fire and past harvest with the proposed action are significant. The base GIS layer used to create the project level watersheds was the CalWater 2.2.1 GIS layer from the state of California. The base layer was selected over the PNF corporate layer for two reasons; it is more up to date and it contains the watershed numbering system that the Regional Water Quality boards use (common language). CalWater 2.2.1 GIS layer was modified to create subdivisions (the project analysis watersheds) based on REGION 5 ERA protocols (watersheds optimally are to be between 2000 and 6000 acres). The analysis area includes complete drainage for all proposed treatment units. Total acreage for the analysis sub watersheds is 41,414 acres.

The area of land manipulated by each past management activity was converted to a theoretical area of road surface, resulting in a measure of Equivalent Roaded Acres (ERA). Numeric disturbance coefficients were used to convert these management effects to ERA effects in terms of the pattern and timing of surface runoff. Coefficients vary by management activity, silvicultural prescription, site preparation method, type of equipment utilized, and fireline intensity. Coefficients were also applied to burned areas within the subwatersheds, particularly the 2012 Chips Fire, with assigned coefficients varying based upon the soil burn severity determined in the 2012 assessment for Burned Area Emergency Response (BAER) (USDA 2012b, c).

Dividing the total ERA by the size of the watershed yields the percent of the watershed in a hypothetically roaded condition. ERA model values are used to track general changes to hydrologic function of watersheds in terms of alteration of surface runoff patterns and timing. In this way, ERA values can serve as an index to assess effects on downstream water quality. An increase in ERA for a watershed indicates increased concentration of surface runoff, which could result in detrimental changes to sedimentation rates and stream channel condition that could subsequently have effects on downstream water quality and beneficial uses.

As the amount of disturbance (such as wildfire) or land use increases within a watershed, the susceptibility of that watershed to cumulative watershed effects increases. There is a point where additive or synergistic effects of the land use activities will cause the watershed to become highly susceptible to CWE. Natural watershed sensitivity is an estimation of a watershed's natural ability to absorb disturbance and land use impacts without increasing CWE to unacceptably high levels. Upper limits of watershed "tolerance" to disturbance are estimated for the ERA model and this upper limit is called the Threshold of Concern (TOC).

For additional information on ERA and watershed Threshold of Concern, refer to the Watershed and Soils section of this Environmental Assessment.

The analysis for potential direct, indirect, and cumulative effects to habitat suitability and associated species required consideration of varying spatial scales. For the purpose of this report, the direct and indirect analysis areas are unique to species or groups of species requiring similar habitat features. The scale and location of analysis areas reflect fresh water fish assemblages that require large habitat stream reaches featuring mature, multi-canopy forest cover (stream shading) and diverse habitat components such as down large woody material (shelter). The western pond turtle (*Actinemys marmorata*) is opportunistic and will use varying habitats. Whereas, the Sierra Nevada yellow-legged frog (*Rana sierrae*) and foothill yellow-legged Frog (*Rana boylii)* will use similar habitat conditions but in relatively small areas compared to fish species, increasing its vulnerability to change.

Affected Environment/Environmental Consequences

Affected Environment – Terrestrial

The Chips Fire burned approximately 51,433 acres in the MHRD in a mosaic of intensity through a spectrum that included unburned or very low, low, medium, and high fire intensity. As a result, there are areas where tree mortality is 100 percent while other areas still support a green tree component. Within the boundary of the Plumas National Forest, the Chips Fire left 17 percent (13,101 acres) of forested land in a deforested condition[4], with the possibility of further mortality extending into stands with lower burn severity due to other post-fire stresses such as drought or insect attack. Appendix F of the Chip-munk Biological Assessment/Evaluation (USDA 2013c) provides pre- and post-fire vegetation information currently available within the wildlife analysis area (41,414 acres). All vegetation information is displayed using the CWHR vegetation codes (Appendix D of USDA 2013c). The following summary of Chips Fire effects on forest types in the analysis area is derived from Appendix F of Biological Assessment/Evaluation.

Aspen (ASP, willow, alder) – Aspen habitat was minimally impacted by the fire with 95 percent of available habitat burned at low severity or was not burned (basal area mortality less than 25 percent). The analysis area supports relatively the same amount of aspen habitat that existed pre-fire.

Jeffrey Pine (JPM, ponderosa pine, Coulter pine, sugar pine) – Jeffrey Pine habitat constitutes a little over 1 percent of the analysis area, and (also burned at relatively low severity (82 percent of available habitat), only 7 percent of Jeffrey pine habitat in the analysis area burned at high severity (greater than 75 percent basal area mortality). Ninety-three percent of Jeffrey pine habitat was retained post-fire.

Montane Chaparral (MCP, *Ceanothus*, manzanita, bitter cherry) – High severity fire within the analysis area resulted in approximately 7,972 acres of forest habitat converted to montane chaparral (650 percent increase). The analysis area contains 9,424 acres of montane chaparral habitat.

Montane Harwood-Conifer (MHC, ponderosa pine, Douglas fir, incense cedar) – Although 27 percent of montane hardwood-conifer habit in the analysis area burned at high severity (greater than 75 percent basal area mortality), 60 percent of montane hardwood-conifer habitat burned at low severity or was not burned (basal area mortality less than 25 percent). The analysis area supports relatively the same amount of montane hardwood-conifer that existed pre-fire.

[4] Based upon data received from the Remote Sensing Applications Center (RSAC) at Salt Lake City, Utah. The 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 PNF obtained the GIS data from ftp://fsweb.rsac.fs.fed.us/RAVG/Region5/2012/Chips/.

Montane Hardwood (MHW, canyon live oak, Douglas fir, knobcone pine) – Some montane hardwood burned at high severity (19 percent); however, most montane hardwood habitat (73 percent) was burned at low severity or was not burned (less than 25 percent basal area mortality). The analysis area supports relatively the same amount of montane hardwood that existed pre-fire.

Ponderosa Pine (PPN, white fire, incense cedar, Coulter pine) – Thirty percent of ponderosa pine habitat in the analysis area burned at high severity (greater than 75 percent basal area mortality). Overall, 30 percent of ponderosa pine habitat was lost during the fire. The analysis area supports approximately 481 acres of ponderosa pine habitat.

Sierran Mixed-Conifer (SMC, white fir, Douglas fir, ponderosa pine) – Prior to the Chips Fire, 97 percent of the analysis area was categorized at Sierran mixed-conifer habitat. Although 67 percent of Sierran mixed-conifer habitat burned at low severity or did not burn (less than 25 percent basal area mortality), 22 percent did burn at high severity and now Sierran mixed-conifer habitat comprises only 61 percent of habitat in the analysis area (25,358 acres).

White Fir (WFR, live oak, Jeffrey pine, sugar pine) – Nineteen percent of white fir habitat in the analysis area burned at high severity (greater than 75 percent basal area mortality), while 71 percent burned at low severity or was not burned. The analysis area currently contains 2,252 acres of white fir habitat (513 acres of white fir habitat was lost during the Chips Fire).

Affected Environment – Aquatic

The existing conditions reflect the aggregate impact of prior human actions and natural events that have affected the environment and might contribute to cumulative effects. Clearly, the Chips Fire of 2012 is the event that has had the largest impact on existing watershed condition, as described below. Current conditions in the project analysis watersheds have been impacted to a lesser extent by many anthropogenic actions over the last century—particularly mining and timber harvesting. A detailed description can be found in the Soil and Water Resources section of this chapter.

Environmental Consequences – Terrestrial & Aquatic Species

The fifteen watersheds comprising the project analysis area is roughly 46,500 acres. According to the PNF corporate GIS stream layer, there are approximately 533 miles of stream channel within the analysis watersheds: 326 miles are ephemeral, 150 miles are intermittent and 57 miles are perennial. Ephemeral and intermittent streams are seasonal—surface water is present during some portion of the year but these streams are typically dry by late summer. Ephemeral streams only flow in response to storm events or snowmelt, and do not necessarily flow every year. Intermittent streams are seasonally connected to the underlying water table and may flow during all but the driest months, whereas perennial streams typically flow year round.

Direct effects include immediate changes in habitat conditions and disturbance/ harassment to individuals, including direct mortality, during project activities. It is assumed in this analysis that the Proposed Action would be implemented as stated, in compliance with all rules and regulations governing land management activities, including the use of the appropriate Limited Operating Periods (LOPs). The following Limited Operation Periods (LOPs) would be implemented within ¼ mile of known active nest sites: American Peregrine Falcon, February 1 – August 31; California Spotted Owl: March 1 – August 15, Northern goshawk: February 15 – September 15, Bald eagle: November 1 – August 31; Sierra Nevada yellow-legged frogs: no activity from October 1, or the first wetting rain (more than ¼ inch precipitation), until April 15th within a stream mile of SNYLF's detection (USDA 1988a, as amended by the SNFPA, USDA 2004a,b). Direct disturbance, including mortality to individual animals addressed in this report is highly unlikely, due to survey efforts for selected species, incorporation of LOPs where appropriate, and implementation of Forest standards and guidelines. Indirect effects include effects that occur later in time or beyond the treatment area of the project. Indirect effects also may include effects to a species prey base.

Cumulative effects analysis for ESA compliance includes "those effects of future State or Private activities, not involving Federal activities that are reasonably certain to occur within the action area (aquatic or terrestrial wildlife analysis area) of the Federal action subject to consultation". There are no interrelated or interdependent actions in the Chip-munk and Reforestation Project. Under NEPA, cumulative effects represent the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. There are no connected actions in the Chip-munk Project.

Direct and Indirect Effects of Roadside Hazard Tree Removal, Timber Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measure 1 & 2: Acres of suitable habitat modified, lost or fragmented and Habitat components modified lost or fragmented.

With the implementation of the action alternative, the major potential direct effect is the removal of dead, dying and live (structurally defective) trees and its impact to species associated with snag habitats. Tree removal in the Chip-munk Project would result in the taking of a component or structure (dead/dying tree) that is considered integral for the habitat requirements of certain sensitive species that are present in the terrestrial wildlife analysis area. Although some acres of fire recovery activities (salvage) are proposed in areas that support late-successional forest (Table 59), the proposed action would have a nominal effect on the residual live tree size, canopy cover or live-tree basal area as the project would only remove dead or dying trees (Appendix C of USDA 2013c) . Roadside hazard tree removal activities are proposed throughout the area in some late-successional forest that received torching or localized moderate-high and high severity fire

impacts. A summary of habit forest types (CWHR) in the proposed Chip-munk Project treatment units is provided in Table 59 .

Snags

The loss of snags important for wildlife is expected with logging; however some snag recruitment is expected with the retention of conifers that do not meet the specific probability of mortality guidelines in the project design features (Appendix C of USDA 2013c). Biological Assessment/Evaluation). The net result of snag loss and gain is undetermined. However, project design criteria requires approximately 10 percent (370 acres) of salvage treatment units (3,675 acres) to be designated as snag retention areas, and roadside hazard tree removal and salvage operations are restricted within 950 acres of Riparian Conservation Area (RCAs; total RCA acres = 1,464; equipment exclusion and full suspension zone acres = 950; see Appendix B of USDA 2013c for RCA and equipment exclusion and full suspension zone widths). Based on project design criteria, we do not anticipate significant salvage activities in RCA equipment exclusion and full suspension zones for tractor units. These design criteria would maintain snags on the landscape at levels consistent with current direction (USDA 2004b). Primary selection criteria for snag retention areas are near late-seral habitat adjacent to the treatment units. No harvesting would occur within snag retention areas, but incidental removal of snags within snag retention areas may occur to allow for operability and safety. Snags removed for operability or safety within snag retention areas would be replaced with a snag of the same size and species.

Water Resources

Roadside hazard tree removal and salvage operations would be mitigated by Project Design Features (PDFs, Chapter 2, Appendix G of USDA 2013c), e.g., equipment exclusion (EEZ) and full suspension zones (FSZ). Hazard tree removal and salvage are restricted within 950 acres of RCAs, (total RCA acres = 1,464; equipment exclusion and full suspension zone acres = 950; see Appendix G of USDA 2013c for RCA and equipment exclusion and full suspension zone widths). If trees within the EEZ or FSZ cannot be fully suspended then trees will be felled and left, or left standing if not a hazard tree. Coupling full suspension along stream with retention of trees greater than or equal to 30 inches diameter at breast height in EZZ and FSZ would reduce disturbed ground and the potential for erosion and sedimentation into the water ways.

Best Management Practices

As described in the Soil and Water section of this chapter, areas of the Chips Fire that burned at high or moderate soil burn severity are susceptible to accelerated erosion during intense precipitation or snowmelt events over the next several years. Accelerated erosion is not expected to be of a size or pattern that would deliver sediment to streams that would impact beneficial uses of water. In addition to BMPs, the chief design feature for the Chip-munk Project to prevent sediment delivery is that slash and debris generated by harvest of fire-killed trees would be left on

the ground, resulting in an increase of soil cover within treated units over the level of cover that existed pre-harvest.

Water Drafting

Three water drafting sites (sources of water for pump trucks that add water to haul roads to abate dust and stabilize the road surface) would be constructed or reconstructed under the Proposed Action. Per BMP 2.5 (USDA 2012d), this work would occur so that water would be pumped outside of the normally flowing stream channel, preventing impacts to in-stream flow and assuring that disturbance associated with pumping or maintenance of the water source would not cause turbidity in the stream. Additionally, the short access routes to the water sources from NFS roads for water trucks would be reconstructed to improve drainage and prevent sediment delivery from the access route to the stream. These actions would improve long-term protection of water quality at these drafting sites. Specific guidelines will be followed in a water drafting plan.

Aquatic Habitat Alteration

Habitat alterations may cause behavior changes to aquatic species. Many reptiles and amphibians are dependent on terrestrial habitats in riparian zones as they are on the aquatic habitats for some parts of their life cycles. Riparian corridors are important linkages to other streams or wetlands to complete species life cycles. Vital activities requiring terrestrial riparian habitat are nesting, hibernating, aestivating, foraging, adult residency, and terrestrial dispersal. Unaltered terrestrial linkages within the riparian buffers will provide aquatic stability decreasing amphibian and reptile changes in behavior. Project treatments were used to measure the habitat alterations which may affect behavior changes in aquatic and terrestrial species. Acres of RCA's proposed in treatments are presented in Table 60.

Large Woody Debris

The effects of losses in Large Woody Debris (LWD) would be mitigated for by the retention of logs as described in the 2004 SNFPA FSEIS ROD standards and guidelines, where available. Table 61 shows the approximate number of down logs by average dbh needed to meet 10-15 tons/acre referred to in the 2004 SNFPA FSEIS ROD. These retention standards were designed to meet the needs of wildlife. There is also a potential for future recruitment of LWD due to snags falling. The proposed action calls for the retention of LWD at 2004 SNFPA FSEIS ROD standards and guidelines level, where available (10-15 tons/acre ≥12" diameter). Specifically, where there are large ≥30" dbh down logs, these should be avoided during treatments. In areas considered deficient in LWD, cull logs would be left at the stump, where possible.

Reforestation

The action alternative includes reforestation of conifers to promote the reestablishment and development of a mature, closed canopy, conifer forest. The Proposed Action proposes to reforest up to 3,675 acres in salvage treatment units with the proper conifer seedling mix (e.g., ponderosa

pine, Jeffrey pine, and rust resistant sugar pine). Reforestation will convert Montane Chaparral vegetation type to Sierra Mixed Conifer types 1 and 2 (shrub/seedling/sapling) after reforestation, where conifer seedlings are competing with brush for the next 2 to 5 decades.

Table 60. Chip-munk Project treatment acres in roadside hazard tree and salvage (interior and salvage-roadside) units, and the amount of Riparian Conservation Area (RCA) acres in each treatment type (all acres are approximate and National Forest System lands only).

	Acres		
Unit Type	**Skyline**	**Tractor**	**Total**
Roadside	691	583	**1274**
Salvage	358	1725	**2082**
Salvage - Roadside	144	499	**644**
Non-RCA Total	**1193**	**2807**	**4000**
RCA - Roadside	311	203	**514**
RCA - Salvage	345	404	**749**
RCA - Salvage - Roadside	82	118	**200**
RCA Total	**738**	**726**	**1464**
Grand Total	**1931**	**3533**	**5464**

Table 61. Approximate number of down logs by average dbh needed to meet 10-15 tons/acre.

Average dbh (inches)	Number of down logs
12	24 to 30
14	18 to 24
16	14 to 20
18	10 to 14
20	8 to 12
22	6 to 8
24	4 to 6
26	4 to 6
28	4 to 6
30	4 to 6
> 30	2 to 4

Cumulative Effects

The existing condition reflects the landscape changes from all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on TES habitat from the existing condition within the terrestrial wildlife analysis areas.

Present or Reasonably Foreseeable Future Activities

Present and future projects planned that overlap with the terrestrial wildlife analysis area may have cumulative impacts to wildlife, fisheries and amphibians. The analysis area is guided by direction described for the other Sierra Nevada National Forests (USDA 2004a).

The PNF woodcutting and Christmas tree cutting programs are ongoing and are expected to continue. These programs allow the public to purchase a permit to remove firewood and Christmas trees (Sapling tree 1 - 6" dbh) from National Forest System lands. The Chip-munk Project area, as well as the analysis area is open to woodcutting and, a large portion, to Christmas tree cutting. Snags and down logs would continue to be removed, resulting in the cumulative loss of these habitat components across the landscape. Loss of these habitat features may indirectly impact wildlife species. Uncontrolled public use, especially during the breeding season, also may cause disturbance to species nesting and denning nearby. However, snags are recruited annually from live trees through natural processes at a rate that may sustain this loss within the analysis area. Further, snag and log removal is along, or within a short distance from, open roads; and woodcutting impacts in the analysis area are expected to be minimal due to the topography (steep slopes low accessibility) and the abundance of snags post-fire. The past and future effect of these actions has and would be to shift forest successional stages to somewhat earlier stages, while generally retaining continuous forest cover.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and after fire suppression by PG&E to protect critical electrical power infrastructure.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area and proposes to remove danger trees (1,589 acres), salvage (548 acres) and reforestation (3,296 acres). Lassen NF biologists considered the cumulative effects of both the Chip-munk and Poker Chip Projects, among others, in their analysis of potential environmental impacts of the Poker Chip Project. This

report also considers the Poker Chip project, among others, when analyzing potential environmental effects of the Chip-munk Project.

Most of the recreation use within the wildlife analysis areas consists of dispersed camping, hiking, horseback riding, aquatic activities, hunting, fishing, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. These activities are expected to continue at the current rate, and such activities would have minimal effect on the terrestrial and aquatic species in the analysis areas.

In this analysis, each present and future project is analyzed by species in order to understand the contribution of present and future projects to the cumulative effects of the alternatives.

Alternative B – No-action Alternative

Direct and Indirect Effects of Mechanical Treatments

Indicator Measure 1 & 2: Acres of suitable habitat modified, lost or fragmented and Habitat components modified, lost or fragmented.

No direct effects (disturbance or habitat changes) on TES species are expected to result from the No-action Alternative. Potential indirect effects relate to the long-term effects on stand structures, riparian areas and the increased possibility of large stand-replacing wildfire due to implementing the No-action Alternative. The effects of a large stand-replacing wildfire are speculative, but a worst case situation of a high intensity, wind driven fire could result in the direct loss of goshawk and spotted owl nesting sites, elimination of large patches of mid and late seral habitat, as well as alteration of riparian zones with potential increases in soil erosion above normal levels. Direct mortality of wildlife would occur with a large stand-replacing fire, but the magnitude of this mortality is unknown. Large fires create large-scale habitat fragmentation across landscapes that may remove suitable habitat, isolate habitat parcels, and/or creates large openings that could deter occupancy or immigration by some species. Alternative B does not move the habitat in a direction to reduce the threat of large stand-replacing fires.

Degraded conditions within watersheds as a result of the fires would continue. Post-fire (0-5 years) sediment loading to aquatic habitats would be higher than pre-fire levels because of the decrease in ground cover and bank stability provided by live vegetation and the resulting increase in soil movement. Sediment inputs should decrease over time as groundcover increases, vegetation re-establishes, and stream banks stabilize.

Cumulative Effects

The No-action Alternative would not provide any long-term protection from large stand-replacing fires for existing wildlife habitat present in the Chip-munk Project area. There would be no actions taken that would reduce the risk of high intensity wildfire. Total wildfire acres and high intensity wildfire acres are anticipated to increase from current levels under this alternative, based

on analysis conducted in SNFPA (USDA 2001), which could lead to further reduction of wildlife habitat compared to the existing condition within the analysis area.

Affected Environment & Environmental Consequences for Terrestrial and Aquatic Sensitive Species

Western bumble bee (*Bombus occidentalis*)

Population Status

Historically, *Bombus occidentalis* was one of the most broadly distributed bumble bee species in North America, distributed along the Pacific Coast and westward from Alaska to the Colorado Rocky Mountains (Thorp and Shepard 2005, Cameron et al. 2011, Koch and Williams 2012). *B. occidentalis* currently occurs in California and all adjacent states, but is experiencing severe declines in distribution and abundance due to a variety of factors including diseases and loss of genetic diversity (Tommasi et al. 2004, Cameron et al. 2011, Koch and Williams 2012). Collection records provide the best available data on *B. occidentalis* distribution in the Sierra Nevada, and 22 percent of records (N = 94) from the Pacific Southwest Region were collected on the PNF (Hatfield 2012). Although the general distribution trend is steeply downward, especially in the west coast states, some isolated populations in Oregon and the Rocky Mountains appear stable (Rao et al. 2011, Koch and Williams 2012). The overall status of populations in the west is largely dependent on geographic region: populations west of the Cascade and Sierra Nevada mountains are experiencing dire circumstances with steeply declining numbers, while those to the east of this dividing line are more secure with relatively unchanged population sizes. The reasons for these differences are not known.

B. occidentalis populations and their habitats are threatened by diverse factors, including but not limited to habitat loss and fragmentation, contaminants, parasites, and habitat alteration resulting from fire suppression. Habitat alteration (e.g., agricultural and urban development) may fragment or reduce the availability of flowers that produce nectar and pollen bumble bees require, and habitat alteration also may decrease the number of abandoned rodent burrows that provide nest and hibernation sites for queens. Invasive species also are impacting *B. occidentalis*, as bumble bees introduced from Europe for commercial pollination apparently carried a microsporidian parasite, *Nosema bombi*, which has been introduced into and impacted native bumble bee populations (Cameron et al. 2011). Exposure to organophosphate, carbamate, pyrethroid and particularly neonicotinoid insecticides has recently been identified as a major contributor to the decline of many pollinating bees, including honey bees and bumble bees (Henry et al. 2012, Hopwood et al. 2012). Further, fire suppression in many systems has permitted native conifers to encroach upon meadows, which decreases foraging and nesting habitat.

Affected Environment – Western bumble bee

Habitat Requirements

The western bumble bee is currently managed as a USDA Forest Service sensitive species in accordance with the proposed USFS Region 5 2013 update. Queens overwinter in the ground in abandoned rodent (i.e. mouse, chipmunk or vole) nests at depths from 6-18 inches and typically emerge about mid-March (Heinrich 1979). The queen then lays fertilized eggs and nurtures a new generation, and individuals emerging from fertilized eggs will become workers that reach peak abundance during July and August (Heinrich 1979). Foraging individuals are largely absent by the end of September, and those that emerge from unfertilized eggs become males, which do not forage and only serve the function of reproducing with newly emerged queens (Heinrich 1979). Queens produce between fifty to hundreds of individuals annually, depending on the quantity and quality of flowers available. When the colony no longer produces workers, the old queen will eventually die and newly emerged queens will mate with males and then disperse to found new colonies (Heinrich 1979). During these dispersal flights, which may last two weeks, new queens may make several stops to examine the ground for a suitable burrow. Mikkola (1984) reported that bumble bees may forage up to a distance of 80 km from the nest in search of food.

Unlike all other bees, bumble bees are large enough to be capable of thermoregulation, which allow them to maintain their foraging activities for longer periods of the day, but also to occupy regions with more extreme latitudes and temperatures compared to other bees (Heinrich 1979). Bumble bees may continue to forage when temperatures are below freezing even in inclement weather (Heinrich 1979). Queens end the year by locating a sheltering burrow, where they may spend the winter months under cover. Where nesting habitat is scarce, bumble bee species having queens that emerge early (mid-March) in the season like *B. vosnesenskii* which co-occurs with the later emerging *B. occidentalis*, may be able to monopolize available nest sites and reduce the chances of success for bumble bee species emerging later.

Western bumble bees have a short proboscis or tongue length relative to other co-occurring bumble bee species, which restricts nectar gathering to flowers with short corolla lengths and limits the variety of flower species it is able to exploit. Western bumble bees have been observed taking nectar from a variety of flowering plants, including: *Aster* spp., *Brassica* spp., *Centaurea* spp., *Cimicifuga arizonica, Corydalis caseana, Chrysothamnus* spp., *Cirsium* spp., *Cosmos* spp., *Dahlia* spp., *Delphinium nuttallianum, Erica carnea, Erythronium grandiflorum, Foeniculum* spp., *Gaultheria shallon, Geranium* spp., *Gladiolus* spp., *Grindelia* spp., *Haplopappus* spp., *Hedysarum alpinum, Hypochoeris* spp., *Ipomopsis aggregata, Lathyrus* spp., *Linaria vulgaris, Lotus* spp., *Lupinus monticola, Mentha* spp., *Medicago* spp., *Melilotus* spp., *Mertensia ciliata, Monardella* spp., *Nama* spp., *Origanum* spp., *Orthocarpus* spp., *Pedicularis capitata, P. kanei,* and *P. langsdorfii, P. groenlandica, Penstemon procerus, Phacelia* spp., *Prunus* spp., *Raphanus* spp., *Rhododendron* spp., *Salix* spp., *Salvia* spp., *Solidago* spp., *Symphoricarpos* spp., *Tanacetum*

spp., *Taraxacum* spp., *Trifolium dasyphyllum, Trichostema* spp., *Trifolium* spp. and *Zea* spp. (Evans et al. 2008).

Analysis Area Surveys

Surveys for *B. occidentalis* have not been conducted in the analysis area. However, botanical surveys across the Chips Fire burn area and analysis area routinely reported numerous occurrences of flowering plant species (listed above) known to be used by *B. occidentalis* (see Chip-munk Project botany specialist report, Mt. Hough RD).

Environmental Consequences – Western bumble bee

Action Alternative (Alternative A)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measure 1: Acres of suitable habitat modified, lost or fragmented.

Although potential direct effects on *B. occidentalis* include mortality of individuals or entire nesting colonies, it is difficult to precisely quantify the risk of and occurrence of such events for this species. We therefore focused on three management questions regarding *B. occidentalis* while designing and evaluating potential environmental consequences of the Chip-munk Project:

1. Do bumble bees have continuous access to flowering plants from spring through autumn?
2. Does adequate habitat for nesting and overwintering sites exist (undisturbed areas with logs and clumps of grass)?
3. Are floral resources and nesting habitat fragmented or isolated in distribution? (e.g., is nesting habitat in close proximity to foraging habitat?).

Flowering plant species (nectar sources) known to be used by *B. occidentalis* occur throughout the analysis area (see Chip-munk Project botany specialist report). Ground disturbing activities associated with the Chip-munk Project likely will reduce foraging opportunities for *B. occidentalis* in the project footprint (treatment units) through trampling; however, this reduction in foraging habitat likely will be ephemeral as flowering plants will sprout and regenerate post-project. Ground disturbing activities also may destroy suitable nesting and overwintering sites for *B. occidentalis* within treatment units. However, snag retention areas within salvage treatment units (365 acres) and equipment exclusion zones within RCAs (greater than 950acres) will not experience ground disturbing activities and will provide foraging, nesting, and over wintering opportunities throughout the Chip-munk Project area. Further, snag retention areas and RCA equipment exclusion zones will help mediate any spatial fragmentation in flowering plant availability that may occur during the project.

Indicator Measure 2: Habitat components modified, lost or fragmented.

Habitat Components

As previously noted, ground disturbing activities associated with the Chip-munk Project may reduce available nectar sources and nesting and overwintering sites (e.g., rodent burrows) for *B. occidentalis* through trampling. However, the Chips Fire created abundant opportunities for herbaceous flowering plants to sprout or regenerate by reducing canopy cover and competition for resources. Thus, post-fire conditions will likely stimulate herbaceous plant germination and growth, offering numerous foraging opportunities for *B. occidentalis* across the landscape compared to pre-fire condition. Although ground disturbing activities likely will trample some nectar sources that could be utilized by *B. occidentalis*, ground disturbing activities also likely will promote germination of flowering plants immediately post-project as salvage activities will disturb the seed bank, and promote germination.

Throughout the project, both spatially and temporally, there will be habitat refugia for *B. occidentalis* via snag retention areas and RCA equipment exclusion zones. Snag retention areas will not be entered during project operations, and RCA equipment exclusion zones will receive minimal disturbance during the project. As neither area will experience significant ground disturbing activity, we expect suitable nesting and overwintering sites to persist throughout the length of the project. Further, given the linear nature of RCAs, equipment exclusion zones within RCAs also serve as habitat corridors for *B. occidentalis*, providing habitat connectivity between and among foraging and nesting habitat.

Cumulative Effects

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on TES habitat from the existing condition within the analysis area.

Cumulative effects on *B. occidentalis* could occur with the incremental loss of the quantity and/or quality of habitat for this species. Overall, increases in urbanization, increases in recreational use of National Forest System lands, and the utilization of natural resources on state, private and federal lands may contribute to habitat loss for this species.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and after fire suppression by PG&E to protect critical electrical power infrastructure.

The PG&E Right of Way Salvage Timber Project will potentially impact 250 acres of suitable foraging and nesting habitat for *B. occidentalis*; however this will occur in an area that has

already been highly disturbed by right-of-way maintenance and felling of hazards trees during suppression of the Chips fire.

The Lassen National Forest proposed the Poker Chip Project (salvage, danger tree and reforestation treatments, USDA 2013i) which overlaps the Chip-munk Project analysis area. Snag retention and equipment exclusion zones in the Poker Chip Project area will provide foraging, nesting, and over wintering opportunities throughout the project area and help mediate any spatial fragmentation in flowering plant availability that may occur during the project.

The Chip-munk Project treatment units, as well as much of the analysis area are open to woodcutting and, a large portion also is open to Christmas tree cutting. The woodcutting program would continue to remove snags and down logs, resulting in the cumulative loss of these habitat components across the landscape. Loss of these habitat features may indirectly impact nesting and wintering site availability (i.e., rodent burrows). Uncontrolled public use, especially during the nesting season, may cause disturbance to nesting colonies. However, *B. occidentalis* colonies are capable of deterring people and other animals from trampling the nest by repeatedly stinging them.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities would have nominal effect on *B. occidentalis* in the analysis area.

Most recreation use in the wildlife analysis areas consists of camping, hiking, aquatic activities, horseback riding, hunting, fishing, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. Recreational use is expected to continue at the current rate. These activities are expected to have a nominal effect on *B. occidentalis*.

No Action Alternative (Alternative B)

Direct and Indirect Effects of No Action Alternative

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

There would be no direct effects on B. occidentalis or its habitat, as no activities would occur that would cause disturbance to nesting or foraging bees, nor any impacts to the existing habitat conditions.

Cumulative Effects

Cumulative effects on *B. occidentalis* under the no action alternative mirror those described above for the proposed action.

Determinations for All Alternatives – Western bumble bee

Action Alternative

It is our determination that the Chip-munk may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for *B. occidentalis*.

No-action Alternative

It is our determination that not implementing the Chip-munk Project (Alternative B) will not affect *B. occidentalis*.

Northern Goshawk (*Accipiter gentilis*)

Affected Environment – Northern Goshawk

Population Status

The latest published information regarding the goshawk, in terms of Sierra Nevada distribution, population and habitat trends, and species requirements can be found within SNFPA FEIS (Chapter 3, Part 4.4.2.2), and in Chapter 3.2.2.4 of the SNFPA FSEIS 2004. A total of 588 northern goshawk-breeding territories have been reported from Sierra Nevada National Forests. In 2000, there were approximately 75 Northern Goshawk nesting territories or PACs on PNF (USDA 2001b), but by the end of 2012, this number had grown to 114 goshawk PACs on the Forest. This is approximately 28 percent of the total nesting goshawks within the Sierra Nevada. These numbers represent goshawks that have been found as a result of both individual project inventories to standardized protocols, as well as nest locations found by incidental methods. The increase in the number of goshawk PACs from 2000 to 2012 is likely the result of increased survey effort during this period.

The PNF LRMP EIS stated that the PNF has the capacity for 100 goshawk pairs (USDA 1988b). The 1988 PNF LRMP calls for a network of 60 nesting territories to provide for the viability of the goshawk. It is uncertain as to whether this figure is accurate; the Forest began delineating goshawk territories prior to implementation of SNFPA, and currently establishes 200 acre PACs for all newly discovered goshawk breeding sites (USDA 2004b). The current number of goshawk PACs on the Forest (N=165) exceeds the minimum objectives by more than double, and the

predicted capacity of PACs (N=100) by 65. Thus, it is believed that current density of goshawk territories on the Forest is adequate to maintain goshawk population viability. Population trends for Northern Goshawks in the Sierra Nevada are unknown, although some speculate that numbers are declining due to habitat reductions and loss of territories to timber harvest (Bloom et al. 1986). Based on several studies (Bloom et al., 1986, Reynolds et al. 1994, Kennedy 1997, Squires and Reynolds 1997, Smallwood 1998, DeStefano 1998) there is concern that goshawk populations and reproduction may be declining in California and throughout North America due to changes in the amount and distribution of habitat or reductions in habitat quality. In-house surveys on the Mt. Hough RD (1998-2002) indicated that nesting occurred at approximately 36 percent of monitored sites annually (NRM 2013). During 2004-2007, the mean number of offspring produced during 62 nesting attempts on the PNF ranged between 1.1-1.9 offspring/nest (Dunk et al. 2011). Considered as a whole, these data indicate that the goshawk population on the PNF appears relatively stable.

Habitat Requirements

The Northern Goshawk is currently being managed under the PNF LRMP guidelines as amended by the SNFPA FSEIS ROD (USDA 2004b), pages 66-67 and Table 2. Habitat requirements for this species can be found within the SNFPA FEIS and is summarized below.

Northern Goshawks require mature conifer and deciduous forest with large trees, snags, downed logs and dense canopy cover for nesting, and appears to prefer more open habitats for foraging (forests with moderately open overstories, open understories interspersed with meadows, brush patches, other natural or artificial openings and riparian areas). Recent studies indicate that goshawks typically select for canopy cover levels greater than 60 percent for nesting (Hall 1984, Richter and Calls 1996, Keane 1997). For purposes of this analysis, the following affected CWHR types provide suitable nesting habitat: Aspen, Douglas-fir, Eastside Pine, Jeffrey Pine, Lodgepole Pine, Montane Hardwood-Conifer, Montane Hardwood, Montane Riparian, Ponderosa Pine, Red Fir, Sierra Mixed Conifer, White Fir, (6, 5D, 5M, 4D, 4M). For purposes of this analysis, the following affected CWHR types provide suitable foraging habitat: Aspen, Douglas-fir, Eastside Pine, Jeffrey Pine, Lodgepole Pine, Montane Hardwood-Conifer, Montane Hardwood, Montane Riparian, Ponderosa Pine, Red Fir, Sierra Mixed Conifer, White Fir, (5P, 4P, 3D, 3M) (SNFPA FEIS Vol3, Chap.3, part 4.4 pg. 116, USDA 2004a).

Moderate-high and high severity wildfire results in long term harmful effects to goshawk habitat due to a reduction in the existing large tree component and dense forested stand structure, as well as a short to long term reductions in availability of structural diversity provided by mature riparian habitat. A foraging goshawk can take advantage of the short term increase in prey availability resulting from the increase in snag and down wood component throughout the burn, especially on edges adjacent to moderate and/or low severity and unburned habitat. Wildfires the size of the Chips Fire usually result in habitat loss and large scale openings, fragmenting suitable

nesting habitat. Approximately 8,445 acres of potentially suitable nesting habitat was rendered unsuitable on National Forest Lands as a result of the stand replacing wildfire based on the CWHR vegetation layer (Table 62).

Analysis Area Surveys

Northern Goshawk surveys were recently conducted within the terrestrial wildlife analysis area (2009-2010). These surveys were implemented as part of the planning process for an unrelated project that partially overlaps the Chip-munk Project analysis area, 18,563 survey acres overlap the analysis area (41,414 acres). Surveys followed the Forest Service two-year protocol standards (USDA 2000b) and were conducted in apparently suitable Northern Goshawk habitat (delineated via Forest vegetation GIS data). There are three Northern Goshawk PACs within the analysis area (Figure 13). Two nests (Clear Creek and Ohio Valley PACs) were located during goshawk survey efforts in 2010. Prior survey efforts on the Mt. Hough RD (1998-2002) indicated that nesting occurred at approximately 36 percent of monitored sites annually (NRM 2013).

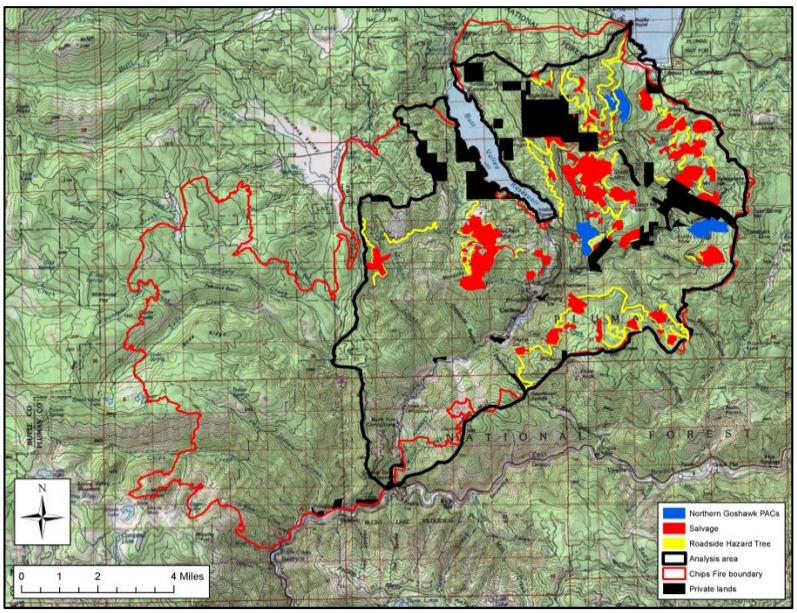


Figure 13. **Chips Fire perimeter, Northern Goshawk Protected Activity Centers (PACs), Chip-munk Project treatment units and analysis area.**

Environmental Consequences – Northern Goshawk

Action Alternative (Alternative A)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measure 1: Acres of suitable habitat modified, lost or fragmented.

Analysis Area

Potential direct effects on the Northern Goshawk may result from the modification or loss of habitat or habitat components, and rarely from direct mortality if nest trees are felled. The proposed action would not cut or remove nest trees, nor would salvage operations occur within goshawk PACs. Roadside Hazard Tree Removal would occur on 26.9 acres within goshawk PACs. Disturbances associated with logging, temporary road construction, or other associated activities within or adjacent to occupied habitat may disrupt nesting, fledging, and foraging activities (Richardson and Miller 1997). Implementation of Limited Operating Periods (LOPs) around goshawk nesting territories would ameliorate potentially disturbing effects associated with project activities.

Table 62. Pre- and post-fire acres of potentially suitable Northern Goshawk foraging and nesting habitat (California Wildlife Habitat Relationships, CWHR types, in four basal area mortality categories) in the Chip-munk Project analysis area (41,414 acres) and treatment Units (all acres are approximate and National Forest System lands only).

		categories					Acres in Chip-munk treatment unit		
CWHR	Pre-fire acres	0-25%	25-50%	50-75%	75-100%	Post-fire acres in analysis area (exisiting condition)	Riparian Conservation Areas	Roadside Hazard Tree	Salvage
FORAGING HABITAT									
ASP 3M	9.6	9.6				9.6			
ASP 4P						0.7			
JPN 4P	76.6	75.0	1.5	0.0	0.1	75.0			
JPN 5P	31.5	31.5				31.5			
MHC 3D	141.6	54.5	10.9	10.0	66.2	54.5			
MHC 3M	72.8	61.5	3.7	3.4	4.3	61.5			
MHC 4P	277.4	82.6	15.4	15.2	164.2	200.4			
MHC 5P	82.1	0.2	4.0	5.9	72.0	24.8			
MHW 3D	216.8	179.0	7.1	3.3	27.4	179.0			
MHW 3M	83.3	18.7	6.8	10.7	47.0	18.7			
MHW 4P						2.4			
PPN 3M	25.6	9.8	1.4	4.1	10.3	9.8			
PPN 4P	146.0	32.4	13.5	16.8	83.2	32.6	1.9	1.1	1.4
PPN 5P	160.3	111.5	10.9	11.9	26.0	111.5	10.6	8.5	1.7
SMC 3D	195.8	136.3	11.8	8.6	39.0	136.3	2.0	0.0	6.3
SMC 3M	843.5	316.6	54.6	52.5	419.8	316.6	5.2	2.2	19.9
SMC 4P	3286.4	2047.9	245.0	207.0	786.6	2615.1	53.4	85.6	110.9
SMC 5P	963.8	675.1	67.1	50.3	171.3	1514.7	48.6	87.9	49.6
WFR 3D	119.7	71.8	5.4	3.2	39.3	71.6	0.0	0.0	0.0
WFR 3M	97.1	84.5	3.8	2.3	6.5	84.5	0.4	0.3	0.2
WFR 4P	514.6	371.6	45.0	37.5	60.6	433.9	24.6	19.9	12.2
WFR 5P	32.8	29.8	2.2	0.6	0.2	59.6	2.1	0.6	1.4
Subtotal foraging habitat	**7377.6**	**4399.9**	**510.2**	**443.4**	**2024.1**	**6044.4 #**	**148.8**	**206.3**	**203.5**
NESTING HABITAT									
ASP 4D	89.8	87.7	0.6	0.0	1.5	87.7			
ASP 4M	12.1	12.1				12.1			
MHC 4D	690.0	519.1	48.7	38.3	84.0	519.0			
MHC 4M	160.5	73.1	15.5	16.0	55.9	73.1			
MHC 5D	231.6	191.6	11.8	8.7	19.4	191.6			
MHC 5M	35.3	35.2	0.1			35.2			
MHW 4D	56.8	54.5	1.4	0.5	0.5	54.5			
MHW 4M	19.0	18.5	0.5			18.5			
PPN 4D	14.3	13.8	0.2	0.0	0.2	13.8			
PPN 4M	11.7	11.7	0.0			11.7			
SMC 4D	2992.5	2356.9	128.2	93.9	413.4	2356.5	29.1	17.1	45.5
SMC 4M	7357.0	5112.5	439.2	361.1	1444.3	5112.1	72.2	105.4	150.4
SMC 5D	6252.1	4582.0	354.5	255.7	1060.0	4582.0	32.1	47.1	42.3
SMC 5M	8262.5	5197.0	485.1	391.2	2189.1	5196.7	152.2	110.4	248.5
WFR 4D	365.9	272.2	17.7	17.1	58.9	272.2	1.6	8.1	11.8
WFR 4M	582.6	352.7	44.6	34.7	150.5	352.7	4.1	2.2	11.0
WFR 5D	222.5	185.1	6.2	4.5	26.7	185.1	5.0	0.0	5.6
WFR 5M	658.3	495.3	23.6	17.4	122.0	495.2	15.1	0.8	30.6
Subtotal nesting habitat	**28014.6**	**19571.1**	**1578.0**	**1239.2**	**5626.3**	**19569.7 #**	**311.3**	**291.2**	**545.7**

3 = Pole Tree 6 - 11" dbh, 4 = Small Tree 11 - 24"dbh, 5 = Medium/Large Tree >24"dbh, 6 = Multi-layered Tree. D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 - 39%).

Based on the vegetation layer and the CWHR model, about 15 percent (6,044 acres) of the analysis area on NFS lands may be considered suitable goshawk foraging habitat (3M, 3D, 4P, 5P) and about 47 percent (19,570 acres) may be considered suitable goshawk nesting habitat (4M, 4D, 5M, 5D; Table 62; Appendix F of USDA 2013c). The amount of goshawk habitat that would potentially be impacted by the Chip-munk Project under the proposed action would be minimal (treatment units overlap 3 percent of available nesting and roosting habitat in the analysis area),

compared to goshawk habitat degradation and loss that occurred during the Chips Fire (18 percent reduction in foraging habitat and 30 percent reduction in nesting habitat (Table 62). Of the 1,707 acres of potentially suitable goshawk habitat in Chip-munk Project treatment units, 56 percent are in Riparian Conservation Areas (RCAs) or are within roadside hazard units (i.e., no salvage will occur). Roadside hazard tree removal and salvage operations are restricted within 950 acres of RCAs, total RCA acres = 1,464; equipment exclusion and full suspension zone acres = 950; Table 3 (see Appendix G of USDA 2013c for RCA and equipment exclusion and full suspension zone widths). Based on these project design criteria, we do not anticipate significant salvage activities in RCA equipment exclusion and full suspension zones for tractor units. Further, project marking guidelines (Appendix C of USDA 2013c) indicate only dead and dying trees will be removed, thus impact to live tree components of goshawk habitat will be nominal.

The proposed action includes reforestation of conifers to promote the reestablishment and development of a mature, closed canopy, conifer forest. The action alternative proposes to reforest approximately 3,675 acres, with a mix of pine, Douglas-fir and incense cedar seedlings. Montane Chaparral vegetation in reforestation patches would be converted to Sierra Mixed Conifer types 1 and 2 (shrub/seedling/sapling) after reforestation, when conifer seedlings would be competing with brush for the next 2 to 5 decades. This would potentially improve foraging habitat and promote and accelerate stand development for future nesting opportunities.

Indicator Measure 2: Habitat components modified, lost or fragmented.

Habitat Components

Alternative A would maintain and/or improve large down woody debris and/or snags, by retaining 10-15 tons/acre in the largest logs (large down woody debris) and snags in a combination of patches and individual trees across the Chip-munk Project, so as to average 3 of the largest snags per acre for wildlife, including goshawks and their prey.

Cumulative Effects

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on TES habitat from the existing condition within the analysis area.

Cumulative effects on the goshawk could occur with the incremental loss of the quantity and/or quality of habitat for this species. Overall, increases in urbanization, increases in recreational use of National Forest System lands, and the utilization of natural resources on state, private and federal lands may contribute to habitat loss for this species. High intensity stand replacement fires have contributed and would continue to contribute to loss of habitat for this species.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area

residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These roadside hazard tree activities would occur in goshawk habitat and PACs. However, implementation of appropriate LOP in goshawk PACs will ameliorate any potential impact of these activities.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and after fire suppression by PG&E to protect critical electrical power infrastructure.

Design features will be developed during the planning process (e.g., Limited Operating Periods) to ensure that the PG&E Right of Way Salvage Timber Project avoids the potential for significant environmental effects or extraordinary circumstances.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments, USDA 2013i,j) which overlaps the Chip-munk Project analysis area. While considering potential future impacts (such as the Chip-munk Project), Lassen NF biologists found that potential adverse effects from the Poker Chip Project would be largely avoided through implementation of appropriate SOPs and LOP.

The woodcutting and Christmas tree cutting programs on the PNF are ongoing programs that have been in existence for years and are expected to continue. The past and future effect of the woodcutting program has and would be to reduce snags, in all forest types (including burned patches), along roadsides throughout much of the analysis area. However, the impacts are expected to be minimal due to the topography (steep), accessibility in the area and the abundance of snags post fire.

The Chip-munk Project treatment units, as well as much of the analysis area are open to woodcutting and, a large portion also is open to Christmas tree cutting. The woodcutting program would continue to remove snags and down logs, resulting in the cumulative loss of these habitat components across the landscape. Aside from removing current and future snags, uncontrolled public use within areas used by Northern Goshawks (e.g., woodcutting), especially during the

nesting season, may cause disturbance to nesting birds. However, snag and log removal through the woodcutting program has a limited spatial impact across the PNF as woodcutting is only permitted along open roads (within 100 feet). Further, woodcutting permits explicitly prohibits cutting snags in which birds are actively nesting, and the rate of natural snag recruitment (via disease and other mortality factors) may abate losses associated with woodcutting within the analysis area. As for the effect of the Christmas tree cutting program, it would slightly shift forest successional stages to somewhat earlier stages, while generally retaining continuous forest cover which would have a nominal effect on the northern goshawk.

Most recreation use in the wildlife analysis areas consists of camping, hiking, aquatic activities, horseback riding, hunting, fishing, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. Recreational use is expected to continue at the current rate. These activities are expected to have a minimal effect on Northern Goshawks and late-seral, closed-canopy coniferous forest habitat in the analysis area.

No Action Alternative (Alternative B)

Direct and Indirect Effects of No Action Alternative

Indicator Measure 1: Acres of suitable habitat modified, lost or fragmented.

Analysis Area

There would be no direct effects on Northern Goshawks or goshawk habitat, as no activities would occur that would cause disturbance to nesting or foraging birds, nor any impacts to the existing habitat conditions. The greatest impact to the goshawk and goshawk habitat within the analysis area was the Chips Fire. Approximately 28 percent (9,779 acres) of suitable goshawk nesting and foraging habitat in the analysis area was lost during the Chips Fire (Table 62). Those portions of the analysis area that burned, and no longer provide suitable goshawk habitat, may remain unsuitable for goshawk nesting for the next 125 years. Intraspecific competition for suitable nesting and foraging habitat outside the burn area also may increase as fire-displaced goshawks from within the burn disperse in search of suitable habitat.

The montane chaparral type that would persist under the no action alternative (Alternative B) provides some low suitability foraging habitat in all seral stages for goshawks (CDFG 2005). Goshawks prey on small mammals as well as catch birds on the wing. They then perch on plucking posts to feed. These plucking posts are usually located within forested stands, providing cover for feeding goshawks. The habitat edge between unburned (or low-intensity burned areas) and high severity burn patches is attractive to a variety of goshawk prey species (i.e., jays, flickers, and ground squirrels), and small patches of forested habitat, or areas that burned at low-intensity, within the burn provide plucking posts for goshawks foraging along these habitat edges.

Indirect effects of no action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could

lead to increased rates of spread resulting in potential loss of suitable goshawk nesting habitat and other important habitat attributes such as large trees, large snags and down woody material. The occurrence of another large fire within the analysis area would further fragment goshawk habitat, which could lead to reduced numbers of Northern Goshawks within the analysis area.

Indicator Measure 2: Habitat components modified, lost or fragmented.

Habitat Components

Under the current PNF woodcutting program, the project area would be open to public woodcutting 12 months a year, limited only by available access. Uncontrolled public use within the areas used by Northern Goshawks, especially during the nesting season, could cause disturbance that could disrupt and preclude successful nesting as well as the continued removal of current and future snags. However, impacts are expected to be minimal due to the topography (steep), accessibility in the area and the abundance of snags post fire.

Cumulative Effects

The No-action Alternative (Alternative B) for the Chip-munk Project would not reduce long-term surface fuel loading that would accumulate over time. Thus there would be increased risk associated with future fire behaviors, including increased fire severity and rate of spread that could reduce suppression capabilities. This could allow for increased risk to habitat recovery by burning up any reforested (naturally or artificially) stands. Thus the No-action alternative does not provide for accelerated recovery and restoration of Northern Goshawk habitat.

Determinations for All Alternatives – Northern Goshawk

Action Alternative

It is our determination that the Chip-munk Project will not affect the Northern goshawk. This determination is based on salvage operations not occurring in PACs, implementation of a limited operating period around known nests, and because retention of 97 percent of available nesting and foraging habitat in the analysis area would provide opportunity for population expansion.

No-action Alternative

It is our determination that not implementing the Chip-munk Project (Alternative B) will not affect the Northern Goshawk. Alternative B is not without risk to Goshawk habitat, as no action would be taken to reduce existing fuel levels, leaving existing habitat vulnerable to large scale fragmentation as a result of wildfire.

Bald Eagle (*Haliaeetus leucocephalus*)

Affected Environment – Bald Eagle

Population Status

The breeding range of Bald Eagles in California is expanding, and the number of eagle pairs that occupy breeding territories also has increased (CDFW 2013). In 1977, Bald Eagles were reported to be nesting in eight counties. By the mid-1990's, Bald Eagles were found nesting in 28 of the State's 58 counties. Today, bald eagles are found in 41 of the State's 58 counties. Reintroduction programs have fostered the establishment of breeding pairs in several of these counties. The annual, nationwide Midwinter Bald Eagle Survey indicates that the State's winter population varies from year to year but is likely stable (greater than 1,000 birds during some winters). From 1986–2005, results indicated a 1.2 percent increase in California's wintering Bald Eagle population. Typically, about half of the State's wintering Bald Eagles are found in the Klamath Basin along the California-Oregon border, the location of the largest winter concentration of Bald Eagles in the lower 48 states. Bald eagles are considered a permanent resident in Plumas County.

Habitat Requirements

The Bald Eagle was federally listed as a threatened species but has subsequently been removed from the list (August 8, 2007; Federal Register Vol.72, No. 130/Monday, July 9, 2007/Rules & Regulations), and is currently managed as a USDA Forest Service sensitive species. There are generally two Bald Eagle habitat management zones (primary and secondary) associated with each eagle nesting territory on the PNF (PNF LRMP, Rx-11, USDA 1988a). Primary zones are delineated to protect known eagle nesting habitat, whereas secondary zones are established to protect possible future nest locations, as well as roosting and perching habitat (detailed descriptions of Bald Eagle management zones on MHRD are provided in the 2006 Antelope Lake Bald Eagle Management Plan, USDA 2006a).

Bald Eagles are piscivorous and generally require large bodies of water or free flowing rivers with abundant fish and adjacent perch sites. In California, Bald Eagles are not known to nest further than two miles from an open water body, (Lehman 1979; USDI 1986). Bald eagles swoop from hunting perches or soaring flight to pluck fish from water. They also forage through scavenging and kleptoparasitism (a behavior in which one animal takes food or inanimate objects from another, Brockman and Barnard 1979). Breeding pairs defend a nesting territory that contains high perch sites, generally in stoutly limbed trees, broken-topped trees, or snags. Nest trees generally are large, old-growth, or dominant live trees with open branch work that provide an unobstructed view of the associated water body (USDI 1986). Bald Eagle nests in California are predominately placed in ponderosa pine (*Pinus ponderosa*, 71 percent of nest trees), with sugar pine (*P. lambertiana*, 16 percent of nest trees), incense cedar (*Calocedrus decurrens*, 5 percent of nest trees), and other coniferous species used to a lesser extent (Lehman 1979). Most nesting eagles on the PNF are associated with reservoirs or lakes. There are two water bodies able

to support nesting Bald Eagles in the analysis area (Butt Valley Reservoir and the North Fork of the Feather River). Lake Almanor is adjacent to the analysis area and also provides breeding habitat for eagles in the analysis area. Bald Eagles roost communally during winter on PNF in dense, sheltered, and remote conifer stands.

Analysis Area Surveys

Bald Eagle nesting territories on the PNF are monitored annually for nesting activity. Five eagle nest territories are in the analysis area, four surrounding Butt Valley Reservoir and one along Lake Almanor (Figure 14). Eagle pairs attempted reproduction in all five nesting territories during 2012, and nestlings were observed in two.

Environmental Consequences – Bald Eagle

Action Alternative (Alternative A)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measure 1: Acres of suitable habitat modified, lost or fragmented.

Analysis Area

High severity wildfire results in long term harmful effects to Bald Eagle habitat due to reduction in existing large tree component and loss of future replacement trees that would serve as nesting and perching structures. The Chips Fire burned in all five eagle territories in the analysis area. On average, 95 percent of nesting territories burned (Table 63), but burn severity was relatively low in eagle territories compared to adjacent areas (Figure 14). The Chips Fire reduced the amount of suitable nesting habitat in eagle nesting territories (primary zones) by 119 acres (range of values across territories = 0-101 acres), and the amount of suitable nesting habitat in secondary management zones by 225 acres (344 total acres of nesting habitat lost (Table 63).

Potential direct effects on the Bald Eagle may result from the modification or loss of habitat or habitat components, and rarely from direct mortality if nest trees are felled. The proposed action would not cut or remove nest trees. Roadside hazard tree removal would occur on 18.6 acres in two eagle nesting territories and on 64.1 acres in three two secondary management zones (Figure 14, Table 64). Salvage operations would occur on 33 acres in two secondary management zones (Figure 14, Table 58). Disturbance associated with logging, temporary road construction, or other associated activities within or adjacent to occupied habitat may disrupt nesting, fledging, and foraging activities (Richardson and Miller 1997). Implementation of appropriate LOPs around eagle nesting territories would ameliorate potentially disturbing effects associated with project activities.

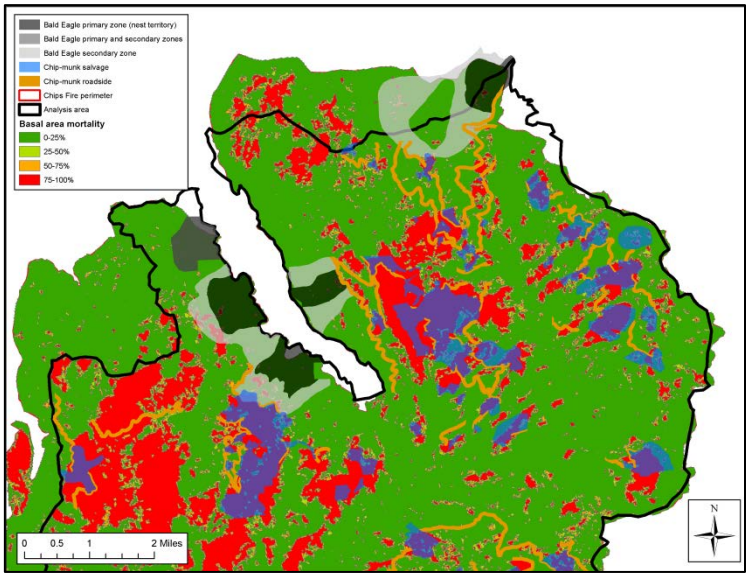


Figure 14. **Basal area mortality within the Chips Fire boundary and near Bald Eagle nesting territories (primary zones) and management areas (secondary zones), Chip-munk Project treatment units.**

Table 63. Habitat composition of Bald Eagle management units in California Wildlife Habitat Relationships size classes and density classes (all acres are approximate and National Forest System lands only.

			Pre-fire acres that burned						post-fire acres					
SITE NAME	Total Acres	Burned Acres	4D	4M	4P	5D	5M	5P	4D	4M	4P	5D	5M	5P
Butt II Bald Eagle Nest Site Area	179	179	5	59	1		115		5	59	0		106	5
Butt II Bald Eagle Primary Use Area	256	256	36	105	1		110		36	104	1		108	2
Butt Valley Dam Bald Eagle Nest Site Area	302	266	72	70	30	53	76		47	64	26	51	76	2
Butt Valley Dam Bald Eagle Primary Use Area	414	414	55	82	89	112	67		54	67	55	87	56	15
Cool Springs Bald Eagle Nest Site Area	356	356	37	114		176	22		37	111	2	173	17	3
Cool Springs Bald Eagle Primary Use Area	271	271	62	118	11	75	0		61	75	18	55	0	3
Gravel Island Bald Eagle Territory	288	249	100	48	4	64	72		71	41	6	62	67	2
Rocky Point Bald Eagle Nest Site Area	292	258	45	129		74	10		19	123	3	71	10	0
Rocky Point Bald Eagle Primary Use Area	849	753	16	249	102	194	131		13	215	101	144	115	1

4 = Small Tree 11 - 24"dbh, 5 = Medium/Large Tree >24"dbh. D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 - 39%).

Table 64. Chip-munk treatment unit acres in Bald Eagle management units (all acres are approximate and National Forest System lands only).

	Acres			
SITE NAME	Eagle management units	Roadside hazard units	Salvage units	Total treatment units
Butt II Bald Eagle primary zone	179	4.9	0	4.9
Butt II Bald Eagle secondary zone	256	4.8	0	4.8
Butt Valley Dam Bald Eagle primary zone	302	16.6	29.7	46.3
Rocky Point Bald Eagle primary zone	292	13.7	0	13.7
Rocky Point Bald Eagle secondary zone	849	42.8	3.3	46.1

Indicator Measure 2: Habitat components modified, lost or fragmented.

Habitat Components

The spatial extent of high severity fire was relatively low in eagle nesting territories (primary management zones) and secondary management zones compared to adjacent areas (Figure 14). Although, large portions of eagle management units burned (95 percent of acres), we did not observe large amounts of eagle nesting habitat destroyed during the Chips Fire (89 percent of suitable nesting habitat in primary and secondary management zones remained post-fire). However, pre-fire snags that provided perching and roosting sites in eagle management zones were rendered no longer suitable by the fire (personal observation, Matthew Johnson). Limited roadside hazard tree removal in two eagle nesting territories (18.6 acres) and three secondary management zones (64.1acres) could remove current or future roosting /perching snags from the landscape. Similarly, salvage operations on 33 acres in two of the secondary management units could remove dead trees that are currently suitable for roosting. However, any currently suitable roost/perch snags removed under the proposed action would likely provide suitable habitat for a limited number of years post-fire, before they decay or are modified through other natural processes (e.g., wind or disease) to an unusable state. Further, the proposed action would maintain snags within treatment units in Bald Eagle management zones in a combination of patches and individual trees, so as to average 3 of the largest snags per acre for wildlife, including eagles. Lastly, the most important habitat element for Bald Eagles in the analysis area is the availability of prey (fish) in Butt Valley Reservoir and Lake Almanor. No treatments in the Chip-munk Project will affect prey availability for Bald Eagles.

Cumulative Effects

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on TES habitat from the existing condition within the analysis area.

Cumulative effects on the Bald Eagles could occur with the incremental loss of the quantity and/or quality of habitat for this species. Overall, increases in urbanization, increases in recreational use of National Forest System lands, and the utilization of natural resources on state, private and federal lands may contribute to habitat loss for this species. High intensity stand replacement fires have contributed and would continue to contribute to loss of habitat for this species.

The woodcutting and Christmas tree cutting programs on the PNF are ongoing programs that have been in existence for years and are expected to continue. The past and future effect of the woodcutting program has and would be to reduce snags, in all forest types (including burned patches), along roadsides throughout much of the analysis area. However, the impacts are expected to be minimal due to the topography (steep), accessibility in the area and the abundance of snags post fire.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Rocky Point Bald Eagle primary and secondary management zones (Salvage/Danger tree acres proposed, primary zone = 25.4/4.3, secondary zone = 38/22.8). Lassen National Forest biologists reported that the Poker Chip Project may affect Bald Eagles and their habitat, but with the lack of severe fire and the implementation of LOPs, the risk to individuals and habitat is very low. The Lassen National Forest considered potential future effects that the Chip-munk Project may have on the Rocky Point eagle management zones in their cumulative effects analysis for the Poker Chip Project. Combined, the Poker Chip and Chip-munk Projects propose to remove hazard trees (109 acres) and conduct salvage operations (96 acres) on approximately 6 percent of Bald Eagle management zone acres.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and after fire suppression by PG&E to protect critical electrical power infrastructure. These activities would have nominal effect on Bald Eagle habitat, and implementation of LOPs will reduce the impact of activities near eagle territories.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities would have a nominal effect on Bald Eagle habitat and implementation of appropriate LOPs will reduce project related effects on individuals.

Most recreation use in the wildlife analysis areas consists of camping, hiking, aquatic activities, horseback riding, hunting, fishing, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. Recreational use is expected to continue at the current rate. In the past, we have not found that recreational activities in the analysis area negatively impact nesting eagles, and we expect recreational activities to have minimal effect on nesting eagles in the future.

No Action Alternative (Alternative B)

Direct and Indirect Effects of No Action Alternative

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

There would be no direct effects on Bald Eagles or eagle habitat under Alternative B, as no activities would occur that cause disturbance to nesting or foraging birds, nor impact existing habitat conditions. The greatest impact to the eagle and eagle habitat within the analysis area was the Chips Fire. Those portions of the analysis area that burned, and no longer provide suitable eagle habitat, may remain unsuitable to eagles for greater than 125 years. Indirect effects of no action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative could make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread resulting in potential loss of suitable bald eagle nesting habitat and other important habitat attributes such as large trees and snags. The occurrence of another large fire within the analysis area would further fragment eagle habitat, which could lead to reduce numbers of eagle in the analysis area.

Cumulative Effects

Cumulative effects on Bald Eagles under the no action alternative mirror those described above for the proposed action.

Determinations for All Alternatives – Bald Eagle

Action Alternative

It is our determination that the Chip-munk Project will not affect the Bald Eagle because salvage operations would not occur in eagle nesting territories, large proportions (97 percent) of eagle management units will not be treated, and implementation of a limited operating period around known nests would avoid disturbance of nesting eagles during project operations.

No-action Alternative

It is our determination that not implementing the Chip-munk Project (Alternative B) will not affect the Bald Eagle. Alternative B is not without risk to eagle habitat, as no action would be taken to reduce existing fuel levels, leaving existing habitat vulnerable to large scale fragmentation as a result of wildfire.

California Spotted Owl (Strix occidentalis occidentalis)

Affected Environment – California Spotted Owl

Population Status

Four demographic studies of California Spotted Owl have been ongoing for a number of years within the Sierra Nevada: (1) Eldorado National Forest (since 1986); (2) Lassen National Forest (since 1990); (3) Sierra National Forest (since 1990); and (4) Sequoia-Kings Canyon National Park (since 1990). Portions of the PNF (including the analysis area) have been surveyed since 2002 as part of the Plumas Lassen Administrative Study (citation needed). One of the primary objectives of these demographic studies is to monitor rate of change (lambda, λ) in owl populations (i.e., the number of owls present in a given year divided by the number of owls present the year before). For these demographic models a lambda (λ) value of 1 indicates a stable population; less than one indicates the population is decreasing, and greater than 1 indicates an increasing population. For the California spotted owl demographic studies, lambda has been estimated individually for each study area at five-year intervals (Franklin et al. 2004, Blakesley et al. 2010). The most recent analysis, using data collected between 1990 and 2005, provided estimates of lambda for all four Sierra Nevada demography study areas (Blakesley et al. 2010):

- **Lassen:** $\lambda = 0.973$ (95% confidence interval, 0.946-1.001);
- **Eldorado:** $\lambda = 1.007$ (95% confidence interval, 0.952-1.066);
- **Sierra:** $\lambda = 0.992$ (95% confidence interval, 0.966-1.018);
- **Sequoia-Kings Canyon:** $\lambda = 1.006$, (95% confidence interval, 0.947-1.068).

Although researchers update demographic estimates for individual study sites annually in unpublished reports, the most recent meta-analysis of data from all four study sites in the Sierra Nevada (Blakesley et al. 2010) provides the most robust demographic estimates available. With the exception of the Lassen study area, owl populations were stable, with adult survival rate highest at the Sequoia-Kings Canyon study site. The 95 percent confidence limit for lambda in the Lassen study area ranged from 0.946 to 1.001 (estimated value 0.973), which barely includes 1, and the analysis estimated a steady annual decline of 2-3 percent in the Lassen study population between 1990 and 2005. The Sierra Nevada Adaptive Management Project conducted a new analysis in 2011 for the Eldorado demographic study area. However, results from this analysis are preliminary and may be subjected to corrections and revisions as they undergo the peer review process. Gutierrez, one of the study authors, cautions that results have not been peer reviewed and, therefore, until a published analysis is issued, the previous meta-analysis (Blakesley et al. 2010) remains valid (Gutierrez, personal communication, 2012).

The Chip-munk Project analysis area overlaps with survey area SA-2 of the Plumas Lassen Administrative Study (PLAS) area. Table 65 provides basic data from throughout the PLAS area

(i.e., productivity) and data specific to the analysis area (i.e., number of pairs detected, density estimates, taken from Keane et al. 2011).

Table 65. California Spotted Owl productivity (2004-2010) throughout the Plumas and Lassen National Forests [proportion of pairs to fledge young (confirmed/unconfirmed pairs), mean number of young fledged per successful nest], and number of owl pairs detected and crude density estimates within the analysis area (PLAS SA-2, Keane et al. 2011).

	2004	2005	2006	2007	2008	2009	2010
No. of owl pairs detected	11.00	12.00	10.00	10.00	12.00	11.00	10.00
Single owls detected	1.00	2.00	1.00	1.00	0.00	0.00	2.00
No. of territorial owls per square kilometer	0.12	0.14	0.12	0.12	0.13	0.12	0.13
Proportion of pairs to fledge young	0.49	0.18	0.14	0.55	0.16	0.48	0.51
Mean young fledged per successful nest	1.68	1.47	1.50	1.81	1.70	1.57	1.70

Habitat Requirements

The California Spotted Owl is currently managed as a USDA Forest Service sensitive species. Definitions of suitable habitat are derived from those listed in Verner et al. (1992), USDA 2004a, and 70 Federal Register, June 21, 2005. Based on these definitions the following CWHR types in the analysis area provide high nesting habitat: Sierran Mixed Conifer, White Fir, Red Fir, Ponderosa Pine, and Lodgepole Pine (5D, 5M). These CWHR types have the highest probability of providing stand structure associated with preferred nesting, roosting and foraging. Suitable foraging habitat is found in the same forest types listed above for nesting habitat (CWHR 5D, 5M) as well as 4D and 4M. Stands considered to be suitable for foraging have at least two canopy layers, dominant and co-dominant trees in the canopy averaging at least 12 inches in dbh, at least 40 percent canopy closure, and higher than average levels of snags and downed woody material. Although California Spotted Owls require late-seral forest habitat, owls do exploit resources on post-fire landscapes. Recent studies have reported California Spotted Owls may select forest patches that burned at high severity for foraging over adjacent green forest habitat (Bond et al. 2009), and that high severity fire may burn over 30% of suitable habitat in a spotted owl breeding site without reducing the probability of site occupancy (Lee et al. 2012).

Analysis Area Surveys

California Spotted Owls are managed through the establishment of Protected Activity Centers (PACs) and Home Range Core Areas (HRCAs). The HRCAs on the Plumas National Forest are 1,000 acres in size, comprised of the 300-acre PAC and 700 acres of the best available habitat around or adjacent to the PAC (USDA 2001a; USDA 2004b). Spotted owl PACs and HRCAs were established for owl activity centers based on criteria described in the California Spotted Owl Technical Report (Verner et al. 1992), California Spotted Owl Sierran Province Interim Guidelines Environmental Assessment (USDA 1993), and the SNFPA (USDA 2001a,b; USDA 2004a,b).

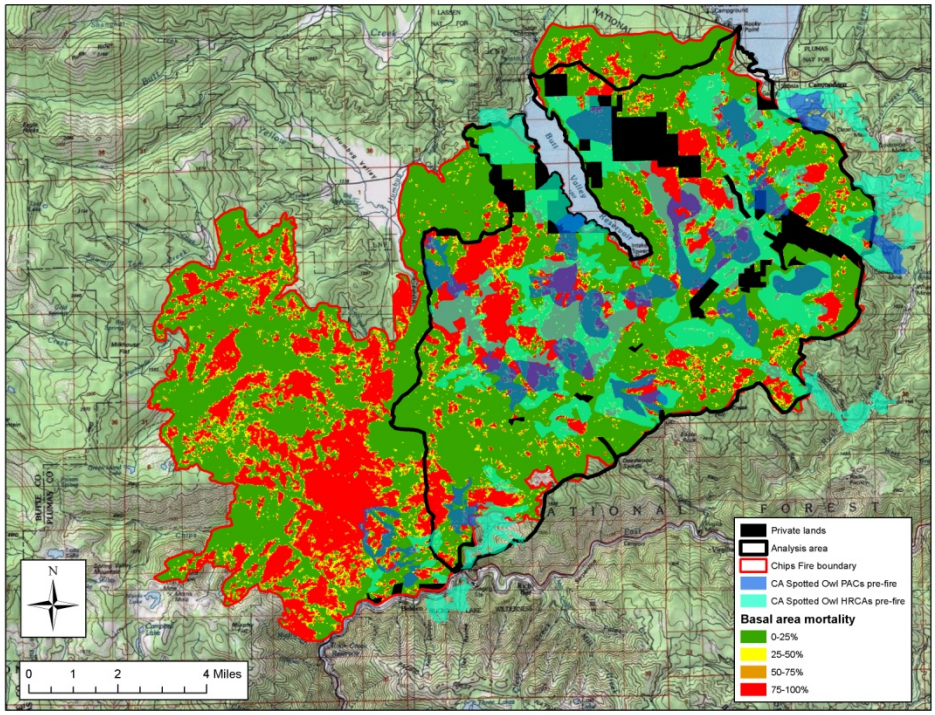
There are 20 spotted owl PACs and 23 HRCAs within the Chips Fire perimeter; of these, 19 PACs and 23 HRCAs are within the analysis area (Figure 15). High severity fire overtly modified spotted owl habitat within the fire perimeter (25 percent of PAC and 22 percent of HRCA acres burned at moderate and high severity, i.e. greater than 50 percent basal area mortality). Post-fire, we evaluated owl habitat conditions around activity centers, and re-mapped 11 PACs and 16 HRCAs to incorporate the best available habitat (Figure 15; Table 70; SNFPA 2004, p.37).

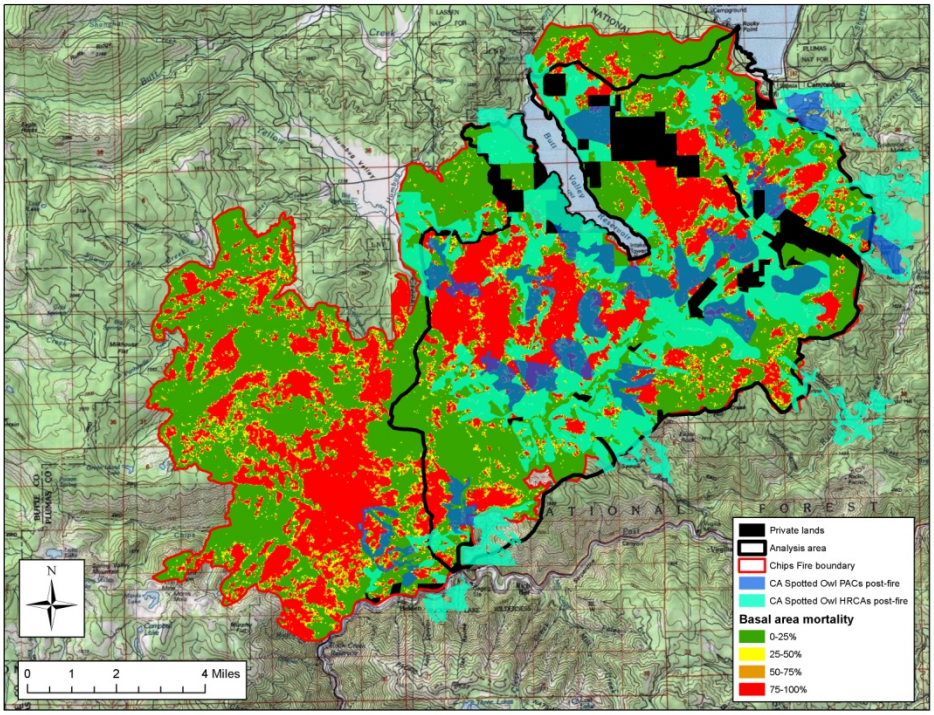
Table 66. California Spotted Owl PAC and HRCA habitat (CWHR) composition pre and post Chips Fire (all acres are approximate and National Forest System lands only).

	Pre-Fire acres						Post Fire acres				
PAC or HRCA	Total Acres	Acres Burned at 50-100% basal area mortality	4D	4M	5D	5M	Total Acres	4D	4M	5D	5M
PAC PLU0002	295.0	28.7	75.4	64.8	110.7	1.9	337.4	8.9	20.4	131.8	119.9
PAC PLU0093	321.8	96.0		69.0	153.1	38.3	387.5		61.3	187.4	33.8
PAC PLU0098	422.2	74.1	81.2	84.5	15.3	178.6	422.2	75.5	49.5	14.3	127.0
PAC PLU0103	353.1	116.2		23.6		268.0	360.9		14.2		171.9
PAC PLU0108	500.9	263.5		159.9	155.7	163.2	319.3		83.6	162.0	31.9
PAC PLU0116	337.9	33.6	65.2	148.5	80.0	0.0	372.7	73.7	111.7	92.4	
PAC PLU0124	417.8	20.4		15.0	4.3	327.7	417.4		10.9	4.3	304.2
PAC PLU0127	477.2	132.9	73.1	150.5	127.4	107.0	415.9	62.1	82.0	89.0	67.4
PAC PLU0128	310.5	2.2	14.6		286.3		310.5	14.4		282.1	
PAC PLU0224	271.2	29.8	39.4	109.9	63.9		310.8	12.1	89.8	78.7	
PAC PLU0246	368.4	82.9	47.9	26.1	243.0	32.6	355.0	64.3	7.4	209.0	0.8
PAC PLU0278	326.5	3.5	64.0	61.2	31.4	151.8	326.5	56.2	22.5		20.7
PAC PLU0279	387.8	303.5		13.1	31.1	270.7	289.7	10.2	8.1	103.8	75.7
PAC PLU0280	324.4	78.4		0.3	200.5	117.4	324.3		0.3	149.3	64.4
PAC PLU0296	330.7	138.1	22.3		216.0	58.2	330.7	16.6		99.4	27.6
PAC PLU0346	296.6	153.3	12.4	1.0	273.6	4.1	301.9	10.3	0.1	104.4	3.6
PAC PLU0347	344.5	78.1	127.1	72.7	76.1	54.0	316.9	53.5	33.4	80.9	35.9
PAC PLU0349	356.9	35.9	87.4	139.7	14.8	68.2	356.7	73.6	123.8	14.8	56.2
PAC PLU0350	322.9	0.1	112.4	25.8		135.4	322.9		12.4		1.4
PAC PLU0354	326.2	121.1		23.6	202.4	45.3	326.3		11.0	113.7	37.4
HRCA PLU0002	826.7	71.1	157.5	293.8	236.4	92.6	826.7	130.9	253.1	205.7	76.6
HRCA PLU0035	671.1	61.5	122.1	96.5	39.0	230.8	706.7		47.1		94.0
HRCA PLU0093	342.0	14.7	18.8	96.5	84.7	84.6	342.0	18.1	80.7	83.2	84.5
HRCA PLU0098	588.9	36.0	135.9	105.3	53.1	65.6	588.9	35.6	62.9	0.2	9.4
HRCA PLU0102	698.8		46.7	181.7		436.1	698.8				15.5
HRCA PLU0103	668.0	577.1	29.8	211.6	15.7	296.7	777.5	14.9	337.0		371.3
HRCA PLU0108	695.1	462.5	29.7	237.9	51.1	270.3	792.3	209.4	220.7	83.3	113.0
HRCA PLU0116	634.1	20.8	194.4	199.1	131.4	88.9	634.1	187.4	182.2	121.8	78.6
HRCA PLU0124	641.8	128.8	84.7	119.0	90.5	274.1	776.2	118.2	142.4	110.5	313.6
HRCA PLU0127	570.6	144.5	165.1	144.8	200.8	38.9	745.9	216.4	153.0	161.1	81.6
HRCA PLU0128	746.5	55.3	128.3	34.3	507.2		746.5	108.5	23.1	459.6	
HRCA PLU0224	665.1	71.9	43.7	449.5	16.4	43.2	740.5	29.1	110.1		14.6
HRCA PLU0246	485.4	37.6	129.3	55.3	197.2	69.7	749.0	134.8	89.4	143.1	101.4
HRCA PLU0278	684.4	35.0	65.7	150.5	64.3	246.5	757.4	13.5	13.6		171.7
HRCA PLU0279	599.9	218.6	25.1	21.8	135.4	336.4	708.8	6.1	44.0	201.3	430.5
HRCA PLU0280	588.0	442.1		36.4	207.0	303.4	712.0	83.4	50.6	207.5	105.5
HRCA PLU0296	332.1	179.4		17.2	167.8	113.4	720.3	94.8	230.9	159.8	86.9
HRCA PLU0346	727.9	124.9	134.7	76.4	320.2	125.0	704.4	102.8	277.9	85.7	119.2
HRCA PLU0347	690.5	214.3	130.9	87.1	52.6	263.9	733.0	121.5	154.9	43.1	309.3
HRCA PLU0349	845.6	140.7	51.5	107.5	50.2	468.5	719.3	60.1	116.7	40.4	479.3
HRCA PLU0350	682.9	23.9	108.1	28.1	172.4	250.2	715.3	18.3	8.1		177.2
HRCA PLU0354	327.3	83.8		111.7	25.6	152.7	754.4	2.7	485.6	45.2	146.1
HRCA PLU0374	754.5	2.4	199.6	145.0	221.3	95.2	754.5	79.9	138.9	163.2	59.2

4 = Small Tree 11 - 24"dbh, 5 = Medium/Large Tree >24"dbh, D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%).

Figure 15. **Pre- (top panel) and post-fire (bottom panel) California Spotted Owl Protected activity Centers (PACs), Home Range Core Areas (HRCAs), and vegetation burn severity post-fire (four basal area mortality categories) in the Chip-munk Project analysis area (approximately 41,414 acres on NFS lands).**





Spotted owl surveys have occurred within the analysis area (2004-2012) as part of the Lassen demographic study and PLAS (SA-2). Results from recent meta-analyses using these data were discussed and referenced above (Population Status section). During 2012, 22 pairs and one singleton were detected in the analysis area (Keane et al. 2012). This includes two barred owl pairs and one pair composed of a spotted owl and a spotted x barred owl hybrid. Survey crews were unable to complete late-season surveys due to the Chips Fire. The analysis area will continue to be surveyed for spotted owls to assess post-fire space use and productivity (cooperative study with USDA Pacific Southwest Research Station).

Surveys were conducted southwest of the analysis area to estimate spotted owl density and distribution across accessible areas within the Storrie Fire footprint (Keane 2013). Suitable habitat and priority management areas were surveyed during 2011 (22,864 acres) and 2012 (6,640 acres). A total of 12 spotted owls were detected, but only one owl at one site met protocol for residence status (near Belden, CA). The Chips Fire re-burned the majority of the survey area in 2012, and surveys were terminated for safety reasons.

Environmental Consequences – California Spotted Owl Action Alternative (Alternative A)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measure 1: Acres of suitable habitat modified, lost or fragmented.

Analysis Area

Approximately 25 percent of suitable California Spotted owl habitat (6,641 acres) in the analysis areas (41,414 acres) burned at moderate to high severity (greater than 50 percent basal area mortality) during the Chips Fire (Table 67). On average, 76 percent of acres within spotted Owl PACs and HRCAs burned at moderate to high severity (range = 14-100 percent, Table 66).

Potential direct effects on spotted owl may result from the modification or loss of habitat or habitat components, and rarely from direct mortality if nest trees are felled. The proposed action would not cut or remove nest trees.

Proposed Chip-munk Project treatments would occur on approximately 6 percent of potential spotted owl habitat in the analysis areas (Table 67). No salvage or reforestation would occur within any PACs. Of treatments occurring on potential spotted owl habitat (1,148 acres), 48 percent are roadside hazard tree removal treatments, 27 percent are in RCAs, and 25 percent are salvage treatment units (Table 67). One-percent of spotted owl HRCA acres would be treated with roadside hazard tree removal and salvage operations, and 3 percent of spotted owl PACs would be treated for roadside hazard trees (Table 66 and Table 68). Hazard tree removal would remove fire killed or fire injured trees and trees with structural deformities that pose a hazard to

the roadway. There would be no change in CWHR type, size class, or density as a result of the danger tree treatment. Snags may be removed from within 150 feet of the roadway if they are a risk to the road, otherwise snags would not be touched. Disturbance associated with logging, temporary road construction, or other associated activities within or adjacent to occupied habitat may disrupt nesting, fledging, and foraging activities; however, implementation of appropriate LOPs around spotted owl activity centers would partially ameliorate any potentially disturbing effects associated with project activities. In summary, using CWHR criteria, implementation of Alternative A would not result in any additional reduction of spotted owl habitat beyond what was caused by the Chips Fire. Proposed activities would not further reduce canopy closure. Further, long-term effects of the Proposed Alternative would be beneficial to individuals and their habitat as reforestation efforts would increase habitat quality and quantity.

Indicator Measure 2: Habitat components modified, lost or fragmented.

Habitat Components

Project activities could temporarily reduce prey availability through loss of habitat, mortality of small mammals, or behavioral changes. Because prey species (e.g., deer mice, flying squirrels) have relatively rapid reproduction rates, this effect would be expected to be short-term in duration.

Reforestation would contribute to future large tree forest conditions that would eventually provide suitable habitat (decades into the future). If owls are present, they might be temporarily disturbed during planting and subsequent hand grubbing due to noise from crews and disturbance to prey species. Over time, the plantings would increase cover for prey species. If the plantings occur near suitable forest habitat, owls could potentially forage along the edges as well as within the reforested sites.

Approximately 94 percent suitable spotted owl habitat in the analysis area would not have any treatment. This vast, untreated area would support various densities of fire-killed trees that will naturally decay and contributing to downed wood, and in the future, develop into more suitable habitat for some owl prey species.

By reducing the fuel load within the proposed project area by salvage harvesting dead standing snags, long-term effects of the proposed action on spotted owl habitat include a reduced risk of stand-replacing fire. This would decrease the potential loss of additional suitable spotted owl habitat adjacent to the project area. Other effects include the eventual return of structural complexity and canopy cover in treated stands, increased forest health and vigor in treated stands, and a potential increase in habitat quality and quantity due to the eventual development of reforested acres into suitable habitat.

Table 67. Summary of California Spotted Owl potential habitat acres in the analysis area and Chip-munk Project treatment units (all acres are approximate and National Forest System lands only).

		Pre-fire CWHR acres within four basal area mortality categories					Acres in Chip-munk treatment units			
CWHR	Pre-fire acres	0-25%	25-50%	50-75%	75-100%	Post-fire acres in analysis area (exisiting condition)	Riparian Conservation Areas	Roadside Hazard Tree	Salvage	Total Chip-munk units
PPN 4D	14.3	13.8	0.2	0.0	0.2	13.8				0.0
PPN 4M	11.7	11.7	0.0			11.7				0.0
SMC 4D	2992.5	2356.9	128.2	93.9	413.4	2356.5	29.1	45.5	17.1	91.6
SMC 4M	7357.0	5112.5	439.2	361.1	1444.3	5112.1	72.2	150.4	105.4	328.0
SMC 5D	6252.1	4582.0	354.5	255.7	1060.0	4582.0	32.1	42.3	47.1	121.5
SMC 5M	8262.5	5197.0	485.1	391.2	2189.1	5196.7	152.2	248.5	110.4	511.1
WFR 4D	365.9	272.2	17.7	17.1	58.9	272.2	1.6	11.8	8.1	21.6
WFR 4M	582.6	352.7	44.6	34.7	150.5	352.7	4.1	11.0	2.2	17.3
WFR 5D	222.5	185.1	6.2	4.5	26.7	185.1	5.0	5.6	0.0	10.5
WFR 5M	658.3	495.3	23.6	17.4	122.0	495.2	15.1	30.6	0.8	46.5
Total	**26719.4**	**18579.3**	**1499.4**	**1175.6**	**5465.0**	**18578.0**	**311.3**	**545.7**	**291.2**	**1148.2**

Table 68. Proposed Chip-munk Project treatment acres in California Spotted Owl PACs and HRCAs (all acres are approximate and National Forest System lands only).

HRCAs	Acres	PACs	Acres
Roadside Hazard - skyline		Roadside Hazard - skyline	99.5
Roadside Hazard - tractor	163.5	Roadside Hazard - tractor	97.8
Salvage - skyline	1.4	Salvage - skyline	
Salvage - tractor	24.2	Salvage - tractor	
Total	189.0	Total	197.3

Cumulative Effects

The existing condition reflects habitat changes from all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on MIS habitat from the existing condition within the analysis area.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities would have a nominal

effect on spotted owl habitat and implementation of LOP will reduce project related effects on individuals.

The woodcutting and Christmas tree cutting programs on the PNF are ongoing programs that have been in existence for years and are expected to continue. The past and future effect of the woodcutting program has and would be to reduce snags, in all forest types (including burned patches), along roadsides throughout much of the analysis area. However, the impacts are expected to be minimal due to the topography (steep), accessibility in the area and the abundance of snags post fire.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area. While considering potential future impacts (such as the Chip-munk Project), Lassen NF biologists found that implementation of the Poker Chip Project would not result in any additional reduction of spotted owl habitat beyond what was caused by the Chips Fire. Although, in the short term, project actions may temporarily disturb individuals and their habitat, risk to individual's remains low as the adjacent land would provide suitable habitat for displaced individuals, and implementation of LOPs around spotted owl activity centers would further mediate project effects.

Most of the recreation use within the wildlife analysis areas consists of dispersed camping, hiking, horseback riding, hunting, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. Such use is expected to continue at the current rate. These activities would have no effect on late seral habitat in the analysis area.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and after fire suppression by PG&E to protect critical electrical power infrastructure.

These activities could impact California Spotted Owls and their habitat, as right-of-way corridors routes travel through spotted owl PACs. However, Forest direction prohibits salvage operations within spotted owl PACs, thus we anticipate only hazardous trees would be removed during the PG&E Right of Way Salvage Timber Project in spotted owl PACs with appropriate LOPs in place.

No Action Alternative (Alternative B)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

The indirect effects of no action would include an increased risk for future wildfire and related impacts on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and could create a more intense burn and would result in higher severity effects to vegetation and habitat. Increased rates of spread would result in potential loss of suitable owl nesting habitat and other important habitat attributes such as large trees and snags and down woody material. Thus, under alternative B, suitable habitat for productive owl sites as a result of fire could become patchy or unevenly distributed, and the abundance of owls in the wildlife analysis area could decline.

Cumulative Effects

Cumulative effects on California Spotted Owl under the no action alternative mirror those described above for the proposed action.

Determinations for All Alternatives – California Spotted Owl

Action Alternative

It is our determination that the Chip-munk Project will not affect the California Spotted Owl. This determination is based on: 1) roadside hazard tree and salvage treatments removing dead or dying trees, and not reducing canopy closure; 2) salvage operations not occurring in PACs, 3) implementation of a limited operating period around known nests, 4) no treatment occurring on 94 percent of available spotted owl habitat in the analysis area; and 5) less than 1 percent and approximately 3 percent of HRCAs and PACs treated for hazard trees, respectively.

No-action Alternative

It is our determination that not implementing the Chip-munk Project (Alternative B) will not affect the California Spotted Owl. Alternative B is not without risk to spotted owl habitat, as no action would be taken to reduce existing fuel levels, leaving existing habitat vulnerable to large scale fragmentation as a result of wildfire.

Mesocarnivores (medium-sized carnivores)

Affected Environment – Mesocarnivores

Population Status

Approximately 65 percent of the PNF has been systematically surveyed, by the Pacific Southwest Research Station (PSW), district biologists/wildlife technicians and contractors, to protocol for mesocarnivores using track plates and camera stations (American Marten, Fisher, Lynx and Wolverine: Survey Methods for Their Detection; Zielinski and Kucera 1995). To date, there have been no fisher observations on the PNF, but reintroduction efforts on adjacent private lands have used radio transmitters to track individuals making forays onto the forest. All confirmed sightings (photograph, tracks, hair sample, sighting by reputable biologist) of American marten on PNF occur within three areas: the Lakes Basin-Haskell Peak area, Eureka Ridge area, or around Little Grass Valley Reservoir.

Habitat Requirements

Habitat requirements for forest carnivores can be found in California Wildlife Habitat Requirements (Zeiner et al. 1990), habitat capability models (Freel 1991) and in Ruggerio et al. (1998). Snags and down logs also are important habitat elements for forest carnivores and their prey. Large (greater than 15” dbh) snags and logs provide more habitats per piece and are retained in the environment for longer periods of time (Ruggiero et al. 1998). Habitat requirements and risks are further described within the 2001 SNFPA (USDA 2001a,b) and within species specific section below. Open roads and improperly closed roads adversely affect mesocarnivores by: allowing access to areas and causing disturbance to these animals from human intrusion and removal of snags and downed logs through wood gathering activities; increasing vehicle/animal encounters resulting in road-kill; and fragmenting the habitat and affecting the ability of animals to use otherwise suitable habitat on opposing sides of the road (Duncan Furbearer Interagency Workgroup 1989). There may be a threshold value for road density (miles of open road per square mile) above which the habitat cannot sustain certain wildlife species but studies specifically addressing these effects on marten or fisher have not yet been addressed (USDA 2001a,b). Early habitat models (Freel 1991) indicated that to provide high habitat capability for marten, open road densities should be less than 1mile/square mile, while 1-2 miles/square mile provided moderate habitat capability; more than 2 miles was providing low-no habitat capability. Models indicate that open road densities should be less for pacific fisher. The current road density within the analysis area is approximately 2.7 miles of open road per square mile.

Analysis Area Surveys

The analysis area has been surveyed several times over the past decade for mesocarnivores using both camera stations and track plates (Zielinski and Kucera 1995). The analysis area was most

recently surveyed during 2009-2010 while planning for an unrelated project in the area (NRM 2013). Mesocarnivore surveys are currently being conducted 5 miles to the southeast of the analysis area as part of the Forest's out-year planning process (NRM 2013). To date, no target mesocarnivore (American marten, pacific fisher) has been detected in the analysis area.

American Marten (Martes americana)

Affected Environment – American Marten

Population Status

The distribution of American marten, a mature-forest specialist, has substantially changed since the early 1900's. Distribution appears to have decreased in the northern Sierra Nevada and southern Cascade region and populations appear to be discontinuous. Comparing the historical and contemporary locations centered on Plumas County indicate large gaps between detections that were not historically present. Zielinski et al. (2005) points out that these gaps are largely areas composed of National Forests that have received more impacts from humans, including timber harvest, road building, and – until the mid-1950's – trapping. The reduction in marten distribution is probably more closely linked to the influence of timber harvest and forest management during the historical and the contemporary periods. Based on Zielinski et al. (2005), trends in marten detections in Plumas County, and by inference PNF, from the early 1900's to the late 1900's are downward, primarily due to relatively small amounts of late seral/old-growth forest attributes.

There are over 40 records of marten observations/detections on the PNF dating back to 1975, but none of these observations were within the analysis area. There are three unconfirmed marten records within a 5-mile buffer of the analysis area, but confirmed marten detections (photograph, tracks, hair sample, sighting by reputable biologist) on PNF have been distant from the analysis area (Lakes Basin-Haskell Peak area, Eureka Ridge area, Little Grass Valley Reservoir). We have failed to detect marten in the analysis area for the past 10 years.

Habitat Requirements

In the Sierra Nevada, marten are most often found above 7,200 feet, but the species core elevation range is from 5,500 to 10,000 feet (USDA 2001b). Martens prefer coniferous forest habitat with large diameter trees and snags, large down logs, moderate-to-high canopy cover, and in interspersion of riparian areas and meadows (USDA 2001b). Martens generally avoid habitats that lack overhead cover; they select stands with 40 percent canopy cover for both resting and foraging and usually avoid stands with less than 30 percent canopy cover (USDA 2001b). Foraging areas are generally in close proximity to both dense riparian corridors (used as travel ways), forest meadow edges, and include an interspersion of small (less than 1 acre) openings with good ground cover used for foraging (USDA 2001b).

Important forest types include mature mesic forests of Aspen, Douglas-fir, Eastside Pine, Jeffrey Pine, Lodgepole Pine, Montane Riparian, Ponderosa Pine, Red Fir, Sierran Mixed Conifer, Subalpine Conifer and White Fir (USDA 2001b). CWHR types 4M, 4D, 5M, 5D and 6 are identified as moderately to highly important for the marten (USDA 2001b). The red fir zone forms the core of marten occurrence in the Sierra Nevada (USDA 2001b). These CWHR types have the highest probability of providing stand structures associated with preferred denning, resting and foraging. Table 69 displays the acres of habitat present in the analysis area and proposed treatment units.

Table 69. Summary of mesocarnivore (American marten and Pacific fisher) potential habitat acres within the analysis area and Chip-munk Project treatment units (all acres are approximate and National Forest System lands only).

		Pre-fire CWHR acres within four basal area mortality categories					Acres in Chip-munk treatment units			
CWHR	Pre-fire acres	0-25%	25-50%	50-75%	75-100%	Post-fire acres in analysis area (exisiting condition)	Riparian Conservation Areas	Roadside Hazard Tree	Salvage	Total Chip-munk units
ASP 4D	89.8	87.7	0.6	0.0	1.5	87.7				
ASP 4M	12.1	12.1				12.1				
MHC 4D	690.0	519.1	48.7	38.3	84.0	519.0				
MHC 4M	160.5	73.1	15.5	16.0	55.9	73.1				
MHC 5D	231.6	191.6	11.8	8.7	19.4	191.6				
MHC 5M	35.3	35.2	0.1			35.2				
MHW 4D	56.8	54.5	1.4	0.5	0.5	54.5				
MHW 4M	19.0	18.5	0.5			18.5				
PPN 4D	14.3	13.8	0.2	0.0	0.2	13.8				
PPN 4M	11.7	11.7	0.0			11.7				
SMC 4D	2992.5	2356.9	128.2	93.9	413.4	2356.5	29.1	17.1	45.5	91.6
SMC 4M	7357.0	5112.5	439.2	361.1	1444.3	5112.1	72.2	105.4	150.4	328.0
SMC 5D	6252.1	4582.0	354.5	255.7	1060.0	4582.0	32.1	47.1	42.3	121.5
SMC 5M	8262.5	5197.0	485.1	391.2	2189.1	5196.7	152.2	110.4	248.5	511.1
WFR 4D	365.9	272.2	17.7	17.1	58.9	272.2	1.6	8.1	11.8	21.6
WFR 4M	582.6	352.7	44.6	34.7	150.5	352.7	4.1	2.2	11.0	17.3
WFR 5D	222.5	185.1	6.2	4.5	26.7	185.1	5.0	0.0	5.6	10.5
WFR 5M	658.3	495.3	23.6	17.4	122.0	495.2	15.1	0.8	30.6	46.5
Total	**28014.6**	**19571.1**	**1578.0**	**1239.2**	**5626.3**	**19569.7**	**311.3**	**291.2**	**545.7**	**1148.2**

*4=small 11-24"dbh, 5=medium/large >24"dbh. D= Dense Canopy Cover > 60%, M= Moderate Canopy 40-59%.

Small openings and regenerating stands (including plantations) are used by marten as foraging habitat (USDA 2001b). These openings are of optimum value when they occupy a small percent of the landscape and occur adjacent to mature forest stands (CWHR 4D, 5M, 5D, and 6). Small openings within a forested matrix may be more conducive to marten populations than large contiguous openings (USDA 2001b).

Numerous and heavily traveled roads are not desirable in order to avoid habitat disruption and/or animal mortality. Roads may decrease prey and food availability for marten as well as fisher (Allen 1987) due to prey population decreases resulting from road kills and/or behavioral barriers to movement.

Pacific Fisher (Martes pennanti pacifica)

Affected Environment – Pacific Fisher

Population Status

The USFWS completed an initial 90-day review of a petition submitted by 20 groups seeking to list the pacific fisher as endangered in Washington, Oregon and California. After reviewing the best available scientific information, the USFWS found that substantial information indicated that listing the pacific fisher as endangered in its West Coast range may be warranted (USDI 2013a). After a 12-month status review, the West Coast population of the fisher is designated as a candidate species by USFWS (USDI 2004), but listing under the Endangered Species Act is currently precluded by other, higher priority listing actions.

In the Pacific States, fishers were historically more likely to be found in low to mid-elevation forests up to 8,200 feet (USDI 2004). In the southern Sierra Nevada pacific fisher most often occur at elevations between 4,000-8,000 feet (Freel 1991, USDA 2004b). The current distribution of fisher within California suggests that the once continuous distribution is now apparently fragmented into two areas separated by a distance that greatly exceeds reported fisher dispersal ability. Methodologies used to detect fisher in numerous survey efforts have failed to detect this species in an area between Mt. Shasta and Yosemite National Park (Zielinski et al. 1995). These authors strongly suggest that the absence of fisher detections within this large 240-mile area is because they do not occur in the areas surveyed. This gap in distribution may be effectively isolating the southern Sierra Nevada population from the rest of the fisher range in Northern California. Since 1990 there have been no detections or confirmed sightings of fisher within this 240 mile gap of the Sierra Nevada (Note: gap is identified as 240 miles in USDA 2001b, 260 miles in USDI 2004). The Chip-munk Project is located within this "gap".

Reintroduction of fishers to the central and northern Sierra has been proposed and has strong support in the scientific and research community. The Pacific Southwest Region, Forest Service supports reintroduction and will actively pursue partnerships in this effort as a feature of the SNFPA management strategy (USDA 2004a). As a result of this interest in reintroduction, fishers have been reintroduced to land owned by Sierra Pacific Industries on their Sterling Management Tract in Butte County just west of the Plumas National Forest. These reintroductions began in November 2009 and to date 18 females and 10 males have been released. In 2011-2012, 8 females and 4 males were planned for release. Evidence of reproduction was documented the first year of release, however young are not tracked. In 2010, an adult male fisher, who was tracked through radio telemetry, traveled east from the release point onto the Mt. Hough Ranger District, Plumas National Forest. This male subsequently went back to the release site. Another adult male was tracked to the Lake Almanor area in Lassen County; he also did not stay, but went back to the release site. Male fishers are known to make these forays, but will go back to habitats where females are present.

The loss of structurally complex forest and the loss and fragmentation of suitable habitat by roads and residential development has likely played a significant role in both the loss of fishers from the central and northern Sierra Nevada and its failure to recolonize these areas (USDA 2001a,b). Elimination of late-successional forest from large portions of the Sierra Nevada and Pacific Northwest has probably significantly diminished the fisher's historical range on the west coast (USDI 2004). Additional factors identified in the range reduction of fisher include a combination of legal trapping in the first half of the 20th century and occasional incidental trapping since 1954, timber harvest and associated road building, development of trans-Sierran highways, increased recreational use of the Sierra Nevada, and porcupine poisoning campaigns conducted during the 1950's and 1960s (Lamberson et al. 2000).

The only two verified (verified = trapped animal, photo, track, or sighting by reliable observer) fisher observations on the PNF are from 1940's trapping records. One was from the central portion of the Forest, and the other on the eastside. Four unconfirmed reports of fisher were located within the central portion of the forest (Rotta 1999). One of these fisher detections (1995) was identified in the April 8, 2004 edition of the Federal Register.

There have been no good population estimates for fisher in California, Oregon, and Washington, so it is unknown precisely how many fishers exist but indications are that extant fisher populations likely are small (USDA 2004). Lamberson et al. (2000) states that the Sierra Nevada fisher population is "likely to be no less than 100 and probably no more than 500 individuals".

Habitat Requirements

Currently, the analysis area does not appear to provide habitat needed to sustain resident fisher populations. However, we manage the forest to perpetuate those attributes that are important to fishers to provide suitable travel corridors between resident populations and grow forest habitat to promote establishment of future populations (USDA 2004b). Large trees, large snags, large down wood and higher than average canopy cover are important habitat attributes for fisher (CWHR types 4M, 4D, 5M, 5D and 6). A vegetated understory and large woody debris appear to be important for their prey species. Preferred fisher forest types include: Aspen, Douglas-fir, Eastside Pine, Jeffrey Pine, Lodgepole Pine, Montane Hardwood, Montane Hardwood-Conifer, Montane Riparian, Ponderosa Pine, Red Fir, Sierran Mixed Conifer, Subalpine Conifer and White Fir. Table 69 displays the acres of suitable fisher habitat present in the terrestrial wildlife analysis area (i.e., CWHR types that provide stand structures associated with preferred denning, resting and foraging).

The physical structure of the forest, and prey species associated with forest structures, are thought to be the critical features that explain fisher habitat use. Powell (1993) states that forest type is probably not as important to fishers as the vegetative and structural aspects, and fishers may select forests that have low and closed canopies. Numerous studies, as referenced in the 2004 SNFPA FSEIS (USDA 2004a), indicate that canopy cover over 60 percent is important, and

fishers preferentially select home ranges to include high proportions of dense forested habitat. The fishers need for overhead cover is very well documented in the April 8, 2004 Federal Register. Fishers select stands with dense canopy cover which provides security cover from predators, increases snow interception, lowers the energetic costs of traveling between foraging sites, and preferred prey species may be more abundant and vulnerable in areas of higher canopy cover (USDA 2004a). A number of studies have shown that fishers avoid areas with little forest cover or significant human disturbance and prefer large areas of contiguous interior forest (USDA 2004a).

Rest site structures used by fishers include: cavities in live trees, snags, hollow logs, fallen trees, canopies of live trees, broken top trees, platforms formed by mistletoe or large and deformed branches. Trees used for resting were among the largest diameter trees available, including conifers, snags, and hardwoods. Standing trees (live and dead), were the most common resting structures, with black oak being the most frequent species used in a Sierra study (Zielinski et al. 2004). Most den sites are found in live trees. Of 19 tree den sites documented in California, the average diameter was 45-inch dbh for conifers and 25-inch dbh for hardwoods (USDI 2004).

Fishers in the pacific states appear to be dietary generalists and may be flexible in their requirements for foraging habitat (USDI 2004). Stands supporting a complex of down woody material including large down logs and multi-layered vegetative cover are important in foraging habitat. This high structural diversity is associated with prey species richness and abundance. Shrubs also provide food (fruits and berries) for both prey (hare/rabbits, porcupines, moles, squirrels, etc.) and fishers. Fishers can be found where the shrub cover is 40-60 percent, but fishers can also avoid areas with too much low shrub cover because it may adversely affect hunting success (USDI 2004).

Based on studies of home range sizes, estimates of potentially suitable and contiguous habitat that must be present before an area can sustain a population of fishers range from 31,600 acres in California, 39,780 acres in the northeastern United States, and 64,000 acres in British Columbia (April 8, 2004 Federal Register). These same studies also showed a positive association between fisher presence and forest stand area, detecting fishers more frequently in stands over 247 acres and 126 to 247 acres than in smaller stands (USDI 2004).

Numerous and heavily traveled roads are not desirable in order to avoid habitat disruption and/or animal mortality. Roads may decrease prey and food availability for fisher (Allen 1987) due to decreases in prey populations resulting from road kills and/or behavioral barriers to movement. Access provided to forested areas by roads leads to increased human disturbances from resource use and extractive activities resulting in an overall degradation of habitat.

Environmental Consequences – Mesocarnivores

Action Alternative (Alternative A)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

Potential direct effects on these carnivores from vegetation management activities consist of modification or loss of habitat or habitat components, especially in regards to denning/resting habitat and foraging/travel habitat. Additional direct effects are possible behavioral disturbance to denning from logging, road-building, or other associated activities

The analysis area does not appear to provide habitat needed to sustain resident fisher or marten populations and therefore does not currently contribute to these mesocarnivore populations in the Sierra Nevada mountain range. As stated earlier, individual fishers from a reintroduced population have made forays onto the west side of the Plumas, but these individuals did not stay on the forest. The reintroduced population of fisher adjacent to PNF appears to be residing over seven miles southwest of the analysis area (A. Facka, personal communication, 2012). Although a small population of marten exists on the Plumas, located within the Lakes Basin area on the Plumas/Tahoe NF border. martens have not been detected in the analysis area. Since no target mesocarnivores are believed to exist in the terrestrial wildlife analysis area, no direct impacts are expected for the American Marten or pacific fisher.

The Chips Fire resulted in long-term harmful effects to mesocarnivore habitat due to the reduction in existing large tree component and dense forested stand structure (30 percent reduction in analysis area, Table 69). However, increased diversity and edge habitat created by the fire may provide increased foraging opportunities for marten and fisher prey species. In areas burned at low and moderate severity (less than 50 percent basal area mortality) that still support live trees and forested canopy, there could be some short-term increase in snag and down wood components post-fire that would benefit mesocarnivores and their prey.

Proposed Chip-munk Project treatments would occur on approximately 6 percent of potential mesocarnivore habitat in the analysis areas (Table 69). Three-percent of potential mesocarnivore habitat in the analysis area is in Chip-munk salvage units, and 1 percent of potential habitat in the analysis area will be treated for roadside hazard trees (Table 69). The remaining 311 acres of proposed treatments in potentially suitable mesocarnivore habitat are within RCAs and equipment exclusion and full suspension zones (Table 66). Roadside hazard tree removal and salvage operations are restricted within 950 acres of RCAs (total RCA acres = 1,464; equipment exclusion and full suspension zone acres = 950; see Appendix G of the Chip-munk Biological

Assessment/Evaluation (USDA 2013c) for RCA and equipment exclusion and full suspension zone widths). Based on project design criteria, we do not anticipate significant salvage activities in RCA equipment exclusion and full suspension zones for tractor units. Further, the Chip-munk Project is only removing dead or dying trees in an area apparently not occupied by American marten or Pacific fisher.

Although the Chip-munk Project potentially would remove some mesocarnivore habitat components from the landscape (snags and downed logs), loss of these components is temporary, and will predominately occur in areas not suited for mesocarnivores (85 percent of salvage treatment unit acres do not provide suitable habitat). Thus, the amount of potential habitat in the analysis area that is not within the Chip-munk Project boundary (94 percent, 18,422 acres) allows opportunities for future dispersal, foraging and denning within the terrestrial wildlife analysis area. Further snag retention areas within salvage treatment units (365 acres) and equipment exclusion and full suspension zones within RCAs (greater than 950acres) will not be entered or will not be entered with ground based equipment, respectively. These two snag retention areas will maintain some mesocarnivore habitat components throughout the Chip-munk Project area. Further, as a result of their linear nature, RCA equipment exclusion zones also will mediate spatial fragmentation in habitat availability throughout the project area.

Open roads and improperly closed roads adversely affect mesocarnivores by fragmenting suitable habitat and increasing the opportunity for human intrusion and habitat manipulation (e.g., woodcutting). The current road density estimate (2.7 miles of road per square mile) in the analysis area exceeds the range (1-2 miles/square mile) of road density estimates that will still provide moderate habitat capability for American Marten (Freel 1991). Models indicate that open road densities should be less for pacific fisher. Approximately 8.5 miles of unclassified, non-system roads currently exist and would be reconstructed to standards in order to provide access to treatment units. Approximately 4 miles of new unclassified, non-system temporary roads would be constructed, and subsequently obliterated, entirely within a proposed treatment unit. Bringing existing, unclassified, non-system roads up to standards to provide access to treatment units will not further fragment mesocarnivore habitat, but may lead to increased human intrusion along these routes post-project.

Cumulative Effects

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the Action Alternatives evaluates the impact on TES habitat from the existing condition within the terrestrial wildlife analysis area. Cumulative effects on the Mesocarnivores are similar to those described for the California Spotted Owl above.

Cumulative effects on forest carnivores could occur with the incremental reduction of the quantity and/or quality of habitat for this species. Overall, increases in urbanization, increases in

recreational use of National Forest System lands, and the utilization of natural resources on state, private and federal lands may contribute to habitat loss for this species. Moderate-high and high severity large stand-replacing fires have contributed and would continue to contribute to loss of habitat for these species.

The fisher does not currently inhabit the analysis area and even though reintroduction has begun just west of the PNF, it would probably be many years before available habitats in the populations current range are saturated and individuals permanently disperse to the forest (Facka, personal communication, 2012). Based on the home range and stand size reported in the April 8, 2004 Federal Register (USDI 2004), it appears as if the terrestrial wildlife analysis area supports large blocks of contiguous suitable habitat. Based on studies of home range sizes referenced in the above-mentioned Federal Register, estimates of potentially suitable and contiguous habitat that must be present before an area can sustain a population of fishers range from 31,600 acres in California, 39,780 acres in the northeastern United States, and 64,000 acres in British Columbia. The amount of potentially suitable fisher habitat in the Chip-munk Project analysis area (Table 69) does not meet this acreage figure under existing conditions (19,570 acres) of 4M, 4D, 5M, 5D, 6 habitats on NFS lands. Thus the Chip-munk Project area most likely does not support habitat attributes needed to contribute to the potential for recovery of the species in this area of the PNF.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area. Forest biologists reported that the Poker Chip Project will not affect Pacific fisher, and may affect individual American marten but is not likely to result in a trend toward Federal listing or loss of viability(USDA 2013i,j). Combined, the Poker Chip and Chip-munk Projects propose to treat hazardous trees and remove fire-killed trees from 3,285 acres of potential mesocarnivore habitat. These actions would not reduce live tree canopy cover or degrade any foraging habitat for mesocarnivores. In the short-term, this could affect habitat quality for mesocarnivores as structural diversity would be reduced. The present condition of late-successional forest habitat within the analysis area would not change from the existing condition created by the wildfire.

No Action Alternative (Alternative B)

Direct and Indirect Effects of No Action Alternative

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

There would be no direct effects on mesocarnivores or mesocarnivore habitat, as no activities would occur that would cause disturbance to denning/resting or foraging mesocarnivores, nor any impacts to the existing habitat conditions.

Indirect effects of no action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread resulting in potential loss of suitable mesocarnivore habitat and other important habitat attributes such as large trees, large snags and down woody material. If a large fire occurred, suitable mesocarnivore habitat could become further fragmented within the analysis area.

Cumulative Effects

The No-action Alternative for the Chip-munk Project would not provide for the long-term protection of mesocarnivore habitat from large stand-replacing fire. There would be no actions designed to reduce the risk of high intensity wildfire. Total wildfire acres and high intensity wildfire acres are anticipated to increase from current levels under this alternative (USDA 2001a,b), which could lead to the loss of existing potential habitat within the analysis area.

Determinations for All Alternatives – Mesocarnivores

It is my determination that the Chip-munk Project will not affect the American marten or Pacific fisher. These determinations are based on over a decade of survey effort indicating that this area does not appear to provide habitat needed to sustain resident fisher or marten populations and therefore this area does not currently contribute to these mesocarnivore populations in the Sierra Nevada mountain range. The amount of potential mesocarnivore habitat that will not be entered during the Chip-munk Project (94 percent, 18,422 acres) allows opportunities for future dispersal, foraging and denning within the area.

No-action Alternative

It is my determination that not implementing the Chip-munk Project (Alternative B) will not affect American marten or Pacific fisher). Alternative B is not without risk to mesocarnivores, as no action is taken to reduce existing fuel levels, create areas that could allow for better and more efficient fire suppression efforts, and leaves existing mesocarnivore habitat vulnerable to large scale fragmentation as a result of wildfire.

Townsend's big-eared bat (*Corynorhinus townsendii*), Pallid bat (*Antrozous pallidus*), Fringe-tailed myotis (*Myotis thysanodes*)

Affected Environment – Townsend's big-eared bat

Population Status

Throughout California, Townsend's big-eared bat (*Corynorhinus townsendii*) populations have declined over the last 40 to 60 years (USDA 2001b). Approximately 52 percent of historic maternity roosts are no longer occupied, and 40 percent of these sites have been destroyed or rendered unsuitable (USDA 2001b). Recent data used to estimate these trends were collected from a statewide effort (1987-1991) that unfortunately did not occur on PNF. Bat distribution data on 16 species has been collected (using mist nets, acoustic sampling, and visual inspection of suitable roosting sites) to address project specific needs for more than two decades across the PNF (1991-2013, 206 forest-wide survey locations with bat detections, NRM 2013). *C. townsendii* has been detected at multiple locations within each ranger district on the PNF, but our survey data are too patchily distributed, both spatially and temporally, to accurately estimate population size or trend for bat species on PNF.

Habitat Requirements

C. townsendii are usually found below 6,000 feet but have been found up to 10,000 feet elevation occupying a wide variety of habitats (older forest, desert, grasslands/plains, riparian, coastal; Philpott 1997, Pierson and Rainey 1998, Pierson et al. 1999). Roosting habitat requires caves, mines, abandoned human structures, and rock crevices; and access to drinking water (Philpott 1997, Pierson and Rainey 1998, Pierson et al. 1999). *C. townsendii* forages in a variety of habitats (riparian areas, old forests, mixed hardwood-conifer forest) feeding primarily on the wing for flying insects (specializing in moths) or by gleaning from foliage (Philpott 1997, Pierson and Rainey 1998, Pierson et al. 1999). *C. townsendii* prefer mesic habitats, and often forage along habitat edges (Philpott 1997, Pierson and Rainey 1998, Pierson et al. 1999). Townsend's big-eared bats form maternity colonies of up to several hundred females. These colonies show a high degree of roost fidelity, and, if undisturbed, colonies may occupy the same roost indefinitely (Philpott 1997, Pierson and Rainey 1998, Pierson et al. 1999). Its colonial nature places this bat at high risk with a single disturbance causing detrimental harm to potentially large populations (Philpott 1997).

Terrestrial Wildlife Analysis Area Surveys

A small portion (southeastern area) of the analysis area was surveyed for bats during 2002 (July-August) as part of an unrelated project (NRM 2013). Although *C. townsendii* was not detected within the small portion of the analysis area that overlapped the survey effort, it was detected at five sites within a mile of the analysis area. Forest-wide bat distribution data collected (using mist

nets, acoustic sampling, and visual inspection of suitable roosting sites) over the past couple decades (1991-2013, 206 forest-wide locations) show *C. townsendii* at greater than 16 locations distributed across all three ranger districts. Based on these observations, the availability of suitable habitat, and its apparently wide distribution on PNF, it is assumed that *C. townsendii* are present in the analysis area.

Affected Environment – Pallid bat

Population Status

There is no indication that there has been a change in the range or distribution of the pallid bat (*Antrozous pallidus*, USDA 2001b). The pallid bat may be in trouble because it is very sensitive to disturbance. Any disturbance, even hiking, can cause the bat to abandon a roosting area completely (Arroyo-Cabrales and Grammont 2008). Also, the use of pesticides has had a serious impact on *A. pallidus* populations (Weber 2009). Bat distribution data on 16 species has been collected (using mist nets, acoustic sampling, and visual inspection of suitable roosting sites) to address project specific needs for more than two decades across the PNF (1991-2013, 206 forest-wide survey locations with bat detections). *A. pallidus* has been detected at multiple locations within each ranger district on the PNF, but our survey data are too patchily distributed, both spatially and temporally, to accurately estimate population size or trend for bat species on PNF.

Habitat Requirements

A. pallidus occur in a wide variety of habitats, including grasslands, shrublands, and woodlands to mixed conifer forests (USDA 2001b). They are most abundant below 6,000 feet elevation, but have been recorded up to 10,000 feet in the Sierra Nevada (USDA 2001b). They are most common in open, dry habitats with rocky areas for roosting. They day roost in caves, crevices, mines, and occasionally in hollow trees/snags, crevices in oaks, and snags (USDA 2001b). They prefer rocky outcrops, cliffs, and crevices with access to open habitats for foraging. Philpott (1997) emphasizes the importance of oak woodlands for foraging. The 2001 SNFPA FEIS (USDA 2001b) emphasizes the protection and enhancement of both westside foothill oaks and montane oaks to provide for *A. pallidus*. The reduction of hardwoods, both from manual removal and competition from conifers, reduces foraging habitat, yet hardwood and hardwood-conifer stands that contain thick understory vegetation prevents flight and hence use of the area for foraging (USDA 2001b).

Terrestrial Wildlife Analysis Area Surveys

A small portion (southeastern area) of the analysis area was surveyed for bats during 2002 (July-August) as part of an unrelated project. Although *A. pallidus* was not detected within the small portion of the analysis area that overlapped the survey effort, it was detected at five sites within seven miles of the analysis area. Forest-wide bat distribution data collected (using mist nets, acoustic sampling, and visual inspection of suitable roosting sites) over the past couple decades

(1991-2013, 206 forest-wide locations) show *C. townsendii* at greater than 50 locations distributed across all three ranger districts. Based on these observations, the availability of suitable habitat, and its apparently wide distribution on PNF, it is assumed that *A. pallidus* are present in the analysis area.

Affected Environment – Fringe-tailed myotis

Population Status

There is little information on size and trend of fringe-tailed myotis (*Myotis thysanodes*) populations. Although it may be locally abundant, this widespread species (western North America from British Columbia south to Mexico) also may be locally rare (Keinath 2004). In California, *M. thysanodes* is distributed statewide except the Central Valley and the Colorado and Mojave Deserts (Mayer and Laudenslayer). Like other California bat species, it appears there have been declines in numbers and colonies of *M. thysanodes* (Keinath 2004; USDA 2005a). No major threats have been identified throughout the species' range, but the Mexican sub species *aztecus* has experienced around a 40 percent reduction in habitat (Arroyo-Cabrales and Grammont 2008). Bat distribution data on 16 species has been collected (using mist nets, acoustic sampling, and visual inspection of suitable roosting sites) to address project specific needs for more than two decades across the PNF (1991-2013, 206 forest-wide survey locations with bat detections). *M. thysanodes* has been detected at multiple locations within each ranger district on the PNF, but our survey data are too patchily distributed, both spatially and temporally, to accurately estimate population size or trend for bat species on PNF.

Habitat Requirements

M. thysanodes most frequently is observed at middle elevations (3,900–7,050 feet) in desert, grassland, and woodland habitats, but ranges between coastal areas along the Pacific Ocean to 9,350 feet in spruce-fir habitat in New Mexico; (Keinath 2004). Oak and pinyon woodlands appear to be the most commonly used habitat, and bats roosts in caves, mines, rock crevices, buildings, and other protected sites with nearby access to drinking water (Keinath 2004). Nursery colonies occur in caves, mines, and sometimes buildings (Keinath 2004). Individuals are known to move up to five miles between roosting and foraging areas (Keinath 2004). Thermoregulatory requirements result in bats periodically shifting the specific roost site occupied within a colony to adapt to fluctuations in climatic conditions (e.g., clusters of bats move in response to temperature changes in different parts of the roost, (Keinath 2004). Fringed bats are known to migrate, but little is known about the magnitude of movements. Diet includes beetles and moths. *M. thysanodes* forages close to the vegetative canopy, and has relatively slow and highly maneuverable flight (Keinath 2004).

The likelihood of occurrence for *M. thysanodes* increases as the number of snags greater than 12 inches dbh increases and percent canopy cover decreases (Keinath 20045). *M. thysanodes* day

and night roost under bark and in tree hollows, and bats exclusively used snags for day roost sites in Douglas-fir (*Pseudotsuga menziesii*) forest in Northwestern California (Six Rivers National Forest, Weller and Zabel 2001). All roost trees were snags in early to medium stages of decay, and bats switched roosts often (number of bats exiting roosts varying between 1-88). The most important factor that discriminated roost sites from random sites at this study site was 5.4 or more snags ≥ 12 inches dbh at roost sites. Roost snags were 85 feet taller and had diameters 17 inches larger than random snags in the surrounding watershed, and roost sites had 11 percent less canopy cover and were 135 feet closer to stream channels than random sites (Weller and Zabel 2001).

Analysis Area Surveys

A small portion (southeastern area) of the analysis area was surveyed for bats during 2002 (July-August) as part of an unrelated project. *M. thysanodes* was detected at one site in the analysis area and at four other locations within a mile of the analysis area. Forest-wide bat distribution data collected (using mist nets, acoustic sampling, and visual inspection of suitable roosting sites) over the past couple decades (1991-2013, 206 forest-wide locations) show *C. townsendii* at greater than 80 locations distributed across all three ranger districts. Based on these observations, the availability of suitable habitat, and its apparently wide distribution on PNF, it is assumed that *M. thysanodes* are present in the analysis area.

Environmental Consequences – Bats

Action Alternative (Alternative A)

The implementation of Management Area direction and habitat prescriptions and allocations for California spotted owl, northern goshawk, and forest carnivores, including the retention of large trees, retention of hardwoods, snags and LWD and maintaining aquatic/riparian ecosystem processes, would provide many of the habitat attributes necessary to support sensitive bat species. Potentially suitable habitat likely exists in the project area for all three of these bat species (*M. thysanodes, C. townsendii, A. pallidus*).

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

Direct effects from the Action Alternatives are possible if any of these species occur in the project area, and we assume presence for all three bat species (*M. thysanodes, C. townsendii, A. pallidus*). Destruction of active roosts through felling or removal of trees with hollows could displace or harm individual bats. Chain saw activity or the use of heavy equipment causing ground vibrations may cause noise and tremor disturbance significant enough to cause temporary or permanent

roost abandonment. These effects may be especially detrimental to the population during the breeding season (May 20 to August 15) when the potential exists for disturbance to lactating females and maternity colonies. If any of these sensitive bat species breed in the area, project activities during the breeding season could affect individual bats, including direct mortality.

The three sensitive bat species exhibit a continuum of roost site requires. *C. townsendii* is colonial and roosts in caves, mines, and abandoned human structures (hanging in open areas from a wall or the ceiling. *M. thysanodes* and *A. pallidus* also roost in caves, crevices, and mines, but these species also utilize live trees and snags for roosting. Further, *M. thysanodes* may exhibit site specific roosting patters as this species was found to exclusively use snags for day roost sites on the Six Rivers National Forest. Although the Chip-munk Project is not likely to physically alter roosting habitat for *C. townsendii* (caves, mines, abandoned buildings), project activities could disturb or cause abandonment of colonies. Its colonial nature places *C. townsendii* at high risk for a single disturbance event to impact the entire population (e.g., chainsaw noise, tractor operations). The single most important non-structural requirement for roost sites for this species is absence of human disturbance (USDA 2001b). *A. pallidus* also is very sensitive to disturbance; even hiking past a roosting site can cause the bat to abandon the area completely, but unlike *C. townsendii*, *A. pallidus* does use live and dead trees for roosting. Thus *A. pallidus* roost sites could potentially be destroyed during the Chip-munk Project, and any roost sites in the areas that are not physically altered could be abandoned as a result of disturbance. *M. thysanodes*, like many bat species, also is very sensitive to disturbance at or modification of roost and the surrounding environment.

Snag retention areas within salvage treatment units (365 acres) and equipment exclusion zones within RCAs (950 acres) will not be entered or will not be entered with ground based equipment, respectively. These two snag retention areas will maintain bat roosting habitat components throughout the Chip-munk Project area. Marking guidelines for this project identify probability of mortality levels for removing the largest conifers (greater than 40 inches dbh) that are higher compared to those for smaller sized trees (Appendix C of USDA 2013c), allowing future recruitment of large snags and down logs. Further, as a result of their linear nature, RCA equipment exclusion zones also will mediate spatial fragmentation in roosting habitat availability for *M. thysanodes* and *A. pallidus* throughout the project area.

All three sensitive bat species utilize a fairly broad array of habitats, with *C. townsendii* preferring mesic habitats and *M. thysanodes* and *A. pallidus* most frequently inhabiting oak woodlands. Equipment exclusion zones within riparian corridors (950 acres) will provide mesic habitat preferred by *C. townsendii*. The Chips Fire did not reduce the total amount of montane hardwood or montane hardwood-confer habitat in the analysis area; however, there was shift in oak woodland composition and structure post-fire (smaller diameter trees with more open canopy, Appendices E and F of USDA 2013c). Roadside Hazard Tree removal and Salvage treatment units overlap with less than 1 percent of potential oak woodland habitat in the analysis area

(Table 59, Appendix F of USDA 2013c). Oak (*Quercus*) hazard trees will be removed and oak snags may be removed for safety or operability within salvage units. However, many of California's nine species of native oak trees are thought to have evolved with fire as they exhibit high overall survival post-fire with high topkill (death of all above-ground stems) rates followed by recovery via sprouting of basal shoots from the root crown (Holmes et al. 2008). Thus, we would expect the long-term effect of the Chips Fire on oak woodland habitat to be positive and benefit both *M. thysanodes* and *A. pallidus*.

Cumulative Effects

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the action alternative evaluates the impact on TES wildlife from the existing condition within the analysis area.

We assume presence for all three sensitive bat species (*M. thysanodes, C. townsendii, A. pallidus*). Cumulative effects on bats could occur with the incremental loss of the quantity and/or quality of habitat for these species. Overall, increases in urbanization, increases in recreational use of NFS, and the utilization of natural resources on state, private and federal lands may contribute to habitat loss for these species.

The woodcutting and Christmas tree cutting programs on the PNF are ongoing programs that have been in existence for years and are expected to continue. The past and future effect of the woodcutting program has and would be to reduce snags, in all forest types (including burned patches), along roadsides throughout much of the analysis area. However, the impacts are expected to be minimal due to the topography (steep), accessibility in the area and the abundance of snags post fire. If any of these sensitive bat species breed or roost in the project area, project activities could affect individual bats, including direct mortality. However, snag and log removal through the woodcutting program has a limited spatial impact across the PNF as woodcutting is only permitted along open roads (within 100 feet). Further, woodcutting permits explicitly prohibits cutting snags in which birds are actively nesting, and the rate of natural snag recruitment (via disease and other mortality factors) may abate losses associated with woodcutting within the analysis area.

The Lassen National Forest proposed the Poker Chip Project (salvage, danger tree and reforestation treatments, USDA 2013i,j) which overlaps the Chip-munk Project analysis area. Lassen forest biologists did not consider sensitive bat species in their analysis citing a lack of suitable habitat and known occurrences in the project area.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside

Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities would have no effect on early and mid seral habitat in the analysis area. If any of these sensitive bat species breed or roost in the project area, project activities could affect individual bats, including direct mortality.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and after fire suppression by PG&E to protect critical electrical power infrastructure.

If any of these sensitive bat species breed or roost in the project area, project activities could affect individual bats through disturbance, although direct mortality is unlikely because this project targets trees that were previously felled during fire suppression.

With the current PNF woodcutting program, the terrestrial wildlife analysis area would be open to public woodcutting 12 months a year, limited only by available access. Uncontrolled public use within the areas used by bats, especially during the breeding season (maternity roosts), could cause disturbance that could disrupt and preclude successful recruitment of young as well as remove roost trees.

No Action Alternative (Alternative B)

Direct and Indirect Effects of No Action Alternative

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

There would be no direct effects on bats or bat habitat, as no activities would occur that would cause disturbance to denning bats, nor any impacts to the existing habitat conditions.

Indirect effects of no action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread resulting in potential modification of suitable bat habitat including the loss of large trees, large snags and down woody material.

Cumulative Effects

The No-action Alternative for the Chip-munk Project would not provide long-term protection of bat habitat from being greatly altered by a large stand-replacing fire. There would be no actions designed to reduce the risk of high intensity wildfire.

Determinations for All Alternatives – Bats

Action Alternative

It is our determination that the Chip-munk Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for sensitive bat species (*M. thysanodes, C. townsendii, A. pallidus*).

No-action Alternative

It is our determination that not implementing the Chip-munk Project will not affect sensitive bat species (*M. thysanodes, C. townsendii, A. pallidus*). Alternative B is not without risk to bats, as no action is taken to reduce existing fuel levels, create areas that could allow for better and more efficient fire suppression efforts, and leaves existing bat habitat vulnerable to large scale fragmentation as a result of wildfire.

Sierra Nevada Yellow-Legged Frog (*Rana sierrae*)

Affected Environment – Sierra Nevada Yellow-Legged Frog

Population Status

Sierra Nevada Yellow-legged frogs (*Rana sierrae*) are endemic to Region 5 and most remaining populations occur on public lands. *R. sierrae* (SNYLF) can be found on the El Dorado, Inyo, Lassen, Plumas, Sierra, Stanislaus, Tahoe and Lake Tahoe Basin National Forests. *R. muscosa* (mountain yellow-legged frog) can be found on the Inyo, Sequoia, Sierra, Angeles, San Bernardino and possibly Cleveland National Forests. *R. muscosa* populations in the transverse range are federally endangered. *R. muscosa* and *sierrae* were once extremely abundant throughout their range. Historically these frogs were found throughout the Sierra Nevada mountain range in California and Nevada and along the transverse range in southern California. Northern Sierra Nevada frogs belong to *R. sierrae* based on genetic work, morphology and acoustics. Mitochondrial DNA indicates that the contact zone between these two species is

between the middle and south forks of the Kings River and frogs south of this point are classified as *Rana muscosa*. Prior to 2007, these two species were considered to represent a single species; *Rana muscosa sensu lato* (Vrendenburg et al. 2007). As most studies cite *Rana muscosa sensu lato*, and both species occupy similar niches in their respective ranges, this document will address both species together.

The SNYLF is considered warranted for listing under the Endangered Species Act but precluded by higher priority actions at the federal level (USDI 2003b, 2007), is warranted for listing as a threatened species at the state level (California Fish and Game Commission 2012), and is a USDA Forest Service sensitive species. On April 25, 2013, the U.S. Fish and Wildlife Service (FWS) issued a proposed rule to list 3 amphibian species in the Sierra Nevada under the Endangered Species Act (ESA; http://www.gpo.gov/fdsys/pkg/FR-2013-04-25/pdf/2013-09600.pdf): Sierra Nevada Mountain Yellow legged frog (SNYLF) *(Endangered)*; Mountain yellow legged frog, Northern Distinct Population Segment (DPS) *(Endangered)*; and Yosemite toad *(Threatened)*. Of these, the Sierra Nevada Yellow-legged frog (recently classified as a separate species from the Mountain Yellow-legged Frog) is the only species that occurs on the Plumas NF. As required under the Endangered Species Act (and re-emphasized by court order), FWS also proposed Critical Habitat for each species (http://www.gpo.gov/fdsys/pkg/FR-2013-04-25/pdf/2013-09598.pdf). The 4/25/13 proposals start a year-long review period. FWS will then make final determinations. The FWS is accepting comments on the proposals until June 24, 2013.

Habitat Requirements

Yellow-legged frogs are highly aquatic, typically utilizing only the immediate bank and emergent rocks and logs. They prefer well illuminated, sloping banks of meadow streams, riverbanks, isolated pools, and lake borders with vegetation that is continuous to the water's edge (Martin 1992, Zeiner et al. 1988). Frogs space use patterns involve three main sites: overwintering, breeding and foraging.

Tadpoles and adults overwinter in deep pools with undercut banks that provide cover (Martin 1992). Suitable breeding habitat is considered to be low gradient (up to 4 percent) perennial streams and lakes. Streams in this category generally have the potential for deep pools and undercut banks which provide the habitat requirements of this frog. In high elevations, breeding occurs between May and August as soon as the meadows and lakes are free of snow and ice. In lower elevations, breeding occurs between March and June once high water in streams subsides. Sierra Nevada yellow-legged frogs (SNYLF) usually lay their eggs in clusters submerged along stream banks or on vegetation. Tadpoles require at least one year before metamorphosis to the adult stage. Tadpoles in some high elevation populations may require up to three years before metamorphosis (Knapp 1996). Water temperature does not seem to have a significant impact on this species as they are able to fully function in water as cold as 3C (37.4F), and tadpoles have

been found in water as warm as 27C (80.6F), but this seems to be near the maximum tolerance for this species (Mullally and Cunningham 1956). Body temperature is regulated by being primarily diurnal and basking throughout the day utilizing water to reduce body temperature if it gets too high, and utilizing the warmer shallow areas in lakes and streams (Bradford 1984).

Adults primarily feed on aquatic and terrestrial invertebrates favoring terrestrial insects such as beetles, flies, ants, bees, and true bugs (Jennings and Hayes 1994). They are also known to feed on pacific treefrog *(Hyla regilla)* tadpoles (Zeiner et al. 1988). Adult yellow-legged frogs readily consume *Hyla regilla* tadpoles (Pope and Matthews 2001). In areas with high numbers of larval *H. regilla*, adult yellow-legged frogs have better body conditions compared to areas with low numbers. Additionally, the presence of small larval tadpoles such as *H. regilla* or *Bufo spp.* greatly increases both the probability of finding yellow-legged frogs and the actual numbers of yellow-legged frogs on site. These tadpoles represent an abundant, energetically profitable food source and are an important supplemental food source to the regular invertebrate prey (Pope and Matthews 2001). SNYLF tadpoles graze on algae and diatoms along rocky bottoms in streams, lakes and ponds. Garter snakes and introduced trout prey upon SNYLF tadpoles (Zeiner et al. 1988). Due to the adults' overwintering underwater and the tadpoles' long metamorphosis, this species also is very vulnerable to introduced fish (Knapp 1996).

Dispersal studies are in their infancy for stream dwelling SNYLF. One season of a three year radio-telemetry study was conducted in Lone-Rock Creek, with 20 frogs tracked from July through September of 2003. The objective of the study is to determine the dispersal behavior of SNYLF in relation to steams and adjacent terrestrial habitat. This study continues in Bean Creek near Meadow Valley, California. Current findings are that adult frogs have territorial pools and stay near these pools throughout the summer. In the fall, as temperatures decline, female frogs have been found to move as far as one mile downstream within the stream channel (towards male frogs located at the confluence of a larger drainage). To date, the lateral movement of SNYLF away from the channel has been found to be no greater than 23 meters (MGW Biological and Klamath Wildlife Resources 2006).

Historically streams with a bank of less than 10 inches in vertical height with a moderately rocky, sparsely vegetated bank harbored the densest populations (Mullally and Cunningham 1956). Populations of SNYLFs occur on moderate to high, gradient B channels on the Plumas National Forest (NRM 2013). Abundance of SNYLF has not been estimated in Plumas or Tahoe National Forest streams, nor do we understand whether the species' ecology differs in the Northern Sierra where populations are more dispersed. To address this knowledge gap, population monitoring of the SNYLF was conducted in the HFQLG project area during 2009-2011 (USDA 2011b). This study found populations of SNYLF in a moderate to high gradient stream (5-12 percent, Rock Creek, USDA 2013k). The high gradient reach was comprised of 91 percent (1,824 meters) high gradient and low gradient riffles, with the remaining 9 percent (17 meters) comprised of mid-channel and plunge pools habitat. Similarly, the lower gradient reach was comprised of 97

percent (356 meters) high and low gradient riffles, and 3 percent (42 meters) mid-channel pool habitat. South Fork Rock Creek can generally be characterized as an intermittent channel with consistent perennial flows during the run-off and into the early summer months, though flows typically cease by mid-summer and result in long stretches of dry channel and isolated standing water within pool habitats (USDA 2103k).

Female frogs can have live 13-14 years with males living 11-12 years (Matthews and Miaud 2007). Matthews and Preisler (2010) had 11.3 percent survivorship (44 individuals) to an age of at least 10 years old. They also had high annual recapture rates of 0.55-0.91 percent even during years with low snowpacks indicating that low snowpack affects larvae more significantly than adults. Males lack vocal sacks and do not call during the breeding season, nor do they form breeding aggregations (Matthews and Miaud 2007). Frogs grow faster and are typically larger at lower elevations due to the extended summer enabling additional foraging and growth (Matthews and Miaud 2007). However, the additional snow pack of higher elevation animals does not appear to impact survival as year-to-year adult survival is often highest in years with the greatest snowpack.

Analysis Area Surveys

Potential habitat has been identified throughout the project area in perennial and intermittent streams and water bodies above 3,500 foot elevation (SNYLF's occur in the Meadow Valley area, and on the Feather River Ranger District as low in elevation at 3,500 feet). Forest Aquatic's Crew's and Forest Biologists recently (2011-2012) completed amphibian surveys on 20.6 miles of stream (for the Belden and Storrie/Rich Noxious Weed Projects on the Mt Hough Ranger District) within and adjacent to the analysis area (Fellers and Freel 1995). This survey area contained 31 miles of streams that contribute to the North Fork Feather River watershed (Twain to the south, Greenville towards the east and Lake Almanor to the north). Habitat in the area consists of a heterogeneous mosaic of varying canopy cover dominated by Sierra Mixed-Conifer interspersed with meadows, brush fields, open rock areas, rock outcrops, and riparian zones. Surveys occurred in apparently suitable habitat between 3,100 and 5,700 feet elevation (USDA 2012e). Surveys identified moderate to low potential SNYLF habitat in Ohio Creek, tributaries to Ohio Creek, North Fork of the Feather River, lower Salmon Creek, tributaries to North Fork of the Feather River, Owl creek, Butt creek and its tributaries. The upper reaches of many of these drainages were dry or the flow was subterranean, possibly due to the very dry summer, which may have limited our ability to detect SNLYFs. No SNYLF were found during these surveys.

TES amphibian and reptile surveys were completed for the Federal Energy Regulatory Commission (FERC) relicensing of the upper North Fork of the Feather River Project (FERC 2005). Within a portion of the Chip-munk Project area, Garcia and Associates (2001a) conducted site assessments and visual encounter surveys according to Protocols and Standard Operating Procedures (Pacific Gas and Electric Company 2002). All potential herpetofauna habitats within

1/2 mile of Lake Almanor, Butt Valley Reservoir, Belden Forebay, and the North Fork of the Feather River were included in the preliminary habitat assessments. The 31 sites ultimately selected for surveying represent the best potential species-specific habitat, of moderate- to high quality, within the Upper North Fork of the Feather River project area. No SNYLF were detected during these surveys. TES Amphibian site assessments or surveys have not been completed on approximately 40 percent of the project area. Four miles of perennial and 29 miles of intermittent streams (33 miles total) have not been surveyed to date. The four miles of perennial and all potentially suitable intermittent streams will be surveyed in the spring and summer of 2013 following the Feller's and Freel protocol (1995).

SNYLF historically occupied the Butt Creek subwatershed, located north of the project area. Chico State Museum collected two specimens of SNYLF in 1961 in Butt Creek just north of Butt Reservoir. In addition, there are historic locations of SNYLF in Long Valley.

Environmental Consequences – Sierra Nevada Yellow-Legged Frog

Action Alternative (Alternative A)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

There is a total of 741 acres of riparian conservation areas along perennial and intermittent streams in the project area that offer potential habitat for the SNYLFs (Table 70). Analyses of CWHR vegetation size classes was completed pre and post Chips Fire and the potential CWHR changes, retention, and disturbance that could occur with the proposed treatments was assessed. As a result of the steep terrain in the analysis area, the equipment exclusion zone (EEZ) and Riparian Conservation Area (RCA) are the same width in most units (96 percent of EEZs in roadside hazard tree units have slopes have greater than 25 percent, and 90 percent of EEZs in salvage treatment units slopes greater than 35 percent (see Appendix G of USDA 2013c for RCA and EEZ widths).Thus, this analysis includes the entire RCA for salvage units (tractor) when calculating habitat within EEZs. The following analysis includes the acres of RCA and EEZ in treatment units for perennial and intermittent streams identified as potentially suitable SNYLF habitat (greater than 3,500 feet). In addition the CWHR size class and density and percent basal area mortality was analyzed to determine the approximate number of size class 5 and 4 (Appendix D of USDA 2013c) that will be removed or remain on site to determine project effects.

Roadside Hazard Tree Units

There are 162 acres of RCA along the intermittent and perennial drainages within the roadside hazard tractor units, and 150 of these acres are in EEZs or Full Suspension Zones (FSZs, Table 70). Of these acres, only 7.5 acres of the roadside equipment exclusion zone is less than 25 percent slope (4 percent of total RCA acres). Therefore, to meet the project design criteria full suspension is required within the entire RCA (300 horizontal feet on perennial streams, 150 feet on intermittent streams, Appendix G of USDA 2013c).

Before the Chips Fire, 84 percent (137 acres) of RCA acres in roadside hazard tree units contained medium and large size trees (CWHR size class 4 and 5) and, of these acres, 60 percent (81 acres) were in CWHR size class 5 (greater than 24”dbh, Table 71). After the Chips Fire, 106 acres of size class 4 and 5 remain on site (primarily burned at a low severity, basal mortality of less than 25 percent, Table 70). This equates to a loss of 23 percent of medium and large diameter trees (CHWR 4 and 5) to high severity wildfire. Of the large diameters trees in RCAs (106 acres), there is a total of 99 acres in EEZs. Thus, only 7 acres of large diameter trees in RCA would be accessible by logging equipment. In addition to the snag requirement within the RCA (4 of the largest trees per acre); all trees 30”dbh and greater within the EEZ would be retained (Appendix G of USDA 2013c).

Habitat with the greatest potential for SNYLF presence is within perennial streams. Within roadside hazard tractor units RCAs there are 20.0 acres of perennial stream habitat (12 percent of the total RCA area). There is a very low potential for a direct effect by the felling of a hazard tree or pile burning to individual SNYLF in roadside hazard treatment units. SNYLF sheltering habitat could potentially be affected by removal of standing snags. Sheltering habitat for amphibian species also includes landscape features that provide cover and moisture during the dry season within 100-300 feet of the stream. This could include boulders or rocks and organic debris such as downed trees or logs. A reduction in dead wood would result in a lack of connectivity and cover for frogs that could possibly move out of stream and into the floodplain, the RCAs, and upland habitats. Possible indirect effects to frogs using the RCA for dispersal, and over wintering may include a reduction in cover provided by woody debris, warmer and drier microclimate conditions due to removal of dead trees in RCA areas, and reduction in connectivity provided by woody debris between aquatic habitats, RCAs, and uplands. Cover for aquatic-dependent species and effective soil cover in this post-fire environment are very important for the proper functioning of aquatic and riparian habitats until vegetation can reestablish and provide these habitat elements (5to 30+ years). As vegetation reestablishes, the role of the standing dead and downed wood would be reduced. However, there are few acres of treatment along perennial streams, and there will be minimal disturbance to soils on these steep slopes, and remaining snags will provide CWD and LWD recruitment to the streams. In addition these trees will provide shade, retention of water and moisture on site, soil and bank stability, and have a positive effect on the micro-climate within the RCA’s specifically within the equipment exclusion zone. Smaller

diameter fuels left within RCAs will increase the threat of future wildfire. With implementation of the project design features (Chapter 2) and BMPs discussed above, there would be nominal direct and indirect effects to the SNYLF and its potential habitat within the Chip-munk Project by roadside hazard project activity.

Tractor Salvage Units

There is a total of 151 acres of RCA along perennial and intermittent within the interior salvage tractor units (Table 70). Of these acres, only 16.0 acres along intermittent streams are on a slope of less than 35 percent (10 percent of total intermittent RCA acres), therefore to meet the project design criteria full suspension is required within the entire RCA along these intermittent streams (Appendix G of USDA 2013c). All perennial RCA acres (13 acres) have slopes greater than 35 percent (Table 70); therefore, full suspension in required along perennial RCAs in tractor salvage units (Appendix G of, USDA 2013c). Before the Chips fire, 96 percent (145 acres) of RCA acres along intermittent and perennial streams within interior tractor salvage units were CWHR size class 4and 5 (67 percent of which were greater than 24”dbh, size class 5, Table 71). Post-fire, there was a loss of 92 acres of CWHR size class 4 and 5 (62 percent) and these stands will have a site conversion to montane chaparral (with standing CWHR size class 4 & 5 snags). As EEZ equals RCA, and retention of greater than 30” dbh trees is required (Chapter 2, Appendix G of USDA 2013c), most large diameter trees will be left standing within RCAs along intermittent and perennial streams. In addition, there are approximately 53 acres of low or unburned habitat in RCAs containing medium and large size trees (CWHR 4 and 5). Of these, 41 acres (77 percent) experience moderate and low burn severity (less than 50 percent basal area mortality) and chances are these trees will not meet the marking guidelines (appendix C of USDA 2013c) and would be retained. Approximately 75 percent of medium and large size trees (CWHR size class 4 and 5) are moderate to densely spaced (greater than or equal to 40 percent and canopy cover). Overall, the retention levels outlined above will provide adequate LWD and CWD within RCAs, provide shade, retention of water and moisture on site, soil and bank stability, and have a positive effect on the micro-climate within RCAs, specifically within the equipment exclusion zone.

Table 70. Post-fire CWHR size and density classes within RCAs (roadside hazard, tractor salvage, skyline salvage), full suspension zones (skyline salvage), and four basal area mortality categories in proposed treatment units (all acres are approximate and National Forest System lands only).

Acres in RCAs - roadside hazard tree units

	Intermittent streams					Perennial streams					
	Basal area moratlity					Basal area moratlity					
CWHR	0-25%	25-50%	50-75%	75-100%	Total - intermittent	0-25%	25-50%	50-75%	75-100%	Total - perennial	all streams
1	0.4	0.1	0.2	32.3	**33.0**	0.0		0.1	1.9	2.0	**35.0**
2P 2S	1.8	0.6	0.2		**5.2**						**2.6**
3D 3M	1.4				**1.4**						**1.4**
3P 3S	14.2	1.2	0.6	0.0	**16.0**						**16.0**
4D 4M	10.5				**10.4**	4.2				4.2	**14.6**
4P 4S	19.2	4.5	3.0		**26.8**	2.7	0.5	1.0		4.1	**30.9**
5D 5M	29.6				**29.6**	11.3				11.2	**40.8**
5P 5S	12.8	3.4			**18.9**		0.4	0.1		0.5	**60.3**
Grand Total	**90.7**	**10.0**	**6.8**	**32.3**	**139.9**	**18.1**	**1.0**	**1.1**	**1.9**	**22.0**	**161.9**

Acres in RCAs - tractor salvage units

	Intermittent streams					Perennial streams					
	Basal area moratlity					Basal area moratlity					
CWHR	0-25%	25-50%	50-75%	75-100%	Total - intermittent	0-25%	25-50%	50-75%	75-100%	Total - perennial	all streams
1				92.2	**92.2**				1.9	1.9	**94.2**
2S		0.0	0.1		**0.1**						**0.1**
3P 3S	3.1	0.7	0.1		**3.9**	0.2	0.1	0.1		0.3	**4.2**
4D 4M	1.0				**1.0**	2.8				2.8	**3.8**
4P 4S	3.8	3.1	4.9		**11.8**	4.6	0.7	0.3		5.7	**17.5**
5D 5M	15.4				**15.4**	0.8				0.6	**16.0**
5P 5S	3.6	4.1	6.4		**14.1**	0.6	0.4	0.5		1.6	**15.7**
Total	**26.8**	**7.9**	**11.6**	**92.2**	**138.6**	**8.9**	**1.1**	**1.0**	**1.9**	**12.9**	**151.5**

Acres in RCAs - skyline salvage units

	Intermittent streams					Perennial streams					
	Basal area moratlity					Basal area moratlity					
CWHR	0-25%	25-50%	50-75%	75-100%	Total - intermittent	0-25%	25-50%	50-75%	75-100%	Total - perennial	all streams
1		0.1		145.2	**145.3**	0.3	0.5	0.9	124.0	**125.7**	**271.0**
2						2.1	0.1	0.2		**2.4**	**2.4**
2D						1.4				**1.4**	**1.4**
2P 2S						0.6				**0.9**	**0.9**
3D 3M	0.5				**0.5**	0.9				**0.9**	**1.3**
3P 3S	1.4	0.9	1.0		**3.2**	0.8	1.2	1.3		**3.2**	**6.5**
4D 4M	24.8				**24.8**	13.7				**13.8**	**38.6**
4P 4S	6.7	5.3	7.1		**19.1**	0.7	4.0	7.5		**12.2**	**31.4**
5D 5M	30.1				**30.0**	21.7				**21.7**	**51.7**
5P 5S	4.5	5.1	7.4		**17.0**		4.0	4.6		**8.6**	**25.7**
Total	**68.0**	**11.3**	**15.5**	**145.2**	**240.0**	**40.2**	**9.9**	**14.4**	**124.0**	**188.5**	**428.5**

Acres in full suspension zones - skyline salvage units

	Intermittent streams					Perennial streams					
	Basal area moratlity					Basal area moratlity					
CWHR	0-25%	25-50%	50-75%	75-100%	Total - intermittent	0-25%	25-50%	50-75%	75-100%	Total - perennial	all streams
1				76.3	**76.3**				27.0	**27.0**	**103.3**
2D						1.4				**1.4**	**1.4**
3M	0.3				**0.3**	0.1				**0.1**	**0.4**
3P 3S	0.3	0.2	0.0		**1.2**	0.5	0.4			**1.3**	**2.5**
4D 4M	12.1				**12.1**	3.2				**3.2**	**15.3**
4P 4S	2.4	2.5	3.6		**8.5**	0.1	1.0			**3.6**	**12.1**
5D 5M	15.5				**15.5**	4.0				**4.0**	**19.5**
5P 5S	1.8	2.1			**7.8**		0.6	1.0		**1.6**	**9.3**
Total	**32.5**	**4.8**	**8.0**	**76.3**	**121.6**	**9.4**	**1.9**	**4.1**	**27.0**	**42.3**	**163.9**

Table 71. Pre-fire CWHR size and density classes within RCAs (roadside hazard, tractor salvage, skyline salvage) and full suspension zones (skyline salvage) of proposed treatment units (all acres are approximate and National Forest System lands only).

There are few acres of treatment along perennial streams, and there will be minimal disturbance to soils on these steep slopes, and remaining snags will provide CWD and LWD recruitment to

	Acres in RCAs - roadside hazard tree units			Acres in RCAs - tractor salvage units			Acres in RCAs - skyline salvage units			Acres in full suspension zones - skyline salvage units		
CWHR size and density class	Intermittent	Perennial	Total	Intermittent	Perennial	Total	Intermittent	Perennial	Total	Intermittent	Perennial	Total
1	1.1	0.1	1.2				9.7	2.7	12.4	4.8	0.0	4.8
2D								1.4	1.4		1.4	1.4
2P 2S	4.1		4.1	0.6		0.6		1.0	1.0			
3D 3M	1.8		1.8				5.5	5.5	11.0	2.9	1.0	3.8
3P 3S	17.1		17.1	5.3	0.4	5.6	2.1	2.4	4.5	0.5	0.9	1.4
4D 4M	19.5	4.4	23.9	17.0	3.9	20.9	76.9	75.8	152.7	31.1	15.7	56.8
4P 4S	26.0	5.4	31.4	17.7	5.3	23.1	25.4	6.0	31.4	11.8	0.1	11.8
5D 5M	53.9	12.2	66.1	86.3	2.2	88.4	115.1	93.6	208.7	58.7	23.2	81.9
5P	15.4		15.4	11.7	1.1	12.8	5.3		5.3	1.9		1.9
Total	**139.9**	**22.0**	**161.9**	**138.6**	**12.9**	**151.5**	**240.0**	**188.5**	**428.5**	**121.6**	**42.3**	**163.9**

the streams. In addition these trees will provide shade, retention of water and moisture on site, soil and bank stability, and have a positive effect on the micro-climate within the RCA's specifically within the equipment exclusion zone. Smaller diameter fuels left within RCAs will increase the threat of future wildfire. With implementation of the project design features (Chapter 2) and BMPs discussed above, there would be nominal direct and indirect effects to the SNYLF and its potential habitat within the Chip-munk Project by tractor salvage project activity.

Skyline Salvage Units

Prior to the Chips Fire, 97 percent skyline salvage unit RCA acres (429 total acres) contained medium and large diameter trees (CWHR size class 4 and 5, Table 87). Of these acres, 209 contained large diameter trees with greater than or equal to 40 percent canopy cover (CWHR 5D 5M), 152 contained medium diameter trees (CWHR 4D and 4M), 25 acres were of CHHR size and density class 5P and 5S, and 31 acres were of CWHR size and density class 4P and 4S (Table 71). A total of 417acres of size CHWR size class 4 and 5 existed in skyline salvage RCAs prior to the fire (Table 71). Along perennial streams, there were 94 acres of CWHR size class 5 and 82 acres of CWHR size class 4 trees (Table 71).

Post-fire, we estimate there are 52 acres of CWHR size class 5D and 5M habitat, 40 acres of size class 4D and 4M, 25 acres of 5P and 5S, and 31 acres of 4P and 4S habitats (total of 148 acres) burned at low severity (less than 25 percent basal area mortality, Table 70). Of those 30 acres of size class 5 and 26 acres of size class 4 are along perennial streams (Table 70). 259 acres in the outer buffer of the RCA (outside the EEZ) of CWHR size class 4 and 5 burned at a high severity (greater than 75 percent basal area mortality) and therefore according to the post fire CWHR reclassification there has been a site conversion of 259 acres to montane chaparral (with standing

medium to large snags). There are 164 acres within the FSZ's, with the following characteristics; 84 acres of size class 5 and 69 acres of size class 4 (all primarily conifers) and with CWHR densities of primarily dense to moderate. One-hundred-and-twenty-five acres of size class 5 and 83 acres of size class 4 is available for salvage in the outer RCA buffer (Table 70, Appendix G of, USDA 2013c).

Project design features allow for removal of all trees greater than 16" dbh, as long as 4 of the largest snags per acre are retained for LWD and CWD recruitment (Chapter 2). Within FSZs, all trees greater than 30" dbh will be retained, unless felling is required for safety or operability. In addition, no trees will be felled or harvested within 25 feet of the bankfull stream, unless required for the development of the skyline corridor.

In a review of the effects of salvage logging in Western North America, Peterson et al. (2009) found most of the literature reported adverse environmental effects to fish and amphibians and to their habitat. Although, specific effects in relation to proximity of salvage operations to aquatic habitats isn't well quantified (Peterson et al. 2009). Some of the common effects from removing snags post fire include reduced macroinvertebrate, fish, and amphibian populations, alterations of sediment transport and nutrient cycling, loss of large wood recruitment and the resulting changes in channel morphology (Peterson et al. 2009). Long term effects of salvage on aquatic systems are variable and both scale and context specific (Reeves et al. 2006).

Effects of post fire logging on aquatic ecosystems contribute to the cumulative effects of hundreds of years of human activities such as logging, road building; which have degraded stream environments and caused significant losses to aquatic biodiversity and reduced the abundance and range of sensitive aquatic species (Karr et al. 2004). Research of existing studies found that by removing fire-killed trees reduces shade on site and regeneration of seedlings on high elevation or dry sites, removing future soil organic matter and the ability of the soil to retain water affecting soil biota, plant growth and stream flow (Peterson et al. 2009).

Log suspension associated with skyline treatments reduces the likelihood of logs dragging on the ground and disturbing the soil. The minimum full suspension zone within the FSZ for the proposed action within skyline units is 75 feet. One end suspension outside of the full suspension zone has the potential to cause excessive erosion, compaction, and sedimentation into the stream with the potential of smothering egg masses and reducing their survival.

A positive indirect effect of skyline cable units (under Alternative A only), because of the lop and scatter of limbs and tops, and the leaving of trees under 16 inches dbh, would be that the resultant ground cover within RCAs immediately post-harvest is likely to be higher than in untreated RCAs outside of units. The same is not true for ground-based units which will transport most of the standing dead material out. There will be some amount of breakage that will be left on the ground but this volume is not easily quantifiable.

Within skyline salvage units, there is a low probability of direct and indirect effects to the SNYLF or its potential habitat. We failed to detect frogs during recent survey efforts (2011-2012), and implementation of project design features and BMPs will significantly reduce the probability of any adverse effects on frogs (Chapter 2; Appendix G of USDA 2013c).

Cumulative Effects

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on TES habitat from the existing condition within the Analysis Area.

Cumulative effects on the SNYLF could occur with the potential incremental loss of the quantity and/or quality of habitat for this species. Overall, increases in urbanization, and as described above; increases in recreational use of National Forest System lands, and the utilization of natural resources on state, private and federal lands may contribute to habitat loss for this species. High intensity stand replacing fires have contributed and would continue to contribute to loss of habitat for this species.

There are fifteen sub-watersheds within the analysis area in which a cumulative watershed effects (CWE) analysis has been completed. The Equivalent Roaded Acre (ERA) method is used to assess cumulative effect of activities that alter hydrologic function and result primarily in alteration of runoff in project watersheds. The ERA method is essentially an accounting of the past, present and future impacts. Watersheds are rated as moderately sensitive by Forest staff when evaluated for use of the ERA method. Rating variables include erosion potential, slope steepness, amount of alluvial channels, risk of rain-on-snow and/or thunderstorm events, and re-vegetation potential. Using these ratings, a Threshold of Concern (TOC) value is assigned for each watershed, beyond which an adverse effect might be expected. The TOC is generally expressed as a percentage of watershed area.

Seven of the fifteen CWE watersheds are over acceptable Forest thresholds for management impacts that affect runoff; all but one are due to the effects of the fire (see Hoffman 2013 for details). These watersheds include (in order of the highest ERA values, including miles of perennial and intermittent streams at risk): Clear Creek (p=4.7. I=4.2), Ohio Creek (p=3.6, i=7.5), Upper Mosquito Creek (p=5.3, i=12.0), Belden Forebay North Fork of the Feather River (p=4.6, i=15.5), Salmon Creek (p=5.2, i=7.4), Butt Valley Reservoir East (p=2.2, i=8.4), and the Upper North Fork Feather River (p=2.4, i-3.3). Butt Valley Reservoir East watershed is currently over threshold because of private logging activities and road densities.

Erosion from harvest slopes, and subsequent sediment delivery to channels is expected to be elevated over normal conditions because of lack of ground cover. But in the event of precipitation that initiates erosion the overall lack of ground cover on burned slopes will be the greater source. Within these watersheds with a high threshold of concern there are 28 miles of perennial streams and 58 miles of intermittent streams identified as potentially suitable SNYLF habitat, and have a

higher risk of these cumulative watershed effects. Harvesting creates areas of compaction and displacement of soils, leading to localized incidences of overland flow, but incorporation of RCA equipment restrictions, BMPs, Forest Plan standards and regional soil productivity guidelines into project implementation would limit detrimental disturbances to soil to 15 percent or less of a treatment unit. Therefore actual harvest effects are a relatively minor proportion of the cumulative effects to watersheds.

Other effects from the Chip's wildfire to SNLF are a reduction of the input of leaf fall and insects from floodplains into streams, which could contribute to a decrease in a primary food source. A reduction in availability of this organic material may result in poor survival of tadpoles to metamorphosis. Organic debris serves as concealment for larvae, and loss of such hiding cover makes the larvae more susceptible to predation.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and after fire suppression by PG&E to protect critical electrical power infrastructure. The Chips Fire PG&E Right of Way Salvage Timber Project would not affect SNLYF or its habitat.

The Lassen National Forest proposed the Poker Chip Project (salvage, danger tree and reforestation treatments, USDA 2013i,j) which overlaps the Chip-munk Project analysis area. Lassen NF biologists reported that the Poker Chip project may affect individual SNYLFs but will not likely results in a trend toward Federal listing or loss of viability.

The Chip-munk Project treatment units, as well as much of the analysis area are open to woodcutting and, a large portion also is open to Christmas tree cutting. The woodcutting program would continue to remove snags and down logs, resulting in the cumulative loss of these habitat components across the landscape. However, these activities would have a nominal impact on SNYLF and its habitat.

Most recreation use in the wildlife analysis areas consists of camping, hiking, aquatic activities, horseback riding, hunting, fishing, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. Recreational use is expected to continue at the current rate. These activities are expected to have a minimal effect on SNYLFs and its habitat in the analysis area.

No Action Alternative (Alternative B)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

There would be no removal of dead and dying trees within the Project Boundary. Zero acres of RCA and EEZ will be treated. Degraded conditions within watersheds as a result of the fires would continue. Post-fire (0-5 years) sediment loading to aquatic habitats would be higher than pre-fire levels because of the decrease in ground cover and bank stability provided by live vegetation and the resulting increase in soil movement. Sediment inputs should decrease over time as groundcover increases, vegetation re-establishes, and stream banks stabilize. There is no potential of directly affecting the SNYLF through crushing or indirectly by increased solar exposure, changes in microclimate, and loss of recruitment of LWD and CWD within the project area. There would be high fuels concerns and the potential for another catastrophic wildfire in the area is not reduced.

Cumulative Effects

Cumulative effects listed under the Proposed Action are the same for the No-action Alternative.

Determinations for All Alternatives – Sierra Nevada Yellow-Legged Frog

Action Alternative

The Chip-munk Project Proposed Action (Alternative A) may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the Sierra Nevada yellow-legged frog. There is potential to directly affect the SNYLF by crushing a frog during harvest activities, and there also is potential to indirectly affect their habitat via downstream erosion and potential alternation of stream morphology. However, project design features, such as equipment exclusion and full suspension zones, upper diameter limits in riparian conservation areas, and snag retention requirements will partially mediate potential effects to Sierra Nevada yellow-legged frogs. Implementation of a limited operating period near occupied sites identified during 2013 surveys would further mitigate potential adverse impacts to the frog.

No-action Alternative

The Chip-munk Project No-action Alternative (Alternative B) will not affect Sierra Nevada yellow-legged frogs.

Foothill yellow legged frog (*Rana boylii*)

Affected Environment – Foothill yellow legged frog

Population Status

Over the last half century, *Rana Boylii* (FYLF) has declined dramatically and is currently a USDA FS California Sensitive species, USDI Bureau of Land Management sensitive species, and California Species of Special Concern (Lind 2005). Historically this frog was found across most of southwestern Oregon west of the Cascades Mountains crest south through California to Baja California (Fellers 2005; Jennings and Hayes 1994). Specimens collected from the Sierra San Pedro Martir of Baja California in 1961 were lost in transit and represented a population almost 300 miles south of the nearest known population (Loomis 1965).

High mortality in this species occurs during the egg and larval life stages. The main causes of mortality in eggs are hydrologic in nature. Eggs are usually killed by either desiccation or scour (Kupferberg 1996; Lind et al. 1996). Tadpole mortality can also occur as a result of irregular stream flows. The main critical velocity for tadpoles is 20cm/s but flows as low as 10cm/s can displace large tadpoles. This results in slower growth and development, greater exposure to predators and possible mortality. The seasonal pulses of high water flows used in many regulated rivers have a significant negative impact on recruitment for this species (Kupferberg et al. 2011).

FYLFs are susceptible to a wide range of predators, including aquatic insects, garter snakes, bullfrogs, birds, and raccoons. A wide variety of fish species prey on all life stages of FYLF (Jennings 1988). Pesticides can impact these frogs in both original and derived forms. Air-borne pesticides are implicated as the most significant threat to this species, especially for Sierra Nevada populations which are directly impacted by pesticide drift from the central valley (Fellers 2005).

Parasites pose an additional threat to foothill yellow-legged frogs. The parasite, *Ribeiroia* has been shown to cause severe limb deformities in other frog species and has been found in the vicinity of foothill yellow-legged frogs. Another parasite, Anchor Worm (*Lernaea cyprinacea*), is non-native and typically infects fish but can infect larval foothill yellow-legged frogs which can cause deformities or mortality. Perhaps the most significant parasite that impacts this species is *Batrachochytrium dendrobatidis* which causes amphibian chytridomycosis. This parasite has had significant impacts to the similar mountain yellow-legged frog (*Rana sierrae/Rana muscosa*) and other amphibian species worldwide (Fellers 2005).

The FYLF is currently found in most of northern California west of the Cascade Mountains crest, in the Coast Ranges from the California-Oregon border south to the Transverse Mountains in Los Angeles County and along the western slope of the Sierra Nevada Mountains south to Kern County. Isolated populations have been reported from the San Joaquin Valley and the mountains in Los Angeles County. This frog can be found from near sea level to 1940m (6370 ft) where

habitat is suitable (Morey and Papenfuss 1990). Within Region 5 this frog is found on, or could occur on, all national forests except for the Cleveland, Inyo, Modoc, and Lake Tahoe Basin National Forests.

Habitat Requirements

FYLF are found in partially shaded rocky streams in a variety of habitats including: valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral and wet meadows and appear to be highly dependent on free water for all life stages (Morey and Papenfuss 1990). These frogs prefer partial shade, shallow riffles, and cobble sized or greater substrate (Hayes and Jennings 1988). Occasionally, this species is also found in other riparian habitats, including moderately vegetated backwaters, isolated pools, (Hayes and Jennings 1988), slow moving rivers with mud substrates (Fitch 1938) and stock ponds (Tierney 1997, personal communication). Suitable habitat for the FYLF is all perennial water bodies within the project boundary and all treatment units are within the range of the FYLF.

Breeding habitat is typically classified as a stream with riffles containing cobble-sized or larger rocks as substrate (Morey and Papenfuss 1990). These streams are further defined by having low-water velocities near tributary confluences in shallow reaches and are wider and shallower than non-breeding sites, have emergent rocks and are typically asymmetrical with cobble or small boulder bars (Wheeler and Welsh 2007; Kupferberg 1996). Egg attachment sites are usually cobbles or boulders, but frogs may sometimes utilize bedrock or vegetation. These sites are often on the lee side of rocks or beneath overhangs such that the site has a narrow range of low-water velocity. Coarse sediment enables frogs to choose the best oviposition site to shield egg masses from high-flows. The reproductive strategy of the foothill yellow-legged frog is well suited to rivers with predictable winter flooding and summer droughts (Kupferberg 1996). Breeding can occur as early as April 7th but may start as late as May 8th and typically continues at least a month with an average duration of 49.5 days between first and last egg depositions (Wheeler and Welsh 2007; Kupferberg 1996).

Habitat characteristics associated with non-breeding adult FYLFs have not been fully evaluated. Overwintering behavior is completely unknown, but adults are commonly found in tributaries prior to being found in the main stem waterway. They are rarely seen more than a few meters away from water, but it remains unknown if they utilize upland areas during winter months (Kupferberg 1996). Habitat use of juvenile frogs also is also largely unknown. Some evidence indicates that they potentially use smaller waterways such has springs or small tributary streams (Lind et al. 2011).

Analysis Area Surveys

Formal surveys occurred in 2011 and 2012 and are described in the SNYLF section, above. No FYLF were found during these surveys. The closest known population of FYLF is within the Cresta Reach on the North Fork of the Feather River approximately seven miles from the project boundary. In addition there is a large population of FYLF in the Poe reach of the North Fork of the Feather River and Flea Valley Creek.

Throughout the annual cycle, foothill yellow-legged frogs are rarely encountered far from permanent water. Telemetry studies in the North Fork of the Feather River (FERC 2005), indicate that adult FYLF move from tributaries to the main stem of the river to breed and return to tributaries in the summer, post-breeding. During the winter, frogs have been observed in abandoned rodent burrows and under logs as far as 100 meters from a stream (Zeiner et al. 1988). Recently metamorphosed frogs show a strong tendency to migrate upstream (Twitty 1967). Overwintering of larvae probably does not take place (Zweifel 1955).

Breeding is known to occur in the Cresta Reach of the North Fork of the Feather River where numerous egg masses and adult and juvenile frogs have been detected during white water flow studies for the Rock Creek Cresta Project. No FYLF have been found in the Project Area, with surveys along the upper North Fork of the Feather River and its tributaries by PG&E consultants. Larval FYLF primarily consume algae and will preferentially graze on epiphytic diatoms as this food item allows them to grow more rapidly (Jennings and Hayes 1994). Post-metamorphs likely consume both aquatic and terrestrial insects but there is little research on the subject (Jennings and Hayes 1994). Adult diet is thought to include: flies, moths, hornets, ants, beetles, grasshoppers, water striders and snails with a terrestrial arthropod composition of 87.5 percent insects and 12.6 percent arachnids (Fellers 2005).

Environmental Consequences – Foothill yellow legged frog

Action Alternative (Alternative A)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

Suitable habitat for the FYLF is all perennial water bodies within the project boundary and all treatment units are within the range of the FYLF. Potential direct and indirect effects for the FYLF are the same as those for the SNYLF. The following analysis is based on CWHR acreage estimates in RCAs, EEZs, and FSZs (Table 70 and Table 71).

Roadside Hazard

Prior to the Chips Fire, there were 22 acres of medium and large diameter trees (CWHR size class 4 and 5) within roadside hazard treatment units (14 percent of all perennial stream RCA acres). Twenty acres of these large diameter trees burned at a low severity (less than 25 percent basal area mortality). As a result of low burn severity, we do not anticipate many trees meeting the project marking guidelines (Appendix C of USDA 2013c). If FYLFs were present at site during roadside hazard treatments, there could be some potential for direct or indirect effects to individuals and habitat. However, limited harvest due to marking guidelines, restrictions on activities in RCAs, and retaining all trees greater than 30”dbh (Chapter 2) would significantly reduce these already nominal risks.

Tractor Salvage Units

There were 12 acres of medium and large diameter trees (CWHR size class 4 and 5) in interior salvage units prior to the Chips Fire, accounting for 7 percent of all perennial and intermittent stream RCA acres. Only three of these acres burned at a high severity while nine acres acre burned at a low severity (less than 25 percent basal area mortality). As a result of low burn severity, we do not anticipate many trees meeting the projects’ marking guidelines (Appendix C of USDA 2013c). Although there could be some potential for direct or indirect effects to FYLF during implementation of tractor salvage units if frogs were present at the time, limited harvest due to marking guidelines (Appendix C of USDA 2013c), RCA restrictions (Appendix G of USDA 2013c), and retention of all trees greater than 30”dbh (Chapter 2) would significantly reduce these already nominal risks.

Skyline Salvage

Perennial stream RCAs within the skyline salvage units (roadside and interior) contain 94 acres of large (CWHR size class 5) and 82 acres of medium (CWHR size class 4) trees (95 percent of all RCA perennial acres). Of these, 36 acres of medium and large size trees (CWHR size class 4 and 5) burned at low severity and 140 acres burned at a high severity (greater than 75 percent basal area mortality). Thus, there has been a site conversion of 176 acres of medium and large size trees to montane chaparral, with standing medium to large snags. Of these 176 acres, only 27 acres are within the FSZ and the remaining 149 acres are in the outer RCA. Within the FSZ, all trees greater than 30” dbh will be left standing unless felling is required for corridor construction (Chapter 2). There is potential for direct effects with the felling of trees adjacent to perennial streams, hand piling and burning of slash, and during reforestation site preparation. There also is potential for indirect effects to FYLF habitat via downstream sedimentation. However, because the predominance of trees to be harvested will be outside of the FSZ, and with the application of BMPs there should be nominal potential direct or indirect affects to FYLF and their potential habitat by implementation of the skyline treatment units.

Cumulative Effects

Cumulative effects for the FYLF are the same as the cumulative effects discussed for the SNYLF. Indirect effects to potential FYLF habitat can occur from downstream sedimentation within those watersheds at or above the threshold of concern.

No Action Alternative (Alternative B)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

There is no potential to directly or indirectly affect FYLF or its habitat under the No-action Alternative. There would be high fuels concerns with this alternative, and the risk of catastrophic wildlife in the area is not reduced.

Cumulative Effects

Cumulative effects for FYLF are identical to those for SNYLF.

Determinations for All Alternatives – Foothill yellow legged frog

Action Alternative

It is our determination that the Chip-munk Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the foothill yellow-legged frog.

No-action Alternative

Alternative B will not affect individuals or result in a trend toward Federal listing or loss of viability for the foothill yellow-legged frog.

Western Pond Turtle (*Actimyes mamorata*)

Affected Environment – Western Pond Turtle

Population Status

The western pond turtle (*Actimyes marmorata*) is found on the west coast of North America. Historically it was found from as far north as British Columbia, Canada to as far south as Baja California mostly west of the Cascade-Sierra crest (Lovich and Meyer 2002). Fossil fragments have been found east of the current range indicating that the species was once more widespread

(Buskirk 2002). Disjunct populations have been documented in the Truckee, Humboldt and Carson Rivers in Nevada, Puget Sound in Washington, and the Columbia Gorge on the border of Oregon and Washington. It is currently unclear if these are relict or introduced populations (Lovich and Meyer 2002). Modern distribution is limited to parts of Washington, Oregon, California and northern Baja California (Buskirk 2002). Western pond turtles are the only native aquatic turtle in California and southern Oregon, in the northern part of its range it coexists with the western painted turtle (*Chrysemys picta bellii*, Germano and Rathbun 2008). On Region 5 lands, this turtle can be found on all National Forests, except the Inyo and Lake Tahoe Basin.

Abundance has been well studied in this species. In some stream habitats densities can exceed 1,000 turtles per hectare. In Oregon, small ponds can hold over 500 turtles per hectare. These densities represent extremes with typical densities ranging from 23 to 214 turtles per hectare throughout most of the range (Lovich and Meyer 2002). Capture rates at one site in southern California were approximately 2 to 2.6 turtles per trap night (Germano 2010). These density estimates are likely accurate for populations on National Forest System lands where habitat is suitable.

Habitat Requirements

Western pond turtles inhabit fresh or brackish water in permanent or intermittent ponds, lakes, and rivers streams, creeks, marshes, and irrigation ditches from sea level to about 6,000 feet elevation, but is primarily found below 3,000 feet (Holland 1991). Occupied habitat typically contains abundant vegetation, and either rocky or muddy bottoms, in woodland, forest, and grasslands. In streams, turtles prefer pools to shallower areas. Logs, rocks, cattail mats, and exposed banks are required for basking. It is often restricted to areas near banks or in quiet backwaters where there is a relatively slow current, basking sites, and refugia (Holland 1991).

Western pond turtles are generalist omnivores and have been documented to eat a wide variety of prey. Prey items include larval insects, midges, beetles, filamentous green algae, tule and cattail roots, water lily pods, and alder catkins (Germano 2010). Filamentous algae are considered to be an important food source for females after egg laying (Buskirk 2002).

Western pond turtle nests have been found as far as 400m from a water body (Reese and Welsh 1998) in open sunny areas on hill slopes, generally with a south to southwest facing aspect. The majority of nest sites discovered to date have been found on dry, well- drained soils with increased amounts of clay and silt and gentle slope less than 15 degree slope. The nests found were dominated by grasses or annuals with few shrubs or trees in the vicinity thus skid roads or small plantations can be ideal for nesting or estivating. There is potentially suitable turtle habitat throughout the project area, but as described above the species is primarily found below 3,000 feet in elevation.

Analysis Area Surveys

Potential habitat has been identified throughout the project area as all perennial streams. Forest Aquatic's Crews have completed amphibian surveys and did not formally survey for Western pond turtles. Twenty two miles of perennial streams were surveyed for amphibians within the project area and no turtles were detected Most of the drainages are high gradient with suitable habitat in the upper North Fork of the Feather River, and the low gradient section of Clear Creek, Butt Stream, and Butt Lake. There is potential habitat in other locations within the analysis area and surveys will be completed if moderate to high potential habitat is identified.

TES amphibian and reptile surveys were completed for the FERC re-licensing of the upper North Fork of the Feather River Project (FERC 2005). Within a portion of the Chip-munk project area, Garcia and Associates (2001a) conducted site assessments and visual encounter surveys according to protocols and Standard Operating Procedures (Pacific Gas and Electric Company 2002). All potential herpetofauna habitats within 1/2 mile of Lake Almanor, Butt Valley Reservoir, Belden Forebay, and the North Fork of the Feather River were included in the preliminary habitat assessments, with 31 sites finally selected for surveying represent the best potential species-specific habitat, of moderate- to high quality, within the upper North Fork of the Feather River project area. Visual encounter surveys (VIS) were conducted in accordance with the methodologies provided in Holland (1991). Western pond turtle surveys were conducted in Butt Valley Reservoir and along the North Fork of the Feather River. No Western pond turtles were detected during these surveys. TES Amphibian site assessments or surveys have not been completed on approximately 40 percent of the project area. Surveys will be completed in the summer of 2013. WPT are found in the lower French Creek watershed, in Indian and American Valleys, all over 15 miles from the project area.

No Western pond turtles have been observed in the Chip-munk Project area. The nearest recorded sightings of turtles are in Greenhorn Creek near Quincy, approximately 18 miles east of the project boundary (Garcia and Associates 2001a). In addition a single adult turtle was observed downstream of the project area during GANDA surveys conducted for the Poe Project in 2000.

Environmental Consequences – Western Pond Turtle

Action Alternative (Alternative A)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

Western pond turtles primarily live within perennial streams, lakes and ponds. Potential direct and indirect effects for the western pond turtle are the same as those for the SNYLF. The

following analysis is based on CWHR acreage estimates in RCAs, EEZs, and FSZs (Table 70 and Table 71).

Roadside Hazard

Prior to the Chips Fire, there were 22 acres of medium and large diameter trees (CWHR size class 4 and 5) within roadside hazard treatment units (14 percent of all perennial stream RCA acres). Twenty acres of these large diameter trees burned at a low severity (less than 25 percent basal area mortality). As a result of low burn severity, we do not anticipate many trees meeting the project marking guidelines (Appendix C of USDA 2013c). If western pond turtles were present at site during roadside hazard treatments, there could be some potential for direct or indirect effects to individuals and habitat. However, limited harvest due to marking guidelines, restrictions on activities in RCAs, and retaining all trees greater than 30”dbh (Chapter 2) would significantly reduce these already nominal risks.

Tractor Salvage Units

There were 12 acres of medium and large diameter trees (CWHR size class 4 and 5) in interior salvage units prior to the Chips Fire, accounting for 7 percent of all perennial and intermittent stream RCA acres. Only three of these acres burned at a high severity while nine acres acre burned at a low severity (less than 25 percent basal area mortality). As a result of low burn severity, we do not anticipate many trees meeting the projects’ marking guidelines (Appendix C of Biological Assessment/Evaluation). Although there could be some potential for direct or indirect effects to turtles during implementation of tractor salvage units if turtles were present at the time, limited harvest due to marking guidelines (Appendix C of USDA 2013c), RCA restrictions (Appendix G of USDA 2013c), and retention of all trees greater than 30”dbh (Chapter 2) would significantly reduce these already nominal risks.

Skyline Salvage

Perennial stream RCAs within the skyline salvage units (roadside and interior) contain 94 acres of large (CWHR size class 5) and 82 acres of medium (CWHR size class 4) trees (95 percent of all RCA perennial acres). Of these, 36 acres of medium and large size trees (CWHR size class 4 and 5) burned at low severity and 140 acres burned at a high severity (greater than 75 percent basal area mortality). Thus, there has been a site conversion of 176 acres of medium and large size trees to montane chaparral, with standing medium to large snags. Of these 176 acres, only 27 acres are within the FSZ and the remaining 149 acres are in the outer RCA. Within the FSZ, all trees greater than 30” dbh will be left standing unless felling is required for corridor construction (Chapter 2). There is potential for direct effects with the felling of trees adjacent to perennial streams, hand piling and burning of slash, and during reforestation site preparation. There also is potential for indirect effects to turtle habitat via downstream sedimentation. However, because the predominance of trees to be harvested will be outside of the FSZ, and with the application of

BMPs there should be nominal potential direct or indirect affects to turtles and their potential habitat by implementation of the skyline treatment units.

Cumulative Effects

Cumulative effects for the western pond turtle are the same as the cumulative effects discussed for the SNYLF. Indirect effects to potential turtle habitat can occur from downstream sedimentation within those watersheds at or above the threshold of concern.

No Action Alternative (Alternative B)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

There is no potential of directly or indirectly affect the western pond turtle under the No-action Alternative. There would be high fuels concerns with this alternative, and the risk of catastrophic wildlife in the area is not reduced.

Cumulative Effects

Cumulative effects for western pond turtle are identical to those for SNYLF and FYLF.

Determinations for All Alternatives – Western Pond Turtle

Action Alternative

Alternative A may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the western pond turtle.

No-action Alternative

Alternative B will not affect individuals or result in a trend toward Federal listing or loss of viability for western pond turtle.

Hardhead Minnow (*Mylopharodon conocephalus*)

Affected Environment – Hardhead minnow

Population Status

Historically, hardhead minnows have been regarded as a widespread and locally abundant species (Ayres, 1854; Jordan and Evermann 1896; Evermann 1905; Rutter 1908; Murphy 1947; Soule

1951; Reeves 1964). Hardhead are widely distributed in low to mid-elevation streams in the main Sacramento-San Joaquin drainage as well as the Russian River drainage (Moyle 2002). Their range extends from the Kern River, Kern County, in the south to the Pit River, Modoc County, in the north. Populations are scattered in the tributary streams of the San Joaquin drainage, but have not been found in the valley reaches of the San Joaquin River (Moyle and Nichols 1973; Saiki 1984;, Brown and Moyle 1987). In the Sacramento River drainage, Hardhead are present in most of the larger tributary streams as well as the Sacramento River. They are widely distributed in the Pit River drainage (Cooper 1983; Moyle and Daniels 1982), including the main Pit River and its series of hydroelectric reservoirs.

Although hardhead are still widespread in the foothill streams, but their specialized habitat requirements, combined with widespread alteration of downstream habitats, resulted in the isolation and localization of populations (Moyle 2002). These conditions increase the chance for local extinctions. Current threats include but are not limited to widespread alteration of downstream habitats, population isolation that increases possibility of local extinction, habitat loss from hydroelectric power developments, and predation by exotic species.

Habitat Requirements

Hardhead are typically found in undisturbed areas of larger middle- and low- elevation streams (Elevation range 30 to 4750 feet, Reeves 1964; Moyle and Nichols 1973; Moyle and Daniels 1982). Most occupied streams have summer temperatures in excess of 20°C, and hardhead select typically select areas ranging between 24-28°C (Knight 1985). Hardhead are relatively intolerant of low oxygen levels, especially at higher temperatures, a factor which may limit their distribution to well oxygenated streams and the surface water of reservoirs (Cech et al. 1990). They prefer clear, deep (greater than 3.3 ft) pools with sand-gravel-boulder substrates and slow water velocities (less than 25cm sec^{-1}) (Moyle and Nichols 1973; Knight 1985; Moyle and Baltz 1985). In streams, adult hardhead tend to remain in the lower half of the water column, rarely moving into the upper levels (Knight 1985), while juveniles concentrate in shallow water close to the stream edges (Moyle and Baltz 1985). Hardhead are always found in association with Sacramento pikeminnow (*Ptychocheilus grandis*) and usually with Sacramento suckers (*Catostomus occidentalis*). They tend to be absent from streams introduced with exotics, especially centrarchids (Moyle and Nichols 1973; Moyle and Daniels 1982), or streams that have been severely altered by human activity (Baltz and Moyle 1993). Studies indicate hardhead populations are maintained when native species compositions remain at 90 percent or higher and small mouth bass (*Micropterus dolomieu*) are absent (Moyle and Nichols 1973; Brown and Moyle 1987). Primarily bottom feeders, hardheads forage for benthic invertebrates (mayflay larvae, caddisfly larvae, small snails) and aquatic plant material in quiet water.

The known distribution of hardhead on the Plumas National Forest is Butt Valley Reservoir, the North Fork of the Feather River (NFFR) from Lake Oroville to the confluence of the East Branch

of the NFFR (thirty-four miles), Chips Creek from the confluence with the NFFR (one-quarter mile), East Branch NFFR to the confluence of Rush Creek (ten miles), Indian Creek from the confluence of Spanish Creek to Antelope Lake Dam, Spanish Creek from the confluence of Gilson Creek to the confluence of Mill Creek in American Valley (five miles), Greenhorn Creek in American Valley to the confluence of Taylor Creek (five miles), Middle Fork Feather River from Lake Oroville to the confluence of Humbug Creek near Portola (eighty miles). The total known distribution for the hardhead on the PNF is 134.25 stream miles.

There are 77 miles of perennial streams within the project area, but the only potential hardhead minnow habitat is within the upper NFFR, from the confluence of the East Branch of the NFFR to the Gansner Bar CDF&W dam (known occupied habitat), and suspected above the dam to just below Lake Almanor at the Dam. All the tributaries except Butt Creek are too steep of a gradient for this species. Lower Butt Creek is also potential hardhead minnow habitat.

Analysis Area Surveys

No formal surveys have been completed for the Chip-munk Project. FERC relicensing studies have been completed within the Upper North Fork of the Feather and hardhead were found below the CDF&G dam just above the confluence with the East Branch of the North Fork of the Feather River. Little is known regarding where or if this species spawns in tributaries to larger rivers. There is some potential that hardhead could travel above the dam in high water and potentially spawn in tributaries to the North Fork of the Feather River. Most of these drainages are steep gradient and unsuitable for the hardhead minnow.

Environmental Consequences – Hardhead minnow

Action Alternative (Alternative A)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

The proposed tractor and skyline units are well above potential habitat within the project area. Hardhead are not known to occur in step tributary drainages of the North Fork of the Feather River, and is only known to occur within the main stream channels (Upper North Fork of the Feather River, and North Fork of the Feather River). Implementation of the project design features and best management practices should ensure that there will be no direct or indirect effect to hardhead or their habitat (e.g., retention of confers greater than 30 inch dbh within EEZs

and FSZs will increase LWD recruitment and potentially have positive downstream impacts to hardhead minnow habitat in the lower reaches).

Cumulative Effects

Activities considered in the cumulative effects for hardhead minnow are identical to those for SNYLF and FYLF.

No Action Alternative (Alternative B)

Direct and Indirect Effects of Roadside Hazard Tree Removal, Salvage Operations, and Re-establishing Forested Conditions (Action Alternative)

Indicator Measures 1 & 2: Acres of suitable habitat modified, lost or fragmented; and habitat components modified, lost or fragmented.

Analysis Area & Habitat Components

There is no potential of directly or indirectly affecting the hardhead minnow under the No-action Alternative. There would be high fuels concerns with the potential of another catastrophic wildfire.

Cumulative Effects

Because there would be no direct or indirect effect to hardhead from the No Action alternative, there would be no cumulative effects.

Determinations for All Alternatives – Hardhead minnow

Action Alternative

Implementation of Alternative A will not affect individuals or result in a trend toward Federal listing or loss of viability for hardhead minnow.

No-action Alternative

The No-action Alternative (Alternative B) will not affect individuals or result in a trend toward Federal listing or loss of viability for hardhead minnow.

Summary of Determinations

Action Alternative

The Proposed Action would protect and maintain key sensitive species habitat areas through project design, specifically goshawk and spotted owl PACs, would not be salvaged, disturbance in PACs would be limited through implementation of the necessary LOPs, and riparian areas and meadows would be managed by designating RCAs, EEZs, FSZs, and meeting BMPs during

implementation. Nevertheless, impacts resulting from the Chip-munk Project are expected to contribute to cumulative impacts on certain sensitive wildlife species. See Table 72 for a summary of the determinations.

Table 72. Determinations of effects on threatened, endangered, proposed, and sensitive animal species that potentially occur on the Plumas National Forest.

Threatened, Endangered and Sensitive Species (Scientific Name)	Species Status*	Determination Proposed Action (Alternative A)	Determination No-action Alternative (Alternative B)**
Invertebrates			
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	FT	WNA	WNA
Western bumble bee (*Bombus occidentalis*)	USFS : S	MAI	WNA
Fish			
Hardhead minnow (*Mylopharodon conocephalus*)	USFS : S, DFG : SSC	WNA	WNA
Amphibians			
California red-legged frog (*Rana aurora draytonii*)	FT	WNA	WNA
Foothill yellow-legged frog (*Rana boylii*)	USFS : S, DFG : SSC	MAI	WNA
Sierra Nevada yellow-legged frog (*Rana sierrae*)	FP, USFS : S, DFG : SSC	MAI	WNA
Reptiles			
Western pond turtle (*Actinemys marmorata*)	USFS : S, DFG : SSC	MAI	WNA
Birds			
Bald eagle (*Haliaeetus leucocephalus*)	USFS : S, SE, USFWS : BCC	MAI	WNA
California spotted owl (*Strix occidentalis occidentalis*)	USFS : S, USFS : MIS, DFG : SSC, USFWS : BCC	MAI	WNA
Greater sandhill crane (*Grus canadensis tabida*)	USFS : S, ST	WNA	WNA
Great gray owl (*Strix nebulosa*)	USFS : S, SE	WNA	WNA
Northern goshawk (*Accipiter gentilis*)	USFS : S, DFG : SSC	MAI	WNA
Willow flycatcher (*Empidonax trailii brewsteri*)	USFS : S, SE, USFWS : BCC	WNA	WNA
Mammals			
American marten (*Martes americana*)	USFS : S	WNA	WNA
California wolverine (*Gulo gulo luteus*)	FP, USFS : S, ST	WNA	WNA
Pacific fisher (*Martes pennanti pacifica*)	FC, USFS : S, DFG : SSC	WNA	WNA
Gray wolf (*Canis lupus*)	FE	WNA	WNA
Pallid bat (*Antrozous pallidus*)	USFS : S, DFG : SSC	MAI	WNA
Townsend's big-eared bat (*Corynorhinus townsendii*)	USFS : S, DFG : SSC	MAI	WNA

Threatened, Endangered and Sensitive Species (Scientific Name)	Species Status*	Determination Proposed Action (Alternative A)	Determination No-action Alternative (Alternative B)**
Fringe-tailed myotis (*Myotis thysanodes*)	USFS : S	MAI	WNA

*Species Status: FE = Federal Endangered, FT = Federal Threatened, FP = Federal Proposed, FC = Federal Candidate, USFS : S = U.S. Forest Service - Sensitive, USFS : MIS = U.S. Forest Service – Management Indicator Species, SE = State Endangered, ST = State Threatened, DFG : FP = State Fully Protected, DFG : SSC = State Species of Special Concern, USFWS : BCC = U. S. Fish and Wildlife Service Birds of Conservation Concern, SOI = Species of Interest.
****Determinations: T, E & P Species: WNA** = Will Not Affect, **MAINLA** = May Affect but Is Not Likely to Adversely Affect Individuals or their designated critical habitat, **MAILAA** = May Affect and Is Likely to Adversely Affect Individuals or their designated critical habitat. **FS Sensitive Species: WNA** = Will Not Affect, **MAI** = May Affect Individuals, but is not likely to result in a trend toward Federal listing or loss of viability, **MAILRTFL** = May Affect Individuals, and is Likely to Result in a Trend toward Federal Listing or loss of viability.

These project level effects determinations are consistent with the determinations reached in the SNFPA 2004 ROD by meeting the following three conditions:

1. The project is designed in accordance with all Forest Plan design criteria as analyzed in the SNFPA FSEIS 2004 ROD (USDA 2004b);
2. The spatial location and timing of this project, when considered cumulatively with all other projects affecting TES species and TES habitat in the area, have been displayed and analyzed, and analysis results indicate a determination consistent with that reached in the SNFPA FSEIS 2004 ROD (USDA 2004b);
3. Available new information that was not available in the SNFPA FSEIS 2004 ROD has been included in this project level analysis and this new information leads to the same conclusion as that within the SNFPA FSEIS 2004 ROD (USDA 2004b).

Management Indicator Species Report

Introduction

The purpose of this report is to evaluate and disclose the impacts of the Chip-munk Project on the 11 Management Indicator Species (MIS) identified in the Plumas National Forest (NF) Land and Resource Management Plan (LRMP) (USDA 1988a) as amended by the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (USDA 2007a). This report documents the effects of the Proposed Action and No-action Alternative on the habitat of selected project-level MIS. Detailed descriptions of the Chip-munk Project Alternatives are contained above in Alternatives, Including the Proposed Action. Implementation could begin as early as summer 2013. All activities proposed would be completed within approximately three to five years.

MIS are animal species are identified in the SNF MIS Amendment Record of Decision (ROD) signed December 14, 2007 (USDA 2007a), which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the 1988 Plumas LRMP (USDA 1988a) as amended by the 2007 SNF MIS Amendment ROD (USDA 2007a) directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by

such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the 1988 LRMP, as amended.

Direction Regarding the Analysis of Project-Level Effects on MIS Habitat

Project-level effects on MIS habitat are analyzed and disclosed as part of environmental analysis under the National Environmental Policy Act (NEPA). This involves examining the impacts of the Proposed Project Alternatives on MIS habitat by discussing how direct, indirect, and cumulative effects will change the habitat in the aquatic and analysis areas.

These project-level impacts to habitat are then related to broader scale (bioregional) population and/or habitat trends. The appropriate approach for relating project-level impacts to broader scale trends depends on the type of monitoring identified for MIS in the LRMP as amended by the SNF MIS Amendment ROD. Hence, where the Plumas NF LRMP as amended by the SNF MIS Amendment ROD identifies distribution population monitoring for an MIS, the project-level effects analysis for that MIS is informed by available distribution population monitoring data, which are gathered at the bioregional scale. The bioregional scale monitoring identified in the 1988 Plumas NF LRMP, as amended, for MIS analyzed for the Chip-munk Project is summarized on the following pages.

- Adequately analyzing project effects to MIS generally involves the following steps:
- Identifying which habitat and associated MIS would be either directly or indirectly affected by the Project Alternatives; these MIS are potentially affected by the project.
- Summarizing the bioregional-level monitoring identified in the 1988 Plumas LRMP, as amended, for this subset of MIS.
- Analyzing project-level effects on MIS habitat for this subset of MIS.
- Discussing bioregional scale habitat and/or population trends for this subset of MIS.
- Relating project-level impacts on MIS habitat to habitat and/or population trends at the bioregional scale for this subset of MIS.

These steps are described in detail in the Pacific Southwest Region's draft document "MIS Analysis and Documentation in Project-Level NEPA, REGION 5 Environmental Coordination"(May 25, 2006) (USDA 2006b). This section of this EA documents application of the above steps to select project-level MIS and analyzes project effects on MIS habitat for the Chip-munk Project (see USDA 2013d for complete MIS report)..

Direction Regarding Monitoring of MIS Population and Habitat Trends at the Bioregional Scale

The bioregional scale monitoring strategy for the Plumas NF's MIS is found in the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision

(ROD) of 2007 (USDA 2007a). Bioregional scale habitat monitoring is identified for all 11 of the terrestrial MIS. In addition, bioregional scale population monitoring, in the form of distribution population monitoring, is identified for all of the terrestrial MIS except for the greater sage-grouse. For aquatic macroinvertebrates, the bioregional scale monitoring identified is Index of Biological Integrity and Habitat. The current bioregional status and trend of populations and/or habitat for each of the MIS is discussed in the 2010 Sierra Nevada Forests Bioregional Management Indicator Species (SNF Bioregional MIS) Report (USDA 2010c).

Habitat Status and Trend

All habitat monitoring data are collected and/or compiled at the bioregional scale, consistent with the LRMP as amended by the 2007 SNF MIS Amendment ROD (USDA 2007a).

Habitats are the vegetation types (e.g., early-seral coniferous forest) or ecosystem components (e.g., snags in green forest) required by an MIS for breeding, cover, and/or feeding. MIS for the Sierra Nevada National Forests represent 10 major habitats and 2 ecosystem components (USDA 2007a), as listed in Table 73. These habitats are defined using the California Wildlife Habitat Relationship (CWHR) System (CDFG 2005). The CWHR System provides the most widely used habitat relationship models for California's terrestrial vertebrate species (CDFG 2005). Strata and code definitions for CWHR habitat types are provided in Appendix A of the Chip-munk MIS Report (USDA 2013d), and is described in detail in the 2010 SNF Bioregional MIS Report (USDA 2010c).

Habitat status is the current amount of habitat on the Sierra Nevada Forests. Habitat trend is the direction of change in the amount of habitat over time. The methodology for assessing habitat status and trend is described in detail in the 2010 SNF Bioregional MIS Report (USDA 2010c).

Population Status and Trend

All population monitoring data are collected and/or compiled at the bioregional scale, consistent with the LRMP as amended by the 2007 SNF MIS Amendment ROD (USDA 2007a). The information is presented in detail in the 2010 SNF Bioregional MIS Report (USDA 2010c).

Population monitoring strategies for MIS of the Plumas NF are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment ROD (USDA 2007a). Population status is the current condition of the MIS related to the population monitoring data required in the 2007 SNF MIS Amendment ROD for that MIS. Population trend is the direction of change in that population measure over time.

There are a myriad of approaches for monitoring populations of MIS, from simply detecting presence to detailed tracking of population structure (USDA 2001b, Appendix E, page E-19). A distribution population monitoring approach is identified for all of the terrestrial MIS in the 2007 SNF MIS Amendment, except for the greater sage-grouse (USDA 2007a). Distribution population monitoring consists of collecting presence/absence data for the MIS across a number

of sample locations over time. Presence/absence data are collected using a number of direct and indirect methods, such as surveys (population surveys), bird point counts, tracking number of hunter kills, counts of species sign (such as deer pellets), and so forth. The specifics regarding how these presence data are analyzed to track changes in distribution over time vary by species and the type of presence data collected, as described in the 2010 SNF Bioregional MIS Report (USDA 2010c).

Aquatic Macroinvertebrate Status and Trend

For aquatic macroinvertebrates, condition and trend is determined by analyzing macroinvertebrate data using the predictive, multivariate River Invertebrate Prediction and Classification System (RIVPACS) (Hawkins et al. 2000, Hawkins 2003) to determine whether the macroinvertebrate community has been impaired relative to reference condition within perennial water bodies. This monitoring consists of collecting aquatic macroinvertebrates and measuring stream habitat features according to the Stream Condition Inventory (SCI) manual (Frasier et al. 2005). Evaluation of the condition of the biological community is based upon the “observed to expected” (O/E) ratio, which is a reflection of the number of species observed at a site versus the number expected to occur there in the absence of impairment. Sites with low O/E scores have lost many species predicted to occur there, which is an indication that the site has a lower than expected richness of sensitive species and is therefore impaired.

Selection of Project level MIS

Management Indicator Species (MIS) for the Plumas NF are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA 2007a). The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS, as indicated in Table 73. In addition to identifying the habitat or ecosystem components (1st column), the CWHR type(s) defining each habitat/ecosystem component (2nd column), and the associated MIS (3rd column), Table 73 discloses whether or not the habitat of the MIS is potentially affected by the Chip-munk Project (4th column).

Table 73. Selection of MIS for Project-Level Habitat Analysis for the Chip-munk Project.

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component*	Sierra Nevada Forests Management Indicator Species (Scientific Name)	Species Status**	Category for Project Analysis ***
Early Seral Coniferous Forest	Douglas-fir (DFR), Eastside Pine (EPN), Jeffrey Pine (JPN), Lodgepole Pine (LPN), Ponderosa Pine (PPN), Red Fir (RFR), Sierran Mixed Conifer (SMC), Subalpine Conifer (SCN), White Fir (WFR), tree sizes 1, 2, & 3, all canopy closures	Mountain Quail (*Oreortyx pictus*)	USFS : MIS	3
Mid Seral Coniferous Forest	Douglas-fir (DFR), Eastside Pine (EPN), Jeffrey Pine (JPN), Lodgepole Pine (LPN), Ponderosa Pine (PPN), Red Fir (RFR), Sierran Mixed Conifer (SMC), Subalpine Conifer (SCN), White Fir (WFR), tree size 4, all canopy closures	Mountain Quail (*Oreortyx pictus*)	USFS : MIS	3
Late Seral Open Canopy Coniferous Forest	Douglas-fir (DFR), Eastside Pine (EPN), Jeffrey Pine (JPN), Lodgepole Pine (LPN), Ponderosa Pine (PPN), Red Fir (RFR), Sierran Mixed Conifer (SMC), Subalpine Conifer (SCN), White Fir (WFR), tree size 5, canopy closures S and P	Sooty Grouse (*Dendragapus obscurus*)	USFS : MIS	3
Late Seral Closed Canopy Coniferous Forest	Douglas-fir (DFR), Eastside Pine (EPN), Jeffrey Pine (JPN), Lodgepole Pine (LPN), Ponderosa Pine (PPN), Red Fir (RFR), Sierran Mixed Conifer (SMC), Subalpine Conifer (SCN), White Fir (WFR), tree size 5 (canopy closures M and D), and tree size 6.	California Spotted Owl (*Strix occidentalis occidentalis*)	USFS : S, USFS : MIS, DFG : SSC, USFWS : BCC	3
		Northern flying squirrel (*Glaucomys sabrinus*)	USFS : MIS	
Oak-associated Hardwood & Hardwood/conifer	Montane Hardwood (MHW), Montane Hardwood-Conifer (MHC)	Mule deer (*Odocoileus hemionus*)	USFS : MIS	2
Riparian	Montane Riparian (MRI), Valley Foothill Riparian (VRI)	Yellow Warbler (*Dendroica petechia*)	USFS : MIS, DFG : SSC	2
Riverine & Lacustrine	Riverine (RIV), Lacustrine (LAC)	Aquatic macroinvertebrates	USFS : MIS	3

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component*	Sierra Nevada Forests Management Indicator Species (Scientific Name)	Species Status**	Category for Project Analysis ***
Shrubland (west-slope chaparral types)	Montane Chaparral (MCP), Mixed Chaparral (MCH), Chamise-Redshank Chaparral (CRC)	Fox Sparrow (*Passerella iliaca*)	USFS : MIS	3
Snags in Burned Forest	Medium and large snags in burned forest (stand-replacing fire)	Black-backed Woodpecker (*Picoides arcticus*)	USFS : MIS	3
Snags in Green Forest	Medium and large snags in green forest	Hairy Woodpecker (*Picoides villosus*)	USFS : MIS	3
Wet Meadow	Wet Meadow (WTM), Freshwater Emergent Wetland (FEW)	Pacific chorus frog (*Pseudacris regilla*)	USFS : MIS	2

*All CWHR size classes and canopy closures are included unless otherwise specified; dbh = diameter at breast height;
1 = Seedling Tree <1" dbh, 2 = Sapling Tree 1 - 6" dbh, 3 = Pole Tree 6 - 11" dbh, 4 = Small Tree 11 - 24"dbh, 5 = Medium/Large Tree >24"dbh, 6 = Multi-layered Tree.
D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%) (Mayer and Laudenslayer 1988).
**Species Status: FE = Federal Endangered, FT = Federal Threatened, FP = Federal Proposed, FC = Federal Candidate,
USFS : S = U.S. Forest Service - Sensitive, USFS : MIS = U.S. Forest Service – Management Indicator Species, SE = State Endangered,
ST = State Threatened, DFG : FP = State Fully Protected, DFG : SSC = State Species of Special Concern,
USFWS : BCC = U. S. Fish and Wildlife Service Birds of Conservation Concern, SOI = Species of Interest.
*** Category 1: Species whose habitat is not in or adjacent to the wildlife analysis areas and would not be affected by the project.
Category 2: Species whose habitat is in or adjacent to the wildlife analysis areas, but would not be either directly or indirectly affected by the project.
Category 3: Species whose habitat would be either directly or indirectly affected by the project.

Mule deer, Yellow Warbler, and Pacific chorus frog are identified as Category 2 above, have habitat in the wildlife analysis areas but will not be further discussed because the habitat factors for these species would not be either directly or indirectly affected by the project.

The MIS whose habitat would be either directly or indirectly affected by the Chip-munk Project, identified as Category 3 in Table 73, are carried forward in this analysis. This following section will evaluate the direct, indirect, and cumulative effects of the Proposed Action and Alternatives on the habitat of the Category 3 MIS (also see the full Chip-munk MIS report, USDA 2013d).

Monitoring Requirements for MIS Selected for Project-Level Analysis

MIS Monitoring Requirements

The Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA 2007a) identifies bioregional scale habitat and/or population monitoring for the Management Indicator Species for ten National Forests including the PNF. The habitat and/or population monitoring requirements for PNF's MIS are described in the 2010 Sierra Nevada Forests Bioregional Management Indicator Species (SNF Bioregional MIS) Report (USDA 2010c) and are summarized below for the MIS being analyzed for the Chip-munk Project. The applicable habitat and/or population monitoring results are also described in the 2010 SNF Bioregional MIS

Report (USDA 2010c) and are summarized below for the MIS being analyzed for the Chip-munk Project.

Habitat monitoring at the bioregional scale is identified for all the habitats and ecosystem components, including the following analyzed for the Chip-munk Project: early seral coniferous forest, mid seral coniferous forest, late seral open canopy coniferous forest, late seral closed canopy coniferous forest, riverine and lacustrine, snags in green and burned forest.

Population monitoring at the bioregional scale for: Mountain Quail, Sooty Grouse, California Spotted Owl, northern flying squirrel, aquatic macroinvertebrates, Fox Sparrow, Black-backed Woodpecker, and Hairy Woodpecker.

Distribution population monitoring, which consists of collecting presence data for the MIS across a number of sample locations over time (Appendix E of USDA 2001a).

How MIS Monitoring Requirements are Being Met

Habitat and/or distribution population monitoring for all MIS is conducted at the Sierra Nevada scale. Refer to the 2010 SNF Bioregional MIS Report (USDA 2010c) for details by habitat and MIS.

Description of Alternatives

The Chip-munk Project is located approximately 5 miles west of Greenville, California near Butt Valley Reservoir and the communities of Seneca and Caribou within the Mt. Hough Ranger District, Plumas National Forest, Plumas County, California. The project area is within Management Areas 20 and 26 as described in the PNF LRMP. Management direction for these areas is described in the PNF LRMP as amended by the 2004 SNFPA ROD (USDA 2004b).

Two alternatives are discussed in this MIS report: the Proposed Action (Alternative A), and the No-action Alternative (Alternative B). The Proposed Action proposes to remove roadside fire-killed and fire-injured hazard trees (1,788 acres), recover the economic value of fire-killed trees and re-establish forested conditions by planting native conifer seedlings (3675 acres). Detailed descriptions of the Chip-munk Project are found above, in Chapters 1 and 2. Implementation could begin as early as summer 2013, and all activities proposed would be completed within approximately three to five years.

Comparison of the Alternatives

Potential MIS habitat within the Chips Fire boundary, analysis area, and Chip-munk Project treatment units (Alternative A) are presented in Table 74 through Table 76, respectively (see Appendix A of the Chip-munk MIS Report (USDA 2013d) for CWHR strata and code definitions). There are no activities associated with the No-action Alternative (Alternative B), so there would be no impacts to the existing habitat conditions.

Effects Analysis Methodology

Geographic Analysis Areas

The analysis area is defined by the 15 subwatersheds surrounding the treatment area (Figure 16; 41,414 acres on NFS lands). The additional larger land base was delineated based on roads being used for project activities including a 150' buffer on either side of the road and drafting sites (waterholes to draw water from). All potential direct, indirect and cumulative effects discussed, occur within the 41,414 acre analysis area. Potential direct, indirect and cumulative effects discussed in this report occur within the 41,414 acre analysis area. The direct and indirect effects of each alternative, together with the additive or cumulative effects of each alternative, have been considered in evaluating impacts to MIS and MIS habitat. This threshold of tolerance will be assessed through determination of whether or not the effects to the MIS and MIS habitat will alter the existing trends in habitat and/or populations across the Sierra Nevada bioregion.

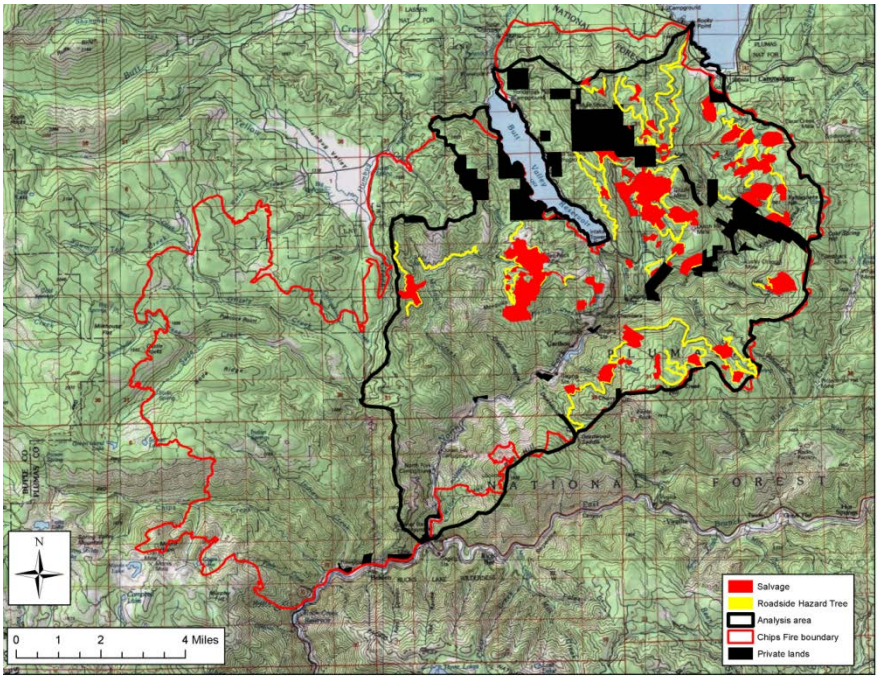


Figure 16. **Chips Fire boundary, Chip-munk Project treatment units, and aquatic and terrestrial analysis area used to evaluate and disclose the impacts of the Chip-munk Project.**

Specific Assumptions

The following assumptions apply specifically to the MIS analysis:

Assumption 1: All standards and guidelines, standard operating procedures (SOPs), project specific design features and mitigations will be fully adhered to and implemented.

Assumption 2: All activities proposed would be completed within approximately three to five years.

Assumption 3: All hardwoods and wildlife inhabited trees (nest trees, roosts, etc.) would be retained unless they pose a safety hazard.

Assumption 4: Proposed activities have the potential to affect MIS species habitat either directly (modification or loss of habitat or habitat components) or indirectly (e.g., through changes to canopy cover, age class structure and species composition).

Specific Methodology

The Chip-munk Project was reviewed on the ground and using aerial photographs, digital orthophoto quadrangles (DOQs), vegetation layer spatial datasets, species specific spatial datasets and known information to help determine the potential presence of MIS species. All observations of MIS species are documented and georeferenced while conducting surveys for other species and projects. Species nest sites and locations are then incorporated into forest-level spatial datasets. For the analysis of effects, changes to suitable habitat were determined by using a spatial dataset of the vegetation layer combined with treatment type (e.g., Roadside Hazard Tree). All vegetation information is displayed using the California Wildlife Habitat Relationships (CWHR) vegetation codes and serves as the baseline acres for analyses. Forest-wide vegetation typing is updated after fires and forest activities to most accurately represent available habitat types. Vegetation burn severity data, aerial photos, and satellite imagery were used to generate the post-fire CWHR vegetation map used for these analyses.

Data Sources

- ● GIS layers containing the following information: vegetation layer, ownership, aquatic features (streams, springs and lakes, etc.), riparian/aquatic management areas (Riparian Conservation Areas (RCAs), Critical Aquatic Refuges (CARs), and species management layers (e.g., Protected Activity Centers, PACs; Home Range Core Areas, HRCAs), Wild and Scenic and Wild Trout streams, fire severity, CWHR pre- and post-fire vegetation, slope, elevation, gradient, aquatic features.
- ● Project survey reports and incidental detection records.
- ● Scientific literature and internal reports.
- ● Equivalent Road Area (ERAs) as compared to Threshold of Concern (TOC) calculations analyzed at the sub watershed scale.

Affected Environment/Environmental Consequences

General Affected Environment

Existing post-fire conditions of low, moderate and high severity were observed within the Chip-munk Project area. The high severity burned sites burnt at an intensity that resulted (or will result) in the sites becoming dominated by shrub species consistent with montane chaparral. Sites that burnt at lesser intensities either resulted in a decrease in canopy cover (e.g., moderate canopy closure to open canopy, CWHR category M to P) or no change to the existing CWHR types. Habitat within the Chips Fire perimeter, analysis area, and Chip-munk Project treatment units are presented in Table 74 through Table 76, respectively (see Appendix A of the Chip-munk MIS Report USDA 2013d for CWHR strata and code definitions).

General Environmental Consequences

Potential changes in MIS habitat or ecosystem components as a result of implementing silvicultural treatment by alternative are displayed for analysis area in Table 78 (see Appendix A of Chip-munk MIS Report USDA 2013d for CWHR strata and code definitions).

Table 74. Pre- and post-fire California Wildlife Habitat Relationships (CWHR) types in four basal area mortality categories within the Chips Fire boundary (67,617 acres; all acres are approximate and National Forest System lands only).

	Pre-fire CWHR acres in four basal area mortality categories				Total acres		
CWHR type	**0-25%**	**25-50%**	**50-75%**	**75-100%**	**Pre-fire**	**Post-fire**	**Change in acres**
AGS	47	3	1	5	55	55	0
ASP 3M, 3S	41	3	< 1	< 1	44	45	1
ASP 4D, 4M, 4P	100	1	< 1	1	102	100	-1
BAR	610	32	27	58	727	738	11
JPN 1, 2M, 2S	46	16	18	38	118	80	-38
JPN 3P, 3S, 4S	481	33	21	20	555	536	-18
JPN 3M, 4P, 5P	121	1	< 1	< 1	123	121	-2
LAC	5	< 1	< 1	< 1	5	5	0
MCH	136	20	25	155	336	336	0
MCP	2690	725	934	5943	10292	20,406	10114
MHC 3D, 3M, 3P, 3S, 4S, 5S	153	21	18	78	270	869	599
MHC 4P, 5P	239	59	56	315	669	495	-174
MHC 4D, 4M	930	94	70	155	1250	930	-319
MHC 5D, 5M	418	31	23	53	524	418	-106
MHW 3P, 3S, 4P, 4S, 5P	54	9	6	9	78	206	128
MHW 3D, 3M	257	17	16	76	366	257	-109
MHW 4D, 4M, 5D	207	8	3	7	225	207	-18
MRI 2D, 2M, 2P, 2S, 3D, 3P	86	4	3	12	105	105	0
PPN 1, 2P, 2S, 3P, 3S	76	11	10	25	122	103	-19
PPN 4P, 5P	148	30	36	127	341	148	-193
PPN 4S, 5S	128	27	27	71	253	248	-4
PPN 3M	10	1	4	10	26	10	-16
PPN 4D, 4M	26	< 1	0	< 1	26	26	0
RFR 3P, 3S, 4S	35	5	2	4	46	49	3
RFR 4P	4	< 1	< 1	< 1	4	15	11
RFR 4M	60	11	7	25	102	60	-42
RIV	126	3	1	< 1	131	131	0
SMC 1, 2P, 2S, 3P, 3S	1277	249	202	740	2468	1,882	-586
SMC 2M, 4S, 5S	434	41	27	69	571	2,698	2128
SMC 3D, 3M, 4P, 5P	4572	508	419	1620	7119	6,401	-718
SMC 4D, 4M	10132	751	599	2208	13690	10,129	-3562
SMC 5D, 5M	13052	1080	824	3649	18605	13,050	-5554
WFR 2S, 3P, 3S, 4S, 5S	540	72	49	142	803	1,308	505
WFR 3D, 3M, 4P, 5P	1438	192	162	379	2170	1,796	-374
WFR 4D, 4M	2003	220	159	507	2889	2,002	-887
WFR 5D, 5M	1614	139	135	484	2372	1,613	-758
WTM	35	< 1	< 1	1	37	37	0
TOTAL	**42329**	**4420**	**3884**	**16984**	**67617**	**67617**	

1 = Seedling Tree <1" dbh, 2 = Sapling Tree 1 - 6" dbh, 3 = Pole Tree 6 - 11" dbh, 4 = Small Tree 11 - 24"dbh, 5 = Medium/Large Tree >24"dbh, 6 = Multi-layered Tree.

D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%). AGS = Annual Grassland, ASP = Aspen, BAR = Barren, BBR = Bitterbrush, DFR = Douglas-Fir, EPN = Eastside Pine, JPN = Jeffrey Pine, LAC = Lacustrine, LPN = Lodgepole Pine, MCH = Mixed Chaparral, MCP = Montane Chaparral, MHC = Montane Hardwood-Conifer, MHW = Montane Hardwood, MRI = Montane Riparian, PGS = Perennial Grassland, PPN = Ponderosa Pine, RFR = Red Fir, SCN = Subalpine Conifer, SGB = Sagebrush, SMC = Sierra Mixed Conifer, URB = Urban, WFR = White Fir, WTM = Wet Meadow (Mayer and Laudenslayer 1988).

Table 75. Pre- and post-fire California Wildlife Habitat Relationships (CWHR) types in four basal area mortality categories within the Chip-munk Project analysis area (41,414 acres; all acres are approximate and National Forest System lands only).

	Pre-fire CWHR acres in analysis area and four basal area mortality categories				Total acres (analysis area)		
CWHR type	**0-25%**	**25-50%**	**50-75%**	**75-100%**	**Pre-fire**	**Post-fire**	**Change in acres**
AGS	28	2	1	5	36	36	0
ASP 3M, 3S	41	3	0	0	44	45	1
ASP 4D, 4M, 4P	100	1	< 1	1	102	100	-1
BAR	392	14	6	2	414	417	3
JPN 1, 2M, 2S	46	16	18	38	118	80	-38
JPN 3P, 3S, 4S	435	27	15	11	488	479	-9
JPN 3M, 4P, 5P	107	1	< 1	< 1	108	107	-2
LAC	< 1	< 1	0	0	< 1	< 1	0
MCH	136	20	25	155	336	336	0
MCP	566	108	109	669	1452	9424	7972
MHC 3D, 3M, 3P, 3S, 4S, 5S	133	19	16	74	241	674	433
MHC 4P, 5P	83	19	21	236	360	225	-134
MHC 4D, 4M	592	64	54	140	851	592	-258
MHC 5D, 5M	227	12	9	19	267	227	-40
MHW 3P, 3S, 4P, 4S, 5P	37	4	2	3	46	151	105
MHW 3D, 3M	198	14	14	74	300	198	-102
MHW 4D, 4M, 5D	73	2	< 1	< 1	76	73	-3
MRI 2D, 2M, 2P, 2S, 3D, 3P	21	1	1	10	33	33	0
PPN 1, 2P, 2S, 3P, 3S	57	7	7	14	84	76	-9
PPN 4P, 5P	144	24	29	109	306	144	-162
PPN 4S, 5S	122	26	25	52	225	226	1
PPN 3M	10	1	4	10	26	10	-16
PPN 4D, 4M	26	< 1	< 1	< 1	26	26	0
RFR 3P, 3S, 4S	0	0	0	0	0	0	0
RFR 4P	0	0	0	0	0	0	0
RFR 4M	0	0	0	0	0	0	0
RIV	122	3	1	0	126	126	0
SMC 1, 2P, 2S, 3P, 3S	971	214	173	675	2033	1485	-548
SMC 2M, 4S, 5S	325	31	16	26	399	2044	1645
SMC 3D, 3M, 4P, 5P	3176	378	318	1417	5290	4583	-707
SMC 4D, 4M	7469	567	455	1858	10349	7469	-2881
SMC 5D, 5M	9779	840	647	3249	14515	9779	-4736
WFR 2S, 3P, 3S, 4S, 5S	94	19	11	48	172	297	126
WFR 3D, 3M, 4P, 5P	558	56	44	107	764	650	-115
WFR 4D, 4M	625	62	52	209	949	625	-324
WFR 5D, 5M	680	30	22	149	881	680	-200
WTM	< 1	0	0	0	< 1	< 1	0
TOTAL	**27369**	**2586**	**2096**	**9363**	**41414**	**41414**	

1 = Seedling Tree <1" dbh, 2 = Sapling Tree 1 - 6" dbh, 3 = Pole Tree 6 - 11" dbh, 4 = Small Tree 11 - 24"dbh, 5 = Medium/Large Tree >24"dbh, 6 = Multi-layered Tree.
D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%). AGS = Annual Grassland, ASP = Aspen, BAR = Barren, BBR = Bitterbrush, DFR = Douglas-Fir, EPN = Eastside Pine, JPN = Jeffrey Pine, LAC = Lacustrine, LPN = Lodgepole Pine, MCH = Mixed Chaparral, MCP = Montane Chaparral, MHC = Montane Hardwood-Conifer, MHW = Montane Hardwood,
MRI = Montane Riparian, PGS = Perennial Grassland, PPN = Ponderosa Pine, RFR = Red Fir, SCN = Subalpine Conifer, SGB = Sagebrush,
SMC = Sierra Mixed Conifer, URB = Urban, WFR = White Fir, WTM = Wet Meadow (Mayer and Laudenslayer 1988).

Table 77. Summary of California Wildlife Habitat Relationships (CWHR) types within Chip-munk Project treatment units (5,464 acres; all acres are approximate and National Forest System lands only).

	Roadside Hazard - skyline	Roadside Hazard - tractor	Salvage - Skyline	Salvage - tractor	Total
AGS	0	3	0	0	3
BAR	< 1	2	0	0	3
MCP	258	153	751	1862	3024
MHC	3	1	0	0	4
MHW	2	0	3	0	4
MRI 2D	1	0	0	0	1
PPN 3P, 3S, 4S	11	2	2	4	18
PPN 4P, 5P	2	8	2	13	25
PPN 5S	0	0	0	12	12
SMC 2P, 2S, 3P, 3S, 4S, 5S	96	162	61	300	619
SMC 3D, 3M, 4P, 5P	151	95	35	190	472
SMC 4D, 4M	174	99	35	112	420
SMC 5D, 5M	238	184	38	173	633
WFR 2P, 2S, 3P, 3S, 4S, 5S	3	23	1	40	68
WFR 3D, 3M, 4P, 5P	9	25	0	28	62
WFR 4D, 4M	17	12	0	10	39
WFR 5D, 5M	37	19	< 1	< 1	57
TOTAL	**1002**	**786**	**929**	**2746**	**5464**

Note: Acres may vary slightly during the final layout due to topography, stand condition, and rounding, etc.
1 = Seedling Tree <1" dbh, 2 = Sapling Tree 1 - 6" dbh, 3 = Pole Tree 6 - 11" dbh, 4 = Small Tree 11 - 24"dbh, 5 = Medium/Large Tree >24"dbh,
6 = Multi-layered Tree. D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%).
AGS = Annual Grassland, ASP = Aspen, BAR = Barren, BBR = Bitterbrush, DFR = Douglas-Fir, EPN = Eastside Pine, JPN = Jeffrey Pine, LAC = Lacustrine, LPN = Lodgepole Pine, MCH = Mixed Chaparral, MCP = Montane Chaparral, MHC = Montane Hardwood-Conifer, MHW = Montane Hardwood, MRI = Montane Riparian, PGS = Perennial Grassland, PPN = Ponderosa Pine, RFR = Red Fir, SCN = Subalpine Conifer, SGB = Sagebrush, SMC = Sierra Mixed Conifer, URB = Urban, WFR = White Fir, WTM = Wet Meadow (Mayer and Laudenslayer 1988).

Table 78. Summary of pre- and post-treatment MIS habitat in the Chip-munk Project analysis area (measured in acres).

Habitat or Ecosystem Component	Alternative B (No-action)	Alternative A (Proposed Action)	
	Pre-treatment MIS Habitat	Post Treatment MIS Habitat	MIS habitat in treatment units
Early and Mid Seral Coniferous Forest	15,710	16,997	1,326
Late Seral Open Canopy Coniferous Forest	2,565	2,565	409
Late Seral Closed Canopy Coniferous Forest	10,459	10,459	690
Riverine & Lacustrine	906	906	714
Shrubland (west-slope chaparral types)	9,760	6,736	3,024
Snag in Burned Forest habitat (>25% basal area mortality)	8,803	6,406	2,397
Snags in Green Forest	26,378	24,213	2,165

Cumulative Effects

The existing condition reflects the landscape changes from all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on MIS habitat from the existing condition within the analysis areas.

According to the Council on Environmental Quality (CEQ) NEPA regulations, “cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR § 1508.7).

In order to understand the contribution of past actions to the cumulative effects of the alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the alternatives. In fact,

focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.

Present and future projects planned that overlap with the analysis areas may have cumulative impacts to wildlife, fisheries and amphibians. In this analysis, each present and future project is analyzed by species in order to understand the contribution of present and future projects to the cumulative effects of the alternatives.

Present or Reasonably Foreseeable Future Activities

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on MIS habitat from the existing condition within the analysis area.

Cumulative effects could occur with the incremental loss of the quantity and/or quality of habitat for this species. Overall, increases in urbanization, increases in recreational use of National Forest System lands, and the utilization of natural resources on state, private and federal lands may contribute to habitat loss for this species.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing the Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area. Forest biologists

did not report the Poker Chip Project, nor other planned or ongoing Lassen NF projects within the Poker Chips area, would meaningfully alter MIS habitat.

The Chip-munk Project treatment units, as well as much of the analysis area are open to woodcutting and, a large portion also is open to Christmas tree cutting. The woodcutting program would continue to remove snags and down logs, resulting in the cumulative loss of these habitat components across the landscape. Loss of these habitat features may indirectly impact wildlife species. Uncontrolled public use, especially during the breeding season, may cause disturbance to species nesting and denning nearby.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres). The PG&E Right of Way Salvage Timber Project will potentially impact 250 acres of suitable MIS habitat for removal of downed hazard trees that were felled during and immediately after fire suppression by PG&E to protect critical electrical power infrastructure.

Most recreation use in the analysis areas consists of camping, hiking, aquatic activities, horseback riding, hunting, fishing, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. Recreational use is expected to continue at the current rate. These activities are expected to have a minimal effect on MIS habitat.

Effects of the Proposed Project on Habitat for Project-Level Management Indicator Species

The following section documents the analysis for the following ‘Category 3’ species: Mountain Quail, Sooty Grouse, California Spotted Owl, northern flying squirrel, aquatic macroinvertebrates, Fox Sparrow, Black-backed Woodpecker, Hairy Woodpecker. The analysis of the effects of the Chip-munk Project on the MIS habitat for the selected project-level MIS is conducted at the project scale using CWHR vegetation types, as discussed earlier. Detailed information on the MIS is documented in the 2010 SNF Bioregional MIS Report (USDA 2010c), which is hereby incorporated by reference. Cumulative effects at the bioregional scale are tracked via the SNF MIS Bioregional monitoring, and detailed in the 2010 SNF Bioregional MIS Report (USDA 2010c).

Mountain Quail - Early and Mid-Seral Coniferous Forest Habitat

Habitat/Species Relationship

The Mountain Quail was selected as the MIS for early and mid seral coniferous forest (Douglas-fir, eastside pine, Jeffrey pine, ponderosa pine, red fir, Sierran mixed conifer, and white fir)

habitat in the Sierra Nevada. Early seral coniferous forest habitat is comprised primarily of seedlings (less than 1” dbh), saplings (1”-5.9” dbh), and pole-sized trees (6”-10.9” dbh). Mid seral coniferous forest habitat is comprised primarily of small-sized trees (11”-23.9” dbh). The Mountain Quail is found particularly on steep slopes, in open, brushy stands of conifer and deciduous forest and woodland, and chaparral; it may gather at water sources in the summer, and broods are seldom found more than 0.8 km (0.5 mi) from water (CDFG 2005).

Project-level Effects Analysis – Early and Mid Seral Coniferous Forest Habitat

Habitat Factor(s) for the Analysis

Acres of early (CWHR tree sizes 1, 2, and 3) and mid seral (CWHR tree size 4) coniferous forest habitat, all canopy closures.

Acres with changes in CWHR tree size class.

Acres with changes in tree canopy closure.

Acres with changes in understory shrub canopy closure.

Current Condition of the Habitat Factor(s) in the Analysis Area

Based on the vegetation layer and the CWHR model, 78 percent of early and mid seral habitats within the analysis area were retained post Chips Fire, and 38 percent (15,710 acres) of all habitat within the analysis area is currently typed as early and mid seral coniferous forest (Table 74 and Table 75).

Effects of the Action Alternative

Direct and Indirect Effects to Habitat

Potential direct effects include removal of fire-killed or hazard trees and subsequent reforestation; however, Alternative A would increase early and mid seral coniferous forest habitat by 8 percent (Table 76). The Chip-munk Project proposes to treat hazard trees and conduct salvage operations on approximately 13 percent (5,464 acres) of the analysis area. Tree removal would not change CWHR habitat types within treated stands as the Proposed Action would remove roadside fire-killed and fire-injured hazard trees and salvage fire-killed tress (i.e., trees that would be removed do not contribute to canopy closure).The proposed action would potentially have a minimal effect on the residual live tree size, canopy cover or live-tree basal area through the removal of trees where damage indicates specific probabilities of mortality guidelines are met (USDA 2013a). The Proposed Action includes reforestation of conifers to promote the reestablishment and development of a mature, closed canopy, coniferous forest. Alternative A proposes to reforest salvaged acres (up to 3,675 acres) with a mix of ponderosa, Jeffrey, and sugar pine seedlings. Montane chaparral (2,613 acres) would be converted to Sierra Mixed Conifer types 1 and 2 (shrub/seedling/sapling) after reforestation, when conifer seedlings would be competing with brush for the next 2 to 5 decades (Table 76).

Cumulative Effects to Habitat

The existing condition reflects habitat changes from all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on MIS habitat from the existing condition within the analysis area.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities would have no effect on early and mid seral habitat in the analysis area.

Woodcutting and Christmas tree cutting programs on the PNF are ongoing programs that have been in existence for years and are expected to continue. The past and future effect of these actions has and would be to shift forest successional stages to somewhat earlier stages, while generally retaining continuous forest cover which would have a nominal effect on the early and mid seral coniferous forest habitat.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area (USDA 2013i). While considering potential future impacts (such as the Chip-munk Project), Lassen NF biologists found there would be no decrease in early of mid seral habitat in the Poker Chip analysis area as a result of removing dead or hazard trees under the proposed action (USDA 2013i,j).

Most of the recreation use within the wildlife analysis areas consists of dispersed camping, hiking, horseback riding, hunting, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. Such use is expected to continue at the current rate. These activities would have no effect on early and mid seral habitat in the analysis area.

Table 79. Summary of Early and Mid Seral acres within the analysis area and Chip-munk Project treatment units (all acres are approximate and National Forest System lands only).

		Pre-fire CWHR acres within four basal area mortality categories					Acres in Chip-munk treatment units			
CWHR	**Pre-fire acres**	**0-25%**	**25-50%**	**50-75%**	**75-100%**	**Post-fire acres in analysis area**	**Riparian Conservation Areas**	**Roadside Hazard Tree**	**Salvage**	**Total Chip-munk units**
JPN 1	118	46	16	18	38	80				0
JPN 4P	77	75	1	0	0	75				0
JPN 4S	488	435	27	15	11	479				0
PPN 1	7	6	0	0	1	6				0
PPN 2S	10	9	1	0		10				0
PPN 3M	26	10	1	4	10	10				0
PPN 3P	55	32	5	5	13	33	0	1	0	1
PPN 3S	13	10	1	1	0	26	0	1	0	1
PPN 4D	14	14	0	0	0	14				0
PPN 4M	12	12	0			12				0
PPN 4P	146	32	14	17	83	33	2	1	1	4
PPN 4S	225	122	26	25	52	203	9	6	2	16
SMC 1	27	24	1	1	1	26				0
SMC 2P	104	20	10	7	67	20	1	2	0	3
SMC 2S	131	83	12	12	25	124	4	13	0	17
SMC 3D	196	136	12	9	39	136	2	6	0	8
SMC 3M	844	317	55	53	420	317	5	20	2	27
SMC 3P	1257	597	127	102	432	662	22	49	8	79
SMC 3S	513	247	64	52	151	652	27	41	34	102
SMC 4D	2992	2357	128	94	413	2356	29	46	17	92
SMC 4M	7357	5112	439	361	1444	5112	72	150	105	328
SMC 4P	3286	2048	245	207	787	2615	53	111	86	250
SMC 4S	341	278	23	15	25	1223	49	58	132	238
WFR 2S	22	10	5	4	4	18	0	1	0	1
WFR 3D	120	72	5	3	39	72	0	0	0	0
WFR 3M	97	85	4	2	6	85	0	0	0	1
WFR 3P	50	24	7	3	16	33	1	1	3	6
WFR 3S	53	45	6	2	1	68	2	8	4	14
WFR 4D	366	272	18	17	59	272	2	12	8	22
WFR 4M	583	353	45	35	151	353	4	11	2	17
WFR 4P	515	372	45	37	61	434	25	12	20	57
WFR 4S	44	13	1	2	27	151	8	9	26	42
TOTAL	**20088**	**13266**	**1343**	**1102**	**4376**	**15710**	**317**	**558**	**450**	**1326**

*1 = Seedling Tree <1" dbh, 2 = Sapling Tree 1 - 6" dbh,, 3 = Pole Tree 6 - 11" dbh, 4 = Small Tree 11 - 24"dbh.
D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%), DFR = Douglas-Fir, EPN = Eastside Pine, JPN = Jeffrey Pine, LPN = Lodgepole Pine, PPN = Ponderosa Pine, RFR = Red Fir, SMC = Sierra Mixed Conifer, WFR = White Fir (Mayer and Laudenslayer 1988).
**Chip-munk unit acres will removal of trees where damage indicates specific probabilities of mortality guidelines are met and show the worst case scenario.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and immediately after fire suppression by PG&E to protect critical electrical power infrastructure. These activities would have no effect on early and mid seral habitat in the analysis area.

Cumulative Effects Conclusion

It is anticipated that implementation of the Proposed Action, in combination with present and reasonably foreseeable future actions would increase the amount of early and mid seral coniferous forest habitat within the analysis area. These changes will not alter the existing trend in the early and mid seral coniferous forest habitat.

Effects of Alternative B (No-action)

Direct, Indirect, and Cumulative Effects to Habitat

There would be no direct or indirect effects on early and mid-seral coniferous forest habitat, as no activities would occur that would impact the existing habitat conditions, thus there would also be no additional cumulative effects as a result of selecting this alternative. As a result, existing early and mid-seral coniferous forest conditions and mountain quail habitat conditions would be maintained.

Cumulative Effects Conclusion

It is anticipated that implementation of the No-action Alternative, in combination with present and reasonably foreseeable future actions, would not have a cumulative effect to the population and habitat distribution across the Plumas National Forest. Thus existing early and mid-seral coniferous forest conditions and mountain quail habitat conditions would be maintained.

Summary of Mountain Quail Status and Trend at the Bioregional Scale

The 1988 Plumas NF LRMP (USDA 1988a), as amended by the SNF MIS Amendment (USDA 2007a) requires bioregional-scale habitat and distribution population monitoring for the Mountain Quail; hence, the early and mid seral coniferous forest effects analysis for the Chip-munk Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for Mountain Quail. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA 2010c), which is hereby incorporated by reference.

Habitat Status and Trend

There is currently 530,851 acres of early seral and 2,776,022 acres of mid seral coniferous forest habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend for early seral is decreasing (changing from 9 percent to 5 percent of the acres on National Forest System lands) and the trend for mid seral is increasing (changing from 21 percent to 25 percent of the acres on National Forest System lands).

Population Status and Trend

Monitoring of Mountain Quail across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with PRBO Conservation Science, as part of a monitoring effort that also includes Fox Sparrow, Hairy Woodpecker, and Yellow Warbler (USDA 2010c, http://data.prbo.org/partners/usfs/snmis/). Mountain Quail were detected on 40.3 percent of 1,659 point counts (and 48.6 percent of 424 playback points) in 2009 and 47.4 percent of 2,266 point counts (and 55.3 percent of 492 playback points) in 2010, with detections on all 10 national forests in both years. The average abundance (number of individuals recorded on passive point count surveys) was 0.103 in 2009 and 0.081 in 2010. In addition, mountain quail continue to be monitored and surveyed in the Sierra Nevada at various sample locations by hunter survey,

modeling, and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA 2008a). Current data at range-wide, California, and Sierra Nevada scales indicate that the distribution of mountain quail populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Mountain Quail Trend

The direct/indirect and cumulative effects of the Chip-munk Project would have a nominal effect on the amount and/or distribution of early and mid seral habitat within the analysis area. Alternative A would increase early and mid seral coniferous forest habitat within the analysis area by 8 percent. Proposed treatments will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of mountain quail across the Sierra Nevada bioregion.

Sooty Grouse – Late-Seral, Open-Canopy Coniferous Forest

Habitat/Species Relationship

The Sooty Grouse was selected as the MIS for late seral open canopy coniferous forest habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures less than 40 percent. Sooty Grouse occur in open, medium to mature-aged stands of red fir, white fir, Douglas-fir, and other conifer habitats, interspersed with medium to large openings, and available water, and occupies a mixture of mature habitat types, shrubs, forbs, grasses, and conifer stands (CDFG 2005). Empirical data from the Sierra Nevada indicate that sooty grouse hooting sites are located in open, mature, fir-dominated forest, where particularly large trees are present (Bland 2006).

Project-level Effects Analysis - Late Seral Open Canopy Coniferous Forest

Habitat Factor(s) for the Analysis

- Acres of late seral open canopy coniferous forest habitat, tree size 5, canopy closures S and P.
- Acres with changes in tree canopy closure class.
- Acres with changes in understory shrub canopy closure class.

Current Condition of the Habitat Factor(s) in the Analysis Area

Based on the vegetation layer and the CWHR model, about 6 percent of the analysis area may be considered suitable late seral open canopy coniferous forest habitat (Table 76, Table 78, and Table 80).

Table 80. Summary of Late Seral Open Canopy Forest acres within the analysis area and Chip-munk Project treatment units (all acres are approximate and National Forest System lands only).

		Pre-fire CWHR acres within four basal area mortality categories					Acres in Chip-munk treatment units			
CWHR	Pre-fire acres	0-25%	25-50%	50-75%	75-100%	Post-fire acres in analysis area	Riparian Conservation Areas	Roadside Hazard Tree	Salvage	Total Chip-munk units
JPN 5P	31.5	31.5				31.5				0.0
PPN 5P	160.3	111.5	10.9	11.9	26.0	111.5	10.6	1.7	8.5	20.8
PPN5S							0.8	0.0	11.0	11.9
SMC 5P	963.8	675.1	67.1	50.3	171.3	1514.7	48.6	49.6	87.9	186.1
SMC 5S	58.0	47.5	7.7	1.6	1.1	821.1	42.0	32.2	106.2	180.4
WFR 5P	32.8	29.8	2.2	0.6	0.2	59.6	2.1	1.4	0.6	4.2
WFR 5S	2.2	1.6	0.5	0.1		26.9	2.8	0.9	2.1	5.7
TOTAL	**1248.7**	**897.0**	**88.4**	**64.5**	**198.7**	**2565.3**	**106.9**	**85.7**	**216.4**	**409.1**

* 5 = Medium/Large Tree >24"dbh, P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%), DFR = Douglas-Fir, EPN = Eastside Pine, JPN = Jeffrey Pine, PPN = Ponderosa Pine, RFR = Red Fir, SMC = Sierra Mixed Conifer, WFR = White Fir (Mayer and Laudenslayer 1988).

Effects of the Action Alternatives

Direct and Indirect Effects to Habitat

The Chip-munk Project proposes to treat hazard trees and conduct salvage operations on approximately 13 percent (5,464 acres) of the analysis area. Potential direct effects include removal of fire-killed or hazard trees and subsequent reforestation. Tree removal would not change CWHR habitat types within treated stands as the Proposed Action would remove roadside fire-killed and fire-injured hazard trees and salvage fire-killed tress. The proposed action would potentially have a minimal effect on the residual live tree size, canopy cover or live-tree basal area through the removal of trees where damage indicates specific probabilities of mortality guidelines are met (Appendix B). Any changes to late seral open canopy habitat resulting from the Proposed Action would be nominal (Table 76, Table 78, and Table 80), There would be no direct or indirect effects on late seral open canopy habitat, as no activities would occur that would impact the existing habitat conditions.

Cumulative Effects to Habitat

The existing condition reflects habitat changes from all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on MIS habitat from the existing condition within the analysis area.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the

safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities would have no would have a nominal effect on the late seral open canopy forest habitat in the analysis area.

Woodcutting and Christmas tree cutting programs on the PNF are ongoing programs that have been in existence for years and are expected to continue. The past and future effect of these actions has and would be to shift forest successional stages to somewhat earlier stages, while generally retaining continuous forest cover which would have a nominal effect on the late seral open canopy forest habitat.

Most of the recreation use within the wildlife analysis areas consists of dispersed camping, hiking, horseback riding, hunting, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. Such use is expected to continue at the current rate. These activities would have no effect on late seral open canopy forest habitat.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and immediately after fire suppression by PG&E to protect critical electrical power infrastructure.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area (USDA 2013i). While considering potential future impacts (such as the Chip-munk Project), Lassen NF biologists found there would be no decrease in late seral open canopy forest habitat in the Poker Chip analysis area as a result of removing dead or danger trees under the proposed action (USDA 2013i,j).

Cumulative Effects Conclusion

It is anticipated that implementation of the Action Alternatives, in combination with present and reasonably foreseeable future actions would maintain the amount of late seral open canopy coniferous forest habitat within the analysis area. These changes will not alter the existing trend in the late seral open canopy coniferous forest habitat.

Effects of Alternative B (No-action)

Direct, Indirect, and Cumulative Effects to Habitat

There would be no direct or indirect effects on late seral open canopy coniferous forest habitat, as no activities would occur that would impact the existing habitat conditions, thus there would also be no additional cumulative effects as a result of selecting this alternative. As a result, existing

late seral open canopy coniferous forest conditions and sooty grouse habitat conditions would be maintained.

Cumulative Effects Conclusion

It is anticipated that implementation of the No-action Alternative, in combination with present and reasonably foreseeable future actions, would not have a cumulative effect to the population and habitat distribution across the Plumas National Forest. Thus existing late seral open canopy coniferous forest conditions and sooty grouse habitat conditions would be maintained.

Summary of Sooty Grouse Status and Trend at the Bioregional Scale

The 1988 Plumas NF LRMP (USDA 1988a), as amended by the SNF MIS Amendment (USDA 2007a) requires bioregional-scale habitat and distribution population monitoring for the Sooty Grouse; hence, the late seral open canopy coniferous forest effects analysis for the Chip-munk Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the sooty grouse. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA 2010c), which is hereby incorporated by reference.

Habitat Status and Trend

There is currently 63,795 acres of late seral open canopy coniferous forest habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is decreasing (changing from 3 percent to 1 percent of the acres on National Forest System lands).

Population Status and Trend

The Sooty Grouse has been monitored in the Sierra Nevada at various sample locations by hunter survey, modeling, point counts, and breeding bird survey protocols, including California Department of Fish and Game Blue (Sooty) Grouse Surveys (Bland 1993, 1997, 2002, 2006); California Department of Fish and Game hunter survey, modeling, and hunting regulations assessment (CDFG 2004a, CDFG 2004b); Multi-species inventory and monitoring on the Lake Tahoe Basin Management Unit (LTBMU 2007); and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that sooty grouse continue to be present across the Sierra Nevada, except in the area south of the Kern Gap, and current data at the range-wide, California, and Sierra Nevada scales indicate that the distribution of sooty grouse populations in the Sierra Nevada north of the Kern Gap is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Sooty Grouse Trend

The direct/indirect and cumulative effects of the Chip-munk Project would have a nominal effect on the amount and/or distribution of late-seral open canopy coniferous forest habitat within the analysis area. However, this change in the amount of late-seral open canopy coniferous forest

habitat in the analysis area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of sooty grouse across the Sierra Nevada bioregion.

California Spotted Owl and Northern Flying Squirrel - Late-Seral, Closed-Canopy, Coniferous Forest Habitat

Habitat/Species Relationship

California Spotted Owl

The California Spotted Owl was selected as an MIS for late-seral, closed-canopy coniferous forest (Douglas-fir, eastside pine, Jeffrey pine, ponderosa pine, red fir, Sierran mixed conifer, and white fir) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures above 40 percent within Douglas-fir, eastside pine, Jeffrey pine, ponderosa pine, red fir, Sierran mixed conifer, and white fir coniferous forests, and multi-layered trees within Douglas-fir, eastside pine, Jeffrey pine, ponderosa pine, red fir, Sierran mixed conifer, and white fir forests. The California Spotted Owl is strongly associated with forests that have a complex multi-layered structure, large-diameter trees, and high canopy closure (CDFG 2005). It uses dense, multi-layered canopy cover for roost seclusion; roost selection appears to be related closely to thermoregulatory needs, and the species appears to be intolerant of high temperatures (CDFG 2005). Mature, multi-layered forest stands are required for breeding (CDFG 2005). The mixed-conifer forest type is the predominant type used by spotted owls in the Sierra Nevada: about 80 percent of known sites are found in mixed-conifer forest, with 10 percent in red fir forest (USDA 2001a,b).

Northern flying squirrel

The northern flying squirrel was selected as an MIS for late seral closed canopy coniferous forest (Douglas-fir, eastside pine, Jeffrey pine, ponderosa pine, red fir, Sierran mixed conifer, and white fir) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures above 40 percent within Douglas-fir, eastside pine, Jeffrey pine, ponderosa pine, red fir, Sierran mixed conifer, and white fir coniferous forests, and multi-layered trees within Douglas-fir, eastside pine, Jeffrey pine, ponderosa pine, red fir, Sierran mixed conifer, and white fir. The northern flying squirrel occurs primarily in mature, dense conifer habitats intermixed with various riparian habitats, using cavities in mature trees, snags, or logs for cover (CDFG 2005).

Project-level Effects Analysis – Late Seral, Closed Canopy, Coniferous Forest Habitat

Habitat Factor(s) for the Analysis

Acres of late-seral, closed-canopy, coniferous forest habitat, tree size 5 (canopy closures M and D), and tree size 6.

Acres with changes in canopy closure (D to M).

Acres with changes in large down logs per acre or large snags per acre.

Current Condition of the Habitat Factor(s) in the Analysis Area

Based on the vegetation layer and the CWHR model, about 25 percent of the analysis area may be considered suitable late-seral, closed-canopy, coniferous forest habitat (Table 76, Table 78, and Table 81).

Table 81. Summary of Late-Seral ,Closed-Canopy, Coniferous Forest acres within the analysis area and Chip-munk Project treatment units (all acres are approximate and National Forest System lands only).

		Pre-fire CWHR acres within four basal area mortality categories					Acres in Chip-munk treatment units			
CWHR	**Pre-fire acres**	**0-25%**	**25-50%**	**50-75%**	**75-100%**	**Post-fire acres in analysis area**	**Riparian Conservation Areas**	**Roadside Hazard Tree**	**Salvage**	**Total Chip-munk units**
SMC 5D	6252.1	4582.0	354.5	255.7	1060.0	4582.0	32.1	42.3	47.1	121.5
SMC 5M	8262.5	5197.0	485.1	391.2	2189.1	5196.7	152.2	248.5	110.4	511.1
WFR 5D	222.5	185.1	6.2	4.5	26.7	185.1	5.0	5.6	0.0	10.5
WFR 5M	658.3	495.3	23.6	17.4	122.0	495.2	15.1	30.6	0.8	46.5
TOTAL	**15395.3**	**10459.4**	**869.4**	**668.8**	**3397.7**	**10458.9**	**204.3**	**327.0**	**158.3**	**689.6**

5 = Medium/Large Tree >24"dbh, 6 = Multi-layered Tree, D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), DFR = Douglas-Fir,
EPN = Eastside Pine, PPN = Ponderosa Pine, RFR = Red Fir, SMC = Sierra Mixed Conifer, WFR = White Fir (Mayer and Laudenslayer 1988).

Effects of the Action Alternatives

Direct and Indirect Effects to Habitat

The Chip-munk Project proposes to treat hazard trees and conduct salvage operations on approximately 13 percent (5,464 acres) of the analysis area (41,414 acres). Twenty-five percent (10,459 acres) of the analysis area is late-seral, closed-canopy habitat, and about 7 percent (690 acres) of the late-seral, closed-canopy habitat in the analysis area is proposed for treatment in the Chip-munk Project (Table 76, Table 78, and Table 81). Potential direct effects include removal of fire-killed or hazard trees and subsequent reforestation. Tree removal would not change CWHR habitat types within treated stands as the Proposed Action would remove roadside fire-killed and fire-injured hazard trees and salvage fire-killed tress. The proposed action would potentially have a minimal effect on the residual live tree size, canopy cover or live-tree basal area through the removal of trees where damage indicates specific probabilities of mortality guidelines are met (Appendix B of MIS Report). Any changes to late-seral, closed-canopy habitat resulting from the Proposed Action would be nominal (Table 76, Table 78, and Table 81), There would be no direct or indirect effects on late-seral, open-canopy habitat, as no activities would occur that would impact the existing habitat conditions.

Cumulative Effects to Habitat

The existing condition reflects habitat changes from all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on MIS habitat from the existing condition within the analysis area.

Woodcutting and Christmas tree cutting programs on the PNF are ongoing programs that have been in existence for years and are expected to continue. The past and future effect of these actions has and would be to shift forest successional stages to somewhat earlier stages, while generally retaining continuous forest cover which would have a nominal effect on the late-seral, closed-canopy forest habitat.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area. While considering potential future impacts (such as the Chip-munk Project), Lassen NF biologists found there would be no decrease in late-seral, closed-canopy forest habitat in the Poker Chip analysis area as a result of removing dead or hazard trees under the proposed action.

Most of the recreation use within the wildlife analysis areas consists of dispersed camping, hiking, horseback riding, hunting, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. Such use is expected to continue at the current rate. These activities would have no effect on late-seral, closed-canopy habitat in the analysis area.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and immediately after fire suppression by PG&E to protect critical electrical power infrastructure.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities would have no effect on late seral closed canopy habitat in the analysis area.

Cumulative Effects Conclusion

It is anticipated that implementation of the Action Alternatives, in combination with present and reasonably foreseeable future actions would maintain the amount of late seral closed canopy coniferous forest habitat within the analysis area. These changes will not alter the existing trend in the late-seral, closed-canopy coniferous forest habitat.

Effects of Alternative B (No-action)

Direct, Indirect, and Cumulative Effects to Habitat

There would be no direct or indirect effects on late-seral, closed-canopy coniferous forest habitat, as no activities would occur that would impact the existing habitat conditions, thus there would also be no additional cumulative effects as a result of selecting this alternative. As a result, existing late-seral, closed-canopy coniferous forest conditions and California Spotted Owl/northern flying squirrel habitat conditions would be maintained.

Cumulative Effects Conclusion

It is anticipated that implementation of the No-action Alternative, in combination with present and reasonably foreseeable future actions, would not have a cumulative effect to the population and habitat distribution across the Plumas National Forest. Thus existing late-seral, closed-canopy coniferous forest conditions and California Spotted Owl/northern flying squirrel habitat conditions would be maintained.

Summary of Status and Trend at the Bioregional Scale

California spotted owl and Northern flying squirrel

The Plumas NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the California Spotted Owl and northern flying squirrel; hence, the late-seral, closed-canopy coniferous forest habitat effects analysis for the Chip-munk Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA 2010c), which is hereby incorporated by reference.

Habitat Status and Trend

There are currently 1,006,923 acres of late-seral, closed-canopy coniferous forest (Douglas-fir, eastside pine, Jeffrey pine, ponderosa pine, red fir, Sierran mixed conifer, and white fir) habitats on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is slightly increasing (changing from 7 percent to 9 percent of the acres on National Forest System lands); since the early 2000s, the trend has been stable at 9 percent.

Population Status and Trend - California spotted owl

The California Spotted Owl has been monitored in California and throughout the Sierra Nevada through general surveys, monitoring of nests and territorial birds, and demography studies (Verner et al. 1992, Gutierrez et al. 2008, 2009, 2010; USDA 2001a,b; USDA 2004a,b; USDI

2006; Keane et al. 2007, 2008, 2009, 2010, 2011, 2012). Current data at the range-wide, California, and Sierra Nevada scales indicate that, although there may be localized population trends indicating a decline (i.e., localized estimates of "lambda", the annual rate of population change, that are less than one) the distribution of California spotted owl populations in the Sierra Nevada is stable (Blakesley et al. 2010).

Population Status and Trend – Northern flying squirrel

The northern flying squirrel has been monitored in the Sierra Nevada at various sample locations by live-trapping, ear-tagging, camera surveys, snap-trapping, and radio telemetry: 2002-present on the Plumas and Lassen National Forests (Sierra Nevada Research Center 2007, 2008, 2009, 2010) and 1958-2004 throughout the Sierra Nevada in various monitoring efforts and studies (see USDA 2008a, Table NOFLS-IV-1). These data indicate that northern flying squirrels continue to be present at these sample sites, and current data at the range-wide, California, and Sierra Nevada scales indicate that the distribution of northern flying squirrel populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trends

California spotted owl

The direct/indirect and cumulative effects of the Chip-munk Project would have a nominal effect on the amount and/or distribution of late-seral, closed-canopy coniferous forest habitat within the analysis area. However, this change in the amount of late-seral, closed-canopy coniferous forest habitat in the analysis area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of California Spotted Owls across the Sierra Nevada bioregion.

Northern flying squirrel

The direct/indirect and cumulative effects of the Chip-munk Project would have a nominal effect on the amount and/or distribution of late-seral, closed-canopy coniferous forest habitat within the analysis area. However, this change in the amount of late-seral, closed-canopy coniferous forest habitat in the analysis area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of northern flying squirrels across the Sierra Nevada bioregion.

Aquatic macroinvertebrates - Riverine & Lacustrine Habitats

Habitat/Species Relationship

Aquatic or Benthic Macroinvertebrates (BMI) were selected as the MIS for riverine and lacustrine habitat in the Sierra Nevada. They have been demonstrated to be very useful as indicators of water quality and aquatic habitat condition (Resh and Price 1984; Karr et al. 1986; Hughes and Larsen 1987; Resh and Rosenberg 1989). They are sensitive to changes in water chemistry, temperature, and physical habitat; aquatic factors of particular importance are: flow, sedimentation, and water surface shade (USDA 2013c).

Project-level Effects Analysis - Riverine & Lacustrine Habitats

Habitat Factor(s) for the Analysis

Acres of riparian conservation area (RCA), Equipment Exclusion Zone (EEZ), and Full Suspension Zone (FSZ) impacted by the proposed action, primarily tree sizes 4's and 5's and potential for sedimentation.

ERA values and watersheds below, at, or above the threshold of concern and potential for cumulative watershed effects.

Current Condition of the Habitat Factor(s) in the Analysis Area

Macroinvertebrates are organisms that are large (macro) enough to be seen with the naked eye and lack a backbone (invertebrate). They inhabit all types of running waters, from fast-flowing mountain streams to slow-moving muddy rivers. Examples of aquatic macroinvertebrates include insects in their larval or nymph form, crayfish, clams, snails, and worms. Most species live part or most of their life cycle attached to submerged rocks, logs, and vegetation.

Stream Condition

The total area for the fifteen project analysis watersheds is roughly 46,500 acres (public and private lands). According to the PNF corporate GIS stream layer, there are approximately 533 miles of stream channel within the analysis watersheds: 326 miles are ephemeral (analyzed in CWE analysis), 150 miles are intermittent and 57 miles are perennial. Ephemeral and intermittent streams are seasonal—surface water is present during some portion of the year but these streams are typically dry by late summer. Ephemeral streams only flow in response to storm events or snowmelt, and do not necessarily flow every year. Intermittent streams are seasonally connected to the underlying water table and may flow during all but the driest months, whereas perennial streams typically flow year round). Streams are further classified by their slope—response reaches have low-gradient (typically less than three percent slope) alluvial conditions. The morphology of response channels reflects depositional processes associated with flowing water. Transport reaches have higher gradient (3 to 12 percent slope or more), non-alluvial conditions and the morphology of transport channels is generally resilient to change due to the prevalence of large channel substrate material (cobbles and boulders). The vast majority of stream channels in the project analysis area resemble these steeper and more resilient transport reaches. Exceptions include a short response reach of Clear Creek above Seneca Road and roughly two miles of Ohio Creek (although most of this stretch of Ohio Valley is on non-NFS lands and is outside of proposed treatment units). Exposed bedrock substantially increases channel stability; occurrence of exposed bedrock is more prevalent along streams in the east side of the project analysis area.

Effects of the Action Alternative (Alternative A)

Direct and Indirect Effects to Habitat

Acres of riparian conservation area (RCA), Equipment Exclusion Zone (EEZ), and Full Suspension Zone (FSZ) impacted by the proposed action, primarily tree sizes 4's and 5's and potential for sedimentation.

Riparian Conservation Area (RCA) for perennial streams require a buffer a minimum of 300' horizontal distance from bank full width on both sides of the stream (600 foot buffer) in which project design features and Sierra Nevada Framework standards and guidelines apply (USDA 2004b).

Table 82. Pre-fire CWHR size and density classes within RCAs (roadside hazard, tractor salvage, skyline salvage) and full suspension zones (skyline salvage) of proposed treatment units (all acres are approximate and National Forest System lands only).

	Acres in RCAs - roadside hazard tree units			Acres in RCAs - tractor salvage units			Acres in RCAs - skyline salvage units			Acres in full suspension zones - skyline salvage units		
CWHR size and density class	Intermittent	Perennial	Total	Intermittent	Perennial	Total	Intermittent	Perennial	Total	Intermittent	Perennial	Total
1	1.1	0.1	1.2				9.7	2.7	12.4	4.8	0.0	4.8
2D								1.4	1.4		1.4	1.4
2P 2S	4.1		4.1	0.6		0.6		1.0	1.0			
3D 3M	1.8		1.8				5.5	5.5	11.0	2.9	1.0	3.8
3P 3S	17.1		17.1	5.3	0.4	5.6	2.1	2.4	4.5	0.5	0.9	1.4
4D 4M	19.5	4.4	23.9	17.0	3.9	20.9	76.9	75.8	152.7	31.1	15.7	56.8
4P 4S	26.0	5.4	31.4	17.7	5.3	23.1	25.4	6.0	31.4	11.8	0.1	11.8
5D 5M	53.9	12.2	66.1	86.3	2.2	88.4	115.1	93.6	208.7	58.7	23.2	81.9
5P	15.4		15.4	11.7	1.1	12.8	5.3		5.3	1.9		1.9
Total	139.9	22.0	161.9	138.6	12.9	151.5	240.0	188.5	428.5	121.6	42.3	163.9

No direct effect is expected to aquatic macroinvertebrates, because there is no equipment allowed within the stream channel. The greatest concern resulting from project activities is increases in sedimentation within suitable macroinvertebrate habitat. There will be no significant disturbance within the RCAs, EEZs, and FSZs due to the proposed action. Project activities would have a negligible to low risk of sediment production into perennial streams flowing through the project area. No mechanical equipment would be permitted to operate within 300 feet of perennial streams (as described above in Chapter 2), thus minimizing ground disturbance within perennial stream RCAs.

There are a total of 741 acres of Riparian Conservation Acres (Table 82 and Table 83) within Roadside Hazard Tractor, Interior Salvage Tractor, and Skyline Salvage units within the project area. There are approximately 460 acres within the RCAs that are designated as equipment exclusion zones and full suspension zones. Sixty-two percent of the riparian conservation area will not have impacts from equipment or skyline yarding, or one end suspension outside of the FSZ. To prevent additional disturbance adjacent to the streams, to protect the existing microclimate, and to provide LWD and CWD

recruitment, large diameter trees (greater than 30” dbh) will be retained in equipment exclusion zones.

Table 83. Post-fire CWHR size and density classes within RCAs (roadside hazard, tractor salvage, skyline salvage), full suspension zones (skyline salvage), and four basal area mortality categories in proposed treatment units (all acres are approximate and National Forest System lands only).

Acres in RCAs - roadside hazard tree units

	Intermittent streams					Perennial streams					
	Basal area moratlity					Basal area moratlity					
CWHR	0-25%	25-50%	50-75%	75-100%	Total - intermittent	0-25%	25-50%	50-75%	75-100%	Total - perennial	all streams
1	0.4	0.1	0.2	32.3	**33.0**	0.0		0.1	1.9	2.0	**35.0**
2P 2S	1.8	0.6	0.2		**5.2**						**2.6**
3D 3M	1.4				**1.4**						**1.4**
3P 3S	14.2	1.2	0.6	0.0	**16.0**						**16.0**
4D 4M	10.5				**10.4**	4.2				4.2	**14.6**
4P 4S	19.2	4.5	3.0		**26.8**	2.7	0.5	1.0		4.1	**30.9**
5D 5M	29.6				**29.6**	11.3				11.2	**40.8**
5P 5S	12.8	3.4			**18.9**		0.4	0.1		0.5	**60.3**
Grand Total	**90.7**	**10.0**	**6.8**	**32.3**	**139.9**	**18.1**	**1.0**	**1.1**	**1.9**	**22.0**	**161.9**

Acres in RCAs - tractor salvage units

	Intermittent streams					Perennial streams					
	Basal area moratlity					Basal area moratlity					
CWHR	0-25%	25-50%	50-75%	75-100%	Total - intermittent	0-25%	25-50%	50-75%	75-100%	Total - perennial	all streams
1				92.2	**92.2**				1.9	1.9	**94.2**
2S		0.0	0.1		**0.1**						**0.1**
3P 3S	3.1	0.7	0.1		**3.9**	0.2	0.1	0.1		0.3	**4.2**
4D 4M	1.0				**1.0**	2.8				2.8	**3.8**
4P 4S	3.8	3.1	4.9		**11.8**	4.6	0.7	0.3		5.7	**17.5**
5D 5M	15.4				**15.4**	0.8				0.6	**16.0**
5P 5S	3.6	4.1	6.4		**14.1**	0.6	0.4	0.5		1.6	**15.7**
Total	**26.8**	**7.9**	**11.6**	**92.2**	**138.6**	**8.9**	**1.1**	**1.0**	**1.9**	**12.9**	**151.5**

Acres in RCAs - skyline salvage units

	Intermittent streams					Perennial streams					
	Basal area moratlity					Basal area moratlity					
CWHR	0-25%	25-50%	50-75%	75-100%	Total - intermittent	0-25%	25-50%	50-75%	75-100%	Total - perennial	all streams
1		0.1		145.2	**145.3**	0.3	0.5	0.9	124.0	**125.7**	**271.0**
2						2.1	0.1	0.2		**2.4**	**2.4**
2D						1.4				**1.4**	**1.4**
2P 2S						0.6				**0.9**	**0.9**
3D 3M	0.5				**0.5**	0.9				**0.9**	**1.3**
3P 3S	1.4	0.9	1.0		**3.2**	0.8	1.2	1.3		**3.2**	**6.5**
4D 4M	24.8				**24.8**	13.7				**13.8**	**38.6**
4P 4S	6.7	5.3	7.1		**19.1**	0.7	4.0	7.5		**12.2**	**31.4**
5D 5M	30.1				**30.0**	21.7				**21.7**	**51.7**
5P 5S	4.5	5.1	7.4		**17.0**		4.0	4.6		**8.6**	**25.7**
Total	**68.0**	**11.3**	**15.5**	**145.2**	**240.0**	**40.2**	**9.9**	**14.4**	**124.0**	**188.5**	**428.5**

Acres in full suspension zones - skyline salvage units

	Intermittent streams					Perennial streams					
	Basal area moratlity					Basal area moratlity					
CWHR	0-25%	25-50%	50-75%	75-100%	Total - intermittent	0-25%	25-50%	50-75%	75-100%	Total - perennial	all streams
1				76.3	**76.3**				27.0	**27.0**	**103.3**
2D						1.4				**1.4**	**1.4**
3M	0.3				**0.3**	0.1				**0.1**	**0.4**
3P 3S	0.3	0.2	0.0		**1.2**	0.5	0.4			**1.3**	**2.5**
4D 4M	12.1				**12.1**	3.2				**3.2**	**15.3**
4P 4S	2.4	2.5	3.6		**8.5**	0.1	1.0			**3.6**	**12.1**
5D 5M	15.5				**15.5**	4.0				**4.0**	**19.5**
5P 5S	1.8	2.1			**7.8**		0.6	1.0		**1.6**	**9.3**
Total	**32.5**	**4.8**	**8.0**	**76.3**	**121.6**	**9.4**	**1.9**	**4.1**	**27.0**	**42.3**	**163.9**

Ground-disturbing activities within RCAs along intermittent streams would not produce a measurable volume of sediment within downstream aquatic macroinvertebrate habitat due to very limited ground-disturbance within intermittent stream RCAs (limited to hand treatments and skyline treatments). Other ground-disturbing treatments outside of RCAs would not produce a measurable volume of sediment to perennial streams due to RCAs acting as buffers, filtering out any disturbed sediment before it could reach perennial waters in a measurable volume.

Site preparation such as hand thinning, piling and burning for reforestation would be implemented wherever salvage activities have occurred. Hand treatments within RCAs would require limbing and topping of felled trees, which would increase ground cover within the RCA and further restrict sediment transport. Ground disturbance resulting from hand thinning, piling, and burning is considered minimal, particularly within units that entail falling and leaving fire-killed trees. Thus, sedimentation of aquatic macroinvertebrate habitat from hand treatments within perennial and intermittent RCAs would not occur to any measurable extent.

Cumulative Effects to Habitat

ERA values and watersheds below, at, or above the threshold of concern and potential for cumulative watershed effects.

There are fifteen sub-watersheds within the analysis area in which a cumulative watershed effects (CWE) analysis has been completed. The Equivalent Roaded Acre (ERA) method is used to assess cumulative effect of activities that alter hydrologic function and result primarily in alteration of runoff in project watersheds. The ERA method is essentially an accounting of the past, present and future impacts. Watersheds are rated as moderately sensitive by Forest staff when evaluated for use of the ERA method. Rating variables include erosion potential, slope steepness, amount of alluvial channels, risk of rain-on-snow and/or thunderstorm events, and re-vegetation potential. Using these ratings, a Threshold of Concern (TOC) value is assigned for each watershed, beyond which an adverse effect might be expected. The TOC is generally expressed as a percentage of watershed area.

Seven of the fifteen CWE watersheds are over acceptable Forest thresholds for management impacts that affect runoff; all but one are due to the effects of the fire (see the Soil and Water Resources section of this Environmental Assessment for details). These watersheds include (in order of the highest ERA values, including miles of perennial and intermittent streams at risk): Clear Creek (p=4.7. I=4.2), Ohio Creek (p=3.6, i=7.5), Upper Mosquito Creek (p=5.3, i=12.0), Belden Forebay North Fork of the Feather River (p=4.6, i=15.5), Salmon Creek (p=5.2, i=7.4), Butt Valley Reservoir East (p=2.2, i=8.4), and the Upper North Fork Feather River (p=2.4, i-3.3). Butt Valley Reservoir East watershed is currently over threshold because of private logging activities and road densities.

Erosion from harvest slopes, and subsequent sediment delivery to channels is expected to be elevated over normal conditions because of lack of ground cover. But in the event of precipitation that initiates erosion the overall lack of ground cover on burned slopes will be the greater source.

Within these watersheds with a high threshold of concern there are 28 miles of perennial streams and 58 miles of intermittent streams identified as potentially suitable SNYLF habitat, and have a higher risk of these cumulative watershed effects. Harvesting creates areas of compaction and displacement of soils, leading to localized incidences of overland flow, but incorporation of RCA equipment restrictions, BMPs, Forest Plan standards and regional soil productivity guidelines into project implementation would limit detrimental disturbances to soil to 15 percent or less of a treatment unit. Therefore actual harvest effects are a relatively minor proportion of the cumulative effects to watersheds.

Exposed, unprotected soil has the potential to move into the aquatic system as a result of the season's first significant rain. High levels of sediment can fill deep pools, alter and fill interstitial spaces in streambed materials with fine particulates, change flow characteristic, reduce dissolved oxygen, and restrict waste removal (USDA 2007a).

The slight amounts of sediment generated from activity areas during a high runoff event over the burned landscape would not be measurable or detectable at the analysis watershed scale and would not affect identified downstream beneficial uses, including aquatic macroinvertebrate habitat.

Other effects from the Chips wildfire to aquatic macroinvertebrates include a reduction of the input of leaf fall and insects from floodplains into streams and a potential for a reductions in relative abundances of shredder and scraper taxa, while collector-gatherer abundances increased.

Clear Creek and Upper Mosquito Creek watersheds are currently above the Threshold of Concern (see the Soil and Water Resources section of this Environmental Assessment for details). These two watersheds are susceptible to very high cumulative effects risk, such as erosion and large movement of sediment into streams. See the Soil and Water Resources section of this Environmental Assessment for detailed cumulative conditions of watersheds with perennial stream miles and thus populations of aquatic macroinvertebrates. Those perennial streams with greater than 15 percent ERA, and over the threshold of concern are at very high risk of adverse downstream effects. However, implementation of conservative project design criteria (USDA 2013, Chapter 2), standards and guidelines, and BMPs, there will be minimal additional impact to water quality, sedimentation, and temperature.

Prior to the Chips Fire, macroinvertebrate samples were collected in relation to Stream Condition Inventory Monitoring reaches (Appendix C of Chip-munk MIS Report, USDA 2013d). Seven reaches were selected to show the variability of streams over time, and in relation to "reference streams" and those "managed streams". Chips and Yellow Creek are just to the West of the project boundary, East and West Branch Nelson and Willow Creek were reference streams, and Fourth Water and Lights Creek are managed watersheds. In addition, sampling of Lights Creek was completed one winter after the Moonlight Fire. The metric used to describe the benthic community condition was the Observed/Expected (O/E) score. O/E models compare the

macroinvertebrate taxa observed at sites of unknown biological condition (in this case, all HFQLG monitoring reaches) to the assemblages expected to be found in the absence of anthropogenic stressors (collected from reference streams across California). Given the physiographic diversity of California, separate O/E models for three climatically unique regions have been developed for the state. An O/E score of 1.0 would indicate that all macroinvertebrate taxa expected to occur there (when compared with reference streams with comparable conditions) were identified, and would indicate the stream is in "good" condition. Meanwhile, an O/E score of 0.5 would represent a stream in "poor" condition, in which only 50 percent of expected taxa were found to occur.

Macroinvertebrate samples have not been taken within the project area. Chips and Yellow Creek, just to the West of the Project Area, have an O/E rating from poor to good, and reference reaches also varied from poor to good. This represents the annual variability in stream taxa in both managed and reference watersheds. Biologic indices and O/E scores were higher following the 2007 Moonlight Fire than they were pre-fire, despite the significant increase in fine sediment post-fire. One possible explanation for the increases in O/E scores following the Moonlight Fire is increased productivity within the riparian area. Field notes collected in 2010 indicated a significant increase in the abundance of riparian hardwood species (particularly willow), as the Moonlight Fire burned the vast majority of conifers within the watershed and allowed increased sunlight penetration into the Moonlight Creek riparian zone. Many macroinvertebrate species feed upon the leaves of deciduous hardwoods such as willows. Thus, an increase in the abundance of riparian hardwoods may have led to an increase in macroinvertebrate species richness and abundance as well.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing the Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities have the potential for direct and indirect effects to stream condition and aquatic macroinvertebrates and their habitat in the analysis area.

Woodcutting and Christmas tree cutting programs on the PNF are ongoing programs that have been in existence for years and are expected to continue. The past and future effect of these actions has and would be to shift forest successional stages to somewhat earlier stages, while

generally retaining continuous forest cover which would have a nominal effect on stream and riparian habitat within the project area.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area. While considering potential future impacts (such as the Chip-munk Project), Lassen NF biologists found there would be no decrease in the quality and quantity of riparian habitat and associated stream condition in the Poker Chip analysis area as a result of removing dead or hazard trees under the proposed action.

Most of the recreation use within the wildlife analysis areas consists of dispersed camping, hiking, horseback riding, hunting, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. Such use is expected to continue at the current rate. These activities would have no effect on riparian and stream habitat in the analysis area.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and immediately after fire suppression by PG&E to protect critical electrical power infrastructure. These activities would not directly and indirectly effect stream condition and aquatic macroinvertebrates and their habitat in the analysis area.

Cumulative Effects Conclusion

Effects to aquatic macroinvertebrate habitat by the proposed management actions were considered at multiple scales. On site impacts of activities to LWD and CWD recruitment, microclimate effects, and streamside areas (RCA, EEZ, and FSZ) were considered. Indirect impacts to stream habitat was considered, and cumulative effects were considered at both the sub-watershed scale, and the larger scale of the CWE Analysis Area which includes fifteen Huc-6 sub-watersheds, and analyzing the downstream effects of the two).

The responses to the key factors (as described below) identified for riverine habitat would be affected by wildfire. As with numerous studies (included in Roby & Azuma 1995, and in Minshall 2003), it is expected that stream temperatures, stream flows and nutrient levels will all increase in the short term, and that long term increase in sediment production and deposition will occur. Partial recovery of these systems will occur quickly (1-5 years), species diversity will be higher than pre-fire but species richness would be lower, and long term recovery of the macroinvertebrate community may take 10-50+ years. With salvage logging, the timeframes for recovery may be extended. Recovery of stream ecosystems from the effects of fire is likely to be slower, more sporadic, and potentially incomplete in cases where natural process is impaired

(Minshall 2003). Rapid recovery of stream macroinvertebrates is associated with the more rapid recovery of the riparian vegetation (Ibid).

It is anticipated that implementation of the Proposed Action, in combination with present and reasonably foreseeable future actions, implementation of the project design features and standards and guidelines would retain sufficient for LWD and CWD recruitment, maintain existing post-fire microclimate, and have minimal increase in sedimentation in the analysis area.

Effects of Alternative B (No-action)

Direct and Indirect Effects to Habitat

No direct or indirect effect is expected to aquatic macroinvertebrates from the No-action Alternative.

Cumulative Effects to Habitat

Cumulative effects of the No-action Alternative are identical to those presented under the Proposed Action above.

Cumulative Effects Conclusion

It is anticipated that implementation of the No-action Alternative, in combination with present and reasonably foreseeable future actions, would not have a cumulative effect to the population and habitat distribution across the Plumas National Forest. Thus existing aquatic macroinvertebrate population and habitat conditions would be maintained.

Summary of aquatic macroinvertebrates Status and Trend at the Bioregional Scale

The 1988 Plumas NF LRMP (USDA 1988a) as amended by the SNF MIS Amendment (USDA 2007a) requires bioregional-scale Index of Biological Integrity and Habitat monitoring for aquatic macroinvertebrates; hence, the lacustrine and riverine effects analysis for the Chip-munk Project must be informed by these monitoring data. The sections below summarize the Biological Integrity and Habitat status and trend data for aquatic macroinvertebrates. This information is drawn from the detailed information on habitat and population trends in the 2010 Sierra Nevada Forests Bioregional MIS Report (USDA 2010c), which is hereby incorporated by reference.

Habitat Status and Trend

Habitat monitoring for benthic macroinvertebrate data are collected and/or compiled at the bioregional scale, consistent with the LRMP as amended by the 2007 SNF MIS Amendment ROD (USDA 2007a). Habitat trend is the direction of change in the amount or quality of habitat over time. The methodology for assessing habitat status and trend is described in detail in the SNF Bioregional MIS Report (USDA 2008a). All habitat monitoring data are collected and/or compiled at the bioregional scale, consistent with the LRMP as amended by the 2007 SNF MIS Amendment ROD (USDA 2007a).

Population Status and Trend

For aquatic macroinvertebrates, condition and trend is determined by analyzing macroinvertebrate data using the predictive, multivariate River Invertebrate Prediction and Classification System (RIVPACS) (Hawkins 2003) to determine whether the macroinvertebrate community has been impaired relative to reference condition within perennial water bodies. This monitoring consists of collecting aquatic macroinvertebrates and measuring stream habitat features according to the Stream Condition Inventory (SCI) manual (Frasier et al. 2005). Evaluation of the condition of the biological community is based upon the RIVPACs generated O/E (observed/ expected) score, which is a reflection of the number of species observed at a site versus the number expected to occur there based on the RIVPACS model in the absence of impairment. Sites with a low O/E scores have lost many species predicted to occur there, which is an indication that the site has a lower than expected richness of sensitive species and is therefore impaired.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale trends - Aquatic macroinvertebrates

In the short term, based on the direct/indirect and cumulative effects of the Proposed Action and No-action Alternative, the status and trend of in-stream habitat and the macroinvertebrate community would be negatively impacted, but long term restoration and recovery would occur 10-50 years out. This impact could occur in approximately 10+ miles of perennial streams within the project area. These short term impacts at the project level are too small to have any affect at the larger scale and thus will not alter the existing trend in the habitat or population distribution of aquatic macroinvertebrates across the Sierra Nevada bioregion.

Overall, the collection of condition scores reveals that there are many sites in very good-to-excellent condition (Table 84), since their O/E scores are near unity (i.e., the species of aquatic macroinvertebrates observed to occur at many sites closely matches those expected to occur at a site that is unimpaired). However, the sites sampled were specifically chosen because they generally represented the best sites available on each forest and data from them cannot be related confidently to broader scales for assessment of condition and trend. However, samples taken in future years at these sites will allow us to assess condition and trend at scales from stream reach up to watersheds of thousands of acres.

Table 84. Summary of existing BMI bioassessment data from the Sierra Nevada national forests.

Forest	Number of Sites	Samples Collected What Years	Mean Watershed Area (acres)	Range in Watershed Areas (acres)	Mean RIVPACS O/E Score	Range in RIVPACS O/E Scores
Eldorado	10	2000-01	4,426	670 - 13,523	1.04	0.76 – 1.24
Inyo	9	2000-02	4,112	1,429 – 8,192	0.95	0.87 – 1.12
Lassen	18	2000	9,996	215 – 67,748	1.02	0.61 – 1.27
LTBMU	17	2000-01	3,054	263 – 10,905	0.89	0.58 – 1.16
Modoc	14	2000-01	82,176	1 – 913,982	0.81	0.67 – 1.34

Plumas	14	2000-05	67,244	1,262 – 564,652	0.92	0.57 – 1.26
Sequoia	8	2000	3,009	3 – 5,506	1.05	0.77 – 1.20
Sierra	10	2000-01	22,135	640 – 167,029	0.93	0.78 – 1.30
Stanislaus	14	2000-01	21,535	585 – 92,806	0.90	0.77 – 1.23
Tahoe	15	2000-01	11,429	480 – 87,939	0.93	0.59 – 1.26
Total	**130**	**2000-05**	**23,686**	**1 – 913,982**	**0.95**	**0.57 – 1.34**

Fox Sparrow - Shrubland (West-Slope Chaparral) Habitat

Habitat/Species Relationship

The Fox Sparrow was selected as the MIS for shrubland (chaparral) habitat on the west-slope of the Sierra Nevada, comprised of montane chaparral (MCP), mixed chaparral (MCH), and chamise-redshank chaparral (CRC) as defined by the California Wildlife Habitat Relationships System (CWHR) (CDFG 2005). Recent empirical data from the Sierra Nevada indicate that, in the Sierra Nevada, the Fox Sparrow is dependent on open shrub-dominated habitats for breeding (Burnett and Humple 2003, Burnett et al. 2005, Sierra Nevada Research Center 2007).

Project-level Effects Analysis - Shrubland (West-Slope Chaparral) Habitat

Habitat Factor(s) for the Analysis

Acres of all shrubland (chaparral) habitats.

Acres with changes in all shrubland habitat ground cover class.

Acres with changes in all CWHR shrubland habitat size class.

Current Condition of the Habitat Factor(s) in the Analysis Area

Based on the vegetation layer and the CWHR model, about 24 percent of the analysis area may be considered shurbland habitat (Table 76, Table 78, and Table 85).

Table 85. Summary of Shrubland (west-slope chaparral types) habitat in the analysis area and Chip-munk Project treatment units (all acres are approximate and National Forest System lands only).

		Pre-fire CWHR acres within four basal area mortality categories					Acres in Chip-munk treatment units			
CWHR	**Pre-fire acres**	**0-25%**	**25-50%**	**50-75%**	**75-100%**	**Post-fire acres in analysis area (exisiting condition)**	**Riparian Conservation Areas**	**Roadside Hazard Tree**	**Salvage**	**Total Chip-munk units**
MCH	336.0	135.7	19.6	25.3	155.5	336.0				
MCP	1451.7	565.7	107.8	109.2	669.0	9424.0	825.8	297.6	1900.8	3024.2
TOTAL	**1787.8**	**701.4**	**127.5**	**134.4**	**824.5**	**9760.1**	**825.8**	**297.6**	**1900.8**	**3024.2**

*MCH = Mixed Chaparral, MCP = Montane Chaparral (Mayer and Laudenslayer 1988).

Effects of the Action Alternative

Direct and Indirect Effects to Habitat

The Chip-munk Project proposes to treat hazard trees and conduct salvage operations on approximately 13 percent (5,464 acres) of the analysis area (41,414 acres). Twenty-four percent (9,760 acres) of the analysis area is shrubland habitat, and about 31 percent (3,024 acres) of the shrubland habitat in the analysis area is proposed for treatment in the Chip-munk Project (Table 76, Table 78, and Table 85). Roadside hazard tree and salvage treatments would not directly result in a change in the amount of shrubland habitat within the analysis area. However, the Proposed Action would directly affect shrubland habitat through reforestation of up to 3,675 acres, thus converting shrubland habitat back to early-seral conifer habitat within a couple decades. Early-seral conifer habitat resulting from reforestation under the action alternative will function similarly to shrubland habitat, but because such early-seral conifer habitat would be classified as plantations, they could be subject to actions that release seedlings (such as grubbing, brush mastication, and pre-commercial thinning) that would accelerate the succession of this habitat into mid-seral conifer habitat in the future. If every acre proposed for reforestation were treated, it would leave approximately 6,736 acres of shrubland habitat in the analysis area, which is well over three-times the amount of shrubland habitat that existed prior to the Chips Fire (Table 85). Overall, 69 percent of shrubland habitat would be retained post-project within the analysis area (Table 78 and Table 85).

Cumulative Effects to Habitat

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on MIS habitat from the existing condition within the analysis area.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities would have no effect on shrubland habitat in the analysis area.

Woodcutting and Christmas tree cutting programs on the PNF are expected to continue. The past and future effect of these actions has and would be to shift forest successional stages to somewhat earlier stages, while generally retaining continuous forest cover which would have no effect on shrubland habitat in the analysis area.

Most of the recreation use within the wildlife analysis areas consists of dispersed camping, hiking, horseback riding, hunting, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. The use is expected to continue at the current rate. These activities would have no effect on shrubland habitat in the analysis area.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area (USDA 2013i). While considering potential future impacts (such as the Chip-munk Project), Lassen NF biologists found there may be a positive impact of danger tree removal on shrubland habitat due to increased light exposure to the ground and proposed measures (retaining shrubs in some treatment units) to mediate any shrubland habitat loss associated with reforestation activites (USDA 2013i,j).

, USDA 2013l).Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and immediately after fire suppression by PG&E to protect critical electrical power infrastructure.

Cumulative Effects Conclusion

It is anticipated that implementation of the Action Alternative, in combination with present and reasonably foreseeable future actions may slightly decrease or maintain the amount of shrubland habitat, through reforestation, within the analysis area (dependent upon out-year plantation management). These changes will not alter the existing trend in the shrubland habitat.

Effects of Alternative B (No-action)

Direct, Indirect, and Cumulative Effects to Habitat

There would be no direct or indirect effects on shrubland habitat, as no activities would occur that would impact the existing habitat conditions, thus there would also be no additional cumulative effects as a result of selecting this alternative. As a result, existing shrubland habitat conditions and Fox Sparrow habitat conditions would be maintained.

Cumulative Effects Conclusion

It is anticipated that implementation of the No-action Alternative, in combination with present and reasonably foreseeable future actions, would not have a cumulative effect to the population and habitat distribution across the Plumas National Forest. Thus existing shrubland habitat conditions and fox sparrow habitat conditions would be maintained.

Summary of Fox Sparrow Status and Trend at the Bioregional Scale

The 1988 Plumas NF LRMP (USDA 1988a) as amended by the SNF MIS Amendment (USDA 2007a) requires bioregional-scale habitat and distribution population monitoring for the Fox Sparrow; hence, the shrubland effects analysis for the Chip-munk Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the Fox Sparrow. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA 2010c), which is hereby incorporated by reference.

Habitat Status and Trend

There are currently 1,009,681 acres of west-slope chaparral shrubland habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is slightly increasing (changing from 8 percent to 9 percent of the acres on National Forest System lands).

Population Status and Trend

Monitoring of the Fox Sparrow across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with PRBO Conservation Science, as part of a monitoring effort that also includes Mountain Quail, Hairy Woodpecker, and Yellow Warbler (USDA 2010c, http://data.prbo.org/partners/usfs/snmis/). Fox Sparrows were detected on 36.9 percent of 1659 point counts in 2009 and 44.3 percent of 2266 point counts in 2010, with detections on all 10 national forests in both years. The average abundance (number of individuals recorded on passive point count surveys) was 0.563 in 2009 and 0.701 in 2010. These data indicate that Fox Sparrows continue to be distributed across the 10 Sierra Nevada National Forests. In addition, the Fox Sparrows continue to be monitored and surveyed in the Sierra Nevada at various sample locations by avian point count, spot mapping, mist-net, and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA 2008a). Current data at the range-wide, California, and Sierra Nevada scales indicate that, although there may be localized declines in the population trend, the distribution of Fox Sparrow populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Fox Sparrow Trend

The direct/indirect and cumulative effects of the Chip-munk Project would have a nominal effect on the amount and/or distribution of shrubland habitat through reforestation within the analysis area. The Chip-munk Project would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of Fox Sparrow across the Sierra Nevada bioregion.

Black-backed Woodpecker - Snags in Burned Forest Ecosystem Component

Habitat/Species Relationship

The Black-backed Woodpecker was selected as the MIS for the ecosystem component of snags in burned forests. Recent data indicate that black-backed woodpeckers are dependent on snags created by stand-replacement fires (Hutto 1995, Kotliar et al. 2002, Smucker et al. 2005). Severely burned forests provide abundant snags that benefit both prey (by providing food for the specialized beetle larvae that serve as prey) and nesting sites (Hutto and Gallo 2006). Black-backed Woodpeckers were also found to select for moderate burn severity (Dudley 2012). Thus, suitable habitat would be considered in moderate to high vegetation burn severity areas (greater than 25 percent basal area mortality) of the pre-fire CWHR types listed below. Areas where vegetation burn severity habitat is low (less than 25 percent basal area mortality) are not considered to provide suitable Black-backed Woodpecker habitat but may contribute future snag habitat for Black-backed Woodpecker foraging and nesting near moderate and high burn severity areas (Hutto 1995). Recent studies have confirmed and better delineated key habitat features (e.g., the importance of snag density) for Black-backed Woodpeckers (Siegel et. al 2013), and the Black-backed Woodpecker Conservation Strategy (Bond et al. 2012) provided numerous management recommendations that may be employed to benefit the species. Management suggestions from these and other scientific studies were considered and incorporated when possible in designing the Chip-munk Project.

Project-level Effects Analysis – Snags in Burned Forest Ecosystem Component

Habitat Factor(s) for the Analysis

4. Large number of small and large snags per acre within burned forest created by moderate to high severity fire (greater than 25 percent basal area mortality, within size classes 3,4,5, and 6 that existed pre-fire).
5. Moderate to dense stand density pre-fire (CWHR density classes M and D).
6. Exclude elevations below 3,700 as these areas are not frequently used by Black-backed Woodpeckers.

Current Condition of the Key Habitat Factor(s) in the Chips Fire and Analysis Area

The Chip-munk Project proposes to treat hazard trees and conduct salvage operations on approximately 13 percent (5,464 acres) of the analysis area (41,414 acres). Within the Chip Fire boundary, 11,561 acres of snags in burned forest habitat (greater than 25 percent basal area mortality) was created, and 64 percent of this area burned at high severity (greater than 75 percent basal area mortality, Table 86).Within the analysis area, 8,803 acres of potentially suitable Black-backed Woodpecker habitat was created, and 68 percent of those acres burned at high severity (Table 87). CWHR 3M and 3D were included in this analysis because size class trees 6-11” dbh have been utilized by Black-backed Woodpeckers, as shown in recent studies (Burnett et al. 2011,

Seavy et al. 2012). The analysis area contains 663 acres CWHR with size class 3 of moderate and dense canopy cover and represents 8 percent of total suitable snags in burned forest habitat within the project area (Table 87 and Table 88).

Effects of the Action Alternative

Direct and Indirect Effects to Habitat

The Chip-munk Project proposes to treat hazard trees and conduct salvage operations on approximately 13 percent (5,464 acres) of the analysis area (41,414 acres). Twenty-one percent (8,803 acres) of the analysis area contains potentially suitable Black-backed Woodpecker habitat, and about 31 percent (2,767 acres) of potentially suitable habitat in the analysis area is proposed for treatment in the Chip-munk Project (Table 86 through Table 88). Several studies have suggested that Black-backed Woodpecker distribution is most associated with areas that burned at the high end of the fire severity spectrum (Russell et al. 2007, Hanson and North 2008, Vierling et al. 2008, Hutto 2008). Acres of potentially suitable Black-backed Woodpecker habitat that burned at high severity (greater than 75 percent basal area mortality, 5,980 acres) comprise 68 percent of potential habitat in the analysis area and 38 percent of these acres are in Chip-munk Project treatment units (Table 87 and Table 88).

Of the 2,767 acres of potentially suitable Black-backed Woodpecker habitat proposed for treatment in the Chip-munk Project (Table 88), 9 percent (243 acres) are roadside hazard tree treatment, 63 percent (1,758 acres) are salvage treatment, and 28 percent (767 acres) are within Riparian Conservation Areas (RCAs; Table 88). Roadside hazard tree removal and salvage operations are restricted within 950 acres of RCAs, and 50 percent (474 acres) of these acres are potentially suitable for Black-backed Woodpeckers (Table 89; total RCA acres = 1,464; equipment exclusion and full suspension zone acres = 950; snags in burned forest habitat acres = 474; see Appendix B of the Chip-munk MIS Report (USDA 2013d) for RCA and equipment exclusion and full suspension zone widths). Based on project design criteria, we do not anticipate significant salvage activities in RCA equipment exclusion and full suspension zones for tractor units. Within Chip-munk Project treatment units, snag retention areas also would be designated and maintain 370 acres of snags in burned forest habitat. Further, the 243 acres of snags in burned forest habitat within roadside hazard treatment units may still provide suitable habitat for snags in burned forest species (e.g., roadside hazard tree removal units would likely still provide foraging habitat for Black-backed Woodpeckers).

We estimate 73 percent (6,406 acres) of potentially suitable Black-backed Woodpecker habitat in the analysis area will be retained post Chip-munk Project (Table 87 and Table 88; 8,803 acres available; 2,767 acres proposed for treatment; 370 acres snag retention). Of those acres proposed for treatment (2,397 acres), equipment and full suspension restrictions within RCAs will maintain approximately 474 additional acres of woodpecker habitat (although some salvage may occur in these areas if operators are able to fully suspend harvested timber). Further, roadside hazard tree

units (243 acres) will provide some level of woodpecker habitat (e.g., foraging sites). If we consider RCA exclusion and full suspension zones and roadside hazard acres as providing some level of snags in burned forest habitat, our estimate of potentially suitable Black-backed Woodpecker habitat maintained post-project ranges between 73-81 percent (Table 87 through Table 89).

Table 86. Summary of Snags in Burned Forest Habitat within the Chips Fire boundary and four basal area mortality categories (all acres are approximate and National Forest System lands only).

	Pre-fire CWHR acres within four basal area mortality categories					
CWHR	**0-25%**	**25-50%**	**50-75%**	**75-100%**	**Total**	**Potential Black-backed Woodpecker habitat**
JPN 3M	4.2				4.2	0.0
PPN 3M	9.8	1.4	4.1	10.3	25.6	15.8
SMC 3D	219.0	16.6	11.8	45.3	292.6	73.6
SMC 3M	465.3	66.3	59.8	439.6	1031.0	565.7
WFR 3D	150.9	9.4	8.2	50.9	219.4	68.5
WFR 3M	183.7	15.1	6.8	16.4	222.0	38.3
3D 3M subtotal	**1032.9**	**108.8**	**90.7**	**562.4**	**1794.8**	**761.9**
PPN 4D	13.8	0.2	0.0	0.2	14.3	0.4
PPN 4M	11.7	0.0			11.7	0.0
RFR 4M	60.0	11.0	6.8	24.6	102.4	42.4
SMC 4D	2997.1	169.4	121.3	524.2	3812.0	814.9
SMC 4M	7135.0	581.8	477.7	1683.9	9878.4	2743.4
WFR 4D	677.3	81.7	68.7	209.3	1037.0	359.7
WFR 4M	1325.2	138.8	90.1	298.0	1852.1	526.9
4D 4M subtotal	**12220.2**	**982.9**	**764.6**	**2740.2**	**16707.9**	**4487.7**
SMC 5D	5405.6	386.6	286.0	1110.3	7188.4	1782.9
SMC 5M	7646.1	692.9	538.4	2539.0	11416.5	3770.4
WFR 5D	753.2	38.7	38.0	113.3	943.2	190.0
WFR 5M	860.3	100.0	97.1	371.1	1428.6	568.2
5D 5M subtotal	**14665.1**	**1218.2**	**959.5**	**4133.7**	**20976.6**	**6311.5**
GRAND TOTAL	**27918.3**	**2309.9**	**1814.8**	**7436.3**	**39479.4**	**11561.1**

*1 = Seedling Tree <1” dbh, 2 = Sapling Tree 1 - 6” dbh,, 3 = Pole Tree 6 - 11” dbh, 4 = Small Tree 11 - 24"dbh.

D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%), DFR = Douglas-Fir, EPN = Eastside Pine, JPN = Jeffrey Pine, LPN = Lodgepole Pine, PPN = Ponderosa Pine, RFR = Red Fir, SMC = Sierra Mixed Conifer, WFR = White Fir (Mayer and Laudenslayer 1988).

Table 87. Summary of Snags in Burned Forest Habitat within the analysis area and four basal area mortality categories (all acres are approximate and National Forest System lands only).

	Pre-fire CWHR acres within four basal area mortality categories					Potential Black-backed Woodpecker habitat
CWHR	**0-25%**	**25-50%**	**50-75%**	**75-100%**	**Total**	
PPN 3M	9.8	1.4	4.1	10.3	25.6	15.8
SMC 3D	136.3	11.8	8.6	39.0	195.8	59.5
SMC 3M	316.6	54.6	52.5	419.8	843.5	526.9
WFR 3D	71.8	5.4	3.2	39.3	119.7	47.9
WFR 3M	84.5	3.8	2.3	6.5	97.1	12.6
3D 3M subtotal	**619.1**	**77.0**	**70.8**	**514.8**	**1281.7**	**662.6**
PPN 4D	13.8	0.2	0.0	0.2	14.3	0.4
PPN 4M	11.7	0.0			11.7	0.0
SMC 4D	2356.9	128.2	93.9	413.4	2992.5	635.5
SMC 4M	5112.5	439.2	361.1	1444.3	7357.0	2244.5
WFR 4D	272.2	17.7	17.1	58.9	365.9	93.7
WFR 4M	352.7	44.6	34.7	150.5	582.6	229.9
4D 4M subtotal	**8120.0**	**630.0**	**506.8**	**2067.3**	**11324.0**	**3204.1**
SMC 5D	4582.0	354.5	255.7	1060.0	6252.1	1670.1
SMC 5M	5197.0	485.1	391.2	2189.1	8262.5	3065.4
WFR 5D	185.1	6.2	4.5	26.7	222.5	37.4
WFR 5M	495.3	23.6	17.4	122.0	658.3	163.0
5D 5M subtotal	**10459.4**	**869.4**	**668.8**	**3397.7**	**15395.3**	**4936.0**
GRAND TOTAL	**19198.4**	**1576.4**	**1246.4**	**5979.8**	**28001.1**	**8802.7**

*1 = Seedling Tree <1" dbh, 2 = Sapling Tree 1 - 6" dbh,, 3 = Pole Tree 6 - 11" dbh, 4 = Small Tree 11 - 24"dbh.
D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%), DFR = Douglas-Fir, EPN = Eastside Pine, JPN = Jeffrey Pine, LPN = Lodgepole Pine, PPN = Ponderosa Pine, RFR = Red Fir, SMC = Sierra Mixed Conifer, WFR = White Fir (Mayer and Laudenslayer 1988).

Table 88. Summary of Snags in Burned Forest Habitat within Chip-munk Project treatment units and four basal area mortality categories (all acres are approximate and National Forest System lands only).

Treatment type	CWHR	Pre-fire CWHR acres within four basal area mortality categories					Potential Black-backed Woodpecker habitat
		0-25%	25-50%	50-75%	75-100%	Total	
Roadside Hazard Tree	3D	6.3	0.0	0.2	0.1	6.6	0.3
	3M	20.1	1.8	0.8	8.0	30.7	10.5
							0.0
	4D	57.3	7.0	7.4	23.5	95.2	37.9
	4M	161.4	17.3	11.4	45.9	236.1	74.7
	5D	47.9	7.0	4.4	9.6	68.9	21.0
	5M	280.1	27.1	18.1	53.3	378.5	98.4
	Subtotal	**573.2**	**60.1**	**42.4**	**140.3**	**816.0**	**242.9**
Riparian Conservation Areas	3D	2.0	0.4	0.0	0.2	2.6	0.7
	3M	5.6	1.0	1.1	7.4	15.2	9.6
							0.0
	4D	30.7	5.8	5.7	37.0	79.2	48.5
	4M	76.3	13.4	18.7	172.3	280.7	204.4
	5D	37.1	6.4	8.7	88.0	140.2	103.2
	5M	167.3	23.6	25.7	351.1	567.6	400.3
	Subtotal	**318.9**	**50.7**	**59.9**	**656.0**	**1085.4**	**766.6**
Salvage	3D	0.0		0.0	0.0	0.1	0.0
	3M	2.5	0.4	0.8	25.7	29.5	27.0
							0.0
	4D	25.2	7.2	8.5	79.6	120.5	95.3
	4M	107.6	45.9	71.4	431.9	656.8	549.2
	5D	47.1	13.7	20.3	175.6	256.6	209.5
	5M	111.2	42.6	68.4	765.7	988.0	876.7
	Subtotal	**293.7**	**109.8**	**169.4**	**1478.5**	**2051.4**	**1757.7**
	GRAND TOTAL	**1185.7**	**220.6**	**271.7**	**2274.9**	**3952.9**	**2767.2**

*1 = Seedling Tree <1" dbh, 2 = Sapling Tree 1 - 6" dbh,, 3 = Pole Tree 6 - 11" dbh, 4 = Small Tree 11 - 24"dbh.
D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%), DFR = Douglas-Fir, EPN = Eastside Pine, JPN = Jeffrey Pine, LPN = Lodgepole Pine, PPN = Ponderosa Pine, RFR = Red Fir, SMC = Sierra Mixed Conifer, WFR = White Fir (Mayer and Laudenslayer 1988)

Table 89. Summary of snags in burned forest habitat within Chip-munk Project equipment exclusion and full suspension zones (see Appendix B in Chip-munk MIS Report, USDA 2013d, for zone details).

	Pre-fire CWHR acres in four basal area mortality categories					Potential Black-backed Woodpecker habitat
CWHR	0-25%	25-50%	50-75%	>75%	Total pre-fire acres	
SMC 3D	0.4	0.2		0.0	0.6	0.2
SMC 3M	1.4	0.2	0.6	2.3	4.5	3.2
SMC 4D	12.0	2.1	2.4	15.0	31.5	19.5
SMC 4M	40.1	8.0	12.0	78.2	138.3	98.2
SMC 5D	19.3	3.0	5.6	52.4	80.2	61.0
SMC 5M	96.8	15.6	16.2	220.1	348.7	251.9
WFR 3D	0.0			0.0	0.0	0.0
WFR 3M	0.4			0.0	0.4	0.0
WFR 4D	1.6	0.1	0.4	0.4	2.6	0.9
WFR 4M	2.7	0.4	1.1	9.9	14.2	11.4
WFR 5D	2.6	0.2		0.0	2.9	0.3
WFR 5M	6.3	0.8	1.8	24.4	33.3	27.0
TOTAL	**183.6**	**30.7**	**40.1**	**402.8**	**657.2**	**473.6**

3 = Pole Tree 6 - 11" dbh, 4 = Small Tree 11 - 24"dbh; D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover (40 - 59%), P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%); DFR = Douglas-Fir, EPN = Eastside Pine, JPN = Jeffrey Pine, LPN = Lodgepole Pine, PPN = Ponderosa Pine, RFR = Red Fir, SMC = Sierra Mixed Conifer, WFR = White Fir (Mayer and Laudenslayer 1988).

There is considerable variation in home range size among individual Black-backed Woodpeckers. Recent studies on PNF (Wheeler Fire) estimated individual home range sizes varying between 59-166 acres (95 percent Brownian bridge kernel) or 412-822 acres (minimum convex polygon), dependent upon home range size estimation method (Siegel et al. 2013). Further, this same study examined Black-backed Woodpecker home range size on the Lassen NF (Peterson and Sugarloaf Fire areas) and found similarly wide variation among individuals, with generally larger home range size estimates compared to PNF (Brownian bridge (95 percent) range of estimates = 101-773 acres, minimum convex polygon range of estimates = 252-1,967 acres). Variation in home range size within and across populations limits our ability to accurately estimate the potential number of Black-backed Woodpecker territories within suitable habitat. However, we did crudely estimate the number of potential woodpecker territories within the analysis area to examine the relative impact of the Chip-munk Project. For simplicity, we used a range of home range sizes (59-166 acres) based on the mean (+/- 1 standard deviation) estimated home range size for Black-backed Woodpeckers on PNF (95 percent, Brownian bridge estimator, Siegel et al. 2013). If we assume all snags in burned forest habitat within the analysis area (8,803 acres) is available and suitable for Black-backed Woodpeckers, the analysis area could potentially support between 53-149 woodpecker territories within the analysis area (8,803/166 = 53, 8,803/59 = 149). Using these same simplifying assumptions, the analysis area could potentially support 38-108 woodpecker territories post Chip-munk Project (6,406 acres of snags in burned forest habitat retained post-project). Using this crude method to examine the relative impact of the Chip-munk Project underestimates project impact on snags in burned forest habitat suitability for Black-backed Woodpeckers.

Implementation of the Chip-munk Project will reduce and fragment available habitat, potentially rendering some portions of the analysis area not suitable or unavailable. Snag retention areas (370 acres) and restrictions on activities in RCAs (Appendix B of Chip-munk MIS Report, USDA 2013d) would be implemented to mediate fragmentation effects on Black-backed Woodpeckers. Although these measures will not eliminate negative impacts of the Proposed Action on snags in burned forest habitat and the species it supports, they will mediate these effects to some extent. Further, project implementation would not begin until after nestlings have fledged in 2013 (end of July, beginning of August), thereby avoiding any potential direct mortality to nestlings. The Chip-munk Project area is being surveyed for Black-backed Woodpeckers in 2013, and it will be surveyed again in 2014 as part of bioregional monitoring efforts (presence/absence point survey). If surveys indicate potential conflict between project activities and nesting birds, a forest biologist will assess the situation and attempt to mitigate disturbance to breeding birds.

Cumulative Effects to Habitat

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the alternatives evaluates the impact on MIS habitat from the existing condition within the analysis area.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities would have nominal effect on snags in burned forest habitat in the analysis area.

The woodcutting and Christmas tree cutting programs on the PNF are ongoing programs that have been in existence for years and are expected to continue. The past and future effect of the woodcutting program has and would be to reduce snags, in all forest types (including burned patches), along roadsides throughout much of the analysis area. However, the impacts are expected to be minimal due to the topography (steep), accessibility in the area and the abundance of snags post fire.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and immediately after fire suppression by PG&E to protect critical electrical power infrastructure.

Most recreation use within the analysis areas consists of dispersed camping, hiking, horseback riding, hunting, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. The use is expected to continue at the current rate. These activities would have no effect on snags in burned forest in the analysis area.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area (USDA 2013i). Lassen NF biologists estimated the Poker Chips Project could potentially eliminate 477 acres of snags in burned forest habitat (USDA 2013i,j). The cumulative effects of Poker Chip and Chip-

munk Projects on National Forest lands would be the potential loss of 2,874 acres of snags in burned forest habitat.

Cumulative Effects Conclusion

Considering treatment estimates for the Poker Chips and Chip-munk Projects, approximately 75 percent (8,687 acres) of potentially suitable Black-backed Woodpecker habitat within the Chips Fire boundary would not be treated (Table 86). Implementation of salvage and reforestation treatments within the analysis area, in combination with past, present and reasonably foreseeable future actions would result in a decline in habitat availability and distribution, and potentially a reduction in the amount of woodpeckers the analysis area could potentially support. However, overall there would be an increase in suitable habitat over pre-fire conditions, and local populations should remain relatively stable given the retention of such a large portion of potentially suitable habitat post-project.

Effects of Alternative B (No-action)

Direct, Indirect, and Cumulative Effects to Habitat

No tree removal would occur with this alternative. Snags in burned forest habitat would remain in the analysis area.

Cumulative Effects Conclusion

It is anticipated that implementation of the no action alternative, in combination with past, present and reasonably foreseeable future actions, would not have a cumulative effect to the population and habitat distribution across the Plumas National Forest. There would be short term population increase resulting from the suitable habitat created by wildfire.

Summary of Black-backed Woodpecker Status and Trend at the Bioregional Scale

The 1988 Plumas NF LRMP (USDA 1988a) as amended by the SNF MIS Amendment (USDA 2007a) requires bioregional-scale habitat and distribution population monitoring for the Black-backed Woodpecker; hence, the snags effects analysis for the Chip-munk Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the Black-backed Woodpecker. This information is drawn from the detailed information on habitat and distribution population trends in the 2010 SNF Bioregional MIS Report (USDA 2010c), which is hereby incorporated by reference.

Ecosystem Component Status and Trend

The current average number of medium-sized and large-sized snags (≥ 15” dbh, all decay classes) per acre across major coniferous and hardwood forest types (westside mixed conifer, ponderosa pine, white fir, productive hardwoods, red fir, eastside pine) in the Sierra Nevada ranges from 1.5 per acre in eastside pine to 9.1 per acre in white fir. In 2008, snags in these forest types ranged from 1.4 per acre in eastside pine to 8.3 per acre in white fir (USDA 2010c).

Data from the early-to-mid 2000s were compared with the current data to calculate the trend in total snags per acre by Regional forest type for the 10 Sierra Nevada national forests and indicate that, during this period, snags per acre increased within westside mixed conifer (+0.76), white fir (+2.66), productive hardwoods (+0.35) and red fir (+1.25) and decreased within ponderosa pine (-0.16) and eastside pine (-0.14).

Detailed information by forest type, snag size, and snag decay class can be found in the 2010 SNF Bioregional MIS Report (USDA 2010c).

These data include snags in both green forest and burned forest. Between 2000 and 2007, 211,000 acres underwent severe burn and 176,000 acres underwent moderate burn in the Sierra Nevada.

Further, a recent summary of Black-backed Woodpecker habitat availability in the Sierra Nevada found that between 5-10% (depending on fire severity levels) of Forest Service acres that burned during 2005-2012, and that are suitable for Black-backed Woodpeckers, have been or are proposed to have post-fire timber removal (internal report, available in the Project Record, Mt. Hough Ranger District).

Population Status and Trend

Monitoring of the black-backed woodpecker across the 10 National Forests in the Sierra Nevada has been conducted since 2008 in partnership with the Institute for Bird Populations (IBP) (USDA 2010c, http://www.birdpop.org/Sierra/bbwo.htm). In 2008, Black-Backed Woodpeckers were detected at 68 survey stations distributed across 10 of the 19 fire areas surveyed. In 2009, black-backed woodpeckers were detected at 169 survey station distributed across 28 of the 51 fire areas surveyed. In both years, occupied sites were well distributed across the 10 Sierra Nevada National Forests, included burned areas of a variety of sizes, and included areas 1 to 10 years post-fire. These data indicate that black-backed woodpeckers continue to be distributed across the 10 Sierra Nevada National Forests. Additionally, mean occupancy probability for stations surveyed during 2009 was 0.253 (95 percent credible interval: 0.222 – 0.289); applying this probability across the 10 Sierra Nevada National Forests yields an estimate that approximately 81,814 ha (25.3 percent) (range of 71,921 – 93,610 ha) of the 323,358 ha of burned forest (burned between 1999 and 2008) within monitoring area were occupied by Black-backed Woodpeckers in 2009. In addition, the Black-backed Woodpeckers continue to be surveyed in the Sierra Nevada at various sample locations by avian point count, spot mapping, mist-net, and breeding bird survey protocols. These are summarized in the 2010 Bioregional Monitoring Report (USDA 2010c). Current data at the range-wide, California, and Sierra Nevada scales indicate that the distribution of black-backed woodpecker populations in the Sierra Nevada is stable. On 08 April 2013, the U.S. Fish and Wildlife service announced a 90-day status review finding on a petition to lest the Oregon Cascades-California population and Black Hills population of the Black-backed Woodpecker under the Endangered Species Act of 1973, as amended (Act), as subspecies or distinct population segments that are endangered or threatened, and to designate critical habitat

concurrent with the listing (USDI 2013b). U.S. Fish and Wildlife Service has found that these two populations may warrant listing and initiated a status review to determine whether listing each population as endangered or threatened under the Act is warranted. This 90-day finding does not constitute a status review under the Act. The Service will report on their finding on whether a petition action is warranted in a 12-month finding, after completing a thorough status review of the species (a substantial 90-day finding does not mean that the 12-month finding will result in a warranted finding.

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

The direct, indirect, and cumulative effect of the Chip-munk Project in terms of changes in medium-sized and large-sized snags per acre within burned forest habitat would change from the existing condition. With the implementation of the Chip-munk Project, there would be a reduction in burned forest habitat supporting snags, potentially reducing habitat that could support Black-Backed Woodpecker. Thus, the potential for the analysis area to support woodpeckers declines post project implementation. Overall, the analysis area still supports large amounts of habitat (snags in burned forest) that may support higher densities of woodpeckers compared to 2002 levels. The Proposed Action would not alter the existing trend in the ecosystem component, nor would it lead to a change in the distribution of Black-backed Woodpecker across the Sierra Nevada bioregion.

Hairy woodpecker - Snags in Green Forest Ecosystem Component

Habitat/Species Relationship

The Hairy Woodpecker was selected as the MIS for the ecosystem component of snags in green forests. Medium (diameter breast height between 15 to 30 inches) and large (diameter breast height greater than 30 inches) snags are most important. Hairy Woodpeckers use stands of large, mature trees and snags of sparse to intermediate density; cover is also provided by tree cavities (CDFG 2005). Mature timber and dead snags or trees of moderate to large size are apparently more important than tree species (Siegel and DeSante 1999).

Project-level Effects Analysis - Snags in Green Forest Ecosystem Component

Habitat Factor(s) for the Analysis

Green forest acres potentially supporting medium and large snags within the terrestrial wildlife analysis area (CWHR size class 4 and 5).

Current Condition of the Habitat Factor(s) in the Terrestrial Wildlife Analysis Area

Based on the vegetation layer and the CWHR model, about 80 percent of the pre-fire analysis area may have been supporting medium (CWHR size class 4) and large (CWHR size class 5) snags (Table 75 and Table 90). Approximately 69 percent of this habitat did not burn or was

burned at low severity (less than 25 percent basal area mortality) during the Chips Fire (Table 90). Overall, the Chips Fire reduced the habitat potentially supporting medium and large snags in the analysis area by 16 percent, from 33,089 to 26, 378 acres (Table 90).

Effects of the Action Alternatives

Direct and Indirect Effects to Habitat

The Chip-munk Project proposes to treat hazard trees and conduct salvage operations on approximately 13 percent (5,464 acres) of the analysis area (41,414 acres). Twenty-five percent (26,378 acres) of the analysis area may contain medium and large snags, and about 8 percent of those acres are proposed for treatment under the Chip-munk Project (Table 90). For those acres within treatment units potentially containing medium and large snags (2,165 acres), 62 percent are in Riparian Conservation Areas (RCAs) or are within roadside hazard units (i.e., no salvage will occur, Table 90). Roadside hazard tree removal and salvage operations are restricted within 950 acres of RCAs, (total RCA acres = 1,464; equipment exclusion and full suspension zone acres = 950; see Appendix B of Chip-munk MIS Report, USDA 2013d, for RCA and equipment exclusion and full suspension zone widths). Based on project design criteria, we do not anticipate significant salvage activities in RCA equipment exclusion and full suspension zones for tractor units. Within Chip-munk Project treatment units, snag retention areas also would be designated and maintain 370 acres of snags adjacent to forests not in Chip-munk Project treatment units. In total, 3 percent of habitat in the analysis area potentially supporting medium and large snags may experience meaningful loss of these habitat components as a result of the Chip-munk project (828 acres of salvage, Table 90). The potential exists for some additional snags to be removed due to safety and operability concerns; however snag recruitment in the analysis area also is expected to increase due to fire kill, and project design criteria requires replacement snags of the same species and size class be retained within treatment units in such cases. Although the net result of snag loss and gain is not determinable, the Proposed Action calls for the retention of snags at 2004 SNFPA (USDA 2004a) Standards.

Cumulative Effects to Habitat

The existing condition reflects the changes of all activities that have occurred in the past. The analysis of cumulative effects of the Proposed Action evaluates the impact on MIS habitat from the existing condition within the terrestrial wildlife analysis area.

The woodcutting and Christmas tree cutting programs on the PNF are ongoing programs that have been in existence for years and are expected to continue. The past and future effect of the woodcutting program has and would be to reduce snags, in all forest types, along roadsides throughout much of the analysis area. However, the impacts are expected to be minimal due to the topography (steep), accessibility in the area and the abundance of snags post fire.

As a result of the Chips Fire, many trees along National Forest System (NFS) and Plumas County roads were damaged and could fall into the roadway, posing a safety and access hazard to area

residents and landowners, Forest Service personnel and contractors, special use permit holders, and the visiting public. Mt Hough Ranger District is implementing The Chips Fire Roadside Hazard Tree Removal Project (Chips Fire Roadside Project) on approximately six miles (up to 250 acres) of five main NFS and/or Plumas County roads have been identified for hazard tree removal. The majority of hazard trees proposed for removal occur in high severity burned areas; however, hazard trees within mixed severity burned areas will also be included to ensure the safety of road users in all those areas where burned trees pose a genuine risk of falling into the roadway. The four roads that are to be treated provide access to the communities of Caribou and Seneca, Butt Valley Reservoir, and PG&E infrastructure. These activities would have a nominal effect on snags in burned forest habitat in the analysis area.

Approximately nine miles of Pacific Gas and Electric (PG&E) right-of-way corridors (Caribou-Westwood 60 KV, Caribou-Plumas Jct. 60 KV, Caribou-Table Mtn 230 KV, Caribou-Palermo 115 KV, Caribou #2 60 KV, and Butt Valley-Caribou 115 KV) have been identified and proposed for economical tree recovery within the analysis area (Chips Fire PG&E Right of Way Salvage Timber Project, USDA 2013l). This project is still in the planning phase, with treatment units currently being delineated (up to 250 acres) for removal of downed hazard trees that were felled during and immediately after fire suppression by PG&E to protect critical electrical power infrastructure.

Table 90. Summary of Green Forest acres potentially supporting medium and large snags within the analysis area and Chip-munk Project treatment units (all acres are approximate and National Forest System lands only).

		Pre-fire CWHR acres within four basal area mortality categories					Acres in Chip-munk treatment units			
CWHR	Pre-fire acres	0-25%	25-50%	50-75%	75-100%	Post-fire acres in analysis area (exisiting condition)	Riparian Conservation Areas	Roadside Hazard Tree	Salvage	Total Chip-munk units
JPN 4P	76.6	75.0	1.5	0.0	0.1	75.0				
JPN 4S	487.8	434.6	27.4	15.2	10.7	478.7				
JPN 5P	31.5	31.5				31.5				
PPN 4D	14.3	13.8	0.2	0.0	0.2	13.8				
PPN 4M	11.7	11.7	0.0			11.7				
PPN4P	146.0	32.4	13.5	16.8	83.2	32.6	1.9	1.1	1.4	4.4
PPN4S	225.1	122.1	25.6	25.0	52.3	203.1	8.9	2.0	5.6	16.5
PPN5P	160.3	111.5	10.9	11.9	26.0	111.5	10.6	8.5	1.7	20.8
PPN5S						22.8	0.8	11.0	0.0	11.9
SMC4D	2992.5	2356.9	128.2	93.9	413.4	2356.5	29.1	17.1	45.5	91.6
SMC4M	7357.0	5112.5	439.2	361.1	1444.3	5112.1	72.2	105.4	150.4	328.0
SMC4P	3286.4	2047.9	245.0	207.0	786.6	2615.1	53.4	85.6	110.9	249.9
SMC4S	341.0	277.9	23.2	14.6	25.3	1222.5	48.7	131.9	57.5	238.1
SMC5D	6252.1	4582.0	354.5	255.7	1060.0	4582.0	32.1	47.1	42.3	121.5
SMC5M	8262.5	5197.0	485.1	391.2	2189.1	5196.7	152.2	110.4	248.5	511.1
SMC5P	963.8	675.1	67.1	50.3	171.3	1514.7	48.6	87.9	49.6	186.1
SMC5S	58.0	47.5	7.7	1.6	1.1	821.1	42.0	106.2	32.2	180.4
WFR4D	365.9	272.2	17.7	17.1	58.9	272.2	1.6	8.1	11.8	21.6
WFR4M	582.6	352.7	44.6	34.7	150.5	352.7	4.1	2.2	11.0	17.3
WFR4P	514.6	371.6	45.0	37.5	60.6	433.9	24.6	19.9	12.2	56.7
WFR4S	43.8	13.2	1.3	1.9	27.3	150.7	7.6	25.6	9.0	42.2
WFR5D	222.5	185.1	6.2	4.5	26.7	185.1	5.0	0.0	5.6	10.5
WFR5M	658.3	495.3	23.6	17.4	122.0	495.2	15.1	0.8	30.6	46.5
WFR5P	32.8	29.8	2.2	0.6	0.2	59.6	2.1	0.6	1.4	4.2
WFR5S	2.2	1.6	0.5	0.1		26.9	2.8	2.1	0.9	5.7
TOTAL	**33089.2**	**22851.0**	**1970.3**	**1558.1**	**6709.7**	**26377.8**	**563.2**	**773.7**	**828.0**	**2165.0**

*1 = Seedling Tree <1" dbh, 2 = Sapling Tree 1 - 6" dbh, 3 = Pole Tree 6 - 11" dbh, 4 = Small Tree 11 - 24"dbh, 5 = Medium/Large Tree >24"dbh, 6 = Multi-layered Tree. D = Dense Canopy Cover (> 60%), M = Moderate Canopy Cover

(40 - 59%), P = Open Canopy Cover (25 – 39%), S = Sparse Canopy Cover (10 – 24%), DFR = Douglas-Fir, EPN = Eastside Pine, JPN = Jeffrey Pine, LPN = Lodgepole Pine, PPN = Ponderosa Pine, RFR = Red Fir, SMC = Sierra Mixed Conifer, WFR = White Fir, WTM = Wet Meadow (Mayer and Laudenslayer 1988).

Most recreation use within the analysis areas consists of dispersed camping, hiking, horseback riding, hunting, mining, mountain biking, OHV use, pleasure driving, and wildlife watching. The use is expected to continue at the current rate. These activities would have no effect on snags in the analysis area.

The Lassen National Forest has proposed the Poker Chip Project (salvage, danger tree and reforestation treatments) which overlaps the Chip-munk Project analysis area (USDA 2013i). Lassen NF biologists estimated the Poker Chip Project would potentially impact 201 acres of habitat containing medium and large snags (salvage units) (USDAi,j).

Cumulative Effects Conclusion

It is anticipated that implementation of the Proposed Action, in combination with present and reasonably foreseeable future actions would somewhat decrease the amount of snags in green forest habitat within the analysis area. However, the Chip-munk Project calls for the retention of snags at 2004 SNFPA (USDA 2004a) Standards. The proposed action would have minimal impact on snags within green forests because dead trees are to be removed primarily from areas that burned at high/moderate severity that do not support green forest ecosystem.

Effects of Alternative B (No-action)

Direct, Indirect, and Cumulative Effects to Habitat

Selection of the No-action Alternative would contribute to no direct or indirect effects to snags in green forest habitat, thus there would also be no additional cumulative effects as a result of selecting this alternative. Therefore, there would be no direct, indirect or cumulative impacts to snags in green forest habitat. As a result, existing snags in green forest habitat conditions and Hairy Woodpecker habitat conditions would be maintained.

Cumulative Effects Conclusion

It is anticipated that implementation of the No-action Alternative, in combination with present and reasonably foreseeable future actions, would not have a cumulative effect to the population and habitat distribution across the Plumas National Forest. Thus existing snags in green forest habitat conditions and Hairy Woodpecker habitat conditions would be maintained.

Summary of Hairy Woodpecker Status and Trend at the Bioregional Scale

The 1988 Plumas NF LRMP (USDA 1988a) as amended by the SNF MIS Amendment (USDA 2007a) requires bioregional-scale habitat and distribution population monitoring for the hairy woodpecker; hence, the snag effects analysis for the Clarks Aspen Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the Hairy Woodpecker. This information is drawn from the detailed information on habitat and distribution population trends

in the 2010 SNF Bioregional MIS Report (USDA 2010c), which is hereby incorporated by reference.

Habitat Status and Trend

The current average number of medium-sized and large-sized snags (≥ 15 inch dbh, all decay classes) per acre across major coniferous and hardwood forest types (westside mixed conifer, ponderosa pine, white fir, productive hardwoods, red fir, eastside pine) in the Sierra Nevada ranges from 1.5 per acre in eastside pine to 9.1 per acre in white fir. In 2008, snags in these types ranged from 1.4 per acre in eastside pine to 8.3 per acre in white fir (USDA 2008a).

Data from the early-to-mid 2000s were compared with the current data to calculate the trend in total snags per acre by Regional forest type for the 10 Sierra Nevada national forests and indicate that, during this period, snags per acre increased within westside mixed conifer (+0.76), white fir (+2.66), productive hardwoods (+0.35), and red fir (+1.25) and decreased within ponderosa pine (-0.16) and eastside pine (-0.14).

Detailed information by forest type, snag size, and snag decay class can be found in the 2010 SNF Bioregional MIS Report (USDA 2010c).

Population Status and Trend

Monitoring of the Hairy Woodpecker across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with PRBO Conservation Science, as part of a monitoring effort that also includes Mountain Quail, Fox Sparrow, and Yellow Warbler (USDA 2010c, http://data.prbo.org/partners/usfs/snmis/). Hairy Woodpeckers were detected on 15.1 percent of 1659 point counts (and 25.2 percent of 424 playback points) in 2009 and 16.7 percent of 2266 point counts (and 25.6 percent of 492 playback points) in 2010, with detections on all 10 national forests in both years. The average abundance (number of individuals recorded on passive point count surveys) was 0.116 in 2009 and 0.107 in 2010. These data indicate that hairy woodpeckers continue to be distributed across the 10 Sierra Nevada National Forests. In addition, the Hairy Woodpeckers continue to be monitored and surveyed in the Sierra Nevada at various sample locations by avian point count and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA 2008a). Current data at the range-wide, California, and Sierra Nevada scales indicate that the distribution of hairy woodpecker populations in the Sierra Nevada is stable.

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

The direct/indirect and cumulative effects of the Chip-munk Project, in terms of potential medium-sized and large-sized snags per acre within green forest habitat, under the Proposed Action would not change with time, the amount and distribution of snags in green forest habitat within the analysis area. Since there will be no affect, the Chip-munk Project will not alter the

existing trend in the ecosystem component, nor will it lead to a change in the distribution of Hairy Woodpecker across the Sierra Nevada bioregion.

Soil and Water Resources

Introduction

This section describes the regulatory framework that applies to management of soil and water resources on Plumas National Forest System lands and analyzes effects to these resources associated with the alternatives proposed by the Chip-munk Project. Three types of environmental effects are analyzed. Direct effects are defined as those effects which are caused by the proposed action and which occur at the same time and place as the action. Indirect effects are those caused by the action which are later in time or farther removed in distance from the location of the action.

Project cumulative effects are defined as impacts on the environment which result from the incremental impacts of the action when added to other past, present, and foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Cumulative effects may occur outside of the project area. Effects can be either beneficial or adverse and result from the synergistic or additive effects of multiple management activities within a watershed (USDA 1988c). To comply with state and federal law, cumulative watershed effects analyses typically focus on impacts to downstream beneficial uses. For the Chip-munk Project area, these include hydropower generation, recreation, freshwater habitat, habitat suitable for fish reproduction and early development, and wildlife habitat.

Soil quality indicators are analyzed to assess project effects on soil productivity and soil hydrologic functions. Several soil quality measures have been developed to support analysis of these indicators, including effective soil cover, soil porosity and compaction, soil displacement, and surface fine organic matter. The geographic scope of the soil quality analysis is generally limited to the footprint of the proposed vegetative treatment units. Changes to soil productivity are not expected to occur outside of the proposed treatment units. To a limited extent, effects associated with changes to soil hydrologic function could potentially extend outside of the units.

Summary of Effects Analysis

The 2012 Chips Fire has had a large impact on watershed condition. While high and moderate soil burn severity classes were estimated to occur in one-third of the area within the Chips Fire perimeter, the units proposed for treatment in the Chip-munk Project experienced high or moderate soil burn severity over roughly two-thirds of the total unit area. Increased watershed response, including increased magnitudes of runoff and debris flows and increased potential for

accelerated soil erosion, is expected over the next few years due to several prominent factors, including soil hydrophobicity caused by the fire and consumption of effective cover of the soil surface such as duff, litter, live vegetation, and fine woody debris. Instances of this increased watershed response were observed throughout the Chips Fire area in fall 2012 after the intense rainstorms during the week that spanned the end of November and early December.

Water Resource Effects Summary

Project design features, including streamside protection zones and features to increase soil cover in treated units, and standard Best Management Practices (BMPs) implemented during harvest activities would prevent sediment delivery to streams that would significantly affect water quality. When the proposed action is considered along with other past or reasonably foreseeable actions in the area, the cumulative watershed effects model indicates that 7 of the 15 analysis watersheds would exceed the threshold of concern (TOC). The primary reason that these watersheds would exceed the TOCs these exceedancesis the 2012 Chips Fire. For the Clear Creek watershed, additional measures are proposed to improve and protect water quality, including larger streamside equipment exclusion zones and gravel surfacing of roads at stream crossings. BMPs and project design features would assure that the additional disturbance from the Chip-munk Project Proposed Action would not result in significant water quality impacts, stream channel condition damage, or effects to state-designated beneficial uses of water.

Soil Resource Effects Summary

Within areas of high or moderate soil burn severity, the potential for accelerated erosion exists due to fire consumption of the soil cover and surface fine organic matter that existed prior to the Chips Fire. This potential is expected to exist over the next 1-3 years, until vegetation re-growth establishes effective levels of soil cover. Features of the Proposed Action have been designed so that slash and debris generated during treatments would increase the areal extent of effective soil cover and fine organic matter over pre-treatment levels and project treatments would not significantly increase the risk of accelerated soil erosion. Project treatments are likely to slightly increase the areal extent of soil that is compacted above natural levels, but not to an extent that would affect soil productivity or hydrologic function. Levels of large down wood were robust pre-fire throughout proposed treatment units and it is expected that the project standard for large down wood would be met after treatments. Barring an extremely large rain-on-snow runoff event on areas of high or moderate SBS, any movement of soil within all areas of the fire is not expected to be of a pattern or size that would significantly affect soil productivity or that would impact water quality. If such a large event would occur within the Chips Fire, impacts to soil productivity and hydrologic function within treated stands would be very similar to impacts in untreated stands with similar soil burn severity.

Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction

The Chip-munk Project is designed to fulfill the management direction specified in the 1988 Plumas National Forest Land and Resource Management Plan (PNF LRMP) (USDA 1988a), as amended by Sierra Nevada Forest Plan Amendment (SNFPA) Final Supplemental environmental impact statement (FSEIS) and Record of Decision (ROD) (USDA 2004a, b).

Direction Relevant to the Chip-munk Project as it Affects Soil Resources

National Forest Management Act (NFMA) of 1976 (which amended The Forest and Rangeland Renewable Resources Planning Act of 1974)

As described in Forest Service Manual Chapter 2550 (USDA 2010d), this authority requires the maintenance of productivity and protection of the land and, where appropriate, the improvement of the quality of soil and water resources. NFMA specifies that substantial and permanent impairment of productivity must be avoided.

Plumas National Forest Land and Resource Management Plan (LRMP)

Forest Plan standards and guidelines provide the relevant substantive standards to comply with NFMA. The 1988 LRMP (USDA 1988a) establishes standards and guidelines to prevent significant or permanent impairment of soil productivity, including:

- During project activities, minimize excessive loss of organic matter and limit soil disturbance according to Erosion Hazard Rating (EHR): for low to moderate EHR, conduct normal activities; for high EHR, minimize or modify use of soil disturbing activities; for very high EHR, severely limit soil-disturbing activities. In general, motorized equipment traffic is restricted to slopes less than 35 percent, with further restrictions applied to streamside areas (see project design features in Chapter 2 of this EA).
- Determine adequate ground cover for disturbed sites during project planning on a case-by-case basis. Suggested levels of minimum effective cover are: for low EHR, 40 percent; for moderate EHR, 50 percent; for high EHR, 60 percent; and for very high EHR, 70 percent. In substantial areas of the Chip-munk Project, the Chips Fire of 2012 consumed nearly all ground cover. Therefore, the levels of effective cover suggested in the LRMP are not expected to occur in several areas until live vegetation recovers. The ground cover standard for the Chip-munk Project is that project activities shall result in increased ground cover in all units treated.
- To avoid land base productivity loss due to soil compaction, dedicate no more than 15 percent of timber stands to landings and permanent skid trails. Permanent landings and skid trails do not exist within the project area and does not propose such permanent features.

Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD)

The SNFPA ROD (USDA 2004b) amends the Plumas National Forest LRMP and includes a standard and guideline for large down wood and snags:

- Determine down woody retention levels on an individual project basis, based on desired conditions. Emphasize retention of wood in the largest size classes and in decay classes 1, 2, and 3. For the Chip-munk Project, the retention level of large down woody material is 10-15 tons of large wood per acre.

National Forest Service Manual for Soil Management

Forest Service Manual 2550 (USDA 2010d) establishes the management framework for sustaining soil quality and hydrologic function while providing goods and services outlined in Forest land and resource management plans. Primary objectives of this framework are to inform managers of the effects of land management activities on soil quality and to determine if adjustments to activities and practices are necessary to sustain and restore soil quality. Soil quality analysis and monitoring processes are to be used to determine if soil quality conditions and objectives have been achieved.

Forest staff is to determine soil quality indicators and measures that are appropriate for the proposed activities. Most soil quality indicators are observations and measurements taken at the soil surface and in the upper mineral soil since this region of the soil profile strongly influences soil hydrology and long term soil productivity. Forest staff is directed to estimate the type, amount, and degree of change to soil indicators that the proposed activity may produce by using appropriate analysis methods, scientific literature, past monitoring results, and knowledge of local site and soil characteristics. In most cases, qualitative estimates of the effects of management activities on soils are considered sufficient to meet analysis objectives.

The major objective of soil quality monitoring is to ensure that ecologically sustainable soil management practices are applied. Soil quality monitoring is to be used to validate and refine management decisions. Monitoring information collected allows land managers to determine if land management plan desired conditions are being achieved. The focus of project level monitoring is observation and documentation of the implementation of soil protection prescriptions.

Region Five National FSM Supplement for Soil Management

Region 5 FSM 2500 chapter 2550 Supplement (USDA 2012f) establishes soil functions (support for plant growth (productivity) function, soil hydrologic function, and filtering and buffering function) that the region will use to assess soil conditions. The analysis standards are to be used for areas dedicated to growing vegetation. They are not applied to lands with other dedicated uses, such as system roads and trails or developed campgrounds.

Direction Relevant to the Chip-munk Project as it Affects Water Resources

Organic Administration Act of 1897

This act emphasizes that the Forest Reserves, currently known as National Forests, were created to improve and protect the forests within their boundaries; to secure favorable water flows; and to furnish a continuous supply of timber for the use and necessities of the citizens of the United States.

Clean Water Act of 1948 (as amended in 1972 and 1987)

The Clean Water Act of 1948 establishes as federal policy the control of both point and non-point source pollution and assigns to the states the primary responsibility for control of water pollution.

Wild and Scenic Rivers Act of 1968

No streams within the Chip-munk Project area have been designated under the Wild and Scenic Rivers Act. A reach of the North Fork of the Feather River (NFFR) beginning approximately 1 mile downstream of the project area has been categorized as eligible for Wild and Scenic River designation. This reach extends from the community of Belden upstream to Caribou Reservoir, a stream length of approximately 9 miles. Per the water resource effects analysis presented below, the Chip-munk Project Proposed Action is not expected to affect the Wild and Scenic eligibility of the NFFR and is consistent with maintaining the values of the NFFR (Forest Service Manual 2354.42).

State Water Quality Management Plan

From 2000 until 2011, non-point source pollution on Plumas National Forest was managed through the water quality management program contained in Water Quality Management for Forest System Lands in California (USDA 2000a). The Best Management Practices (BMPs) contained in that document have recently been improved and replaced by the BMPs presented in a Region 5 amendment to the Forest Service Handbook (see below). The 2000 State Water Quality Management Plan contains the 1981 Management Agency Agreement (MAA) between the California State Water Resources Control Board and the USDA, Forest Service. The State Board has designated the Forest Service as the management agency for all activities on National Forest lands.

Region 5 2011 Amendment to the Forest Service Soil and Water Conservation Handbook

The Pacific Southwest Region (Region 5) of the USDA-Forest Service has recently adopted an amendment to the Forest Service Handbook, Section 2509.22, Chapter 10 (Water Quality Management Handbook) (USDA 2011a). This handbook improves and replaces the BMPs

presented in Water Quality Management for Forest Service Lands in California. The Forest Service water quality protection program relies on implementation of prescribed BMPs. These best management practices are procedures and techniques that are incorporated in project actions and have been determined by the State of California to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. Improvements to Forest Service BMPs, as presented in the 2011 Handbook amendment, include more detailed descriptions of individual BMPs (section 12), a requirement that site-specific BMPs be included in timber sale contracts (section 13), and direction that legacy sites (sites disturbed by previous land use that is causing or has potential to cause adverse effects to water quality) within timber project boundaries will be restored or improved. Additionally, the 2011 Handbook amendment establishes an expanded water quality management monitoring program (section 16). A brief summary of BMPs applicable to the Chip-munk Project are presented in Appendix B of this Environmental Assessment (EA).

National Best Management Practices

In addition to BMPs prescribed in the Region 5 amendment to the Forest Service Handbook, BMPs presented in *National Best Management Practices for Water Quality Management on National Forest System Lands* (USDA 2012d) are also applicable to activities proposed in the Chip-munk Project.

Section 303(d) of the Clean Water Act

This section requires the identification of water bodies that do not meet, or are not expected to meet, water quality standards or are considered impaired. The list of affected water bodies, and associated pollutants or stressors, is provided by the State Water Resources Control Board and approved by the United States Environmental Protection Agency. The most current list available is the 2010 303(d) list (CRWQCB 2010). No water bodies on this list are located within the Chip-munk Project area. However, all perennial streams that exist in the Chip-munk Project watersheds flow to the North Fork Feather River watershed. The North Fork Feather River is included on the 2010 303(d) list for mercury and water temperature impairments. The Chip-munk Project is not expected to affect water temperature, nor legacy deposits or concentrations of mercury in the North Fork Feather River. The 303(d) list describes hydropower modifications, flow regulation and modification as the potential sources for water temperature impairments.

Beneficial Uses identified by the CA Water Resource Control Board (Central Valley Region)

Beneficial uses are defined under California State law in order to protect against degradation of water resources and to meet state water quality objectives. The Forest Service is required to protect and enhance existing and potential beneficial uses (CRWQCB 1998). Beneficial uses of

surface water bodies that may be affected by activities on the Forest are listed in Chapter 2 of the Central Valley Region's Water Quality Control Plan (commonly referred to as the "Basin Plan") for the Sacramento and San Joaquin River basins (CRWQCB 1998), and are described for the Chip-munk Project area below in the Affected Environment section.

California Regional Water Quality Control Board Conditional Waiver of Waste Discharge

In January of 2003, the California Regional Water Quality Control Board (CRWQCB)—Central Valley Region adopted Resolution No. R5-2003-005 that provides for a conditional waiver of the requirement to file a report of waste discharge and obtain waste discharge requirements for timber harvest activities on National Forest System lands within the Central Valley Region. Additional provisions were added in the 2005 Resolution No. R5-2005-0052. This project complies with the Clean Water Act through use of "Best Management Practices" designed to minimize or prevent the discharge of both point and non-point source pollutants from National Forest System roads, developments, and activities. Prior to initiation of the Chip-munk Project action alternative, the Plumas National Forest would comply with CRWQCB waiver requirements per Resolution R5-2005-0052.

The Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD)

The SNFPA ROD (USDA 2004b) describes management direction for riparian areas and water resources located on Plumas National Forest System lands. The ROD includes six riparian conservation objectives (RCOs) and more than thirty standards and guidelines to be implemented for designated Riparian Conservation Areas (RCAs). Designation of appropriate widths of RCAs is an integral element of the riparian area management. The following widths of riparian areas would be used for the Chip-munk Project.

- For perennial streams, 300 feet on each side of streams in treatment areas, measured from the bank full edge of the stream
- For intermittent streams: 150 feet on each side of streams in treatment areas, measured from the bank full edge of the stream
- For ephemeral streams: 100 feet on each side of streams in treatment areas, measured from the bank full edge of the stream

The RCA width for ephemeral streams (100 feet) is smaller than the width suggested in the SNFPA ROD (150 feet). Justification for this smaller width is presented in the Riparian Management Objective analysis presented in Appendix C of this EA.

Plumas National Forest Land and Resource Management Plan (PNF LRMP)

Forest Plan standards and guidelines provide the relevant substantive standards to comply with NFMA. The 1988 LRMP establishes standards and guidelines for protection and maintenance of Forest watersheds, water quality, and water supply, including:

- Implementation of BMPs.
- Establishment of Streamside Management Zones (SMZs) per guidelines in Appendix M of the LRMP. These guidelines were mostly replaced by the standards and guidelines presented in the SNFPA ROD. However, ephemeral channels without evidence of annual scour and deposition are not addressed by the RCA buffer widths. Therefore, SMZ widths defined in Appendix M of the LRMP are applied to these channels. Recommended SMZ widths for these ephemeral swales range from 0 to 50 feet, depending upon the stability of the swale channel and sideslope.

An SMZ plan is necessary for any activities that will occur within an SMZ, including a description of vegetation management objectives, needed erosion control measures, and an analysis of SMZ areas with over-steepened slopes or very high EHR. The SMZ plan for this project is included Appendix B of this EA.

Effects Analysis Methodology

Geographic and Temporal Bounds

Watershed Analysis

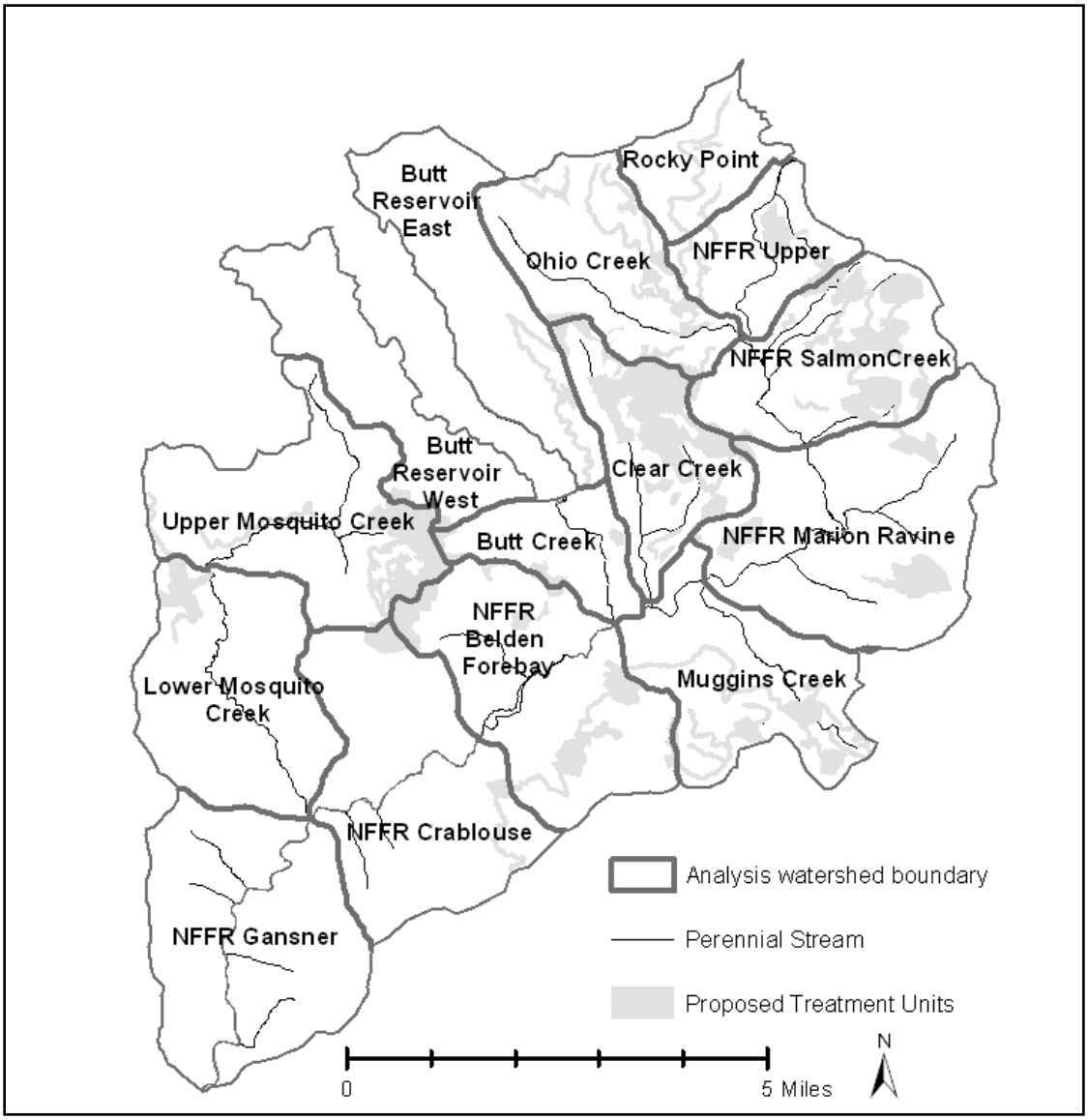
The geographic region defining the watershed analysis area (Figure 17) encompasses fifteen analysis watersheds for the Chip-munk Project. These watersheds range in size from 1,366 acres to 4,898 acres. All of these watersheds drain to North Fork Feather River (NFFR) above its confluence with East Branch North Fork Feather River at Highway 70 near Gansner Bar. At the larger HUC-6 scale, proposed project activities are primarily located within 3 watersheds ranging in size from 18, 455 acres to 20,335 acres (Mosquito Creek – North Fork Feather River, Clear Creek – North Fork Feather River, and Butt Valley Reservoir – Butt Creek). The fifteen project analysis watersheds all drain to North Fork Feather River downstream of Lake Almanor with one exception; the Rocky Point watershed drains to the extreme southwest shore of Lake Almanor.

The watershed analysis area is flanked by Red Hill, Cherry Hill, and Rush Hill on its eastern edge and by the ridge that divides the drainages of NFFR and Wolf Creek on its northeastern edge. The ridge that divides the drainages of NFFR and Yellow Creek defines the eastern edge of the watershed analysis area and this ridge coincides with the boundary between Plumas National Forest System lands and Lassen National Forest System (NFS) lands. Butt Valley Reservoir is the primary landscape feature along the northwestern edge of the analysis area. All of the analysis watersheds are located within the perimeter of the 2012 Chips Fire, which burned across 48,300

acres. Much of the Chips Fire was located within drainages on Plumas NFS lands to the southwest, such as Chips Creek and Indian Creek. However, this is extremely steep and rocky terrain with no NFS roads so the need and capability to treat roadside hazards and to salvage timber from these burned areas is minimal. Additionally, the Chips Fire burned across 18,400 acres of Lassen NFS lands; a roadside hazard and salvage harvest project named Poker Chip is currently being planned for those lands.

Short-term effects for hydrology and water quality would likely be realized within one to two years, providing that rainfall is sufficient enough to saturate the soil and potentially initiate overland flow. Long-term effects are projected to last decades, depending on climate variability and other environmental factors. As part of the cumulative watershed effects model, a recovery period of 25 years is assigned to all mechanical treatments (Figure 18). The model uses a 10-year timeframe for full recovery of wildfire effects.

Figure 17. **Chip-munk Project analysis watersheds**



Soil Resource Analysis

The scope of the analysis for direct and indirect effects to the soil productivity and soil hydrologic functions for all proposed activities is limited to the proposed treatment units (Figure 17). The soil analysis area is made up of the greatest footprint of all proposed treatment units, and totals approximately 5,500 acres. Changes to soil productivity are not expected to occur outside of the proposed treatment units. The scope of the analysis for cumulative effects to the soil productivity and soil hydrologic functions extends beyond the treatment unit boundaries to the boundaries of the watershed analysis area.

The current soil conditions observed reflect the cumulative effects of past activities, regardless of when they took place, so there is no definite time frame or limit for the analysis. For example, if multiple activities have occurred in a given treatment unit over the past 50 years, it is not necessarily possible to separate the effects of older treatments from more recent ones. As a result, it is not practical to set a time constraint on those effects. The future timeframe for the soils analysis must extend until the resource has recovered from the impact of the proposed activities. The persistence of soil effects into the future can vary widely. For example, soil cover may recover within one to three years following a treatment. Soil compaction effects, however, may last for decades (Poff 1996).

Cumulative Watershed Effects Analysis Methods and Assumptions

There are numerous methods for assessing the effects of land use activities on the landscape (Berg et al. 1998; USDA 1988c; Reid 1998). For the purpose of this Cumulative Watershed Effects (CWE) analysis, the effects of past, present, and reasonably foreseeable future actions were assessed using the Region Five Cumulative Off-site Effects Analysis (USDA 1988c). Within each project analysis watershed, past management activities were analyzed to account for the cumulative amount of land disturbance that has occurred within the watershed. The area of land manipulated by each past management activity was converted to a theoretical area of road surface, resulting in a measure of Equivalent Roaded Acres (ERA). Numeric disturbance coefficients were used to convert these management effects to ERA effects in terms of the pattern and timing of surface runoff.

Coefficients vary by management activity, silvicultural prescription, site preparation method, type of equipment utilized, and fireline intensity. Coefficients were also applied to burned areas within the analysis watersheds, particularly the 2012 Chips Fire, with assigned coefficients varying based upon the soil burn severity determined in the 2012 assessment for Burned Area Emergency Response (BAER) (USDA 2012b, c). The ERA analysis for this project also accounted for present and future projects in the analysis area, including the Chips Fire Roadside Hazard Tree Removal Project and the Chips Fire Pacific Gas and Electric (PG&E) Right of Way Salvage Timber Project. Lassen National Forest (LNF) System lands associated with the LNF's effort to salvage timber from the Chips Fire (the Poker Chip Project) overlap the Chip-munk Project

analysis watersheds in very minor amounts and ERA associated with the Poker Chip Project would not significantly affect the CWE analysis for the Chip-munk Project (USDA 2013i).

Dividing the total ERA by the size of the watershed yields the percent of the watershed in a hypothetically roaded condition. ERA model values are used to track general changes to hydrologic function of watersheds in terms of alteration of surface runoff patterns and timing. In this way, ERA values can serve as an index to assess effects on downstream water quality.

As the amount of disturbance (such as wildfire) or land use increases within a watershed, the susceptibility of that watershed to cumulative watershed effects increases. There is a point where additive or synergistic effects of the land use activities will cause the watershed to become highly susceptible to CWE. Natural watershed sensitivity is an estimation of a watershed's natural ability to absorb disturbance and land use impacts without increasing CWE to unacceptably high levels. Upper limits of watershed "tolerance" to disturbance are estimated for the ERA model and this upper limit is called the Threshold of Concern (TOC).

For the ERA model analysis, the TOC for each project analysis watershed is expressed in terms of the percent of the area in a hypothetically roaded condition. The TOC does not represent the exact point at which cumulative watershed effects will occur. Rather, it serves as a "yellow flag" indicator of increasing susceptibility for significant adverse cumulative effects occurring within a watershed. As ERA disturbances approach the TOC, there is an increased risk that soil hydrologic function and downstream water quality and beneficial uses would be impaired. For example, stream channels can deteriorate to the extent that riparian and meadowland areas become severely damaged.

A closer look at the activities planned within an analyzed watershed would be important where ERA values exceed or are approaching the TOC. The TOC for this project was developed by considering the natural sensitivity of the Chip-munk Project analysis watersheds and the sensitivity of downstream beneficial uses to changes in watershed hydrologic function. Watershed sensitivity analyses for the HFQLG Pilot Project watersheds were reported in Appendix N of the HFQLG Forest Recovery Act Final Environmental Impact Statement (USDA 1999). The HFQLG Pilot Project watersheds applicable to this project received a 'moderate' sensitivity rating. This rating level stems from relatively high potential for intense rainfall or rain-on-snow events in the Chip-munk Project watersheds; however, those factors are tempered by high potential for vegetative recovery of bare ground (such as that caused by intense wildfire). Examples given in the REGION 5 Soil and Water Conservation Handbook estimate the TOC for watersheds of moderate sensitivity to be 15 to 16 percent. For this project, the TOC is conservatively estimated to be 15 percent of the watershed area.

Assumptions: In calculating the ERA contribution by the proposed harvest activities, all areas of the treatment units were assumed treatable. For example, no compensations were made for rock outcrops, roaded areas, or small-scale slope limitations that would restrict harvest activities. In

most cases, such site-specific information was not available. Coefficients (0.3 for roadside and tractor units and 0.2 for skyline units) were applied to similar activities regardless of soil type, slope conditions, season of operation, or specific equipment characteristics. In calculating ERA contributions due to roads, all roads were considered equally, regardless of surface material (pavement, gravel, or native soil surface). Acres of roads were calculated with a width of 20 feet for unclassified, closed, and Level 2 National Forest System roads; assumed width for all other roads is 25 feet wide. The linear recovery curve (Figure 18) used in this analysis is not necessarily reflective of recovery patterns on the ground. Linear recovery models tend to over-predict effects in later stages of disturbance recovery.

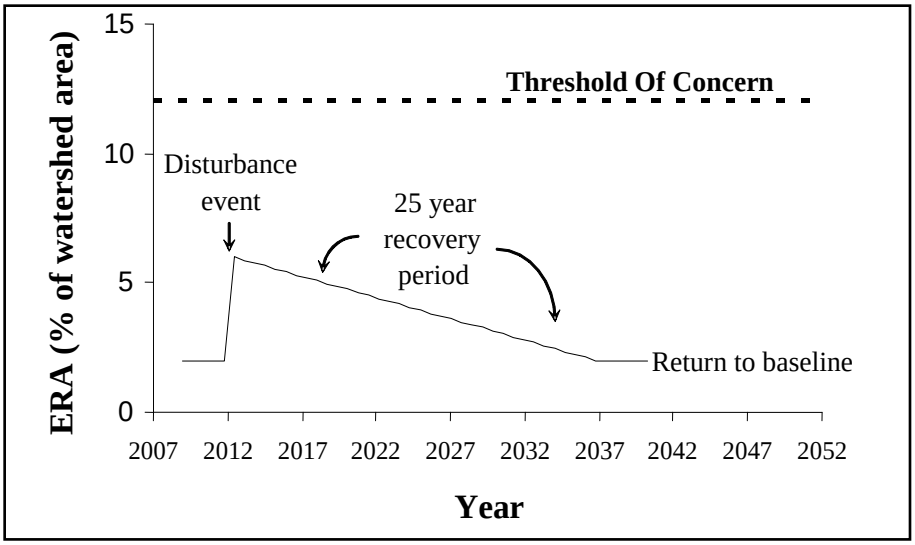


Figure 18. **Conceptual Disturbance and Recovery Model for a Harvest Activity**

Soil Analysis Methods and Assumptions

Soil Quality Functions and Indicators

For this soil quality analysis, Forest Service staff has developed soil quality functions and indicators that are appropriate for the proposed activities and the site conditions and soil characteristics of the Chip-munk Project area. Soil quality functions analyzed are support for plant growth function (soil productivity) and soil hydrologic function. Soil filtering and buffering function is the function of immobilizing, degrading, or detoxifying chemical compounds or excess nutrients. Since the Chip-munk Project does propose use of herbicides or other chemicals, this function is not discussed in the report.

Several soil quality indicators have been developed to support analysis of these functions. While qualitative estimates of the effects of management activities on soils are generally considered sufficient to meet project analysis objectives, quantitative field survey results are used in this project analysis to support description of the existing condition of soils.

Function 1: Soil Productivity

Soil productivity is the inherent capacity of a soil to support appropriate site-specific biological resource management objectives, which includes the growth of specified plants, plant communities, or a sequence of plant communities to support multiple land uses (USDA 2010d). The soil stores water, nutrients, and provides favorable habitat for soil organisms which cycle nutrients. Chemical, physical, and biological soil processes sustain plant growth which provides forage, fiber, wildlife habitat, and protective cover for watershed protection (USDA 2012f). Important measures of soil productivity include: soil cover, soil porosity, and surface organic matter.

Indicator 1: Soil Stability and Effective Soil Cover

An adequate level of soil cover is needed to maintain soil stability and prevent accelerated erosion. Effective soil cover consists of low-growing vegetation (grasses, forbs and prostrate shrubs), plant and tree litter (fine organic matter), surface rock fragments, and may also include applied mulches (straw or chips). Without effective soil cover, an intense storm can generate large quantities of sediment from hillslopes (Cawley 1990). Vegetative cover mitigates accelerated soil erosion by dissipating the energy of falling raindrops through interception. Rain and canopy drip can detach and mobilize soil particles when overland flow occurs. Effective soil cover was measured in field surveys, and the Erosion Hazard Rating (EHR) system was used to quantify the amount of soil cover necessary to prevent detrimental accelerated soil erosion.

Indicators 2 and 3: Surface Fine Organic Matter and Large Woody Material

Soil organic matter consists of living biomass (plant roots, microorganisms, invertebrates, and vertebrate fauna) and dead biomass (dead bark, large woody debris, litter, duff, and humus materials). Soil organic matter is the primary source of plant-available nitrogen, phosphorous, and sulfur; provides habitat for the diverse soil biota that carry out energy transformation and nutrient cycles; contributes to soil structure and porosity of soils; protects soils from erosion; and enhances infiltration and increases the available water-holding capacity (Neary et al. 1999). It is important to realize that surface organic matter levels fluctuate naturally over time. The amount of organic matter is a balance of inputs from vegetation and decomposition rates dependent upon the local climate (USDA 2012f). Fire and management can decrease surface organic matter temporarily but accumulation resumes with natural vegetative growth within a relatively short time frame (years to decades).

Two measures of surface organic matter are analyzed for the Chip-munk Project: fine organic matter and large down wood. Fine organic material consists of plant litter, duff, and woody material less than 3 inches in diameter. Large woody material consists of down logs that are least 12 inches in diameter and 10 feet long.

Indicator 3: Soil Porosity and Compaction

In general, within the Chip-munk Project area, the natural physical structure of the soil provides a favorable environment for root growth. The soil strength level is conducive to a favorable rooting environment for desired plant species and the structure of soils is conducive to maintenance of inherent soil moisture regimes. Soil porosity is the volume of pores in a soil that can be occupied by air, gas, or water and varies depending on the size and distribution of the particles and their arrangement with respect to each other. A monitoring strategy was developed in the EIS for the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act (USDA 1999) and the subsequent monitoring plan was applied to HFQLG projects. Implementation of the HFQLG monitoring plan for soil quality measures utilized a tile-spade sample test that is correlated with measured changes in soil bulk density samples and soil porosity, with a 10 percent reduction in total soil porosity indicating detrimental soil compaction (USDA 2008b). For the Chip-munk Project, this same field survey methodology was used to assess the existing areal extent of detrimental soil compaction at a depth of 4 to 8 inches.

The use of heavy forestry equipment and frequent stand entries increases bulk density and decreases the porosity of soils, which increases the potential for detrimental compaction (Powers et al. 1998). To prevent excessive overland flow and erosion, soil structure and macro-porosity in the top 8 inches of mineral soil for most of the stand area should be similar to the undisturbed, natural condition for the soil type and should provide sufficient infiltration and permeability for the given climate. The degree and extent of susceptibility to compaction is primarily influenced by soil texture, soil moisture, coarse fragments, depth of surface organic matter, ground pressure weight of the equipment, and whether the load is applied in a static or dynamic fashion. Soil compaction and increased soil strength can cause slowed plant growth, impeded root development, poor water infiltration, restricted percolation, increased overland flow during high precipitation events, and can cause plant nutrients to be relatively immobile or inaccessible (Poff 1996). Recent research suggests that the effect of severe compaction on biomass productivity is highly dependent upon soil texture (Powers et al. 2005).

Function 2: Soil Hydrologic Function

Soil hydrologic function is the inherent capability of the soil to absorb, store, and transmit water, both vertically and horizontally (USDA 2010d). Infiltration is the rate of water movement into the soil and is determined by soil texture, cover, and porosity (USDA 2012f). Permeability is the rate at which water percolates or moves down through the soil and is primarily based on soil porosity (USDA 2012f).

Soil hydrologic function is dependent upon an adequate level of cover to reduce rainfall impact and runoff energy, stable soil structure, and sufficient macro-porosity to permit water infiltration and movement through the soil. Two indicators used for the soil productivity function (effective soil cover and soil porosity and compaction) are also used as measures for the soil hydrology

function. The litter layer of soil cover absorbs water, increases storage capacity, and slows the velocity of overland flow. Soil compaction can cause poor water infiltration, restricted percolation, and increased overland flow during high precipitation events (Poff 1996).

Field Survey Methodology for Soil Resource Analysis

Soil map unit designations are described in the PNF Soil Resource Inventory for soils throughout the Forest. Ten different soil map units are applicable to the areas proposed for treatment under the Proposed Action (Table 91). The majority of the area proposed for treatment (2,832 acres) is located in soil map unit #220, with substantial amounts also located in soil map units #221 (488 acres), #264 (719 acres), and #283 (605 acres).

In the summer of 2011, soil and hydrology specialists from the Mount Hough Ranger District assessed soil condition measures within the proposed “Belden” HFQLG vegetation management project (a project that was abandoned after the 2012 fire changed the landscape). Most of the units that were proposed for treatment in the Belden project are located within the Chips Fire perimeter and many overlap with units proposed for treatment in the Chip-munk Project. Characteristics for all of the different soil types that occur within Chip-munk Project units, as described by the soil map unit designations in the PNF Soil Resource Inventory, were field verified during these surveys. Linear transects that roughly traversed proposed treatment slopes were randomly located within the units. A minimum of 25 points along the transect were sampled, with intensive data (soil structure/texture, LWD, snags, canopy cover, and coarse fragments) gathered at every fifth point. Due to higher potential for ground disturbance, units proposed for tractor harvest were given higher priority for soil assessment over units proposed for skyline harvest.

At each point along the transect, yes/no determinations were made regarding whether or not the following characteristics existed at that point: effective soil cover, surface fine organic matter, soil displacement, and detrimental compaction. Dividing the number of “yes” responses by the number of points on the transect yields a measure that describes the soil condition for that particular characteristic along that transact. For detrimental compaction, an assessment technique was utilized that was implemented for the HFQLG pilot project soil quality monitoring plan. A tile-spade sample test that is correlated with measured changes in soil bulk density samples and soil porosity was used a depth of 4 to 8 inches, with a 10 percent reduction in total soil porosity indicating detrimental soil compaction (USDA 2008b). The ‘spade method' consists of measuring compaction from the resistance felt from sticking a spade shovel at the transect point into the ground. Soil bulk density samples were collected and analyzed on soils found in the project area to calibrate the spade method and assure that the person performing the test properly correlated the resistance felt with threshold soil bulk densities. Subsequently, an 8-12 inch deep and 6-12 inch wide hole was excavated with the spade to assess whether detrimental compaction exists based upon field indicators of soil compaction. Although the HFQLG pilot project funding ceased

in 2012, continued use of this detrimental compaction assessment method allows for comparison of conditions observed in the Chip-munk Project area with the large volume of data that exists for past HFQLG projects on the Plumas National Forest.

Soil survey results are described below in the Affected Environment section. Of course, some of these soil parameters were affected drastically by the Chips Fire. However, given time constraints associated with the Forest's focus on Burned Area Emergency Response (BAER) in the fall of 2012; the need to pursue treatment of fire-killed trees in a timely manner (i.e. in 2013); and winter snows that have not yet allowed access to the proposed Chip-munk Project units at the time of this writing, the Belden project soil survey results are used in this report to describe soil condition, with information from the September 2012 BAER assessment providing a description of how these soil survey results have changed. The same soil survey methods will be utilized in spring 2013 within proposed Chip-munk Project treatment units, so that project effectiveness monitoring can occur after treatment.

Table 91. Soil map units located within proposed treatment units. For this table, a treatment unit is correlated with a soil map unit only if the map unit comprises at least 10 percent of the proposed treatment unit area.

Soil Map Unit	Map Unit Components	General Texture of soil surface layer (and depth)	Applicable Proposed Treatment Units	General Management Concerns
200	Holland family (85%)	Gravelly loam or clay loam (9")	10 472 66 474 113 475 328	High soil productivity potential. Prone to mass instability and compaction. Restrict mechanical operations during wet periods.
204	Holland family (40%) Skalan family (30%) Kinkel family (15%)	Gravelly or extremely gravelly loam, sandy loam, or clay loam with some cobble (9")	5 380 57 491 305 499	Well drained soil that is relatively limited in extent. Slopes of 5 to 45 percent with low to moderate maximum erosion hazard rating.
216	Inville family (60%) Woodseye	Very gravelly loam (10" to 15")	12 326 84 327 187 406 189 415	Well drained soil. Slopes of 10 to 50 percent with moderate maximum erosion hazard rating. Some

Soil Map Unit	Map Unit Components	General Texture of soil surface layer (and depth)	Applicable Proposed Treatment Units						General Management Concerns
	family (25%)		251						mass instability evident on slopes over 50 percent.
220	Kinkel family (60%) Deadwood family (25%)	Gravelly or very gravelly loam or silt loam (17”)	2	38	81	163	282	327	Well drained soil with low compaction potential. Slopes of 10 to 50 percent with mostly moderate maximum erosion hazard rating.
			3	39	82	168	285	330	
			6	40	83	174	287	332	
			7	45	85	176	288	334	
			8	46	86	187	289	341	
			9	47	87	188	290	344	
			11	48	88	189	291	372	
			14	52	89	190	292	375	
			15	54	102	207	293	377	
			16	55	103	208	294	396	
			19	56	110	209	296	397	
			20	57	112	212	299	406	
			26	59	115	215	300	415	
			27	60	121	216	306	418	
			28	62	130	236	307	469	
			29	64	133	250	308	472	
			30	68	136	259	309	479	
			31	70	137	261	311	488	
			32	71	148	262	312	496	
			33	72	151	273	320	500	
			34	77	154	274	321	502	
			35	79	155	276	325	503	
			37	80	157	279	326	506	
221	Kinkel family (60%) Deadwood family (25%)	Gravelly or very gravelly loam or silt loam (17”)	9	59	142	334	474		Well drained soil with low compaction potential. Slopes of 50 to 70 percent with mostly moderate maximum erosion hazard rating.
			23	67	157	338	475		
			34	74	278	372	491		
			52	77	330	383	502		
			57	113	333	472			
222	Kistern family (40%) Aiken family (25%) Deadwood	Gravelly or very gravelly loam or silt loam (4” to 10”)	84						Slopes of 30 to 50 percent with mostly moderate maximum erosion hazard rating. Compaction potential is low for Kisern and Deadwood families
			172						
			301						
			302						

Soil Map Unit	Map Unit Components	General Texture of soil surface layer (and depth)	Applicable Proposed Treatment Units						General Management Concerns
	family (20%)								but high for Aiken family. Restrict mechanical operations during wet periods.
264	Skalan family (40%) Deadwood family (30%) Kistern family (15%)	Very gravelly loam, silt loam, or sandy loam with some cobble (4” to 9”)	1 2 4 20 21 24 26 27	36 37 38 49 60 62 63 79	81 82 85 154 156 158 165 166	167 169 170 175 205 208 209 212	281 282 297 298 300 317 319 373	479 503	Moderately well drained soil with low compaction potential. Slopes of 50 to 70 percent with mostly moderate maximum erosion hazard rating. Some mass instability evident on slopes over 50 percent.
281	Ultic Haploxeralfs (55%) Inville family (30%)	Very cobbly or very gravelly loam (7” to 15”)	17 32 73 75	76 132 142 244	250 330 331				Moderately well drained soil with low compaction potential. Slopes of 10 to 50 percent with low to moderate maximum erosion hazard rating. Some mass instability evident on slopes over 50 percent.
283	Ultic Palexeralfs (45%)	Sandy loam, some very gravelly and cobbly (5” to 10”)	1 4 16 18 21 25 42	43 44 53 71 78 79 89	103 113 115 120 155 157 169	264 275 281 292 304 305 307	315 317 319 322 323 324 342	377 396 502 508	Very low compaction potential. Mostly moderate maximum erosion hazard rating. Some mass instability evident on slopes over 50 percent.

Affected Environment

Watershed Condition

The existing conditions reflect the aggregate impact of prior human actions and natural events that have affected the environment and might contribute to cumulative effects. Clearly, the Chips Fire of 2012 is the event that has had the largest impact on existing watershed condition, as described below. Current conditions in the project analysis watersheds have been impacted to a

lesser extent by many anthropogenic actions over the last century—particularly mining and timber harvesting.

A legacy of historic logging and mining is common to many of California's forested watersheds (Cafferata et al. 2007). Tractor logging during the 20th century has left noticeable effects on the composition of the timber stands remaining today in the area of the Chip-munk Project, including effects on tree species composition, age, and diameter classes. Past silvicultural prescriptions included clear cutting, overstory removal, group selection, sanitation, shelterwood, and area thinning, as well as associated activity fuel burning. More recent forest activities, including fire suppression and development of the transportation system, continue to affect the watershed conditions in this area. Unpaved roads are commonly considered the primary source of sediment to stream channels (MacDonald and Coe 2007) and effects of the Chips Fire has added significant sedimentation potential for road in the project area. Total road density in the watershed analysis area is calculated to be 3.8 miles per square mile of terrestrial land.

Generally, recreational activities occur throughout the entire Chip-munk Project area, with moderately concentrated use along Caribou Road and North Fork Feather River and around Butt Valley Reservoir. Dispersed recreational impacts of undeveloped camping areas, firewood cutting, and user-created roads and trails are evident. Off-highway vehicle (OHV) use may contribute to compacted soil conditions where these activities occurOther recreational activities, such as Christmas tree cutting, hiking and hunting, have negligible effects on this soil and water resource assessment.

The geomorphology of the upper slopes of the project area is dominated with slope stability processes including rotational/translational landslides, debris slides, debris flows and rockfalls. Rotational/translational landslides and debris flow processes can be observed in the Chips, Indian Creek, Mosquito Creek and Upper North Fork of the Feather River drainages. Most channels affected by debris flows were cleaned out in the 1997 floods. Since then, the watershed response to multiple fires has begun to re-mobilize source material. A high-intensity rainstorm occurred in late November and early December of 2012, just a few months after the Chips Fire. This storm resulted in large bedload and debris flows in larger streams in the project area, such as Mosquito Creek, Clear Creek, and North Fork Feather River. Steeper, heavily burned watersheds such as Little Indian Creek and Chips Creek were particularly affected by debris flows during that storm, but these streams are outside of the Chip-munk Project area.

The Chips Fire started on July 29, 2012, with ignition occurring on Plumas National Forest System lands along the Pacific Crest Trail near the mouth of Chips Creek. By August 2nd the fire had spotted over a mile ahead of itself and was rapidly wind-driven to the northeast. Rugged terrain and strong afternoon winds pushed past existing fire line, but eventually a sizeable burnout operation was conducted to contain the fire on the north and east edges. The fire was contained on August 31st, burning approximately 75,000 acres.

Wildfire intensity for the Chips Fire was significantly less than some recent wildfires on Plumas National Forest System lands (such as the Moonlight Fire of 2007), generally resulting in a mosaic pattern of predominately unburned or low intensity areas, with some large pockets of higher intensity. For the entire Chips Fire area, soil burn severity (SBS) was estimated to be 30 percent unburned/very low, 35 percent low, 29 percent moderate, and 6 percent high. Although moderate and high SBS areas accounted for just 35 percent of the fire area, these areas are not uniformly distributed but are mostly concentrated in certain watersheds and in some smaller pockets. Particular watersheds with substantial moderate and high SBS in the Chip-munk Project area are Mosquito Creek and Clear Creek. Chips Creek and Little Indian Creek also had substantial areas of moderate or high SBS, but these watersheds are outside of the Chip-munk Project area. Realize that soil burn severity is different from vegetative burn severity or mortality, as described below.

Watershed response to larger rainfall events is expected to be similar in areas of moderate and high SBS because, for both severity classes, the majority of pre-fire litter on the ground and the needles or leaves on the vegetation were consumed. Hydrophobicity in soils (water repellency) occurs naturally in some forested areas where soil fungi and/or understory brush are prominent. Hydrophobicity due to the fire occurs primarily in areas with moderate or high SBS, but the prevalence and degree of hydrophobicity varies widely in these areas. Increased watershed response from areas with moderate and high SBS, characterized by increased runoff and soil erosion potential, is therefore expected over the next several years due to several prominent factors, including soil hydrophobicity and reduced ground cover, duff storage, and infiltration capacity.

Beneficial Uses of Water

Existing beneficial uses of surface waters in the Chip-munk Porject area are found in the Central Valley Region Water Quality Control Plan (CRWQCB 1998). The Chip-munk Project drains to North Fork Feather River, for which existing beneficial uses include municipal and domestic water supply, hydropower generation, recreation, freshwater habitat, habitat suitable for fish reproduction and early development, and wildlife habitat.

Forest Vegetation

Mixed conifer and true fir are the two most common forest types present within the watershed analysis area. However, within the Chip-munk Project area, proposed treatments are located in areas that have been substantially burned in order to recover the value of fire-killed trees, remove safety hazards along roadways, and aid re-establishment of forested areas. Of the approximately 5,500 acres proposed for treatment, approximately two-thirds are located in areas of moderate or high soil burn severity (SBS). As indicated above, while SBS classification often correspond with classifications for vegetation burn severity, the two terms describe different parameter and do not always coincide. SBS goes beyond aboveground vegetation impacts to belowground soil heating

effects and associated impacts to soil hydrologic function, runoff and erosion potential, and vegetative recovery. Such additional factors include amount and condition of residual ground cover, viability of native seed banks, condition of residual fine roots, degree of fire-induced water-repellency, soil physical factors (texture, structural stability, porosity, restricted drainage), soil chemical factors (oxidation, altered nutrient status), and topography (slope gradient, length, and profile). While above-ground burn severity is more related to peak temperatures and fire behavior during the fire, below-ground soil burn severity is related strongly to the length of time the heat is in contact with the soil (residence time).

Therefore, a high intensity fire (high flame lengths, rapid rate of spread, crown fire, etc.) in a stand-replacement event can result in a moderate (or even low) soil burn severity, if the residence time is short and soil characteristics are not altered significantly. Conversely, a slow-moving fire with complete consumption of accumulated surface fuels can leave trees alive, but heat the soil severely with predictable negative consequences to soils and streams. Soil burn severity, used in this context, is a much better index of soil damage, watershed response, and potential for natural vegetative recovery after the fire. A summary of SBS within the Chip-munk Project area is provided below in the Soil Condition section and thorough descriptions of SBS classifications are provided in the Chips Fire Burned Area Emergency Response (BAER) Soil Resource Assessment (USDA 2012c), available in the project record.

Stream Condition

The total area for the fifteen project analysis watersheds is roughly 46,500 acres. According to the PNF corporate GIS stream layer, there are approximately 533 miles of stream channel within the analysis watersheds: 326 miles are ephemeral, 150 miles are intermittent and 57 miles are perennial. Ephemeral and intermittent streams are seasonal—surface water is present during some portion of the year but these streams are typically dry by late summer. Ephemeral streams only flow in response to storm events or snowmelt, and do not necessarily flow every year. Intermittent streams are seasonally connected to the underlying water table and may flow during all but the driest months, whereas perennial streams typically flow year round.

Streams are further classified by their slope—response reaches have low-gradient (typically less than three percent slope) alluvial conditions. The morphology of response channels reflects depositional processes associated with flowing water. Transport reaches have higher gradient (3 to 12 percent slope or more), non-alluvial conditions and the morphology of transport channels is generally resilient to change due to the prevalence of large channel substrate material (cobbles and boulders). The vast majority of stream channels in the project analysis area resemble these steeper and more resilient transport reaches. Exceptions include a short response reach of Clear Creek above Seneca Road and roughly two miles of Ohio Creek (although most of this stretch of Ohio Valley is on non-NFS lands and is outside of proposed treatment units). Exposed bedrock

substantially increases channel stability; occurrence of exposed bedrock is more prevalent along streams in the east side of the project analysis area.

As mentioned above, the 2012 Chips Fire, when compared with past land management activities, has had the larger impact on watershed condition. Increased watershed response from intensely burned areas is expected over the next 1-3 years due to several prominent factors, including soil hydrophobicity caused by the fire and reduced ground cover, duff storage, and infiltration capacity. Increased watershed response, characterized by increased runoff and soil erosion potential, would occur during intense precipitation events, such as the rainstorm of late November 2012. For example, for the 2,318-acre Clear Creek project analysis watershed, over 60 percent of the watershed burned at moderate or high SBS (an estimated 1,031 acres moderate SBS and 398 acres high SBS). Using these SBS estimates, modeling for the Chips Fire BAER hydrology assessment predicted a 69 percent increase in peak stream flow in Clear Creek for a 24-hour rainstorm of 3.5 inches of precipitation. The November 28-December 2 rainstorm produced rainfall intensities similar to that model storm. A substantial increase in watershed response was observed in Clear Creek, with stream channel condition affected due to sediment filling most of the pools along the stream (Figure 19).

Figure 19. **Clear Creek after storms of November 28 – December 2, 2102. Increased watershed response due burned areas in the watershed caused excessive bedload in the stream, filling in most pools that existed along this reach before the 2012 Chips Fire.**

Riparian vegetation is fairly well established in unburned areas and areas of low SBS. Woody riparian species are limited in extent due to the steeper nature of stream channels but substantial alder and willow communities, and a bit of cottonwood, exist along the main stem of North Fork Feather River. In areas of moderate and high SBS, pre-fire riparian vegetation was mostly consumed in the fire. However, riparian vegetation is expected to recover more quickly than vegetation outside of streamside areas, due to increased moisture availability. These plants include Bracken and Lady Fern, grasses, and forbs, and also smaller amounts of sedges, rushes, alder and willow.

There are approximately 160 miles of existing National Forest System roads within the watershed analysis area. As mentioned above, roads are generally the primary source of fine sediment delivery and water quality impact in forested watersheds. Where roads cross stream channels, and in locations where roads run close and parallel to streams, rainfall runoff can carry fine sediments from the road surface or from road cut banks and fill slopes to the stream channel, reducing water quality and potentially impacting aquatic habitat. Additionally, stream crossing structures such as culverts can prevent fish from accessing upstream habitat by creating depth, leap, and velocity barriers.

Despite the inevitability of some amount of road-generated sediment being delivered to stream channels, the road network within the Chip-munk Project area is generally in good condition. Substantial road drainage improvements were implemented after the Chips Fire during Burned Area Emergency Response. Additional road drainage structures were added and existing structures improved along roads located downslope of areas that had burned with moderate or high SBS, to reduce road damage and water quality impacts expected if an intense rainfall event were to occur. These treatments performed well during the November 28 –December 2 rainstorm, protecting roads from damage. However, there was not enough time to implement all of the planned BAER road treatments and some damage did occur along roads that had not been treated (Figure 20 and Figure 21). This damage again demonstrates the fact that the Chips Fire is the primary source of disturbance in the watershed and the largest source of potential water quality impacts. BAER treatments will continue in 2013 since the threat of road drainage damage within burned areas will continue for the next few years until adequate soil cover is restored and water repellency effects of the fire abate.

Figure 20. **Road 26N25 in Upper Mosquito Creek watershed between 27N28 and 26N49 after storms of November 28 – December 2, 2102. Increased watershed response due to burned areas in the watershed caused increased drainage to flow down the road, causing erosion of the road surface. BAER treatments had not yet been completed on this road prior to the storms.**

Figure 21. **Road 26N25 in Upper Mosquito Creek watershed between 27N28 and 26N49 after storms of November 28 – December 2, 2012. Increased watershed response due to burned areas in the watershed caused stream and debris flow to overwhelm the stream crossing structure, resulting in washout of the road prism. BAER treatments had not yet been completed on this road prior to the storms because the fall field season was too short to complete all prescribed BAER treatments.**

Precipitation

Average annual precipitation data from the Prattville weather station, located approximately 3 miles north of Butt Valley Reservoir at an elevation of 4,520 feet, averaged 35.5 inches of rain between 2004 and 2011 (DWR 2013). This annual precipitation value is fairly representative of the entire watershed analysis area, although higher elevations in the project area likely receive more precip.

Precipitation falls primarily as snow above 6,500 feet and as a combination of snow and rain below that elevation. The majority of annual rainfall is characteristic of the Mediterranean climate, with most precipitation occurring between October and May with isolated thunderstorms common during the summer months. Surface runoff depends upon the snowmelt regime, which normally extends into late spring and early summer.

Soil Condition

Soils in the Chip-munk Project area are almost exclusively various loam textures derived from metamorphic and volcanic parent materials. These soils differ primarily in depth and rock content. Geologic types include shale and schist of the Shoofly formation, basalt, metavolcanics, serpentine, ultramafics, and glacial deposits. Dominant soil families are Kinkel, Skalan, Deadwood, Kistern, and Holland families.

Forest productivity in the analysis area ranges from moderately productivity to non-productive sites (USDA 1988d). Forest survey site class (FSSC) is a measure of site productivity in cubic feet of wood per acre per year. Site class 1 is the most productive, while FSSC 7 is the least. Site class 7 lands are considered non-productive, and typically occur along ridge tops and steep rocky slopes. Both site class 5 and 6 lands are interpreted as having low productivity, while site class 4 is slightly more productive. Site class 6 occurs on 87 percent of the roughly 5,500 acres proposed for treatment. Site class 5 lands total 500 acres in proposed treatment units and are located mostly within units in Salmon Creek and Marian Ravine watersheds. Site class 4 lands total 210 acres in proposed treatment units and are located predominately in Salmon Creek, Rocky Point, and Upper NFFR watersheds.

Soil productivity could be affected if substantial areas of topsoil were eroded. Erosion Hazard Rating (EHR) systems have been developed to describe the relative risk of accelerated soil erosion and rill erosion. Many interrelated factors are evaluated to determine whether the ‘inherent’ erosion potential for a given soil may be accelerated with changed conditions as a result of management, including soil texture, depth, infiltration, amount of rock fragments, surface cover (vegetation, duff and debris, surface rocks), slope gradient, and climate. Risk ratings vary from low to very high, with low ratings meaning low probability of surface erosion occurring. Moderate ratings mean that accelerated erosion is likely to occur in most years and water quality impacts may occur for the upper part of the moderate numerical range. High to very high EHR ratings mean that accelerated erosion is likely to occur in most years and that erosion control measures should be evaluated.

Two sources of EHR ratings exist for soils in the Chip-munk Project area. The Plumas National Forest Soil Resource Inventory (SRI) (USDA 1988d) provides maximum EHR ratings for the 9 different soil map units that exist within proposed treatment units. The SRI ratings for EHR is moderate for the dominant soil family in all 9 of these map units, with exceptions occurring for soil map units #221 (488 acres within proposed treatment units) and #200 (167 acres within proposed treatment units). The SRI describes these two map units as having EHR ratings of moderate-high. For comparison’s sake, the EHR ratings for the Chip-munk Project area are substantially lower in general than the EHR ratings for soils in the Moonlight Fire, which contained large areas of highly erosive decomposed granitic soils.

The second source of EHR ratings is the BAER soil assessment report, which utilized the California Erosion Hazard Rating system (FSH 2505.22). This assessment started with information from the SRI, but added in the effect of the Chips Fire. Therefore, these EHR ratings substantially correspond with the soil burn severity assessment. Areas that the SRI rates as having moderate EHR may be rated as high EHR when fire effects are included. High EHRs were estimated for 13.6 percent of the Chips Fire area, with moderate EHR rated for 43 percent of the fire area. Soil map units that rated as moderate EHR in the Soil Resource Inventory (SRI) but high EHR after the fire include some proportion (less than 35 percent) of Deadwood family soils, which are naturally erodible due to shallow soil depth and gravelly or coarse sandy loam textures. None of the BAER report EHR ratings were “very high.” Similar to the trend described above for soil burn severity, the prevalence of high EHR ratings for soils within proposed treatment areas is higher than the prevalence throughout the fire because proposed units are located within heavily burned areas that contain needs for hazard abatement, timber recovery, and reforestation. So while the BAER assessment estimated the percentage of soils having high EHR at 13.6 percent for the entire fire area, the areas of high EHR account for 46 percent (2,513 acres) of the total area of proposed treatment units.

According to the SRI, the dominant soil hydrologic group in the Chip-munk Project area is group B, indicating a low-moderate relative potential for flashy runoff and erosion (A is best, D is worst, rock outcrops are not rated). Lacking water repellency, these soils have moderate infiltration rates when thoroughly wet, so surface runoff and erosion would be localized to shallow soil areas and/or steep slopes. Impacts to soil cover due to the Chips Fire could have effects on soil hydrologic function because duff and litter layers can temporarily hold precipitation and runoff, allowing more time for soil infiltration to occur. A more substantial effect to hydrologic function caused by intense wildfire is the development of water repellency or hydrophobicity that can occur in heated soils. Water repellency was found to occur sporadically in unburned areas, and was somewhat exacerbated by the fire in these medium grained soils. Severe water repellency was found to occur mostly in moderate and high soil burn severity classes, but was highly variable even within these areas. Where it was observed, water repellency was found from the bottom of the surface-charred layer (generally 0.5-1 inch deep), and varying in thickness from 1-6 inches in high SBS. Where it does occur, repellency will be largely responsible for moderate soil burn severity being expected to have a watershed runoff response similar to high. Repellency also occurs naturally in unburned areas where soil fungi and/or understory brush were prominent. Lacking water repellency, these soils have moderate to rapid infiltration rates, and surface runoff and erosion would normally be localized to shallow soil areas and/or steep slopes. Except for low elevation areas of the fire along the North Fork Feather River, snowpack will eventually cover the area for the winter. Repellency will diminish appreciably in the spring while wetted from snowmelt, so spring rains are not as much of a concern; however

repellency will return as soils dry through the summer, to a lesser degree, following the same cycle and gradually diminishing over 3-7 years.

Soil condition measures analyzed for this assessment are described below, using information from 2011 field surveys conducted for the defunct Belden HFQLG project and subsequent information from the September 2012 BAER soil assessment. Several of the soil condition measures were affected drastically by the Chips Fire (see soil burn severity (SBS) map in Figure 22). As mentioned above, high and moderate SBS classes were estimated to occur in about one-third of the Chips Fire area, but account for approximately two-thirds of the areas proposed for treatment in Chip-munk Project. As described in the BAER assessment, the high and moderate severity classes exhibit little evidence of severe soil heating — soil structure and fine roots are intact — though canopy and ground cover have been mostly removed. The major exception being areas within the 1999 Storrie fire that burned again in 2012, where heavy fuel loadings increased fire residence time resulting in more pronounced burn severity. However, most of these severely burned areas are not located within the Chip-munk Project units. Low and lesser severity classes still have good surface structure, contain intact fine roots and organic matter, and should recover in the short-term once re-vegetation begins and the soil surface regains cover.

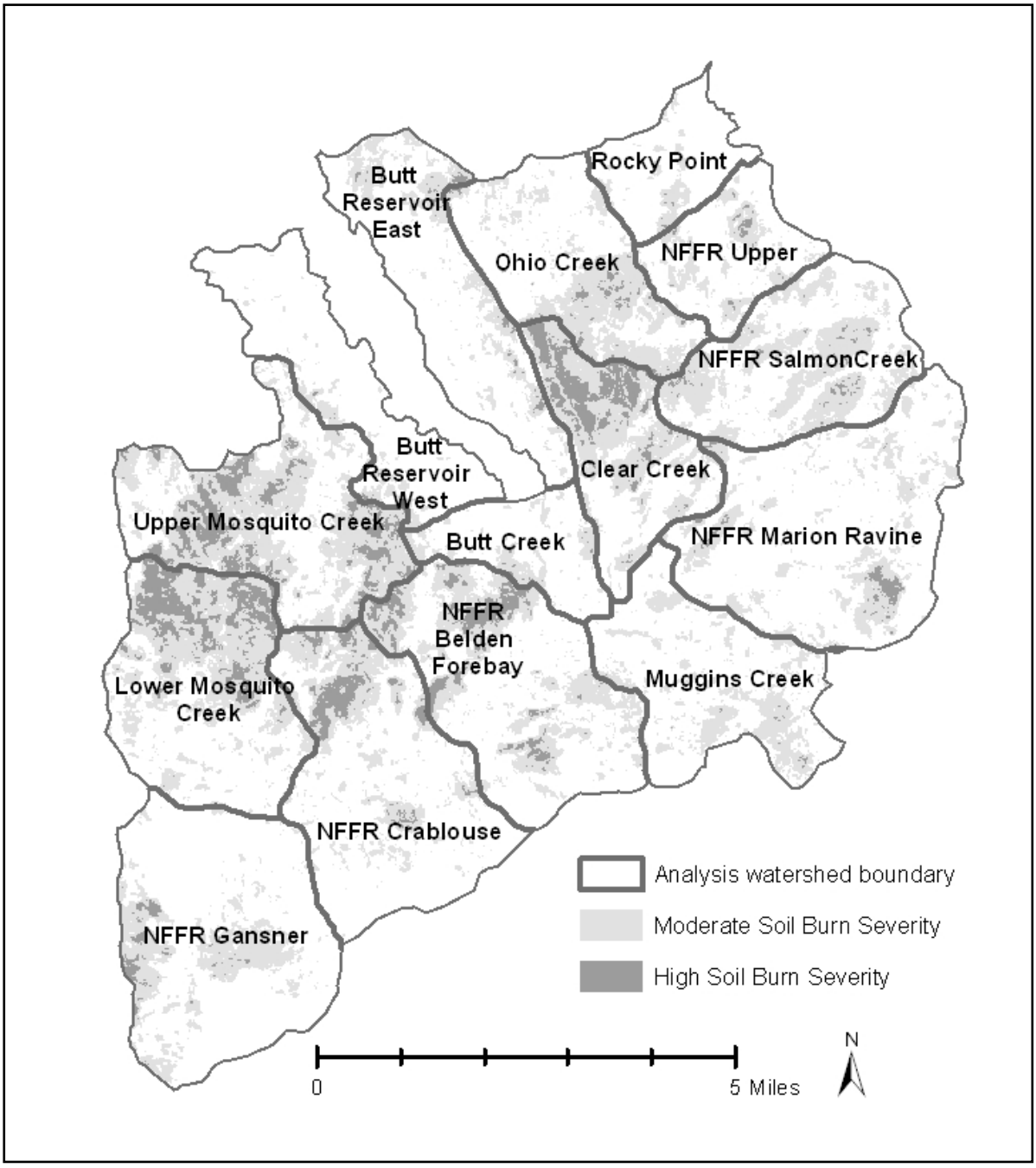


Figure 22. **Areas of moderate and high soil burn severity within the Chip-munk Project analysis watersheds. For sake of clarity, areas of low soil burn severity are not shown.**

Indicator 1: Soil Stability and Effective Soil Cover

Effective soil cover is necessary to prevent accelerated soil erosion. Soil cover was excellent in the 2011 surveyed units, averaging 95 percent and ranging from 84 to 100 percent (Table 91). These levels of soil cover were certainly adequate and signs of erosion were not visible or were very limited in degree and extent. In unburned and low SBS areas, current soil cover is expected to be similar to these 2011 levels. But for the high and moderate SBS areas, ground cover was

mostly consumed. Consistent with the SRI map unit descriptions, most of the surveyed units indicated substantial rock cover, averaging 27 percent and ranging from 0 to 48 percent. Despite the fire effects, this rock still currently provides effective soil cover.

The Plumas National Forest LRMP (USDA 1988a) suggests guidelines for effective ground cover vary by the soil erosion hazard rating, including 60 percent areal extent for soils with a high EHR and 50 percent soil cover for moderate EHR. Due to the Chips Fire, these levels of soil cover are not expected in the moderate and high SBS areas until vegetation is re-established and litter and duff layers are generated. Apart from seedlings that are planted in reforestation units, shrubs such as manzanita and whitethorn are likely the first vegetation that will occupy areas of high and moderate SBS and these shrubs typically provide good soil cover in the first 2-3 years after wildfire, particularly for areas such as the Chip-munk Project area that receive ample precipitation and have good soil holding capacity. Down wood generated by fallen fire-killed trees will also provide effective soil cover over the next 2-3 years. PNF LRMP standards and guidelines direct that a standard for effective soil cover be developed on a project-by-project basis (USDA 1988a). To improve soil productivity, improve precipitation and runoff infiltration, and reduce erosion, the standard for the Chip-munk Project is that project activities will result in a higher areal extent of effective soil cover than the level that exists pre-treatment.

Indicator 2: Surface Fine Organic Matter

Organic cover helps maintain site fertility and prevent soil loss from erosion. Surface fine organic matter consists of plant litter, duff, and woody material less than three inches in diameter. The desired condition for forested areas on Plumas National Forest system lands is at least 50 percent fine organic matter well distributed over the unit, with less than 30 percent areal extent of fine organic matter representing a poor condition. The 2011 field surveys indicate robust levels of surface fine organic matter, with an average areal extent of 90 percent and levels ranging from 72 percent to 100 percent. In 2011, the size, amount, and distribution of surface fine organic matter present was within the range for the project area's ecological type. As with soil cover, it is likely that all of this fine surface organic matter was consumed in areas of moderate or high SBS, but levels should be similar to the pre-fire condition in unburned areas and areas with low SBS.

Indicator 3: Large Down Woody Material

The applicable standard for large down wood is in the PNF LRMP as amended, which states that large down woody material retention levels should be determined on an individual project basis (USDA 1988a). For the Chip-munk Project, 10 to 15 tons per acre of the largest down logs, where they exist, will be retained. Typically, 5 down logs in the type of forest in which the Chip-munk Project is located would comprise a weight of 3 to 10 tons. The 2011 field surveys indicate that large down wood at that time was ample in supply, averaging 51 tons per acre for the 19 transects surveyed and ranging from 30 to 85 tons per acre. As with the effective ground cover discussion

above, most of this large down wood was likely consumed in the areas of moderate or high SBS, but likely remains in the areas with low SBS and unburned areas.

Indicator 4: Soil Strength (Compaction)

The extent of detrimental soil compaction should not be of a size or pattern that would result in a significant change in production potential for the activity area and should not result in common occurrences of overland flow and erosion within treated units (indicating that the infiltration and permeability capacity of the soil has been exceeded for the local climate). The extent of detrimental compaction indicated by the 2011 surveys is generally low. Over the vast majority of the project area, the soil strength level is conducive to favorable rooting environment for desired plant species. Visually, soil structure and macroporosity are relatively unchanged from natural condition and signs of erosion or overland flow were absent or very limited in degree and extent. For the 19 units surveyed, the spatial extent of detrimental compaction generally ranged from 0 to 12 percent (Table 91), with mean and median levels of 6 percent and 4 percent, respectively. The exception to these values is a survey result of 20 percent in unit 64 of the Chip-munk Project. In general, the area of detrimentally compacted ground is primarily occupied by skid trails and landings, although not all skids and landings were deemed compacted. Fire effects would not substantially change physical soil strength (compaction).

Indicator 5: Soil Displacement

For the purpose of our 2011 field surveys, detrimental soil displacement is defined as occurring when either 2 inches or ½ the total thickness (whichever is less) of the humus-enriched topsoil (A horizon) is removed from an area of 1 square meter or larger. Observed soil displacement levels were low. The thickness and color of the upper soil layer was within the normal range of characteristics for the site and was distributed normally across the area. Localized areas of displacement were observed to have occurred but were not widespread and would not affect the productivity of desired plant species. No displacement was observed on 11 of the 19 transects surveyed. For the 8 transects in which displacement was observed, 1 or 2 of the 25 points were determined to be displaced. While the 2012 Chips Fire had drastic effects on soil cover and surface fine organic matter in areas of high and moderate SBS, the fire did not displace soils and current conditions in the proposed treatment areas are expected to be the same as the pre-fire condition for this indicator.

Table 92. Summary of pre-fire soil condition in Chip-munk Project proposed treatment units, using 2011 field soil survey data for the now-defunct Belden HFQLG Project.

Unit #	acres	Logging System	Applicable Belden Unit	Soil Map Unit	Effective Cover (percent)	Surface Rock (percent)	Fine Organic Matter (percent)	Displaced (percent)	Compact ed (percent)	Large Wood (ton/ac)
2	34	tractor	193b	220, 284	96	8	84	0	4	72.5
3	11	tractor	110-t4	220	92	28	84	0	4	55

Unit #	acres	Logging System	Applicable Belden Unit	Soil Map Unit	Effective Cover (percent)	Surface Rock (percent)	Fine Organic Matter (percent)	Displaced (percent)	Compact ed (percent)	Large Wood (ton/ac)
9	30	tractor	66	220,221	96	48	92	0	4	32.5
10	85	tractor	73	x	100	24	92	0	12	65
11	23	tractor	110-t1,t2	216	100	5	100	0	0	85
17	33	tractor	80	281	92	24	96	8	4	30
18	24	tractor	53-t1	221	92	16	92	0	4	67.5
21	14	tractor	52-t1	283,264	96	44	88	4	0	37.5
24	7	tractor	52-t1	283,264	96	44	88	4	0	37.5
25	18	skyline	53	221	92	16	92	0	4	67.5
32	38	skyline	80	281	92	24	96	8	4	30
46	41	skyline	110-t4	220	92	28	84	0	4	55
47	24	tractor	67	221,220	100	28	96	0	12	50
60	31	tractor	107	220,264	96	44	100	4	8	37.5
63	8	tractor	52-t1	283,264	96	44	88	4	0	37.5
64	33	tractor	52-t2	220	88	32	72	4	20	55
74	99	tractor	82	281	96	40	88	0	0	77.5
75	74	tractor	83a	281	84	40	88	4	4	60
77	83	tractor	66	220,221	96	48	92	0	4	32.5
86	25	skyline	110-t1,t2	216	100	5	100	0	0	85
89	224	skyline	54-t1&t2	283	97	16	94	3	6	45
157	53	tractor	57	220	100	12	96	4	8	50
176	6	skyline	198	220	84	36	76	0	12	45
317	4	skyline	54-t1	283	100	0	100	0	6	30
330	22	tractor	67	221,220	100	28	96	0	12	50
331	8	tractor	80	281	92	24	96	8	4	30
332	1	tractor	80	281	92	24	96	8	4	30
372	78	skyline	47	221	100	36	84	8	4	40
475	42	tractor	44	221	100	36	88	0	4	37.5

Environmental Consequences

Chapters 1 and 2 of the EA provide detailed information about the design features for the Proposed Action alternative. All mechanical harvest operations would adhere to standards and guidelines set forth in the timber sale administration handbook (Forest Service Handbook [FSH] 2409.15) and the best management practices as delineated in the Region 5 Amendment to the Forest Service Water Quality Management Handbook (USDA 2011a) and the National Best Management Practices for Water Quality Management on National Forest System Lands (USDA 2012d). Timber sale contracts contain many standard provisions that help ensure protection of soil and water resources. These include provisions for an erosion control plan, road maintenance, skid trail spacing, and restrictions for wet weather operation.

Proposed management activities in RCAs are expected to contribute to improving or maintaining watershed and aquatic habitat conditions described in the riparian conservation objectives (RCOs) of the SNFPA ROD (USDA 2004b). The streamside management zone plan and RCO analysis is presented in Appendices B and C, respectively, of this EA. RCA widths are consistent with the widths prescribed in the SNFPA ROD with the exception of the RCA width for ephemeral stream channels, which has been reduced for this project from 150 feet on each side of the channel to 100 feet on each side of the channel. This reduced width would facilitate more harvest of fire-killed trees near ephemeral streams, reducing future build-up of down wood fuels that could

exacerbate future wildfire intensity in these drainages. The 100-foot width for ephemeral streams has been demonstrated to be a sufficient and effective RCA width throughout implementation of past HFQLG projects and on the Moonlight Fire recovery project.

Where treatment would occur within RCAs, prescriptions and protection measures have been designed to address the RCOs. Where RCAs would be mechanically treated, ground-based equipment would only be used on slopes less than 25 percent for roadside hazard treatments and less than 35 percent for salvage harvest units. To provide a buffer between streams and mechanically treated areas, an equipment exclusion zone would be established. The buffer width would vary by stream type, as shown in Table 93 and Table 94. For example, all mechanical equipment would be excluded from within 100 feet (horizontal) of perennial streams. Any trees harvested within these RCA equipment exclusion zones would require full suspension (no part of the harvested tree dragging on the ground). To facilitate more effective treatment of roadside hazards, an exception to this full-suspension rule would be made in the 25-foot-wide RCA equipment exclusion zones along ephemeral streams in roadside units, thus allowing endlining of that material during harvest. These streamside equipment exclusion zones would serve as effective filter and absorptive zones for potential sediment originating from upslope treatment areas. Equipment exclusion zones are not applicable to skyline salvage harvest, since trees are not harvested with ground-based equipment. However, full suspension zones in RCAs within skyline salvage units would be established (Table 96). See the full list of Proposed Action design features in Chapter 2 of this EA.

Table 93. Riparian Conservation Area (RCA), equipment exclusion zone widths and burn pile restrictions for ground-based mechanical equipment operations under roadside hazard actions. (a - For Clear Creek watershed, the equipment exclusion zone width for ephemeral streams would be 50 feet)

			Equipment Exclusion Zone	
Stream Type	**Riparian Conservation Area (RCA) buffer width**	**Minimum distance to burn pile**	**Slope ≤ 25%**	**Slope >25%**
Perennial stream	300 feet	40 feet	100 feet	300 feet
Intermittent stream over 3,500 ft. elevation	150 feet	40 feet	100 feet	150 feet
Intermittent stream below 3,500 ft. elevation	150 feet	25 feet	50 feet	150 feet
Ephemeral stream	100 feet	25 feet	25 feet [a]	100 feet

Table 95. Riparian Conservation Area (RCA), RCA snag retention and equipment exclusion zones, and burn pile restriction widths for ground-based mechanical equipment operations under salvage timber actions. (a - For Clear Creek watershed, the equipment exclusion zone width for ephemeral streams would be 50 feet)

			Equipment Exclusion Zone	
Stream Type	**Riparian Conservation Area (RCA) buffer and RCA snag retention zone widths**	**Minimum distance to burn pile**	**Slope ≤ 35%**	**Slope >35%**
Perennial stream	300 feet	40 feet	100 feet	excluded
Intermittent stream over 3,500 ft. elevation	150 feet	40 feet	100 feet	excluded
Intermittent stream below 3,500 ft. elevation	150 feet	25 feet	50 feet	excluded
Ephemeral stream	100 feet	25 feet	25 feet[a]	excluded

Table 96. Riparian Conservation Area (RCA), RCA snag retention and full suspension zone widths (fullbank width, measured horizontal from both sides of stream channel) for skyline salvage timber actions.

Stream Type	**Riparian Conservation Area (RCA) buffer and RCA snag retention zone widths**	**Full suspension zone**
Perennial Stream	300 feet	75 feet
Intermittent Stream over 3,500 ft. elevation	150 feet	75 feet
Intermittent Stream below 3,500 ft. elevation	150 feet	50 feet
Ephemeral Stream	100 feet	25 feet

Water Resource Analysis

Alternative A (Proposed Action) – Direct and Indirect Effects of Roadside Hazard Tree Removal and Salvage Timber Harvest

Within or near treatment units, effects to hydrology and runoff patterns due to the Proposed Action would not be measurable. Activities associated with roadside hazard and salvage timber harvest would have little effect on canopy cover because trees identified for harvest are fire-injured or fire-killed. Thus, effects to water yield due to altered interception and evapo-transpiration as a result of the Proposed Action would be small and immeasurable. Additionally, any unclassified roads (roads that are not part of the National Forest System) utilized for the Proposed Action would be closed and treated with water bars or by out-sloping the road prism so that precipitation and runoff patterns resemble the natural condition. Hydrology and runoff patterns within the Chip-munk Project units have been significantly affected by the Chips Fire of 2012, with the degree of hydrology effect dependent upon the amount of high and moderate burn severity. The Clear Creek watershed is cited as an example above in the Affected Environment section as the Chips Fire BAER hydrologist predicted a peak stream flow increase of 69 percent for a 24-hour rainstorm of 3.5 inches (USDA 2012g). See the cumulative effects analysis below for a discussion of effects to hydrology at a watershed scale.

Operations for removal of roadside hazard trees and for harvest of salvage timber would cause ground disturbance, particularly due to harvest traffic within units and along skid trails, construction or utilization of 4 miles of temporary haul road, end-lining (dragging of a harvested tree) along roadsides, and furrows created by skyline harvest. Disturbed ground could result in accelerated erosion (erosion rates above pre-project levels), particularly on areas of concentrated activity, such as skid trails and skyline harvest corridors. If project-generated erosion is delivered to a stream channel, that sedimentation could result in a water quality impact that would affect beneficial uses. For example, delivery of fine sediments from the project could decrease the quality of cold water fish habitat by infilling pools and embedding spawning gravels.

Since 1992, the Best Management Practice (BMP) Evaluation Program for USDA Forest Service, Pacific Southwest Region (the region comprised of the 18 National Forests in California) has demonstrated that BMPs are an effective means for preventing delivery of sediment from timber harvest project units and protecting beneficial uses of water. For the 2007-2009 monitoring seasons (the most recent seasons in which Forest BMP monitoring reports have been compiled), 186 evaluations of BMPs were conducted for practices associated with timber management activities on Plumas National Forest System lands. BMPs were rated as effective for over 88 percent of those evaluations (USDA 2009a). The BMP deficiencies observed were predominantly due to legacy effects associated with the original design or location of system haul roads.

In 2010, BMP evaluations were performed on roadside and salvage timber units implemented by the Moonlight Fire recovery and restoration project. BMPs evaluated included those associated

with streamside management zone protection, project skid trails, and project landings. Twenty-one evaluations were performed and the BMP effectiveness rate was 95 percent. For the one evaluation that indicated ineffective BMPs, an instance of sediment delivery to an ephemeral channel was observed due to poor location of a project skid trail. The issue was subsequently treated with water bars and additional woody debris added to the trail. Erosion was noted to be minor, with no delivery of sediment to downstream intermittent ephemeral or perennial streams and no adverse effect to beneficial uses of water.

As described above in the Affected Environment section, areas of the Chips Fire that burned at high or moderate soil burn severity are susceptible to accelerated erosion during intense precipitation or snowmelt events over the next several years. As described below in the soil resource analysis, accelerated erosion is not expected to be of a size or pattern that would deliver sediment to streams that would impact beneficial uses of water. In addition to BMPs, the chief design feature for the Chip-munk Project to prevent sediment delivery is that slash and debris generated by harvest of salvage and roadside danger trees would be left on the ground, resulting in an increase of soil cover within treated units over the level of cover that existed pre-harvest. Additional ground cover would reduce particle detachment due to rainfall splatter and would help to keep surface soils in place during runoff events. For areas of lower fire severity, needle cast from scorched conifers would provide additional ground cover that may help reduce rill and inter-rill erosion and sediment delivery (Pannkuk and Robichaud 2003). Legacy road designs often incorporated in-sloped road surfaces that drained to an inside ditch rather than current design practices that utilize, as often as practicable, out-sloped road surfaces that disperse runoff. In-sloped designs concentrate road runoff in the inside ditch and the legacy design roads—most constructed prior to the Clean Water Act amendment of 1972— often did not include sufficient frequency of drainage structures to disperse road runoff and prevent the ditches from delivering sediment to streams at road crossings. Legacy designs that located roads at mid-slope locations typically have higher road-intercepted runoff volumes than roads near ridgetops and mid-slope locations also result in frequent stream crossings. When the 2007-2009 Plumas National Forest timber BMP evaluations are considered without the road evaluations, the resulting set of 67 evaluations had a 95 percent effectiveness rate.

All temporary roads constructed or utilized for the Proposed Action would be rehabilitated following use, with ripping of the road surface and out-sloping or water bars to disperse runoff from the surface. Where temporary roads would cross ephemeral or intermittent streams (no perennial stream crossing are proposed), timber sale administrators would consult with District hydrologists to assure the crossing structures are installed and removed per BMPs. Burned Area Emergency Response (BAER) treatments for the Chips Fire are planned or have already been implemented on all National Forest System roads in the Chip-munk Project area that are located in areas of moderate or high severity. Many of these treatments are located at road/stream crossings to provide additional capacity of the crossing structure to pass the increased stream flow

and debris that could occur in periods of intense precipitation over the next several post-fire years. For example, trash racks have been added at culvert inlets to prevent plugging or hardened overflow dips have been installed to protect the road from wash-out in case the culvert does plug. In addition, the potential for sediment delivery from roads within the Chip-munk Project area will be reduced due to BAER treatments that add additional road surface dips to disperse runoff and due to BAER maintenance of existing roadway dips and ditches to assure proper function. Continued maintenance of those road drainage features would also occur along haul roads under Alternative A.

Three water drafting sites (sources of water for pump trucks that add water to haul roads to abate dust and stabilize the road surface) would be constructed or reconstructed under the Proposed Action. Per BMP 2.5 (USDA 2011a), this work would occur so that water would be pumped outside of the normally flowing stream channel, preventing impacts to in-stream flow and assuring that disturbance associated with pumping or maintenance of the water source would not cause turbidity in the stream. Additionally, the short access routes to the water sources from NFS roads for water trucks would be reconstructed to improve drainage and prevent sediment delivery from the access route to the stream. These actions would improve long-term protection of water quality at these drafting sites.

Since the Chips Fire resulted in the majority (roughly 60 percent) of the Clear Creek watershed burned at moderate or high soil burn severity and substantial treatment is proposed within this watershed under Alternative A, additional road treatment is proposed. This treatment would consist of application of gravel road surfacing (roughly three inches thick, compacted) at all stream crossings on haul routes within these watersheds. Gravel surfacing would extend for approximately 90 feet on each side of the stream channel. Since most road erosion that is delivered to streams is derived from road surfaces and slopes in the near vicinity of streams, this type of gravel treatment has been shown to be an effective way to reduce sediment delivery from forest roads. An additional measure to protect water quality in the Clear Creek watershed is to increase the equipment exclusion zone width for ephemeral streams from 25 feet to 50 feet. While a 25-foot exclusion zone width on each side of ephemeral stream channels was demonstrated to be effective at preventing sediment delivery on recent HFQLG projects and the Moonlight Recovery Project, this larger exclusion zone width for ephemeral streams that are tributaries to Clear Creek would provide extra reassurance that motorized traffic would not result in sedimentation.

In forested stream systems, large down wood within and across channels typically help to maintain channel stability, decrease flow velocity, trap sediment, and protect banks from erosion (Berg et al. 1998). Within Chip-munk Project RCAs, the physical effects derived from in-channel large woody debris (LWD) would be sustained because no natural in-channel debris would be removed. Given that a great deal of large fire-killed trees exist along streams within Chip-munk Project proposed treatment units, there is a large level of anticipated future recruitment of LWD,

which is structurally important for channel morphology, channel function, and bank stability. RCA equipment exclusion zones would assure that this ample supply of LWD recruitment would remain sufficient.

Alternative A (Proposed Action) – Cumulative Effects of Roadside Hazard Tree Removal and Salvage Timber Harvest

Equivalent Roaded Acre (ERA) model results confirm the statement above in the Affected Environment section that the 2012 Chips Fire is the largest land disturbance that has occurred in Chip-munk Project watersheds. Without adding the effect of the Chips Fire, pre-project ERA totals for the 15 analysis watersheds ranged from 1.7 to 10.0 percent of watershed area (Table 5). With one exception (Butt Valley Reservoir East watershed), the ERA total for all of these watersheds, expressed as a percentage of watershed area, was roughly doubled when fire effects are added (in Ohio Creek, for example, from 8.7 percent to 16.7 percent) with the increase due to fire effects accounting for more than a tripling of ERA in watersheds like Clear Creek (from 5.2 percent to 18.2 percent), Salmon Creek (from 3.2 percent to 11.6 percent), and Belden Forebay (from 4.5 percent to 13.5 percent). For the Upper Mosquito Creek watershed, pre-project ERA was quintupled by adding in the effects of the Chips Fire (from 3.0 percent to 15.6 percent). The smallest increase in ERA due to the fire, relative to pre-project ERA, is modeled for the Butt Valley Reservoir East watershed, but the increase is substantial (from 10.0 percent to 15.5 percent of watershed area) and enough to put that watershed over the model threshold of concern (TOC) of 15 percent.

As also stated in the Affected Environment section above, these large amounts of burned area have resulted in potential for significantly increased precipitation runoff, bedload, and debris flow response in these watersheds. For a modeled 24-hour storm of 3.5 inches of precipitation, the Chips Fire BAER hydrology report estimated peak streamflow increases of 69 percent for the Clear Creek watershed and 21 percent (from 1,026 cfs to 1,246 cfs) for the entire Mosquito Creek drainage The percent streamflow increase is less for the Mosquito Creek drainage because it encompasses both the Upper and Lower Mosquito Creek project analysis watersheds and effects of the fire are less concentrated and pronounced when spread over a larger watershed area (total drainage area for Mosquito Creek is about 7,400 acres, compared with 2,300 acres for the Clear Creek drainage). These effects of increased streamflow and debris flow were observed in the field in December 2012 (Figure 19 through Figure 21).

Higher ERA values are generally associated with higher peak flows that are more erosive and can lead to increased channel scour and higher sediment loads off-site. Beneficial uses for waters in the project watersheds include water recreation, terrestrial wildlife habitat, and cold freshwater habitat. Among these beneficial uses, aquatic habitat is the most sensitive to adverse water quality effects that could potentially result from land disturbing activities such as those proposed for this project. Alterations to watershed hydrology are believed to be the most probable mechanism for

initiating these effects to aquatic habitat (USDA 1988c). Stream channels in poor condition tend to be more sensitive to increases in peak flows because the channels frequently lack an effective root mass to bind streambanks and large organic debris to retain bedload materials. Such channels are frequently downcut (have eroded down into the bottom of their channels), and all flow is confined to the channel rather than to a broader floodplain. These type of sensitive channels are not common in the Chip-munk Project area, because most of the streams are steeper, transport streams with substantial rock and large tree root masses to hold channel banks together and, oftentimes, bedrock channel sections that control downcutting of the stream.

As described above in the Analysis Methodology section, the ERA threshold of concern (TOC) for analysis watersheds of the Chip-munk Project (i.e. ERA expressed as a percentage of watershed area) is 15 percent. The TOC does not represent the exact point at which cumulative watershed effects will occur, but serves as a “yellow flag” indicator of susceptibility for a watershed to experience significant adverse effects to water quality and beneficial uses. A closer look is needed for watersheds that are expected to exceed the TOC as a result of proposed activities.

Seven of the 15 project analysis watersheds exceed TOC (Figure 23). As described above in this section, the Chips Fire of 2012 is the largest land disturbance that has occurred within the Chip-munk Project analysis watersheds. In the pre-project, existing condition, four of the 15 analysis watersheds exceed the TOC (Butt Valley Reservoir East, Ohio Creek, Clear Creek, and Upper Mosquito Creek). Substantial changes to watershed hydrology, which may lead to impacts to beneficial uses such as freshwater aquatic habitat, have already occurred, as evidenced by the pre-project ERA values and observations of damage that occurred during runoff from the November 28-December 2 storms of 2012 (see Affected Environment section above). Further impact to watershed hydrology due to proposed treatment actions would be prevented by standard timber sale practices such as water bar installation and sub-soiling on hardened surfaces such as skid trails to disburse runoff; by design features and project monitoring that would assure the areal extent of effective soil cover in treated units exceeds pre-treatment levels; by RCA equipment exclusion zones to prevent motorized traffic near stream channels; and by design features to rehabilitate furrows in RCAs caused by end-lining or cable yarding harvested trees. In terms of protection of water quality in these watersheds, BMP monitoring on the Plumas National Forest, described above, has demonstrated that BMPs implemented during timber harvest actions are effective measures for preventing delivery of fine sediment to streams.

ERA increases for the seven analysis watersheds that exceed the TOC generally amount to about half of the ERA increase that resulted from the Chips Fire (with the Clear Creek watershed being an exception). Plumas National Forest BMPs and project design features, as described above, would assure that the additional disturbance from the Chip-munk Project Proposed Action would not result in significant water quality impacts, stream channel condition damage, or effects to beneficial uses of water.

Plumas National Forest is currently implementing or overseeing two other projects to salvage timber within the Chips Fire perimeter, the Chips Fire Roadside Hazard Tree Removal Project and the Chips Fire Pacific Gas and Electric (PG&E) Right of Way Salvage Timber Project. Activities associated with these projects have been considered in this cumulative effects analysis. ERA values associated with proposed ground disturbance for these two projects are included in the model results presented in Table 7.

In terms of BMPs and design features, these two projects are very similar to the activities proposed under the Chip-munk Project. There are instances where the design features for these two projects are less restrictive than the design features for the Chip-munk Project. For example, the RCA equipment exclusion zone along perennial streams is 50 feet for these two projects and 100 feet for the Chip-munk Project. Also, while the Chip-munk Project has established full suspension zones for RCAs, these zones are not part of the two projects named above (however, similar design features to prevent stream channel damage and water quality impacts for endlining activities are in place for all three projects). For the two projects named above, the somewhat less restrictive design features are not expected to result in significant water quality impacts, stream channel condition damage, or effects to beneficial uses of water because these activities will affect much less ground than the Chip-munk Project (both projects are less than 250 acres in size); because BMPs and standard operating procedures are identical for all three projects; and because the RCA design features, while less restrictive, are identical to the design features that were successfully implemented on the Moonlight Fire Recovery project.

For the Clear Creek watershed, the area of proposed skyline treatment has been reduced by about half from the acreage that was originally proposed in December 2012, focusing salvage units on the slopes with the best timber value. Beyond the standard water quality protection design features and standard practices described above, additional measures are included in this watershed to assure that beneficial uses of water would not be affected by the Chip-munk Project Proposed Action. As described above, gravel surfacing would be installed at road stream crossings on haul routes within the Clear Creek watershed. This treatment would not reduce ERA values in the watershed or affect the hydrology changes in the watershed that have occurred due to the fire, but would provide a significant reduction in delivery of road-generated fine sediment from the pre-project condition. Additionally, the equipment exclusion zone along ephemeral stream channels within the Clear Creek watershed would be doubled in size (from 25 feet on each side of the channel to 50 feet) to provide added assurance that motorized traffic would not result in sediment delivery to streams. Finally, the Proposed Action would obliterate a mid-slope section of road (at the end of NFS road 26N23C) in the Clear Creek watershed after that road is utilized for haul of salvaged timber. This section of road is currently closed and not on the National Forest System. However, several culverts with large fills remain on the road from past timber management activities and those culverts are at risk of plugging, potentially resulting in washing out of the road fills, which would send several thousand tons of fine sediment

downstream. This road obliteration would not substantially reduce ERA values for the watershed, but would provide a significant and lasting water quality protection measure for Clear Creek.

Because Proposed Action activities would occur within watersheds that are over TOC, several monitoring protocols would be required. The CA Regional Water Quality Control Board's (Central Valley Region) waiver of waste discharge requirements permitting would require that effectiveness and forensic monitoring be performed and that the water board be informed of monitoring results (CRWQCB 2005). Effectiveness monitoring consists of monitoring subsequent to harvest to evaluate whether management measures were effective. The Forest Service's BMP monitoring protocols would be applied to randomly chosen sites in Chip-munk Project units to satisfy the effectiveness monitoring requirement. Forensic monitoring employs visual field detection techniques, typically during storm events, to detect whether elevated turbidity in streams is the result of timber management actions. Photo points would be used to document turbidity sources.

In addition, the Forest Service Region 5 amendment to the Water Quality Handbook 2509, Chapter 10 would require larger-scale in-channel monitoring, such as the Stream Condition Inventory protocol, to determine whether Forest Service management activities are collectively effective in protecting and improving water quality. Pre-project monitoring would occur in summer 2013, with SCI sites established at the mouths of Clear Creek and Mosquito Creek.

Table 97. Equivalent Roaded Acre (ERA) model results for Chip-munk Project analysis watersheds

Watershed Name	Watershed Area (acres)	ERA, pre-project (without fire)	ERA due to Chips Fire	ERA, pre-project (with fire) (No-Action)	ERA for Proposed Action treatments	ERA after Proposed Action (including fire effects)
Butt Valley Reservoir East	3029	10.0%	5.6%	15.5%	1.0%	16.5%
Rocky Point	1366	2.7%	3.4%	6.1%	2.3%	8.4%
Ohio Creek	2829	8.7%	7.9%	16.7%	4.1%	20.7%
Salmon Creek (NFFR)	3022	3.2%	8.4%	11.6%	6.4%	18.0%
Clear Creek	2318	5.2%	13.2%	18.5%	10.5%	28.9%
Upper North Fork Feather River (NFFR)	1624	5.8%	6.3%	12.0%	3.8%	15.8%
Marion Ravine (NFFR)	4898	5.3%	5.6%	11.0%	2.2%	13.2%
Belden Forebay (NFFR)	4007	4.5%	9.0%	13.5%	4.8%	18.3%
Muggins Creek	3072	3.3%	6.3%	9.6%	3.9%	13.5%
Butt Valley Reservoir West	2596	2.3%	3.6%	5.9%	0.7%	6.5%
Butt Creek	1377	3.7%	5.5%	9.2%	2.0%	11.2%
Upper Mosquito Creek	3859	3.0%	12.6%	15.6%	3.7%	19.3%
Lower Mosquito Creek	3620	0.5%	11.9%	12.4%	1.0%	13.3%
Crablouse Creek (NFFR)	4325	2.4%	7.2%	9.6%	0.7%	10.4%
Gansner Bar (NFFR)	4556	1.7%	5.1%	6.8%	0.0%	6.8%

Alternative B (No-Action) – Direct and Indirect Effects

In general, direct and indirect effects are not applicable under the No-Action Alternative because no ground disturbance would occur within the project area. Planned Burned Area Emergency Response (BAER) treatments along National Forest System (NFS) roads would occur as these previously authorized activities are not affected by the Chip-munk Project decision. However, two actions proposed under Alternative A to improve or protect water quality and protect beneficial uses of water would not occur under Alternative B. The proposed treatment to install gravel road surfacing at stream crossing on NFS roads in the Clear Creek watershed would not

occur under Alternative B, forgoing an opportunity to reduce sediment deliver to streams from these roads. This treatment does not qualify as an emergency treatment under the BAER program, but other funding could be pursued in the future to accomplish the rock surfacing. Also, the obliteration of the unclassified section of road at the end of 26N23C in the Clear Creek watershed would not occur under Alternative B. Again, obliteration of this road section could be pursued in future NEPA analysis and with other potential future funding.

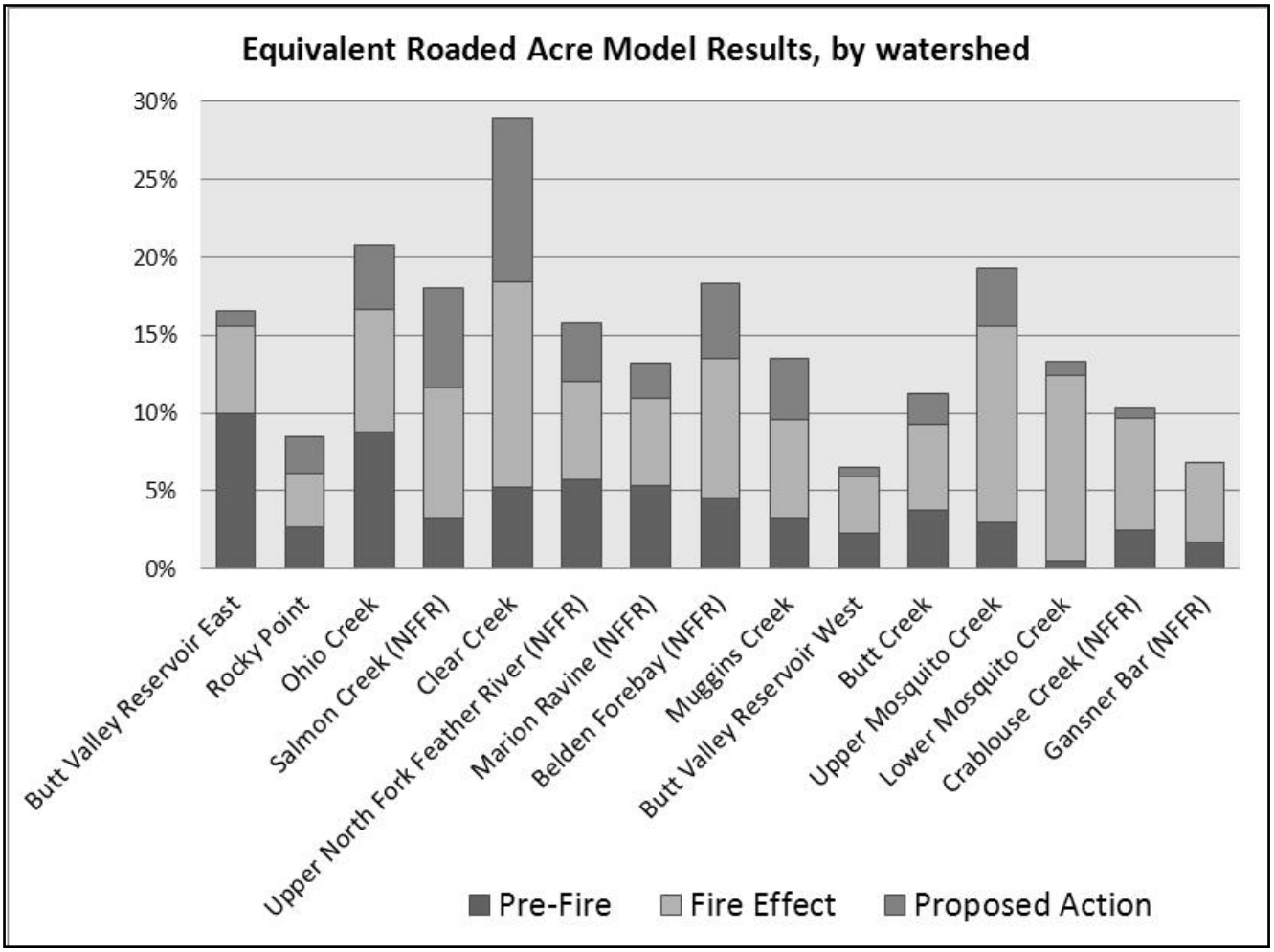


Figure 23. **Equivalent Roaded Acre (ERA) model results for Chip-munk Project analysis watersheds**

Alternative B (No-Action) – Cumulative Effects

The Equivalent Roaded Acre (ERA) model results presented in Table 97 and Figure 23 would apply to the project analysis watersheds under Alternative B, without the added ERA values due to activities associated with Alternative A. The Chips Fire would remain as the largest land disturbance that has occurred in Chip-munk Project watersheds. Large amounts of burned area in the analysis watersheds have resulted in potential for significantly increased precipitation runoff, bedload, and debris flow response. This effect of increased streamflow and debris flow were

observed in the field in following the high-intensity rainstorms of November 28 to December 2, 2012.

Higher ERA values are generally associated with higher peak flows that are more erosive and can lead to increased channel scour and higher sediment loads off-site. Among the beneficial uses of water designated by the California State Water Resources Control Board, aquatic habitat is the most sensitive to adverse water quality effects that could potentially result from elevated ERA values. In the pre-project, existing condition, four of the 15 analysis watersheds exceed the TOC (Butt Valley Reservoir East, Ohio Creek, Clear Creek, and Upper Mosquito Creek). Substantial changes to watershed hydrology, which may lead to impacts to beneficial uses such as freshwater aquatic habitat, have already occurred, as evidenced by observations of damage that occurred during runoff from the November 28-December 2 storms of 2012. The potential for further impacts to water quality and stream channel condition would exist within these watersheds — and to a lesser and more localized extent in substantially burned watersheds that are under the TOC — for the next several years until effective ground cover is restored in the burned areas.

Soil Resource Analysis

This analysis is organized by the two soil quality functions: soil productivity and soil hydrologic function. Analysis indicators appropriate to each of these functions are discussed; those indicators are effective soil cover, fine surface organic matter, large down woody material, soil compaction, and soil displacement. Soil capacity to buffer and filter chemical compounds and excess nutrients is not specifically analyzed because the Chip-munk Project does not involve significant application of chemicals such as herbicides, pesticides or other amendments

Alternative A (Proposed Action) – Direct and Indirect Effects of Roadside Hazard Tree Removal and Salvage Timber Harvest

Effects for Soil Productivity Function

Direct and Indirect Effects for Indicator 1: Soil Stability and Effective Soil Cover

Chip-munk Project operations to harvest roadside hazard trees and salvage timber could increase soil cover by adding project-generated slash and debris to the forest floor, but could also decrease cover during yarding operations due to trampling of emerging post-fire live vegetation or removal and displacement of existing duff, litter, or woody material. As described above in the Affected Environment section, pre-fire extents of effective soil cover were excellent in proposed treatment units, averaging 95 percent. However, the soil burn severity (SBS) map produced for the Chips Fire Burned Area Emergency Response (BAER) report indicates that roughly 60 percent of the area of the proposed treatment units was burned at high (14 percent) or moderate (43 percent) SBS. The BAER report indicated that nearly all of the duff, litter, live vegetation, and surface fine woody material was consumed by the fire in these high and moderate SBS areas, so it is clear that

the fire has significantly reduced the extent of effective soil cover within the proposed treatment units from the 2011 survey results.

In general, for slopes less than 35 percent (such as the slopes proposed for treatment in the Chip-munk Project), a minimum of 50 percent of soil cover in a well distributed pattern is needed to protect soil stability and prevent accelerated erosion. The Plumas NF LRMP (USDA 1988a) suggests extents of soil cover higher than 50 percent for areas of high Erosion Hazard Rating (EHR). Soil survey results from 2011 indicate that effective cover provided by rock (sized greater than ¾ inch) within surface soils is substantial in the proposed treatment units (Table 91), averaging 30 percent areal extent and ranging from 5 to 48 percent. Post-fire, this surface rock will continue to provide some level of effective soil cover in high and moderate SBS areas.

With little effective soil cover currently existing in much of the proposed treatment units, Chip-munk Project design features (Chapter 2 of this EA) stipulate that project-generated slash and debris be utilized to provide a resulting areal extent of ground cover that exceeds the pre-project condition in each of the units treated. For roadside hazard treatments, slash and hazard trees less than 10 inches dbh would be lopped and scattered and left on the ground to a depth of less than 18 inches in areas more than 50 feet from the roadway. Within 50 feet of roadways, slash and small hazard trees would be piled for burning, with piles created by hand or, where feasible and permissible to use motorized equipment, with a grapple pile. Unlike machine piling with a dozer blade, grapple piling equipment leaves substantial small debris on the ground. Both hand piling and grapple piling methods could be used to effect greater extent of soil cover than existed pre-project. For harvest of hazard trees along perennial streams in high SBS areas, all slash material and smaller hazard trees less than 10 inches dbh would left on the ground within equipment exclusion zones, regardless of proximity of harvested trees to the road (i.e. all slash would be left on the ground both within and outside of the 50-foot width from the road). For skyline and ground-based salvage timber harvest units, both inside and outside RCAs, project-generated slash would be lopped and scattered to a depth of less than 18 inches. For ground-based salvage units, this slash would be subsequently piled in preparation for reforestation, with grapple piling used to leave enough debris to result in an extent of soil cover that exceeds the pre-project condition. Grapple piling would not occur within RCA equipment exclusion zones, so in those zones slash would remain on the ground for salvage harvest units.

Past project monitoring on Plumas National Forest demonstrates that timber operations can result in effective levels of soil covers remaining after treatment. Beginning in 2001, effective soil cover has been monitored on HFQLG project units for both the pre- and post-project condition per the Monitoring Plan prescribed in the 1999 HFQLG FEIS (USDA 1999). Post-project monitoring began in 2004. The 2010 HFQLG Soil Monitoring Report presents effects to soil parameters for over 100 units treated on the 3 National Forests that are implementing the HGQLG pilot project (USDA 2011c). For effective soil cover monitoring, differences between silviculture methods are apparent as the 66 thinning units averaged 82 percent soil cover post-project and the 37 group

selection units averaged 64 percent effective cover post-project. While this monitoring was not performed on burned areas, ground disturbance associated with group selection treatments is likely similar to the level of ground disturbance associated with the salvage harvest operations proposed in the Chip-munk Project.

A representative sample of proposed treatment units would be surveyed for soil conditions in spring 2013. The set of sampled units would cover all soil types in the Chip-munk Project area, and would be skewed toward units that are more susceptible to accelerated erosion, such as units with substantial high or moderate SBS areas or substantial areas within the Deadwood family soils that have higher Erosion Hazard Rating. With these surveys establishing pre-project condition, these same units would be visited during operations to assure that the areal extent of soil cover after treatment exceeds the pre-project condition. Where units are observed to be lacking effective cover, consultations will occur with the timber sale administrator or contract administrator to refine the operator's techniques (e.g. raising the brush rake or piling less material) to assure that adequate cover is retained.

The Chips Fire is the most prominent land disturbance that would affect soil cover in the Chip-munk Project area. Despite the relatively high prevalence of rock in surface soils in the proposed treatments units and the methods of assuring that post-project soil cover would exceed pre-project levels, it is expected that many areas of the treated units would have effective soil cover that is below the desired condition of 50 percent areal extent. Soil cover condition would gradually improve over the next 1-3 years as live vegetation is established, primarily shrubs such as manzanita and whitethorn, grasses, forbs and (where moisture levels are sufficient) riparian species along streams. Thus, the desired condition of 50 percent areal extent would likely be achieved within 3 year after the fire. Seedlings planted during reforestation of the Chip-munk Project units would provide only a small amount of additional soil cover in this short timeframe.

During this fire recovery period, areas with insufficient cover would be susceptible to accelerated erosion during high intensity precipitation and snowmelt events. In the event of a large event causing overland flow, some erosion and movement of surface soils is expected. The amount and type of erosion depends on the character of the area. For example, isolated patches of forest floor with insufficient cover material across a large area would be more effective at intercepting surface water than large areas devoid of cover. The jackpot burning site preparation treatment would likely result in this type of cover condition, with scattered patches of mostly bare soil that would not lead to significant soil erosion because the patches would be very small relative to the total stand area and most of the stand area would have unburned cover remaining. The effect of insufficient soil cover would generally be well distributed across treated units. With the existing rock content and project design features for leaving soil cover, only minor portions of treated units are expected to experience signs of accelerated erosion such as soil pedestals, sheet movement, or rills. Burning of slash piles on roadside hazard units would remove soil cover locally in small, isolated patches and would not result in large, contiguous bare areas that would

promote extensive sheet or rill erosion if overland flow were to occur. Concentrated removal of soil cover is most likely to occur in areas such as landings, skid trails, and equipment tracks. Soil erosion would be minimized by the installation of erosion control structures (cross ditches and water bars) which are standard timber sale contract practices.

Barring an extremely large rain-on-snow runoff event on areas of high or moderate SBS, any movement of soil within all areas of the fire is not expected to be of a pattern or size that would significantly affect soil productivity or that would impact water quality. Gullying and rilling of hillslopes was not observed on hillslopes during the first several years of vegetative recovery following the 2007 Moonlight Fire. BMP evaluations (2010) for streamside management zones treated within Moonlight Fire salvage recovery and roadside hazard treatment units did not indicate sediment delivery to channels due to hillslope erosion.

Cumulative Effects for Indicator 1: Soil Stability and Effective Soil Cover

Throughout the Chip-munk Project analysis watersheds, the largest threat for accelerated erosion both within and outside of proposed treatment units stems from the large, contiguous areas of insufficient soil cover that resulted from the Chips Fire of 2012. The Plumas National Forest LRMP suggests minimum extents of effective cover of 40 percent to 60 percent for soils within the project area (USDA 1988a). Recovery of effective soil cover to these suggested levels throughout all areas of the fire that burned at high or moderate SBS is expected to take 1-3 years, as live vegetation growth is established and seasonal decomposition adds to the duff and litter layer. Due to project design features that would increase ground cover in treated units, effects of the proposed treatments are not expected to significantly increase the threat of accelerated erosion. If a typical high intensity precipitation event were to occur during that time period, only minor portions of treated units are expected to experience signs of accelerated erosion such as soil pedestals, sheet movement, or rills. Substantial gully erosion due to the rainstorms of November 28 – December 2, 2012 was not observed during limited post-storm visits to the Chip-munk Project area, with increases in bedload in steam channels stemming mostly from increased streamflow within stream channels. Throughout the Chips Fire area, a large rain-on-snow runoff event on areas of high or moderate SBS could cause accelerated erosion that would affect water quality, but this effect would likely occur both near and away from units treated by the Chip-munk Project. A large rain-on-snow runoff event on areas of high or moderate SBS could also cause accelerated erosion that would affect soil productivity, if substantial areas of topsoil were removed in rills or gullies. However, an exceptionally large runoff event would be necessary to produce this response. Gullying and rilling of hillslopes has not been observed on hillslopes during the first several years of vegetative recovery following the 2007 Moonlight Fire.

Direct and Indirect Effects for Indicator 2: Surface Fine Organic Matter

Effects to surface fine organic matter due to Chip-munk Project activities would be similar to effects for effective soil cover. Surface fine organic matter would increase by adding project-

generated slash and debris to the forest floor, but the existing areal extent of fine organic matter could be decreased due to rearrangement by harvesting and yarding equipment operations.

As described above in the Affected Environment section, pre-fire levels of fine organic matter are robust throughout the surveyed units, with an average areal extent of 90 percent and levels ranging from 72 percent to 100 percent. However, since the proposed treatment units are predominately located in areas of high or moderate SBS, much of this surface fine organic matter was likely consumed during the Chips Fire. Unlike the discussion above for effective soil cover, surface rock does not contribute to the level of surface fine organic matter, so the resulting effect of the Chips Fire on fine organic matter is a greater reduction in areal extent than the result of the fire for soil cover.

The desired condition for surface fine organic matter is at least 50 percent fine organic matter well distributed over treatment units, with less than 30 percent areal extent representing a poor condition. Due to effects from the Chips Fire, it is clear that many of the proposed treatment units are currently well below the desired condition of 50 percent areal extent. Surface fine organic matter would gradually improve over the next 1-3 years as live vegetation, primarily shrubs with some grasses and forbs, is reestablished and decomposition develops a layer of litter on the forest floor. However, given the increased timeframe necessary for recovering vegetation to develop a substantial litter layer, it will take several years for surface fine organic matter to reach the desired condition of 50 percent in areas where duff, litter, and small wood material was consumed by the Chips Fire.

The same Chip-munk Project design features (Chapter 2 of this EA) for utilization of project-generated slash and debris to increase effective soil cover would provide an increase in surface fine organic matter for all treated units over the pre-project condition. Therefore, the extent of surface fine organic matter would likely recover more quickly in proposed treatment units than in other areas of the Chips Fire that burned at high or moderate SBS. However, while the added woody debris would add to the total nutrient pool stored in the forest floor, these nutrients are largely unavailable to plants in their organic forms until they are slowly decayed and recycled by soil organisms. As a result of the decomposition process, nutrients are released in available form for uptake by plants and other organisms. Terrestrial cycling pathways return some nutrients relatively quickly.

Fine organic matter on the soil surface and within the mineral soil are major sources of ecosystem nutrients such as nitrogen, essential for plant growth and soil productivity. However, plant growth is influenced by many factors, including the climate regime, soil aeration, moisture and nutrient availability, soil strength, root-soil interactions, soil mass flow and diffusion properties, and numerous other factors. Recent research indicates that available soil moisture and water-holding capacity is the primary driver of soil productivity and only drastic decreases in surface organic matter leads to measurable changes in plant growth. The North American Long-Term

Soil Productivity (LTSP) is comprised of 26 forest study sites that have been experimentally subjected to various degrees of soil compaction and removal of forest organic matter (Powers et al. 2005). The national ten year results indicate that bole only and whole tree organic matter removals, similar to typical forest thinning treatments, have had no detectable effects on soil nutrition or biomass productivity. Significant reductions in soil carbon and nutrient availability were observed only for the extreme case of whole tree removal plus complete removal of all surface organic matter on the forest floor.

While this second scenario of complete removal of all surface organic matter may be similar to the condition within high or moderate SBS areas of the Chip-munk Project units — and reductions in soil carbon and nutrient availability has likely occurred in those units — data trends for the study indicated no general decline in biomass productivity across any of the organic matter removal levels. Given that surface fine organic matter would increase in proposed treatment units due to slash treatments, soil productivity potential is not expected to be limited any more in project treatment units than in other similarly burned areas of the Chips Fire.

Cumulative Effects for Indicator 2: Surface Fine Organic Matter

Throughout the Chips Fire area, areal extent of surface fine organic matter is likely well below the desired condition in areas that burned at high or moderate SBS. Since most of the tree canopy was also consumed in these areas, potential for increases in fine organic matter due to needle cast is limited and this poor condition will likely persist for several years until vegetation is re-established and litter layers regenerated. Units proposed for treatment under the Proposed Action would realize increases in surface fine organic matter due to project design features that would require slash and fine woody debris to be left on the ground. However, this woody material is largely unavailable for nutrient uptake by plants. Microorganisms that decompose wood would immobilize nitrogen and other nutrients while decaying the woody material. As the wood decomposes, those nutrients would be released and made available to plants and other organisms (Swift et al. 1979). Microclimate changes at the forest floor due to reduced canopy cover could alter rates of decomposition and nutrient turnover in the surface fine organic matter of harvested stands (Erickson et al. 1985). While surface fine organic matter is an important source of soil carbon and nutrients — and long-term maintenance of the amount and distribution of organic matter within the normal range for forest ecological types is clearly desired — recent research indicates that short-term, drastic reductions in soil organic matter is not a significant limiting factor for plant growth. The short-term reductions of fine organic matter in areas of high and moderate SBS within the proposed treatment units and throughout the Chips Fire areas is not expected to be of a size or pattern that would result in significant change in soil productivity.

Direct and Indirect Effects for Indicator 3: Down Large Woody Debris

As described above in the Affected Environment section — and similar to the condition of the soil cover and fine organic matter indicators — pre-fire levels of down large wood were more

than adequate throughout the surveyed units, averaging 51 tons per acre and ranging 30 to 85 tons per acre. However, since the proposed treatment units are predominately located in areas of high or moderate SBS, much of this large down wood was likely consumed during the Chips Fire. The standard for this indicator for the Chip-munk Project is that 10 to 15 tons of the largest down logs, where they exist, would be retained during treatment.

Some of the larger down wood pieces were likely not consumed by fire in areas of low and moderate SBS. Additionally, several fire-killed trees have likely fallen over the past winter and spring. Mechanical operations in the proposed treatment units would likely rearrange large down woody material on the forest floor but, per the project standard, much of this will be left in the units. Additionally, some new woody debris may be created if hazardous snags are felled and left on site. Therefore, it is fully expected that the project standard of 10 to 15 tons of large down wood would be met in all Proposed Action treatment units. Where this level of down wood is not available during treatment, as may occur in areas of high SBS, the project standard would be met in the near-term after treatment (1-2 years) as more fire-killed trees fall within the treatment units.

Cumulative Effects for Indicator 3: Down Large Woody Debris

Reductions in large woody material due to the Chips Fire would cause minor, localized changes to soil microhabitat. Decaying logs can retain moisture longer during the summer season compared with litter and duff materials. A loss of logs and subsequent change in moisture conditions could result in changes in nutrient cycling and microbial activity at the location of the log. However, this change is expected to be insignificant for soil productivity at the proposed unit scale and certainly at the stand scale, since widespread falling of fire-killed trees is expected in forest areas outside of the treatment units. Due to fire effects, resulting areas of high down wood would often be “jack-strawed,” with woody materials accumulated atop each other. When wood is not in direct contact with the ground, its decomposition rate is greatly reduced.

Direct and Indirect Effects for Indicator 4: Soil Strength (Compaction)

As described above in the Affected Environment section, the extent of detrimental compaction indicated by the 2011 surveys is generally low. For the 19 units surveyed, the spatial extent of detrimental compaction generally ranged from 0 to 12 percent (Table 91), with mean and median levels of 6 percent and 4 percent, respectively. Over the vast majority of the project area, the soil strength level is conducive to favorable rooting environment for desired plant species. Fire effects would not substantially change physical soil strength (compaction).

Timber harvest and biomass removal would require the use of skid trails and landings. A number of skid trails and landings exist within the treatment units, and it is predicted that some of these will be re-used to implement the proposed activities. The use of heavy forestry equipment and frequent stand entries would increase the potential for soil compaction (Powers et al. 1998). For any mechanical harvest, the extent and degree of compaction would depend on site-specific soil conditions such as texture and stoniness, moisture content at the time of operations, and harvest

equipment features. Project design criteria include implementation of BMPs and other soil protection measures, such as wet weather standards, to minimize soil compaction (Appendix B of this EA). Erosion control and compaction remediation measures for landings and skid trails are addressed by BMP 1.16 ("Log Landing Erosion Control") and BMP 1.17 ("Erosion Control on Skid Trails").

A growing body of recent research suggests that compaction is not always detrimental to forest productivity. For example, after 10 years of growth, the North American Long-Term Soil Productivity (LTSP) experiment has found that soil productivity was both positively and negatively affected by compaction treatments (Powers et al. 2005). In this comparison of 26 study sites, the effects of compaction depended on soil texture. In general, sandy soils showed improved productivity in compacted soil, clayey soils had reduced growth, and loams showed no apparent trend. Soils in the Chip-munk Project treatment units are largely dominated by loamy soil textures, often with a moderate amount of coarse fragments present at a depth of 4 to 8 inches. The risk of compaction in these texture classes is generally low to moderate. Compaction of soils that may occur in these texture classes would not necessarily reduce site productivity. The wet weather operation soil protection measure would reduce compaction effects. It is important to note that the LTSP study utilizes extreme levels of soil compaction; a mechanical roller, typically used for compaction of highway subgrades, was used to compact the test plots at optimum moisture for compaction. The extent of detrimental soil compaction should not be of a size or pattern that would result in a significant change in soil production potential for the Proposed Action treatment areas.

Cumulative Effects for Indicator 4: Soil Strength (Compaction)

With the incorporation of the design criteria for this project, and the fact that a large number of the units have a low to moderate compaction potential, it is reasonable to expect that only a portion of the new skid trails would contribute to the cumulative amount of detrimental compaction and increase in soil strength. Monitoring of detrimental soil compaction has occurred within the HFQLG Pilot Project area. These data suggest that each harvest entry into an area will add a small amount of compaction (USDA 2010d). Soil porosity and compaction monitoring results reported in the 2007 HFQLG Soil Monitoring report stated that a review of monitoring data indicates that legacy compaction is commonplace (USDA 2008b). Most of the detrimental compaction observed post-project also existed pre-project (USDA 2011c). The 2010 report stated that the observed overall change in compaction levels was not large. For the 107 sets of pre- and post-treatment data available, only 10 units were below the report's analysis threshold for areal extent of detrimental compaction in the pre-treatment condition and then over that threshold in the post-treatment condition (USDA 2011c). Statistical analysis presented in the 2007 report determined that, for 40 thinned units and 11 group selection units (the total number of pre- and post-treatment data sets available at that time) the mean post-project areal extent of detrimental compaction was not statistically different from the pre-project mean. Confidence intervals

indicated broad ranges that suggested both a trend toward increasing the extent of detrimental compaction and a trend toward decreasing extent.

The cumulative effect of the mechanical operations proposed in the Chip-munk Project is likely an increase of detrimental compaction in localized areas (e.g. skid trails) and a small increase in the extent of detrimental compaction at the scale of the treated units. This increase, however, may not result in any measurable change to soil productivity for the reasons discussed above. In the LTSP study, an extraordinary effort was used to compact the soil for research purposes. The expected extent of detrimental soil compaction due to the Proposed Action would not be of a size or pattern that would result in significant change to production potential for the activity area or a significant change to production potential at the scale of the Chips Fire.

Direct and Indirect Effects for Indicator 5: Soil Displacement

As stated above in the "Affected Environment" section, observed soil displacement levels during the 2011 surveys were low. The thickness and color of the upper soil layer was generally within the normal range of characteristics for the site and was distributed normally across the area. Localized areas of displacement were observed to have occurred but were not widespread. No displacement was observed on 11 of the 19 transects surveyed. For the 8 transects in which displacement was observed, 1 or 2 of the 25 points were determined to be displaced. The 2012 Chips Fire did not displace soils and current conditions in the proposed treatment areas are expected to be the same as the pre-fire condition for this indicator.

Occurrences of further displacement of soil due to Proposed Action treatments are not expected to be widespread. Monitoring performed for HFQLG projects indicate that standard timber harvest practices utilized result in less than 10 percent of the areal extent of treated units had displaced soils and that displacement levels were similar to pre-activity levels (USDA 2011c). Design features for proposed Chip-munk Project units (in Chapter 2 of this EA) are prescribed to limit soil displacement, including re-use of existing skid trails and landing. For outer RCAs (outside of the equipment exclusion zones), where motorized equipment is permitted, equipment would not be permitted to turn around while off a skid trail.

Cumulative Effects for Indicator 5: Soil Displacement

Occurrences of displaced soil within proposed treatment units and within the project analysis area are low in frequency. Localized areas of soil displacement would likely occur due to the Proposed Action, but these areas would comprise a very small percentage of productive soils within forest stands and the soil productivity for desired plant species would not be affected.

Effects for Soil Hydrologic Function

Soil hydrologic function is the inherent capability of the soil to absorb, store and transmit water within the soil profile. Soil hydrologic function is dependent upon an adequate level of cover to reduce rainfall impact and runoff energy, stable soil structure, and sufficient macro-porosity to

permit water infiltration and movement through the soil. For the Chip-munk Project, two indicators used for the soil productivity function (effective soil cover and soil porosity and compaction) are also used as measures for the soil hydrology function. The litter layer of soil cover absorbs water, increases storage capacity, and slows the velocity of overland flow. Soil compaction can cause poor water infiltration, restricted percolation, and increased overland flow during high precipitation events.

Direct and Indirect Effects for Soil Hydrologic Function

Relative to the Proposed Action, effects for the two pertinent soil quality indicators, effective soil cover, soil structure, and macroporosity are described above. While the pre-fire soil survey results for extent of effective soil cover indicated excellent levels of cover, it is expected that much of this cover was consumed in the Chips Fire of 2012 because the proposed treatment units are largely located in areas of moderate or high SBS, where substantial numbers of trees were killed by fire. While the relatively high level of rock occurrence in surface soils with the project area would still provide effective soil cover to prevent accelerated erosion, these rocky soils do not necessarily enhance soil infiltration. Project design features to increase effective soil cover in treated units by leaving slash and woody debris on the ground would aid soil water-holding capacity, particularly for finer wood debris that makes good contact with soil surfaces. However, the profound lack of duff and litter layer in areas burned with high or moderate SBS would still result in impacts to soil hydrologic function and localized areas that are prone to overland flow during high intensity runoff events would exist within the project area until vegetative recovery results in soil cover levels returning to desired conditions (roughly 1-3 years after the fire).

The extent of detrimental compaction within proposed treatment units, as indicated by the 2011 soil field surveys, is generally low and fire effects did not substantially change physical soil strength (compaction). Visually, soil structure and macroporosity were observed to bee relatively unchanged from natural condition and signs of erosion or overland flow were absent or very limited in degree and extent. Mechanical operations proposed in the Chip-munk Project would likely result in an increase of detrimental compaction in localized areas, such as along skid trails, but prescribed BMPs have demonstrated to be an effective means for disbursing drainage along these compacted features. Project design features prescribe that landings, skid trail approaches to landings (to a distance of 200 feet), and any temporary roads utilized for timber haul would be subsoiled through the full depth of compaction to restore soil infiltration and permeability capacity. Subsoiling activities would be conducted per the recommendations stated in a 2006 review of subsoiling treatments by the Regional soil scientist (USDA 2006c).

As described below, the largest land disturbance that has affected soil hydrologic function in the project area is the Chips Fire of 2012. Given the design features that would increase effective soil cover in proposed treatment units, the limited degree of detrimental compaction expected in the units, and project BMPs and subsoiling activities that would disburse drainage and/or restore soil

infiltration capacity along compacted surfaces, the Proposed Action would not result in occurrences of overland flow and erosion within treated units beyond the occurrences that would be expected in similarly burned areas outside of the treated units.

Cumulative Effects for Soil Hydrologic Function

The most substantial effect to soil hydrologic function within the proposed treatment units and throughout the Chips Fire area and project analysis watersheds is the development of water repellency or hydrophobicity that has occurred in soils heated by intense wildfire is. During the Chips Fire BAER assessment, severe water repellency was found to occur mostly in moderate and high soil burn severity classes, but was highly variable even within these areas. Where it was observed, water repellency was found from the bottom of the surface-charred layer (generally 0.5-1 inch deep), and varying in thickness from 1-6 inches in high SBS. Where it does occur, repellency will be largely responsible for increased runoff response from areas burned with moderate or high soil burn severity. Repellency effects due to the fire will gradually diminish over the next 3-7 years.

Alternative B (No-Action) –Direct and Indirect Effects

Effects for Soil Productivity Function and Soil Hydrologic Function

Direct and indirect effects to soil productivity function and soil hydrologic function are not applicable under the No-Action Alternative because no ground disturbance would occur within the project area.

Alternative B (No-Action) –Cumulative Effects for Soil Productivity Function

Cumulative Effects for Indicator 1: Soil Stability and Effective Soil Cover

Throughout the Chip-munk Project analysis watersheds, contiguous areas of insufficient soil cover that resulted from the Chips Fire of 2012 would remain as the largest threat for accelerated erosion both within and outside of proposed treatment units under Alternative B. Recovery of effective soil cover throughout all areas of the fire that burned at high or moderate SBS is expected to take 1-3 years, as live vegetation growth is established and seasonal decomposition adds to the duff and litter layer. Substantial gully erosion due to the rainstorms of November 28 – December 2, 2012 was not observed during limited post-storm visits to the Chip-munk Project area, with increases in bedload in steam channels stemming mostly from increased streamflow within stream channels. Throughout the Chips Fire area, a large rain-on-snow runoff event on areas of high or moderate SBS could cause accelerated erosion that would affect soil productivity, if substantial areas of topsoil were removed in rills or gullies. However, an exceptionally large runoff event would be necessary to produce this response. Gullying and rilling of hillslopes has not been observed on hillslopes during the first several years of vegetative recovery following the 2007 Moonlight Fire.

Cumulative Effects for Indicator 2: Surface Fine Organic Matter

Throughout the Chips Fire area, areal extent of surface fine organic matter is likely well below the desired condition in areas that burned at high or moderate SBS and this condition would persist under Alternative B. While surface fine organic matter is an important source of soil carbon and nutrients — and long-term maintenance of the amount and distribution of organic matter within the normal range for forest ecological types is clearly desired — recent research indicates that short-term, drastic reductions in soil organic matter is not a significant limiting factor for plant growth. The short-term reductions of fine organic matter in areas of high and moderate SBS within the proposed treatment units and throughout the Chips Fire areas is not expected to be of a size or pattern that would result in significant change in soil productivity.

Cumulative Effects for Indicator 3: Down Large Woody Debris

Reductions in large woody material due to the Chips Fire has likely caused minor, localized changes to soil microhabitat. However, this change is expected to be insignificant for soil productivity throughout the analysis watershed under Alternative B, since widespread falling of fire-killed trees is expected in burned areas over the next several years.

Cumulative Effects for Indicator 4: Soil Strength (Compaction)

The 2011 soil condition surveys indicate that detrimental compaction is not widespread within the Chip-munk Project area, occurring mostly in localized areas such as along skid trails, landings, and unclassified roads utilized in past timber harvest actions. This extent of detrimental soil compaction is not expected to be of a size or pattern that has resulted in significant change to plant growth in the project area.

Cumulative Effects for Indicator 5: Soil Displacement

Occurrences of displaced soil within proposed treatment units and within the project analysis area are low in frequency, as indicated by the 2011 soil condition field survey. These areas comprise a very small percentage of productive soils within forest stands and it is expected that the soil productivity for desired plant species in the Chip-munk Project area has not been significantly affected.

Alternative B (No-Action) –Cumulative Effects for Soil Hydrologic Function

The most substantial effect to soil hydrologic function that has occurred within the Chip-munk Project area is the development of water repellency (hydrophobicity) that has occurred in soils heated by intense wildfire is. During the Chips Fire BAER assessment, severe water repellency was found to occur mostly in moderate and high soil burn severity classes, but was highly variable even within these areas. Where it does occur, repellency will be largely responsible for increased runoff response from areas burned with moderate or high soil burn severity. Repellency effects due to the fire will gradually diminish over the next 3-7 years.

Comparison of Alternatives

As described above in the Environmental Consequences section for soil and water resources, the Chips Fire of 2012 is the largest land disturbance associated with both Alternative A (Proposed Action) and Alternative B (No-Action). Under both alternatives, the potential exists over the next several years for increased watershed response for large precipitation and snowmelt events that saturate soils to the extent that overland flow is initiated. This increased watershed response could occur throughout the project analysis watersheds under both Alternatives, with the degree of effect primarily affected by the amount of moderate and high soil burn severity that exists within each watershed. Elements of this increased response include increased stream, bedload, and debris flows and the potential for accelerated erosion from watershed hillslopes. The potential for such response would decrease steadily over the next 1-3 years as live vegetation (primarily shrubs with some grasses and forbs and also riparian species along streams where moisture levels are sufficient) re-occupies burned areas to increase ground cover and root stabilization and to regenerate surface fine organic matter contained in the duff and litter layer.

The Proposed Action would provide an increase in the amount of soil cover that exists in all units treated for roadside safety hazards or for recovery of salvage timber. This increase would slightly decrease the potential for accelerated erosion in the treated units. Project design features, RCA requirements, and BMPs would assure that water quality and beneficial uses of water would not be significantly affected by treatments proposed under Alternative A. Road improvements, including addition of gravel surfacing and obliteration of one segment of road, are proposed in Alternative A to provide localized improvements to long-term water quality protection. These road treatments would not occur under Alternative B, although future funding sources could be pursued to implement those road treatments.

Compliance with the Forest Plan and Other Direction

Clean Water Act

The Forest Service is complying with the provisions of the Clean Water Act as it pertains to the Chip-munk Project. Section 208 of the Clean Water Act requires States to prepare nonpoint source pollution plans that are to be certified by the State and approved by the United States Environmental Protection Agency (EPA). In response to this law, and in coordination with the State of California Water Quality Resources Control Board and EPA, the Forest Service, Region 5, began developing best management practices (BMPs) in 1975 for water quality management planning on National Forest System lands in California. This process culminated in the development of the 1981 Management Agency Agreement (MAA) between the California State Water Resources Control Board and the USDA, Forest Service (USDA 2000a). The Region 5 amendment to the Forest Service Handbook for water quality management (USDA 2011a) provides recently updated BMPs, which are augmented by the set of national Forest Service BMPs (USDA 2012d).

The Chip-munk Project meets this through the incorporation of project design features (EA, Chapter 2), standards and guidelines for RCAs contained in the SNFPA ROD (USDA 2004b), soil standards and guidelines (PNF LRMP, USDA 1988a, pages 4-43 to 4-45); and best management practices, streamside management plan, standard timber harvest provisions, and monitoring described in Appendix B of this EA. Refer to the Environmental Consequences section above for the assessment of environmental effects for soil and water resources.

Alternative A includes treatments for improving National Forest System (NFS) roads. Treatments range from light brushing and maintenance of existing drainage structures, to installation of gravel road surfacing, to obliteration of a segment of road. These treatments would provide long-term improvements to water quality protection.

Floodplain Management, Executive Order 11988 of May 24, 1977 and Protection of Wetlands, Executive Order 11990 of May 24, 1977

These executive orders provide for protection and management of floodplains and wetlands. Compliance with these orders will be assured by incorporating project riparian conservation objectives; adhering to forest plan standards and guidelines; implementing best management practices and standard timber harvest provisions (Appendix B of this EA); and project design features.

Botanical Resources

Introduction

The purpose of this section is to present the effects of the proposed project on botanically sensitive resources within the Botany analysis area. Throughout this section, the term “rare species” is used to refer to federally Endangered, Threatened, and Candidate plant species and Forest Service Region 5 Sensitive species. A complete discussion of effects to these species, as well as to Plumas National Forest special interest species, is provided in the “Chip-munk Recovery and Restoration Project: Biological Evaluation of Potential Effects to Threatened, Endangered, and Sensitive Plant Species” (USDA 2013f), which is located in the project record and incorporated by reference.

Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction

The Chip-munk Project is designed to fulfill the management direction specified in the 1988 Plumas National Forest Land and Resource Management Plan (PNF LRMP) (USDA 1988a), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) FSEIS and ROD (USDA 2004a, b). The management activities are designed to comply with the standards and guidelines as described in the SNFPA FSEIS and ROD (USDA 2004a, b) and the PNF LRMP (USDA 1988a).

Regulatory Environment

Federal Laws

Endangered Species Act (16 USC 1531 et seq.): This biological evaluation is being prepared in accordance with the Endangered Species Act of 1973 as amended (16 USC 1531 et seq.). Under this act, federal agencies must ensure that any action authorized, funded, or carried out by the agency is not likely to (a) jeopardize the continued existence of any listed species or (b) result in the destruction or adverse modification of a listed species' designated critical habitat. Section 7 of the act requires federal agencies to consult the U.S. Fish and Wildlife Service concerning listed (i.e. threatened or endangered) plant species that fall under their jurisdiction.

Forest Service Manual (FSM) Direction

FSM Section 2670 (USDA 2005b): provides policy for the protection of sensitive species and calls for the development and implementation of management practices to ensure that species do not become threatened or endangered because of Forest Service actions. It requires a review of all activities or programs that are planned, funded, executed, or permitted for possible effects on federally listed or U.S. Forest Service sensitive species (FSM 2672.4, USDA 2005b). A Biological Evaluation (BE) provides the means to conduct this review, analyze the significance of potential adverse effects, and determine how negative impacts will be minimized or avoided for those species whose viability has been identified as a concern. The objectives of a BE are to:

- ensure that Forest Service actions do not contribute to loss of viability of any native or desired nonnative plant or animal species;
- ensure that Forest Service actions do not jeopardize or adversely modify critical habitat of Federally listed species; and
- provide a process and standard through which rare plant species receive full consideration throughout the planning process, reducing negative impacts on species and enhancing opportunities for mitigation.

Forest Plan Direction

Plumas NF Land Management Plan (USDA 1988a, 2004b): provides management direction for all Plumas NF Sensitive plants; that direction is to "maintain viable populations of sensitive plant species" (USDA 1988a, page 4-34). The 1988 Forest Plan also provides forest-wide standards and guidelines to:

- protect Sensitive and Special Interest plant species as needed to maintain viability;
- inventory and monitor Sensitive plant populations on an individual project basis; and

- develop species management guidelines to identify population goals and compatible management activities / prescriptions that will maintain viability.

Management direction for sensitive plant species on the Plumas NF is also provided in the Sierra Nevada Forest Plan Amendment (SNFPA) Final Supplemental Environmental Impact Statement (USDA 2004a). The standards and guidelines provided in the SNFPA include conducting field surveys, minimizing or eliminating direct and indirect impacts from management activities, and adhering to the Regional Native Plant Policy (USDA 2004a).

Interim Management Prescriptions

Individual species conservation strategies, or species management guidelines, for the Plumas NF have not been completed for most of the Forest's Sensitive species. Until these conservation strategies have been completed, the Plumas NF has developed Interim Management Prescriptions (USDA 2007b) that will be followed to ensure compliance with the Plumas LRMP (USDA 1988a). These species-specific prescriptions are provided in this document.

Effects Analysis Methodology

Geographic Area Evaluated

The area analyzed in this document is referred to as the "botany analysis area"; it encompasses approximately 48,120 acres and consists of all proposed treatment units, access roads to the treatment units, and the area within one mile of treatment unit boundaries. This area was chosen to capture all rare plants and noxious weeds that occur (a) within the proposed treatment units or (b) have suitable habitat within the Chip-munk Project Area as well as a source population (i.e. potential for seed dispersal) located within close proximity to the proposed activities.

Species Analyzed

Those species present within the Botany analysis area were considered to have the highest potential to be impacted by the proposed project activities. Conversely, species outside of the analysis area were not considered to have a high likelihood of being impacted by the proposed project either directly, indirectly, or cumulatively. Table 98 lists all Federally Threatened, Candidate (USDI 2013), and U.S. Forest Service Region 5 Sensitive vascular plant, moss, lichen, and fungi species (USDA 2013)that are known or thought to have potential to occur on the Plumas NF. The Forest Service sensitive species analyzed in detail in this document (i.e. those that fall within proposed treatment units) are also indicated in the table below. All rare species known in the Botany analysis area are included in the Biological Evaluation or Special Interest Report for the project.

Table 98. Threatened, Endangered, Candidate and Sensitive species known within proposed treatment units or the Chip-munk Project botany analysis area.

Species	Common Name	Listing Status	Occurs within analysis area	Occurs within proposed treatment units
Allium jepsonii	Jepson's onion	Sensitive		
Astragalus lemmonii	Lemmon's milkvetch	Sensitive		
Astragalus lentiformis	lens-pod milkvetch	Sensitive		
Astragalus pulsiferae var. coronensis	Pulsifer's milkvetch	Sensitive		
Astragalus pulsiferae var. pulsiferae	Suksdorf's milkvetch	Sensitive		
Astragalus webberi	Webber's milkvetch	Sensitive		
Balsamorhiza macrolepis	Big scale balsamroot	Sensitive		
Boechera constancei	Constance's rock cress	Sensitive	X	
Botrychium ascendens	upswept moonwort	Sensitive		
Botrychium crenulatum	scalloped moonwort	Sensitive		
Botrychium lunaria	common moonwort	Sensitive		
Botrychium minganense	Mingan moonwort	Sensitive		
Botrychium montanum	western goblin	Sensitive		
Botrychium pinnatum	northwestern moonwort	Sensitive		
Bruchia bolanderi	Bolander's bruchia	Sensitive		
Buxbaumia viridis	Bug-on-a-stick	Sensitive		
Calycadenia oppositifolia	Butte County calycadenia	Sensitive		
Clarkia gracilis ssp. albicaulis	white-stemmed clarkia	Sensitive		
Clarkia mildrediae ssp. mildrediae	Mildred's clarkia	Sensitive	X	
Clarkia mosquinii	Mosquin's clarkia	Sensitive		
Cypripedium fasciculatum	clustered lady's-slipper	Sensitive	X	X
Cypripedium montanum	mountain lady's-slipper	Sensitive		
Dendrocollybia racemosa	Branched collybia	Sensitive		
Eleocharis torticulmis	Twisted spike rush	Sensitive		
Eremogone cliftonii	Clifton's eremogone	Sensitive		
Eriogonum microthecium Var. schoolcraftii	Schoolcraft's wild buckwheat	Sensitive		
Eriogonum umbellatum var ahartii	Ahart's buckwheat	Sensitive		

Species	Common Name	Listing Status	Occurs within analysis area	Occurs within proposed treatment units
Fissidens aphelotaxifolius	brook pocket moss	Sensitive		
Fissidens pauperculus	minute pocket moss	Sensitive		
Frangula purshiana ssp. ultramafica	Caribou coffeeberry	Sensitive	x	
Fritillaria eastwoodiae	Butte County fritillary	Sensitive		
Helodium blandowii	Blandow's bog moss	Sensitive		
Ivesia aperta var. aperta	Sierra Valley ivesia	Sensitive		
Ivesia sericoleuca	Plumas ivesia	Sensitive		
Ivesia webberi	Webber's ivesia	Federal Candidate, Sensitive		
Juncus luciensis	Santa Lucia dwarf rush	Sensitive		
Lewisia cantelovii	Cantelow's lewisia	Sensitive		
Lewisia kelloggii ssp kelloggii	Kellogg’s lewisia	Sensitive		
Lewisia kelloggii ssp. hutchisonii	Hutchison's lewisia	Sensitive	x	x
Lomatium roseanum	Adobe lomatium	Sensitive		
Meesia uliginosa	broad-nerved hump-moss	Sensitive		
Mielichhoferia elongata	Elongate copper moss	Sensitive		
Monardella follettii	Follett’s monardella	Sensitive	x	
Monardella stebbinsii	Stebbin's monardella	Sensitive		
Orcuttia tenuis	slender Orcutt grass	Federally Threatened		
Oreostemma elatum	Plumas alpine-aster	Sensitive	x	
Packera eurycephala var. lewisrosei	cut-leaved ragwort	Sensitive	x	
Peltigera gowardii	Goward's waterfan	Sensitive		
Penstemon personatus	closed-throated beardtongue	Sensitive		
Penstemon sudans	Susanville beardtongue	Sensitive		
Phaeocollybia olivacea	Olive phaeocollybia	Sensitive		
Poa sierrae	Sierra bluegrass	Sensitive		
Pyrrocoma lucida	sticky pyrrocoma	Sensitive		
Sedum albomarginatum	Feather River stonecrop	Sensitive		
Senecio layneae	Layne's butterweed	Federally Threatened		

The only Federally Threatened plant species known to occur on the Plumas NF is *Packera layneae* (Layne's butterweed). This species grows in open rocky areas on gabbro and serpentine-derived soils that are between 650feet and 3,300 feet in elevation. Two additional species of federal concern that have the potential to occur on the Plumas NF are the Federally Threatened *Orcuttia tenuis* (slender Orcutt grass) and the Candidate species *Ivesia webberi* (Webber's ivesia). *Orcuttia tenuis* is limited to relatively deep vernal pools with clay soil. *Ivesia webberi* is found in open areas of sandy volcanic ash to gravelly soils in sagebrush and eastside pine. No Threatened, Endangered, or Candidate Species are considered likely to occur in the botany analysis area due to lack of potential habitat.

Specific Methodology

The analysis of effects on rare plant species was a three-step process (FSM 2672.43; USDA 2005b). In the first step, all listed or proposed rare species that were known or were believed to have potential to occur in the analysis area were identified. This list was developed by reviewing the U.S. Fish and Wildlife List for the Plumas NF (USDI 2013, USDA Forest Service Region 5 Sensitive Species List (USDA 2013f), Plumas NF rare plant records and vegetation maps, and California Natural Diversity Database records (California Native Diversity Database 2013).

The second step was field reconnaissance surveys. To date, pre fire field surveys have been conducted on approximately 10,680 acres within the Botany analysis area; this includes 2,187 acres (40 percent) of the proposed treatment units (Buck and Clifton 2000; Garcia and Associates 2001b; Vollmar Consulting 2007; USDA 2008c; USDA 2009b; USDA 2012h; Dittes and Guardino Consulting 2010). For those areas outside of the surveyed areas, but within the Botany analysis area, species occurrence information was compiled using the California Natural Diversity Database (2013), Plumas NF rare plant records, and past survey reports. Post-fire revisits to known sensitive plant locations within proposed treatments units were completed in May and June of 2013 (USDA 2013m). Limited surveys of the 3,277 acres of proposed project units without recent pre-fire surveys were conducted in May and June of 2013 (USDA 2013m). Post-fire surveys were conducted in areas near (500 to 1,000 ft.) previously documented rare plant locations or in areas with soil burn severity in categories moderate, low, or unburned.

Field surveys were designed around the flowering period and ecology of the rare plant species identified in step one. For each rare plant site found, information was collected that described the size of the occurrence and habitat characteristics and identified any existing or potential threats. Location information was collected using a Global Positioning System (GPS).

All of this information was used in step three of the analysis—effects analysis. Data were imported into a Global Information System (GIS) and used to analyze proximity to the proposed treatments, identify direct and indirect effects, and develop mitigation measures.

Data Sources

Basic information describing the life history, ecology, pollination biology, and specific habitat requirements is lacking for most of the Sensitive species that occur within the Botany analysis area. The scientific literature and internal government documents (i.e. species-specific Conservation Assessments) were utilized for the analysis whenever available; however more frequently, the analysis of effects was based on observations by qualified individuals, field experience, unpublished monitoring results, and studies of comparable species.

Types and Duration of Impacts

Direct Effects

Direct effects occur when plants are physically impacted. Examples of proposed treatment activities that have the potential to directly affect rare plants include timber falling; crushing by vehicles or equipment; and temporary road and landing construction. These actions can result in death, altered growth, or reduced seed set through physically breaking, crushing, burning, scorching, or uprooting plants.

Indirect Effects

Indirect effects are separated from an action in either time or space. These effects, which can be beneficial or detrimental to rare species, may include changes in vegetation composition, successional patterns, fire regimes, or the distribution and abundance of noxious weeds. Effects are more likely to occur to those species that are intolerant of disturbance and tend to occupy interior forest habitats with high canopy cover. In contrast, for those species that tolerate or are dependent upon some level of disturbance and inhabit gaps and forest openings, treatments may have beneficial indirect effects. For all rare species, negative effects may occur if prescribed burns are too hot; this has the potential to kill the seedbank and sterilize the soil. Burning hand or machine piles can also alter soil biotic and chemical properties for a number of years (Korb et al. 2004), which in turn greatly influences the degree and type of plant colonization into the fire-scarred site.

Cumulative Effects

A cumulative effect can result from the incremental effect of the current action when added to the effects of past, present, and reasonably foreseeable future actions. These effects are considered regardless of what agency or person undertakes the other actions and regardless of land ownership on which the other actions occur. An individual action when considered alone may not have a significant effect, but when its effects are considered in sum with the effects of other past, present, and reasonably foreseeable future actions, the effects may be significant (40 CFR 1508.7 and 1508.8 and FSH 1909.15 section 15.1).

One crucial step in assessing cumulative impacts on a particular resource is to compare the current condition of the resource (i.e. rare plants) and the projected changes as a result of

management activities (i.e. timber harvest) to the natural variability in the resources and processes of concern (MacDonald 2000). This assessment is particularly difficult for rare plant species because long-term data are often lacking. In addition, the habitats in which many rare plant species are presently found have a long history of disturbance, making an undisturbed reference difficult to find. For some rare plants, particularly those that do not tolerate disturbance or are found under dense canopy conditions, minimizing on-site change is an effective way of reducing the potential for larger-scale cumulative impact (MacDonald 2000). If the greatest impact on a rare species is both local and immediate, then this is the scale at which the effect is easiest to detect (MacDonald 2000).

Undeniably, past, present, and future activities have and will continue to alter rare plant populations and their habitats to various degrees; however, the approach taken in this analysis is that, if direct and indirect adverse effects on rare plant species in the Chip-munk Project are minimal or would not occur, then they would not contribute substantially to cumulative effects on the species. In addition, the effects of future projects would likely be minimal or similar to those described in this analysis if existing management guidelines (such as field surveys, protection of known rare species locations, and noxious weed mitigations) remain in place.

Duration of Effects

It is not known when the effects of the proposed treatments would no longer be altering the life history dynamics (such as germination, growth time necessary to reach sexual maturity, quantity of viable seed produced in a lifetime) of the rare species considered in this analysis. One method to estimate duration of effects is to assume that the effects of the action alternatives last as long as they are, singly or in combination with other anticipated effects, distinguishable from the effects of the no-action alternative. Using this method is difficult for this project because of the intensity and scale of the Chips fire. Natural regeneration of stands after large fires is variable and unpredictable giving factors such as pockets of unburned stands, seed trees, chance seed dispersal, and potential for future fires. The fire of 2012 has permanently changed the vegetation pattern across the botany analysis area.

The additive effects of past actions (such as wildfires, wildfire suppression, timber harvest, mining, nonnative plant introductions, and ranching) have shaped the present landscape and corresponding populations of rare plants. However, data describing the past distribution and abundance of rare plant species is extremely limited, making it impossible to quantify the effects of historic activities on the resources and conditions that are present today. Undoubtedly, some plant species have always been rare due to particular ecological requirements or geographic isolation. It is also likely that past actions have caused some species to become rarer and encouraged others to become more common. Within the Botany Analysis Area, documentation of rare plant surveys began in the early 1980s; therefore, the baseline used for the effects analysis of past activities is 25 years. The documentation of noxious weed species in this area did not begin

until much later. Aside from an occasional appearance on a plant list, the first targeted noxious weed survey on file for this area was in 2000.

Environmental Consequences: Effects on Specific Rare Plant Species

The following section provides a discussion of the direct, indirect, and cumulative effects specific to the three Sensitive species that are within the proposed treatment units. These effects are in addition to those discussed in the sections above. This discussion is organized to *highlight differences* between the no-action alternative (B) and the action alternative (A).

Cypripedium fasciculatum (clustered lady's-slipper)

Affected Environment: clustered lady's-slipper

Clustered lady's slipper has a wide distribution that extends from British Columbia, south to the Sierra Nevada and Coast Ranges of California, and east to the Rocky Mountains. While the distribution of this species is broad, occurrences are often small and widely scattered. In California, the highest distribution of clustered lady's-slipper is on the Klamath and Plumas National Forests. There are 153 occurrences on the Plumas NF; these range in size from one to over 3,000 stems. A total of 227 occurrences have also been recorded on the Six Rivers, Shasta-Trinity, Klamath, Mendocino, and Tahoe National Forests (USDA 2012i).

In California, clustered lady's-slipper is most commonly associated with mixed conifer forests in the mid-to-late stages of successional development. On the Plumas NF, plants most frequently occur in microsites with moist soils, steep slopes, sufficient dogwood (Cornus nuttallii) cover, and a relatively open overstory canopy (Brown 2008). Clustered lady's-slipper orchids lack physiological adaptations to regulate and tolerate drought and heat stress; therefore they depend on species, such as dogwoods, to limit the amount of direct solar radiation that reaches the forest floor (Brown 2008). Mycorrhizal fungi play a pivotal role in the biology of orchids and several stages in the orchid's life-cycle, particularly the early stages of seedling development, depend on mycorrhizal fungal symbioses.

Clustered lady's-slipper appears intolerant of disturbances that directly reduce the duff layer and expose or damage the plant's rhizomes (underground stems) or mycorrhizal symbionts. It is usually found in areas that have not been disturbed, or in areas where the disturbance was light or in the distant past. Clustered lady's-slipper orchids appear to tolerate, and in some cases even benefit from, low severity fires. In contrast, high severity fires that eliminate the duff layer or destroy the overstory canopy have been shown to severely impact or kill individuals (Vance 2005).

The overall trend for this species is thought to be declining (USDA 2012i). In a recent population viability analysis of Oregon occurrences, Thorpe et al. (2010) determined that 59 percent of

clustered lady's slipper populations had declined in size and 31 percent fell to zero. They also determined that smaller populations (less than 10 individuals) had a higher rate of extinction compared to larger populations. The primary threat to this species is disturbance that severely alters the light and soil moisture regime at the microsite level. Examples of other threats include: timber harvest activities that remove most of the overstory canopy; soil compaction from equipment and vehicles; high intensity, stand-replacing wildfires; and illegal collection (Vance 2005). Clustered lady's-slipper orchids can also be negatively impacted by dense, homogenous stand conditions where fire has been excluded for over a century (Brown 2008).

Before the Chips Fire, fifty one occurrences (224 locations) of clustered lady's-slipper, covering approximately 75.9 acres, were documented within the Botany analysis area. These 51 occurrences represented over 13 percent of the statewide total and one-third of the Plumas National Forest total. Of these 51, twenty five occurrences (covering less about 30.7 acres) are within treatment units (Table 99). The twenty five occurrences within treatment units represented over six percent of the statewide total and over 16 percent of the Plumas National Forest total.

In May and June 2013 55 pre fire locations of clustered lady's slipper were revisited. Twenty five of these sites were relocated and 30 were not relocated. During this same time period 13 new locations were discovered in or near proposed treatment units. All previously documented locations in or near (within 100 ft.) of proposed treatment units were revisited.

Table 99. Comparison of clustered lady's-slipper abundance at the global, state, forest, and project scales.

Species	Global Ranking	Number of Occurrences			
		California	Plumas NF	Chip-munk Project Analysis Area	Treatment Units
Cypripedium fasciculatum	G4[1]	380	153	51	25

[1] G4 = apparently secure; factors exist to cause concern, such as limited habitat or population threat (NatureServe 2013)

Plumas NF Management Prescription (USDA 2007b)

Buffer all plant occurrences by approximately 100 feet from ground disturbance to maintain canopy closure, hydrologic conditions, and mycorrhizal relationships. Keep hand piles at least 50 feet from plants to protect individuals, seedbank, and mycorrhizae from excessive heat. Avoid scattering slash on plants. Evaluate potential effects of prescribed fire on a site-by-site basis considering factors such as population size, fuel load, season of burn, predicted intensity and duration of burn, and risk of wildfire vs. potential effects from prescribed fire. Develop monitoring plans to evaluate fire effects on individuals and populations before prescribed burning operations. To the extent possible, avoid ignitions within occurrences and avoid building fire control lines in or near occurrences. Also, allow fire to creep/back into occurrences from adjacent

terrain if the fuel loading permits. Do not advertise locations, to minimize poaching. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution, and known species ecology.

Environmental Consequences: clustered lady's-slipper

Action Alternatives(A):

Direct Effects. Direct effects from project related activities listed below may occur.

- Treatment unit activities (up to 5,464 acres)
  - felling and removal of roadside hazard trees
  - salvage logging dead and dying trees
  - green tree removal for skyline logging systems
  - reforestation including site preparation
- construction of temporary landings (quantity not estimated)
- construction or reconstruction of 12.5 miles of temporary road
- maintenance or reconstruction of 257.5 miles of system roads for use as haul routes
- construction and reconstruction of three water drafting sites

Fifty seven of 237 known locations are in proposed treatment units. Of the fifty seven locations within treatment units 26 were not relocated after the fire, 10 were new discoveries after the fire, 17 were relocations of previously documented sites, and 4 were locations flagged for avoidance for implementation of the roadside hazard CE project. Three of these locations are also near (within 100ft.) proposed temporary roads. There is one location are near (within 25 ft.) proposed haul routes outside of proposed treatment units. The haul route location was not located during 2013 revisits. Given the proximity of known locations to proposed units, temporary roads, and haul routes it is probable that project landings would be proposed in or near known locations of clustered lady's slipper. There are no known locations within 500 ft. of proposed water drafting sites.

Direct effects may occur because all potential habitat present in proposed treatment units and near other proposed project activities has not been surveyed, thus undocumented locations may be present. The potential for direct effects would be greatly reduced because all known locations in and near proposed treatment units have been flagged for avoidance. Hazard trees required to be felled for public safety reasons would be left in place to minimize disturbance to individuals.

Indirect effects. The indirect effects of the proposed action to known locations would likely be negligible because they were buffered by approximately 100 ft. based on the interim management

prescription. Indirect effects to potential habitat may occur when treatments are conducted in unburned treatment units (605 acres) units that experienced low soil burn severity (1,090 acres), and moderate soil burn severity (2,940 acres).

Further indirect effects may occur because habitat requirements are not fully understood. Thus, potential impacts cannot be fully avoided and may inadvertently occur. Hazard trees required to be felled for public safety reasons would be left in place to provide shading and to provide organic material for future soil structure and mycorrhizal fungi.

The proposed activities may indirectly impact clustered lady's slipper through degradation of potential habitat in treatment units and related to other project activities. The Chips fire has greatly reduced the canopy cover, understory vegetation and duff layer in the project area. Project related activities have the potential to further reduce these elements essential to the survival of clustered lady's slipper.

Cumulative effects. Clustered lady's-slipper has likely lost individuals and a considerable amount of suitable habitat over the last 100 years due to human activities related to mining, logging, road building, fire suppression, stand replacing wildfires, and homesteading. These activities have, to one extent or another, resulted in a reduction in canopy cover, modification of stand dynamics, alteration in fire frequency and intensity, and change in microclimate conditions.

Clustered lady's-slipper has been designated as a Plumas NF Sensitive or Special Interest species since the early 1980's. A review of the Forest Activity Tracking System (FACTS) database indicates numerous instances of overlap between past projects and documented locations of clustered lady's slipper (Table 7).

Table 100. Past projects from FACTS by activity, year, and sale that overlap known occurrences of clustered lady's slipper.

SITE_ID	ACTIVITY	YEAR_COMPLETED	SALE_NAME
051102_CYFA_010	Single-tree Selection Cut	1990	
051102_CYFA_011, 038D, 038B, 038E, 038A, 041C	Sanitation Cut	1991	DUTCH HILL
051102_CYFA_022	Plant Trees, Stocking Survey	1990-1992	BEAR TIMBER SALE
051102_CYFA_022	Sanitation (salvage)	1991	RATTLE INSECT SSTS
051102_CYFA_026A, 026B	Fill-in or Replant Trees, Plant Trees, Stocking Survey	1993-1996	
051102_CYFA_031, 031B	Sanitation (salvage)	1991	PINE CREEK THP TRESP
051102_CYFA_031, 036	Single-tree Selection Cut		
051102_CYFA_040A	Single-tree Selection Cut, Overstory Removal Cut	1991	KIRKHAM
051102_CYFA_040D	Single-tree Selection Cut	1991	KIRKHAM

051102_CYFA_040E	Single-tree Selection Cut	1991	KIRKHAM
051102_CYFA_041A, 041B1	Seed-tree Seed Cut (with and without leave trees)	1991	DUTCH HILL
051102_CYFA_049A, 049B, 049C, 049D, 050A, 050B, 050C, 050D, 050E, 050F, 050G, 050H, 050I, 050J, 050K, 050L, 050N, 050O, 051, 052, 053, 05M, 071, 093A, 093B, 093C, 093D, 139A1, 139A2, 139A3, 139A4, 139A5, 139A6, 139A7, 139A8, 139A9, 139B1, 139B10, 139B11, 139B12, 139B13, 139B14, 139B15, 139B16, 139B17, 139B18, 139B2, 139B3, 139B4, 139B5, 139B6, 139B7, 139B8, 139B9, 139C1, 139C10, 139C11, 139C12, 139C13, 139C2, 139C3, 139C4, 139C5, 139C6, 139C7, 139C8, 139C9, 139D1, 139D2, 141A, 141AA, 141B, 141BB, 141C, 141CC, 141D, 141DD, 141E, 141EE, 141F, 141FF, 141G, 141GG, 141H, 141HH, 141I, 141II, 141J, 141JJ, 141K, 141L, 141M, 141N, 141O, 141P, 141Q, 141R, 141S, 141T, 141U, 141V, 141W, 141X, 141Y, 141Z	Sanitation (salvage)	1996	RUSH HILL WINDTHROW SSTS
051102_CYFA_050K	Precommercial Thin, Site Preparation for Planting – Mechanical, Fill-in or Replant Trees, Stocking Survey, Stand Clearcut (w/ leave trees)	1995, 1997, 1998, 1999, 2000, 2002, 2003	RUSH HILL/CHERRY
051102_CYFA_051	Precommercial Thin, Site Preparation for Planting – Mechanical, Fill-in or Replant Trees, Plant Trees, Stocking Survey, Precommercial Thin, Rearrangement of Fuels, Stand Clearcut	1995, 1997, 1998, 1999, 2000, 2001, 2003	RUSH HILL/CHERRY

	(w/ leave trees)		
051102_CYFA_071, 049C, 049C, 071, 049D, 093D, 093A, 093B, 093C	Rearrangement of Fuels, Underburn - Low Intensity, Precommercial Thin, Wildfire - Fuels Benefit	2003, 2004, 2008	KINGSBURY RUSH DFPZ
051102_CYFA_087	Sanitation (salvage)	1991	WOLF INSECT SSTS
051102_CYFA_087	Timber harvest evaluation, Overstory Removal Cut (from advanced regeneration)		
051102_CYFA_087, 096, 097, 127A, 131A, 131B, 131C, 131D, 131E, 148A, 148B	Sanitation (salvage)	1996	WOLF WINDTHROW SSTS
051102_CYFA_096, 097	Rearrangement of Fuels, Mastication/Mowing, Precommercial Thin, Underburn - Low Intensity (Majority of Unit)	2002, 2004, 2005	KINGSBURY RUSH DFPZ
051102_CYFA_127A	Commercial Thin	2011	KEDDIE RIDGE HAZARDOU FUELS REDUCTION PROJEC
051102_CYFA_131A, 131B, 131C, 131D, 131E	Rearrangement of Fuels; Piling of Fuels, Hand or Machine; Underburn; Precommercial Thin; Sanitation Salvage	1990, 2003	KINGSBURY RUSH DFPZ, SENECA INSECT SSTS
051102_CYFA_131A, 131C, 131D, 131E	Commercial Thin	2011	KEDDIE RIDGE HAZARDOU FUELS REDUCTION PROJEC
051102_CYFA_131B	Commercial Thin	2011	KEDDIE RIDGE HAZARDOU FUELS REDUCTION PROJEC
051102_CYFA_139B15, 139B16	Cull		
051102_CYFA_140A, 140B	Single-tree Selection Cut	1991	KIRKHAM
051102_CYFA_149B, 149C, 149D	Sanitation Cut	1991	DUTCH HILL

A review of past projects (Appendix D) indicates that protection measures for this species were included when occurrences were known at the time of implementation. Many of the sites listed above have been discovered and documented since the projects have been completed. This highlights the value of adequate pre-project surveys and underscores the fact that many of the management activities that have occurred within the Botany analysis area have potentially impacted clustered lady's-slipper occurrences and areas of suitable habitat.

Table 101. Documented locations within the analysis area of clustered lady's slipper burned at all levels of soil burn severity.

Soil Burn Severity	#locations	Acres
High	27	0.9
Moderate	84	27.5
Low	88	25.7
Unburned	48	14.2
Total	247	68.3

Post Chips Fire revisits support previous findings of clustered lady's slipper intolerance of high severity fire and tolerance of low severity fire. Locations that were located during post fire surveys may still suffer long term detrimental effects to population sizes

Table 102. Soil burn severity at previously known locations and newly discovered locations in the analysis area.

	Soil Burn Severity				
Plants Found at Location	**Unburned**	**Low severity**	**Moderate**	**High**	**Grand Total**
NO	3	8	18	5	34
YES	6	13	15		34
% Relocated	**66.7**	**61.9**	**45.5**	**0.0**	**50.0**

Based on the survival rate of the 68 locations sampled after, the fire the Chips reduced the number of clustered lady's slipper locations by one-half and the acreage by approximately 45%.

Table 103. Predicted post-fire abundance of clustered lady's slipper based on post-fire sampling of 27.5 percent of documented locations.

Soil Burn Severity	#locations	Acres
High	0	0
Moderate	38	12.5
Low	54	15.9
Unburned	32	9.5
Total	124	37.9

Extrapolation of sampling results predicts severe effects to population size and density. This documented and likely loss of individuals, populations, and habitat increases the importance of adequately protecting known populations and habitat that survived the Chips fire.

Cumulative effects to clustered lady's slipper as a result of the proposed Chip-munk Project would occur because direct and indirect effects as described previously are likely to occur. These cumulative effects are predicted to be relatively minor because the majority

The effects of other present and future projects on this species would likely be minimal or similar to those described in this analysis if existing management guidelines (such as field surveys, protection of known rare species locations, and noxious weed mitigations) remain in place.

Alternative B – No-action Alternative

Direct Effects. No direct effects are anticipated because no project-related activities would occur.

Indirect Effects. Indirect effects may occur because future wildfires may be more severe and larger in size if dead and dying trees are not removed from the Chips fire landscape.

Cumulative Effects. Clustered lady's-slipper has likely lost individuals and a considerable amount of suitable habitat over the last 100 years due to human activities related to mining, logging, road building, fire suppression, stand replacing wildfire, and homesteading. These activities have, to one extent or another, resulted in a reduction in canopy cover, modification of stand dynamics, alteration in fire frequency and intensity, and change in microclimate conditions.

Clustered lady's-slipper has been designated as a Plumas NF Sensitive or Special Interest species since the early 1980's. A review of past projects indicates that protection measures for this species were included when occurrences were known at the time of implementation. Many sites were not located in the area in and near past projects. This underscores the fact that many of the management activities that have occurred within the Botany analysis area have potentially impacted clustered lady's-slipper occurrences and areas of suitable habitat.

Overall, the cumulative effects from the no-action alternative are expected to be negligible to minor, primarily because the direct and indirect effects are expected to be minor. Although existing occurrences would not be protected from a recurrence of high-severity wildfire, the no-action alternative would not significantly reduce the viability of clustered lady's-slipper.

The effects of future projects on clustered lady's-slipper would likely be minimal or similar to those described in this analysis if existing management guidelines (such as field surveys, protection of known rare species locations, and noxious weed mitigations) remain in place.

Summary of determination for clustered lady's-slipper

Action Alternative (A): The Chip-munk Project action alternative (A) may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for *Cypripedium fasciculatum* (clustered lady's-slipper). This conclusion is based on existing information, compliance with LRMP direction as amended by the SNFPA, and following Plumas National Forest management guidelines. If more locations of clustered lady's slipper are found before or during project implementation protection measures would be developed in accordance with PNF

LRMP (USDA 1988a) as amended by the SNFPA (USDA 2004a) established interim management guidelines.

No-action Alternative (B): The no-action alternative may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for *Cypripedium fasciculatum* (clustered lady's-slipper). Under this alternative, direct effects to individuals will be avoided; therefore this determination is based on the potential for long-term impacts to areas of suitable habitat.

Lewisia kelloggii ssp. hutchisonii (Kellogg's lewisia)

Affected Environment: Kellogg's lewisia

In California, Kellogg's lewisia occurs at 64 sites ranging from the southern Cascade Range to the central Sierra Nevada (Butte, Sierra, Plumas, Nevada, El Dorado, Amador, and Tuolumne counties). Site elevations range between 4,500-7,000 feet. The northern-most occurrence is known from the Lassen NF. This species is found in granitic gravel or andesite derived soils commonly on ridge tops and flats, which are sparsely vegetated. One of the largest threats to this species is off-highway vehicles, which travel easily across the flat open terrain where Lewisia kelloggii ssp. huchinsonii is found. Other threats include horticultural collection, camping, hiking, and activities that compact soil and trample plants.

The trend for Kellogg's lewisia is unknown. Plants are often visible during May and June then seem to dry up and disappear latter in the summer. The reason for the apparent disappearance has not been resolved. Either the plants may be subject to poaching, are desirable forage for wildlife or they simply dry up and shrivel beyond the point of recognition.

Five occurrences of Kellogg's lewisia, covering approximately 12.4 acres, have been documented within the analysis area. All of the known occurrences are wholly or partially within the proposed treatment units. These plants die back to ground level by early July, the Chips Fire probably did not severely impact the populations in the area. All 5 occurrences were revisited in May and June 2013. During these revisits three new locations were documented.

Table 104. Comparison of abundance of Kellog's lewisia at the global, state, forest, and project scale.

Species	Global Ranking	Number of Occurrences			
		California	Plumas NF	Chip-munk Project Analysis Area	Treatment Units
Kellogg's lewisia	G4T2T3	64	23	5	5

[1] G4T2T3 = Species (G4) is apparently secure; factors exist to cause concern, such as limited habitat or population threat. Subspecies (T2T3) is ranked between imperiled and vulnerable. (NatureServe 2013)

Plumas NF Management Prescription

Protect all plant occurrences from ground disturbance that result in soil displacement. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution, and known species ecology.

Environmental Consequences: Kellogg's lewisia

Direct Effects. Direct effects may occur from proposed project activities including:

- Treatment unit activities (up to 5,464 acres)
  - felling and removal of roadside hazard trees
  - salvage logging dead and dying trees
  - green tree removal for skyline logging systems
  - reforestation including site preparation
- construction of temporary landings (quantity not estimated)
- construction or reconstruction of 12.5 miles of temporary road
- maintenance or reconstruction of 257.5 miles of system roads for use as haul routes
- construction and reconstruction of three water drafting sites

Seven of 13 known locations are in proposed treatment units. One location is near (within 100ft.) a proposed temporary road. Six locations are near (within 25 ft.) proposed haul routes. Given the proximity of known locations to proposed units, temporary roads, and haul routes it is probable that project landings would be proposed in or near known locations of Kellogg's lewisia. There are no known locations within 500 ft. of proposed water drafting sites.

Direct effects may occur because all potential habitat present in proposed treatment units and near other proposed project activities has not been surveyed, thus undocumented locations may be present. The potential for direct effects would be greatly reduced because all known locations in the analysis area have been flagged for avoidance.

Indirect Effects. The indirect effects of the proposed action would likely be negligible because Kellogg's lewisia is found in dry, naturally open areas with little or no canopy thus is unlikely to benefit or be harmed from removal of dead and dying trees. Some indirect effects may occur because habitat requirements are not fully understood. Thus, potential impacts cannot be fully avoided and may inadvertently occur.

Cumulative effects. Kellogg's lewisia has likely lost individuals and a considerable amount of suitable habitat over the last 100 years due to human activities related to mining, logging, road building, and fire suppression, stand replacing wildfires, and homesteading. These activities have, to one extent or another, resulted in much ground disturbance, modification of stand dynamics, alteration in fire frequency and intensity, and change in microclimate conditions.

Lewisia kelloggii ssp. hutchinsonii has been documented on the Plumas NF since 1998. A review of the Forest Activity Tracking System database indicates 7 locations grouped into four occurrences overlap the Wolf Windthrow SSTS sanitation salvage of 1996. These locations may have been impacted by this project since it was implemented prior to tracking as a rare plant on the Plumas NF.

Table 105. Burn intensity as measured by soil burn severity of Kellog's lewisia locations within the analysis area.

	Soil Burn Severity				
	Unburned	Low	Moderate	High	Grand Total
Sum of Acres	7	4.8	0.5	0.1	12.4

About 0.1 acres within known occurrences in the analysis area burned at high severity during the Chips fire. Since these plants die back to ground level by early July, the Chips Fire probably did not severely impact the populations in the area. The remainder of the occurrences burned at varying severities that likely resulted in minimal impacts to populations.

The five occurrences in the analysis represent about 8 percent of all known occurrences in California and about 22 percent of all Plumas NF occurrences.

The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing management guidelines (such as field surveys, protection of known rare species locations, and noxious weed mitigations) remain in place.

Alternative B – No-action Alternative

Direct Effects. No direct effects are anticipated because no project-related activities would occur.

Indirect Effects. The indirect effects of the no action would likely be negligible because Kellogg's lewisia is found in open areas with little or no canopy cover thus unlikely to benefit from removal of dead and dying trees.

Cumulative Effects.

Because the direct and indirect effects of the no action alternative are expected to be negligible to minor, they would not substantially contribute to the effects from past, present, and future activities.

The effects of past, present, and future projects have been described under the proposed action above. The effects of those projects are the same for this alternative. Summary of determination for *Lewisia kelloggii ssp. hutchisonii*:

Action Alternative (A): The Chip-munk Project Project action alternative (A) may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for

Lewisia kelloggii ssp. hutchisonii. This conclusion is based on existing information, compliance with LRMP direction as amended by the SNFPA, and following Plumas National Forest management guidelines. If more locations of Kellogg's lewisia are found before or during project implementation protection measures would be developed in accordance with PNF LRMP (USDA 1988) as amended by the SNFPA (USDA 2004A) established interim management guidelines.

No-action Alternative (B): The Chip-munk Project would not affect *Lewisia kelloggii ssp. hutchisonii*.

Heritage Resources

Introduction

In 2013 the Mt. Hough Ranger District of the Plumas National Forest conducted an analysis of the proposed Chip-munk Project. This project proposes activities within the vicinity of Seneca, Caribou, and Butt Valley Reservoir to remove roadside fire-killed and/or fire-injured hazard trees, recover the economic value of fire-killed trees, and re-establish forested conditions by planting native conifer seedlings.

The Chip-munk Project proposes to conduct hazard tree removal (1,788 acres), salvage timber harvest (3,675 acres), and plant native conifer seedlings (3,675acres). However, land designations and the landscape itself, limit the areas in which treatment can be proposed. Land designations within the Plumas National Forest and the Chips Fire perimeter include: developed recreational sites, Inventoried Roadless Areas (IRAs), Semi-primitive non-motorized vehicle area, northern goshawk Protected Activity Center (PAC), California spotted owl PAC, suitable willow flycatcher habitat, Old Forest Emphasis (OFE) area, and special interest areas.

A report was written that documents the results of new heritage resource inventory of 3,161.0 acres inventoried in 2013 and the results of the monitoring of 39 previously recorded sites. Inventory was conducted between April 1st and June 25, 2013 by Cristina Weinberg (District Archaeologist, Mt. Hough RD), Doug Baughman (Assistant District Archaeologist, Mt. Hough RD), Keegan Daley (Archaeological Field Crew Lead, Mt. Hough RD), Arlen Cardell (Archaeological Technician, Mt. Hough RD), Miguel Jeffrey (Archaeological Technician, Mt. Hough RD), Megan Krietsch (Archaeological Field Crew Member, Mt. Hough RD), Stephanie Smith (Archaeological Field Crew Member, Mt. Hough RD), Bret Friel (Archaeologist, Enterprise Team), Caleb Hennekey (Archaeologist, Enterprise Team), Devin Hamlin (Archaeologist, Enterprise Team), Heather Horobik (Archaeologist, Enterprise Team), and Randall Turner (Archaeologist, Enterprise Team).

The Standard Protection Measures (SPMs) for heritage resource sites shall be implemented as appropriate for all subject undertakings managed under the 2013 Region 5 Programmatic Agreement (R5PA). When these protection measures are effectively applied, the Forest will have

taken into account the effect of these undertakings on historic properties. Isolated finds are by definition, not heritage resource sites, and therefore, do not require protection. In addition the 2013 R5PA grants us the ability to determine the eligibility of some sites based on certain characteristics. Some sites recorded during this project fell into that category and were therefore deemed ineligible for the National Register of Historic Places. These sites were GPSed and recorded but were not boundary flagged nor were Area Control Tags hung at the sites. The majority of site types in this category were prospect pits with no other artifacts and/or features.

Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction

The Chip-munk Project is designed to fulfill the management direction specified in the 1988 Plumas National Forest Land and Resource Management Plan (PNF LRMP) (USDA 1988a), and the Sierra Nevada Forest Plan Amendment (SNFPA) FSEIS and ROD (USDA 2004a, b). Fuel and vegetation management activities are designed to comply with the standards and guidelines as described in the SNFPA FSEIS and ROD (USDA 2004a, b).

In accordance with the National Historic Preservation Act of 1966 (specifically Section 106), as amended, and 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, Regarding The Processes For Compliance With Section 106 Of The National Historic Preservation Act For Management Of Historic Properties By The National Forests Of The Pacific Southwest Region (2013) (PA), a literature review, files search, and heritage resource inventory were conducted for the Chip-munk Project area.

Effects Analysis Methodology

Of the total 5,687.6 total acres of the area of potential effect for heritage resources 2,526.6 had been previously inventoried for 23 projects. These projects included: Bear Timber Sale 05-11-28(83), Barker Gulch Timber Sale 05-11-116(84), Shnuggins-Johnson Eagle Rock Kingsbury Timber Sale 05-11-34(85), Mosquito Timber Sale 05-11-38(86), Queen Lily Timber Sale 05-11-20(87), Dutch Hill Timber Sale 05-11-32(87), Red Hill Timber Sale 05-11-13(88), Rattle Insect/Butt Lake Management Area Small Salvage Timber Sale 05-11-40(90), Inca Small Salvage Timber Sale 05-11-38(91), Muggins Small Salvage Timber Sale 05-11-39(91), Cherry/Rush Hill Timber Sale 05-11-40(91), Grizz Insect Small Salvage Timber Sale 05-11-99(92), Mule Insect Small Salvage Timber Sale 05-11-114(92), Dutch Hill Mining/Sikaman Gold Resources 05-11-15(94), PG&E Feather River Grid Hazardous Timber Reduction 02-39-2000, Kingsbury-Rush Defensible Fuels Protection Zone 02-07-2001, Stream Fire Restoration 02-07-2002, OHV Route Inventory Heritage Resource Contract 02-59-2007, Belden Vegetation Management Contract Inventory 02-02-2010, Chambers Creek, etc. PL-359 Notices 02-41-2011, Gold In Rivers #1 02-

04-2012, Belden Hazardous Fuels Reduction 02-11-2012, and Chips Fire Roadside Hazard Tree Removal 02-06-2013. In addition to these surveys there were 13 additional surveys completed in the past but they were deemed inadequate per the 2013 R5PA. The results of previous inventory included 46 heritage resource sites and 4 isolates. During the 2013 field season 3,161.0 acres were inventoried for heritage resources. Inventory strategy utilized a 20-30 meter transect spacing between individuals. Some areas were too steep or overgrown to survey. This amounted to less than 1% of the total survey area. In those cases a cursory survey strategy (30-70 meter transects) was used to inventory wherever possible. The total number of new heritage sites found during the project survey was 43. In addition to heritage sites141isolates were discovered. Forty of the previously recorded sites were monitored for change due to the Chips fire (the remaining six were either monitored for the Chips Roadside Salvage Project or the PG&E Right-of-Way Hazard Tree Removal Project or recorded during those projects).

Geographic and Temporal Bounds

The total size of the Chip-munk Project area of potential effect for heritage resources was determined to be 5,687.6 acres. This figure is based on project unit boundaries as well as a 150-foot buffer around temporary roads and water extraction points that planned to be used for this project. If there are any project modifications or previously unanticipated effects are now expected then Mt. Hough Heritage Resource staff would be notified and additional surveys and/or assessments of effects to historic properties may be required.

Adverse effects on heritage resources may permanently impact these sites. As with all federal undertakings, special care must be taken to avoid recorded heritage resources within the project area.

Analysis Methodology

During the 2013 field season a literature review, files search (hard copy and GIS), and heritage resource inventory were conducted for the Chip-munk Project area. A total of 3,161.0 acres were inventoried for heritage resources. Inventory strategy utilized a 20-30 meter transect spacing between individuals. Some areas were too steep or overgrown to survey. In those cases a cursory survey strategy (30-70 meter transects) was used to inventory wherever possible. The total number of new heritage sites found during the project survey was 43. In addition to heritage sites 141 isolates were discovered. Forty of the previously recorded sites were monitored for change due to the Chips fire (the remaining six were either monitored for the Chips Roadside Salvage Project or the PG&E Right-of-Way Hazard Tree Removal Project or recorded during those projects).

Affected Environment

Eighty-nine heritage sites exist within the Chip-munk Project boundaries. Of these sites 91 are historic, two are prehistoric, and three are multi-component (both historic and prehistoric). There

are a total of 145 heritage isolates within the Chip-munk project boundaries. These isolates are deemed ineligible for the National Register of Historic Places and therefore do not need to be protected. A few of the more notable sites within the project area are: Dutch Hill Mine and ditch, Grizzly Mine, Swiss Cabin, and Seneca Cemetery.

Environmental Consequences

Successful utilization of a flag-and-avoid approach to site protection will result in no significant impacts to heritage resources within the Chip-munk Project area. There may be some circumstances where an alternative approach may be justified, such as fall and leave, directional falling, and/or fall and fully suspend out of the heritage site. These alternative approaches, as outlined within the PA, will be used on a case-by-case basis with the recommendation and approval of Mt. Hough Ranger District Heritage Resource personnel and are not to be undertaken without advance coordination with Mt. Hough Heritage Resource personnel prior to project implementation.

Alternative A – Direct and Indirect Effects of Roadside Hazard Tree Removal

Roadside hazard tree removal could have an impact on heritage resources if a flag-and-avoid protection strategy is not utilized. Encroachment by mechanical equipment and/or skidding timber through a heritage site creates major soil disturbance, potentially impacting heritage resources. Successful utilization of a flag-and-avoid approach to site protection will result in no significant impacts to heritage resources within the project area. There may be some circumstances where an alternative approach (as outlined within the PA under Appendix E) may be justified, such as fall and leave, directional falling, and/or fall and fully suspend out of the heritage site. These alternative approaches, as outlined within the PA, will be used on a case-by-case basis with the recommendation and approval of Mt. Hough Ranger District Heritage Resource personnel and are not to be undertaken without advance coordination with Mt. Hough Heritage Resource personnel prior to project implementation.

Alternative A – Cumulative Effects of Roadside Hazard Tree Removal

Past logging efforts conducted prior to the inception of the National Historic Preservation Act of 1966 (NHPA) and the National Environmental Policy Act of 1969 (NEPA) have had impacts on several of the heritage resource sites within the project area~~s~~. Improved project implementation strategies enacted after NHPA and NEPA have greatly reduced and in most cases eliminated impacts to heritage resources. Successful utilization of a flag-and-avoid approach to site protection will result in no significant cumulative impacts to heritage resources within the project area.

Alternative A – Direct and Indirect Effects of Salvage Timber Harvest

Salvage timber harvesting could have an impact on heritage resources if a flag-and-avoid protection strategy is not utilized. Dragging timber through a heritage site creates major soil disturbance, possibly impacting valuable heritage resources. Successful utilization of a flag-and-avoid approach to site protection will result in no significant impacts to heritage resources within the project area. There may be some circumstances where an alternative approach may be justified, such as fall and leave, directional falling, and/or fall and fully suspend out of the heritage site. These alternative approaches, as outlined within the PA, will be used on a case-by-case basis with the recommendation and approval of Mt. Hough Ranger District Heritage Resource personnel and are not to be undertaken without advance coordination with Mt. Hough Heritage Resource personnel prior to project implementation.

Alternative A – Cumulative Effects Salvage Timber Harvest

Past logging efforts conducted prior to the Federal protection of the National Historic Preservation Act of 1966 (NHPA) and the National Environmental Policy Act of 1969 (NEPA) have had impacts on several of the heritage resource sites within the project areas. Improved project implementation strategies enacted after NHPA and NEPA have greatly reduced and in most cases eliminated impacts to heritage resources. Successful utilization of a flag-and-avoid approach to site protection will result in no significant impacts to heritage resources within the project area. Small scale cumulative impacts occasionally occur and will continue to occur due to firewood cutting, roadside maintenance, and mining activities. Between these three activities only firewood cutting is not monitored for heritage resource protection although it is on such a small scale that the impacts to heritage resources are minimal. Routine roadside maintenance is a screened undertaking from heritage resource protection and analysis according to the 2013 Region 5 Programmatic agreement. Mining is monitored by Heritage Resource staff and a flag-and-avoid approach is normally used for heritage site protection.

Alternative B – Direct and Indirect Effects

A “No Action” alternative will potentially impact heritage resources within the project area by allowing hazard and salvage trees to naturally fall within site boundaries. This may cause damage to artifacts and features within heritage resource sites. Allowing natural regrowth of heavy underbrush will impact heritage resources by disturbing artifacts and features, increasing the potential for a hot, concentrated fire which could damage heritage resources, and creating a lack of accessibility and making future monitoring of these sites extremely difficult if not impossible.

Alternative B – Cumulative Effects

Past logging efforts conducted prior to the Federal protection of the National Historic Preservation Act of 1966 (NHPA) and the National Environmental Policy Act of 1969 (NEPA) have had impacts on several of the heritage resource sites within the project areas. Improved project implementation strategies enacted after NHPA and NEPA have greatly reduced and in most cases eliminated impacts to heritage resources. Successful utilization of a flag-and-avoid approach to site protection will result in no significant impacts to heritage resources within the project area. Small scale cumulative impacts occasionally occur and will continue to occur due to firewood cutting, roadside maintenance, and mining activities. Between these three activities only firewood cutting is not monitored for heritage resource protection although it is on such a small scale that the impacts to heritage resources are minimal. Routine roadside maintenance is exempt from heritage resource protection and analysis according to the 2013 Region 5 Programmatic agreement. Mining is monitored by Heritage Resource staff and a flag-and-avoid approach is normally used for heritage site protection. Past and future large-scale projects utilizing appropriate heritage resource protection measures will have no cumulative effect on the project area.

Figure 24. **Arlen Cardell recording a mining prospect pit in the Chips Fire area.**

Comparison of Alternatives

Alternative	Positive Impacts	Negative Impacts
A (Proposed Action)	• Removal of hazard/salvage trees will reduce fire fuel build-up on heritage sites • Removal of hazard/salvage trees will keep them from falling on heritage artifacts/features • Reforestation of burned areas will create a canopy cover to impede the growth of heavy underbrush which would impact heritage artifacts/ features • Reforestation of burned areas will create a canopy cover to impede the growth of heavy underbrush which would make it difficult to access and properly monitor heritage resources in the future	• Increased risk of inadvertent effects to heritage resources if the Standard Protection Measures outlined in FSM 2300 Section 2364.11 - NHPA Section 106 Standard Procedures, and 2013 the R5 PA are not properly utilized.
B (No Action)	• Decreased risk of inadvertent effects to heritage resources by timber harvesters and foresters not properly utilizing the Standard Resource Protection Measures outlined in FSM 2300 Section 2364.11 - NHPA Section 106 Standard Procedures	• Hazard/salvage trees will fall naturally and fire fuel will build-up increasing the fire danger to heritage resources • Hazard/salvage trees left to fall naturally may impact heritage artifacts/features • Lack of reforestation of burned areas will result in growth of heavy underbrush which would impact heritage artifacts/features • Lack of reforestation of burned areas will result in growth of heavy underbrush which would make it difficult to access and properly monitor heritage resources in the future

Compliance with the Forest Plan and Other Direction

In accordance with the National Historic Preservation Act of 1966 (specifically Section 106), as amended, and 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, Regarding The Processes For Compliance With Section 106 Of The National Historic Preservation Act For Management Of Historic Properties By The National Forests Of The Pacific Southwest Region (February, 2013), a literature review, files search, and heritage resource inventory were conducted for the Chip-munk Project area.

The Standard Protection Measures (SPMs) for heritage resource sites shall be implemented as appropriate for all subject undertakings managed under this PA. When these protection measures are effectively applied, the Forest will have taken into account the effect of these undertakings on

historic properties in compliance with Section 106 of the NHPA. Isolated finds are by definition, not heritage resource sites, and therefore, do not require protection.

Recreation

Introduction

Dispersed recreation use is moderate in the project area. Season of use is generally May through November, with activities including camping, hiking, hunting, horseback riding, off highway vehicle riding, fishing, firewood cutting, wildflower viewing, by individuals and small groups. Project related impacts to activities and specific infrastructure such as; roads, OHV routes, single track trails, hiking trails, and campgrounds are analyzed in this section.

There are two developed campgrounds located on the east shore of Butte Valley Reservoir, within the project boundary. Both of which are operated by Pacific Gas and Electric (PG&E). There are no planned actions associated with the Chip-munk project in these facilities. There are two Forest Service developed campgrounds located along Caribou Road, within 2 miles of the project boundary. These two facilities are located outside the project boundary and there are no planned actions in these facilities associated with this project.

There are approximately 180 miles of roads within the project boundary with 1.6 miles of level one system road are planned for decommissioning with this project. There are approximately 22 miles of OHV trail within the project area. Approximately7 miles of these trails are located with salvage harvest units.

No designated hiking trails exist within the project boundary. Consequently, there will be no direct or indirect impacts to this resource and hiking trails will not be discussed further.

Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction

This project is designed to fulfill the management direction specified in the PNF LRMP, as amended. The project area is within the Butt Lake Management Area #26 (PNF LRMP 1988). General direction for this management area as described in the LRMP states, “Provide developed day-use recreation facilities to meet demand. Expand the trail system to meet demand. Maintain the Butt Lake Recreation Area and employ Rx-5. The description for management Rx-5 as described in the LRMP is to provide attractive, well-maintained landscapes around the major reservoirs and within other areas of major recreation use. Visual quality objectives associated with this management prescription state to maintain high quality visual quality. There are three visual quality standards within the project area. These include:

- Retention: People’s activities are not to be evident to the casual forest visitor.
- Partial Retention: People’s activities may be evident but must remain subordinate to the characteristic landscape.

- Modification: Activities may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. This visual quality objective will not be discussed further because management actions may be evident on the landscape.

Effects Analysis Methodology

Potential impacts of project actions to recreation based activities and infrastructure related to recreation are described below. This analysis focuses on visual quality objectives, recreation facilities, roads, motorized and non-motorized trails. Direct and indirect impacts are described for these resources. A description of direct and indirect impacts is listed below.

Direct- the damaging or total loss of a resource. For example the loss of a trail or the closing of a road are considered a direct impact to recreation resources.

Indirect- the temporary closure of an area, increase noise or dust from activities. The loss of visual quality.

Geographic and Temporal Bounds

The geographic extent of this analysis is the project boundary. This extent is appropriate because direct and indirect impacts will be contained within this perimeter. The timeframe for this analysis is five years. This is an appropriate temporal bound because the activities associated with this project should be completed within five years.

Analysis Methodology

The following GIS data were used to complete this analysis:

- Plumas National Forest Roads
- Plumas GIS Library
- Plumas National Forest Visitor map

Affected Environment

There are two developed campgrounds located on the east shore of Butte Valley Reservoir, within the project boundary. Both of which are operated by Pacific Gas and Electric (PG&E). There are no planned actions associated with the Chip-munk project in these facilities. There are two Forest Service developed campgrounds located along Caribou Road, within 2 miles of the project boundary. These two facilities are located outside the project boundary and there are no planned actions in these facilities associated with this project.

There are approximately 180 miles of system road within the project boundary and 1.6 miles of system road are planned for decommissioning with this project. There are approximately 22 miles

of OHV trail within the project area. Approximately 7 miles of these trails are located with salvage harvest units.

No designated hiking trails exist within the project boundary. Consequently, there will be no direct or indirect impacts to this resource and hiking trails will not be discussed further.

Visual Quality, Developed Campgrounds, Roads, and OHV Routes

Alternative A – Direct and Indirect Effects of Roadside Hazard Tree Removal and Timber Salvage

Visual Quality- The amount of roadside hazard tree removal and corresponding effects are described below.

Retention areas: 30 acres of roadside hazard tree removal. This will result in a negligible negative effect to visual quality because only roadside hazard trees that pose a threat to safety will be removed.

Partial Retention: 540 acres of roadside hazard tree removal. This will result in a negligible negative effect to visual quality because only roadside hazard trees that pose a threat to safety will be removed.

Developed Campgrounds- There will be no direct effects from this project on the two developed campgrounds adjacent to Butt Valley Reservoir because there are no planned activities within these grounds. However, there may be short term negative indirect effects as a result of logging truck traffic and noise associated with the removal of roadside hazard trees. There will be a positive impact to safety and access to these facilities with the mitigation of these roadside hazard trees.

Roads- There is approximately 180 miles of system road within the project boundary and 1.6 miles of system road are planned for decommissioning with this project.

OHV Trails- There is approximately 2.5 miles of OHV trail located within roadside hazard tree removal units. There may be a short term closure of these trails during active timber removal operations. However, these trails will remain as functional OHV routes. Refer to the Mitigation section of this EA for incorporated mitigation measures regarding OHV routes.

Alternative A – Cumulative Effects of Roadside Hazard Tree Removal and Timber Salvage

Visual Quality- Cumulative effects to visual quality objects are expected to be minimal due to the small amount of proposed roadside hazard tree removal in the project area.

Developed Campgrounds- Cumulative effects are expected to be minimal because there are no direct effects and the duration of the indirect effect is expected to be short 1-5 years.

OHV Trails- Cumulative negative effects to OHV trails are expected to be minimal because no system trails are proposed for closure. Also, all designated trails will remain usable after the completion of the project.

Alternative A – Direct and Indirect Effects of Salvage Timber Harvest

Visual Quality-There will be a small amount of timber salvage of fire damaged trees within visual quality retention areas. These are described below.

Retention areas: There is no salvage harvest planned in visual retention areas.

Partial Retention: 427 acres of salvage tree removal. This will result in a negligible negative effect to visual quality because only a small portion of the overall landscape will be treated. Also, visual quality is a subjective measure. To some individuals a stand of fire killed trees is ugly. To others, the same stand of dead trees represents habitat for wildlife and a clear-cut is the ugly sight.

Developed Campgrounds-There are no expected direct effects because there are no planned activities within developed campgrounds. However there may be some minor indirect effects from an increase in logging truck traffic in the area as a result of this project.

OHV Trails- There are approximately seven miles of OHV trail located within salvage treatment units. There may be short term negative direct effects to trails if they are closed due to active timber sale operations. However, all trails will remain in a usable condition after the project has been completed.

Alternative A – Cumulative Effects Salvage Timber Harvest

Visual Quality- Cumulative effects to visual quality objects are expected to be minimal due to the small amount of proposed roadside hazard tree removal in the project area.

Developed Campgrounds- Cumulative effects are expected to be minimal because there are no direct effects and the duration of the indirect effect is expected to be short 1-5 years.

OHV Trails- cumulative effects are expected to me minimal because direct effects are expected to be very small will all trails remaining open and useable after project implementation.

Alternative B – Direct and Indirect Effects

The no action alternative will likely result in greater long term negative effects to recreation resources within the Chip-munk project area when compared to the action alternative. Compromised long-term user safety is a primary reason for greater potential impacts with the no action alternative. Key travel routes, developed campgrounds, and OHV routes will not hazard trees mitigated.

Alternative B – Cumulative Effects

The no action alternative will result negative long term cumulative effects to recreation opportunities within the Chip-munk Project area. This is primarily due to the high number of dead and fire damaged trees adjacent to travel routes.

Comparison of Alternatives

Relative impacts to recreation and the human environment are expected to be greater with the implementation of the no action alternative.

There will be no significant effects to human health and safety because operations will are not planned for developed campgrounds, standard mitigations will be applied to warn the public of timber harvest activities, and this project will reduce hazard trees along travel routes in the forest.

The effects on the quality of the human environment, as they relate to recreation, are not expected to be highly controversial because effects to campgrounds will be minimal and short in duration. There is no proposed decommission or closure of OHV routes. Only 1.6 miles of level one dead end spur road are proposed of decommission. Visual quality objectives will be maintained.

Minerals

Introduction

There are approximately 107 active mining claims in the Chip-munk Project boundary[5]. The Mt. Hough Ranger District currently administers three active Plans of Operations and three Notices of Intent for mining operations within the project boundary. In addition, there are three claims for which plans have been submitted but are on hold by the owner/operator. These could be activated at any time. There are several claims which are not currently being worked but which may be worked in the future.

The project area has a long history of mining. There are five abandoned mines in the project area that are planned for closure, two of them this year. Many more exist but have not yet been inventoried.

There are many patented mining claims (private land) within the project area. Currently there is one large private mining operation in the planning stages in the Seneca area.

This mining analysis includes the effects of the Chip-munk Project on mining claimants and mine operators. The short term and long term effects, including beneficial effects, are included in this analysis.

[5] http://www.blm.gov/lr2000/

Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction

Regulatory Environment

Federal Laws

Management of mining operations on the Plumas National Forest falls under several regulatory authorities. The Mining Law of 1872 established the category of locatable minerals. It authorized placer and lode mining claims, mill site claims and tunnel site claims and modified the ability for patenting upon proven discovery. It also required that at least $100 worth of work be done on each claim annually in order to maintain a possessory title.

The Forest Service Organic Administration Act of 1897 gave the Forest Reserves the basic authority to regulate surface uses, including mining.

Other regulatory Acts which affect minerals administration on the Forest include the 1947 Materials Act, the 1955 Multiple Use Mining Act (Surface Use Act), and the Clean Water Act, Section 401.

Daily operations are regulated under 36 CFR 228 regulations, Subpart A and Subpart C.

State Laws

The California Surface Mining and Reclamation Act of 1975 (SMARA 1975) requires that anyone, including government agencies, engaged in surface mining operations in California (including those on federally managed lands) which disturb more than one acre or remove more than 1,000 cubic yards of material must submit and be subject to a Reclamation Plan. This includes, but is not limited to: prospecting and exploratory activities, dredging and quarrying, streambed skimming, borrow pitting, and the stockpiling of mined materials.

Mining operators are responsible for the preparation and submission of reclamation plans and financial assurances for reclamation to the lead agency. Annual reporting to both the State and the lead agency on the status of mining and reclamation activities, annual updates of financial assurances, and annual inspections (to be conducted under the auspices of the lead agency), are required. Following completion of mining activities, and in accordance with the approved reclamation plan and relevant permit conditions, mining operators return mined lands to a second, productive use. Examples of post-mining uses may include, but are not limited to, open space, wildlife habitat, agricultural lands, grazing, park lands, and preparing the land for industrial or commercial uses[6].

[6] http://www.consrv.ca.gov/omr/smara

Forest Plan

Sierra Nevada Forest Plan Amendment Final Supplemental EIS (2004)

The 2004 Sierra Nevada Forest Plan Amendment (USDA 2004a,b) expands upon direction outlined in the 1988 PNF LRMP (USDA 1988a) and further delineates standards and guidelines for mining with requirements for reclamation, inspections and monitoring. These guidelines ensure that plans of operation, reclamation plans and reclamation bonds fully address all costs of reclamation and that reclamation is accomplished in a timely manner; ensure that mine operators and owners limit new road construction, decommission unnecessary roads and maintain needed roads consistent with Forest Service policy; require inspections and monitoring on a regular basis consistent with potential severity of mining related impacts; and limit clearing of trees and other vegetation to the minimum necessary for operations (pages 58-59).

Forest Plan Direction

The 1988 Plumas National Forest Land and Resource Management Plan (USDA 1988a) as amended by the 2004 SNFPA Final Supplemental EIS Record of Decision (USDA 2004a), guides the proposed action and alternatives. Forest wide Standards and guidelines for minerals and geology are outlined in the PNF LRMP and help move the project area towards desired conditions described in that plan. General direction is to “Encourage mineral and materials development that reasonably protects surface resources, and provides for land reclamation; maintain and update a materials source inventory for Forest uses; recommend withdrawal from mineral entry areas valued for other purposes; protect public safety and Forest resources from slope failure; and prevent loss of groundwater quality and quantity”, Chapter 4, Forest Wide Standards and Guidelines (USDA 1988a, page 4-46 to 4-49).

Effects Analysis Methodology

Specific Assumptions

The project boundary encompasses areas where Plan of Operations have been submitted and approved but are currently on hold by the owner or operator for a variety of reasons. These plans may be activated at any time. These operations are proposed in the Seneca area. Analysis of the project area will assume that these plans will be activated during the course of Chip-munk Project implementation. It is also likely there will be other mining proposals implemented during project implementation.

Specific Methodology

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all

prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.

Scope of the Analysis

Geographic Analysis Area: The geographic boundary for the Minerals Effects Analysis is the Chip-munk Project area. This project area encompasses 44,387 acres on the Mt. Hough Ranger District. The rationale for this boundary is that mining claims do not stop at treatment boundaries and the effects of traffic, heavy equipment and smoke would occur across the project area.

Timeframe of Analysis: In the analysis of the project, current ongoing mining projects and reasonably foreseeable actions were considered. The existing condition encompasses the past history of the area including a long and intensive use of the land for mining purposes. The timeframe that these cumulative effects would impact mining is during the project and for 10 years beyond its completion. During the project there will be disturbance from logging, hand piling and burning, and water source development.

Analysis Methodology ; Mining claim data and claim locations were acquired through the Bureau of Land Management (BLM) LR 2000 database [7]. Information was cross referenced with the Chip-munk Project map to determine areas of impact.

Affected Environment

The Chip-munk Project area has experienced extensive gold mining over the last 1½ centuries, and some gold mining continues today. There are approximately 107 active mining claims in the project area: most of these are placer claims with a few lode claims. Most claims are worked by small time operators who mine for gold utilizing gold pans and sluice boxes, and small heavy equipment (i.e. backhoes and mini excavators). Historically, many claims have been worked with suction dredges; however, there is currently a moratorium on suction dredging in the state of California. Several operators have larger operations involving trenching and processing through trommels and power sluices. Some small scale underground mining takes place as well.

The Mt. Hough Ranger District currently administers three active Plans of Operation and three Notices of Intent for active mining operations in the project area. In addition, there are three claims for which plans have been submitted, but are on hold by the owner operator. These could be activated at any time.

Historic and current day mining creates deep horizontal adits and vertical mine shafts that dot many locations in the project area. Terrain, ground cover, and a lack of surrounding structures make many of these mine shafts difficult to see, and because the open shafts are not readily visible, they pose a direct hazard to Forest visitors. There are five known abandoned mines in the Chip-munk Project area; with many more likely but yet undiscovered.

Environmental Consequences

Alternatives (Proposed Action)

Direct and Indirect Effects (Proposed Action)

For the mining community, the main impacts of the proposed action will be conflicts with access to the mining claims. Logging trucks, heavy equipment and water trucks will increase the potential hazards encountered by miners and other users of the road systems within the project area. It is also possible project activities could be occurring in the same locations as a mining operation.

Impacts to mining operations could also occur at two of the three water development sites. The Salmon Run Placer claim is locate in the NE ¼ of Sec 4, T26N, R8E. The Topsider Placer claim is located in the SE ¼ of Section 18, T26N, R8E. The Claim owners of both of these have not

[7] http://www.blm.gov/lr2000/

notified the Forest Service of their intentions for their claim. Therefore, it is not known if any conflicts should be expected.

Forest Service regulations do not require notice if the mining activities are small scale, using hand tools, and are not causing a significant surface disturbance. Therefore it is assumed there will be a number of non-notice mining operations occurring on a small scale within the project area.

Part of the Chip-munk Project is pile burning along the roadsides. The smoke from burning would have a temporary impact on air quality in the area. Most mining operations take place during the summer months, typically May through October. Burning that occurred outside this typical mining season would have less of an impact on claimants.

The indirect effects of all action alternatives within the area boundary would be to remove the hazardous trees along the roadways, thus improving access to their claims. There would be a beneficial effect of reducing the risk of wildfire and aesthetically cleaning up the stands of trees. This would also make access to the subsurface minerals easier. Road maintenance would also improve mining access.

Cumulative Effects (Proposed Action)

In the analysis, cumulative effects of past actions, the action alternatives, current ongoing actions and reasonably foreseeable actions were considered. The existing condition encompasses the past history of the area including mining throughout the project area. Future fuels reduction projects would serve to reduce hazardous fuel conditions that could threaten mining areas, historic structures, and equipment. Reasonably foreseeable future projects that would close or fence off abandoned mine shafts would help reduce safety risks to Forest visitors. Overall, there will be no significant cumulative effects from implementation of the proposed action.

No-action Alternative

Direct and Indirect Effects (No-action Alternative)

Forest ground cover and fuel loading not addressed by fuels reduction may impact the accessibility of areas for exploratory mining utilizing trenching methods. Many mine operators tend to target areas with minimal understory vegetation when selecting areas for exploratory trenching. Dense stands are more problematic for heavy equipment and an open canopy allows for better access to surface resources. The no action alternative would be less beneficial to miners seeking improved accessibility.

Road access would remain the same or decline under the no action alternative. Dead trees could fall across the roads, blocking access. Roads will deteriorate further without maintenance.

Cumulative Effects (No-action Alternative)

There would be no reduction in available mineral resources or mining opportunities under this alternative because there would be no change in current conditions. However, a large-scale fire could have adverse effects on the miner's environment. Hazardous fuel conditions contributed to the severity of the Moonlight Fire near Antelope Lake. Vegetation in these areas has been slow to return and has created a barren looking landscape. Snags from the fire still pose a safety hazard to miners in the Lights Creek and Indian Creek areas.

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CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

ID TEAM MEMBERS:

Chris Christofferson, District Ecosystem Manager

Donna Duncan, Forest Minerals Administrator

Doug Baughman, Assistant District Archeologist

Elaine Vercruysse, District Logging Systems Planner

Erika Brenzovich, Acting Public Service Staff Officer

Gretchen Jehle, Assistant NEPA Planner

Jeannine Sibley, Resource Crew Leader

Jim Belsher-Howe, District Botanist

Joe Hoffman, Watershed Program Manager

Katherine Carpenter, Project Leader and District NEPA Planner

Kelby Gardiner, District Hydrologist

Kurt Sable, District Hydrologist

Luke Floch, District Geographic Information System Coordinator

Matthew Johnson, Wildlife, Fish, and Rare Plants Program Manager

Maurice Huynh, District Silviculturist

Ryan Bauer, District Fuels Officer

Tina Hopkins, Forest Fisheries Biologist

FEDERAL, STATE, AND LOCAL AGENCIES:

Indian Valley Chamber of Commerce

Plumas-Sierra Counties Department of Agriculture

Plumas County Board of Supervisors

Lassen County Fire Safe Council

Sierra Pacific Industries

Northwest Park Management

John Muir Project

Feather River Land Trust

California Department of Forestry and Fire Protection

Sierra Institute for Community & Environment

Dawn Institute

Northern Sierra Air Quality Management District

Pacific Gas & Electric

Plumas County Board of Supervisors

U.S. Department of Interior, US Fish and Wildlife Service

California Department of Fish and Wildlife

Society of American Foresters

Feather River Resource Conservation District

Northern Sierra Air Quality Management District

Pew Logging

California Department of Food and Agriculture

Plumas Forest Project

California Native Plant Society, Mt. Lassen Chapter

Indian Valley Lumber Co

Plumas Corporation

Plumas County Environmental Health Department

QLG Counties Forester

Quincy Library Group

Sierra Forest Legacy

Greenville Rotary

California Native Plant Society

American Forest Resource Council

USDI Bureau of Indian Affairs

Bureau of Land Management

California Alternatives for Toxics

Central Valley Regional Water Quality Control Board

Chester/Lake Almanor Chamber of Commerce

Collins Pine Company

Copper Creek Kids Camp

Crescent Mills Fire Department

Department of Food and Agriculture

Department of Public Works

Department of Water Resources

US Environmental Protection Agency, Region 9

Indian Valley Community Services District

Indian Valley Fire and Rescue

Pacific Gas & Electric

Plumas County Fire Safe Council

Plumas County Road Department

Round Valley Lake Resort

Sierra Pacific Industries

Trout Unlimited

USDA Natural Resource Conservation Service

Coordinated Resource Management

United Prospectors Inc.

Sierra Pacific Industries

Northern Sierra Air Quality Management District

Rubicon Rentals

California Fisheries and Water Unlimited

Sierra Forest Legacy

Friends of the River

California Forestry Association

TRIBES:

Concow Maidu Tribe of Mooretown Rancheria

Estom Yumeka Tribe of Enterprise Rancheria

Greenville Rancheria

Maidu Summit Consortium

Mechoopda Indian Tribe of Chico Rancheria

Susanville Indian Rancheria

Tyme Maidu Tribe of Berry Creek Rancheria

OTHERS:

Albert Will

Alois Tretter

Angelika and Raymond Powell

Annette Wilson

Arnold Bustamante

Arthur Broughton

Beth Bello

Beth Decker

Brian Guiles

CC&H Lands

Charles Earhart

Chris and George Schachtell

Clifton and Susan Dean

Corky Lazzarino

Craig Cameron

Dan Brown

Danial Wilson

Darca Morgan

David and Victoria Thomason

David Grant

David Long

David Preim

David Randolph

Dennis Develter

Dennis Scott

Diane Uchytil

Erik Weber

Gale Dupree

George and Barbara Wilson

Glen Bonet

Gordon Burton

Guy Coykendall

Irina Wright

Ivan Coffman

Jacob Gourley

James Barrow

James Moffat

Jennifer Dietz

Joe and Elizabeth Smailes

Joe Musso

John Forno

Jonathan Rhodes

Joseph Boyer

Judy Moore

Julie Gates

Karen Gimbel

Keith and Wanda Crummer

Kenneth Boyles

Laurie and Brenda Braaten

Lawrence Dean

Lee Crowe

Lloyd Larkin

Marie Anderson

Marilyn West

Mark Anderson

Max Merlich

Michelle Day

Monica Bond

Nancy Marker

Nick Oman

Paul Foreman

Peter Dilles

Rachel Fazio

Rebecca Enrietto

Rene Voss

Rex Fisher

Richard Boersig

Richard Crockett

Robert and Barbara MacAurthur

Robert and Linda Hafterson

Robert Dahlen

Robert Johns

Roger Medici

Rose Buzzetta

Russell Collar

Russell Peter

Scott Lawson

Seneca Inc.

Shasta Forests Timberlands, LLC

Steve Phillips

Teresa Winningham

Terri Woodruff

Thomas Nevins

Tomas Zubicek

Trust Freelander

Walter and Helge McGee

William and Kelly Turner

William Davies