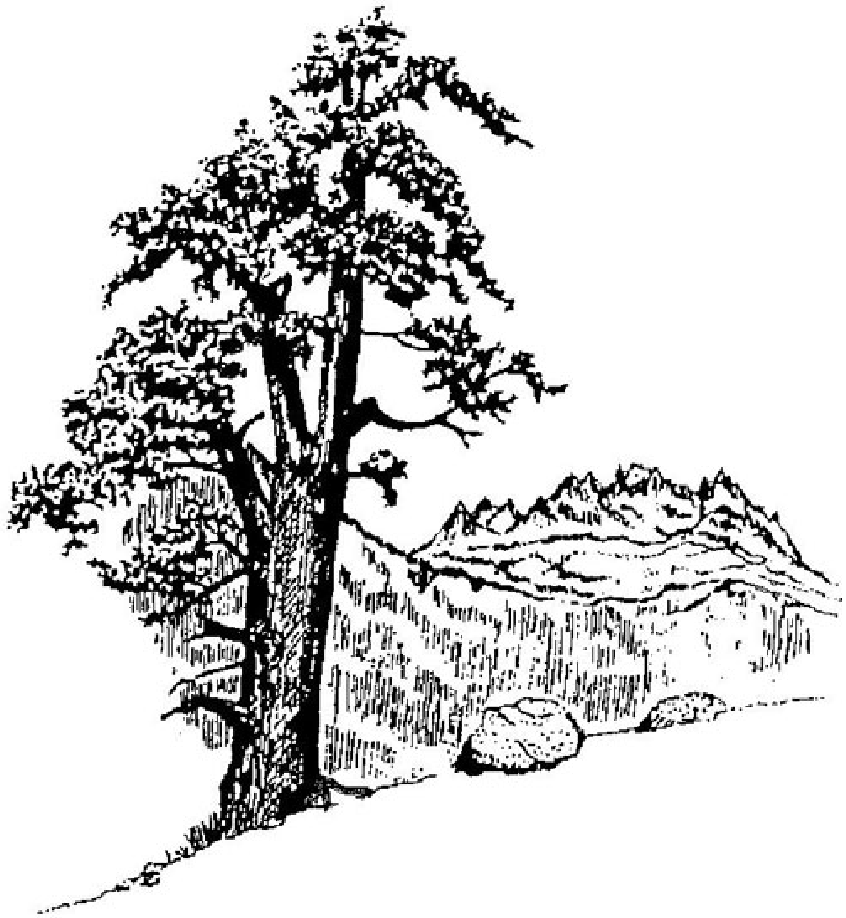
Final Environmental Impact Statement for Fish Camp Project

Sierra National Forest, Bass Lake Ranger District
Madera/Mariposa Counties, CA



Pacific Southwest

R5-MB-235
Region 5

FISH CAMP PROJECT

Final Environmental Impact Statement

Madera & Mariposa Counties, California; Sierra National Forest; Bass Lake Ranger District

Lead Agency: USDA Forest Service
Cooperating Agencies: N/A
Responsible Official: Scott Armentrout, Forest Supervisor
1600 Tollhouse Road, Clovis, CA 93611

For Information Contact: Mark Lemon, District Fuels Officer
57003 Road 225, North Fork, CA 93643
(559) 877-2218 ext. 3110

Abstract: This document examines the environmental effects of a proposal to move towards meeting management goals and objectives set forth in the SNF-LRMP, as amended. The purpose of the proposal is multi-faceted and has two primary purposes (1) the placement of treatment areas on the landscape to reduce the intensity and spread of wildfires across the landscape and near communities and (2) to reduce inter-tree competition to improve tree vigor increasing stand resistance to drought conditions, and insect and disease attack. Alternatives considered in detail are: Alternative 1 (No Action), which would leave the area in its present condition; Alternative 2 (Proposed Action), which proposes to thin conifer stands to reduce stand densities and ladder fuels; masticate ladder fuels and brush/shrub patches; utilize prescribed burning; manually treat and/or prescribed burn noxious weed infestations; and site prepare and plant failed conifer plantations; Alternative 3, contains similar types of treatments as Alternative 2, but proposes to limit the degree of treatment to that needed to achieve fire and fuels objectives only in all treatment areas.

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Summary

The Sierra National Forest (SNF), Bass Lake Ranger District (BLRD) proposes to create a network of landscape area treatments and defensible fuels profiles near key transportation corridors to reduce the intensity and spread of wildfire across the landscape and near communities. As part of the proposal, treatments to improve forest health are planned to reduce inter-tree competition and improve tree vigor providing increased stand resistance to drought conditions, and insect and disease attack.

The area affected by the proposal includes 5,440 total Project boundary acres within the Big Creek watershed, in the Southern Sierra Nevada. The project is immediately east of the community of Fish Camp (designated as Wildland Urban Intermix [WUI]) and State Highway 41. Vegetation types include ponderosa pine plantations, and wild stands made up of mixed conifer, true fir, and hardwood species, as well as areas dominated by brush, rock and steep slopes.

This action is needed, because under the amended SNF-LRMP (Sierra Nevada Forest Plan Amendment [SNFPA], Record of Decision [ROD], USDA-FS 2004), an ecosystem approach to project development and planning is recommended. Where there are significant departures from the desired condition or potential for a loss in key ecosystem functions management actions to address these departures were developed. An emphasis on the inter-relationship of the major functional program goals was placed on these actions. Of particular concern was the State Highway 41 Corridor with its high concentration of human habitation and the declining health of forest stands within and surrounding these areas.

The community of Fish Camp is one of the communities of interest within the State Highway 41 Corridor and is considered highly vulnerable to and at risk from wildland fire. Current forest conditions, due to past management activities (including harvesting operations, fire exclusion/suppression, housing development, etc.) have changed from one where fires were of frequent, low intensity to current conditions where fires are infrequent, and of moderate to high intensity. Forest structure and composition has developed, through the lack of fire in a fire dependent ecosystem, into overabundant shade-tolerate conifer species in the lower and mid-level canopies of the forested stands. This overstocking of conifers has led to a decline in forest health and high susceptibility of loss from insects, disease, drought conditions and wildland fire.

A variety of wildlife species are highly dependent on conditions provided by functioning ecosystems (Pacific fisher, California spotted owl and Northern goshawk, to name a few) and are susceptible to possible loss of viability if the degree of change in their habitat and the ecosystem in which they are dependent is improperly balanced. There is uncertainty (due to gaps in information) surrounding the proper degree of change that can occur in these species habitat, where forest functionality and resilience can be improved and where human habitation's susceptibility to wildland fire can be reduced.

These issues led the agency to develop alternatives to the Proposed Action including:

- **Alternative 1 – No Action**. Under the No Action alternative, current management plans would continue to guide management of the Project area. No thinning, either commercial, pre-commercial and/or biomass operations, of mixed conifer and pine stands, mastication of brush/shrub patches, prescribed burning to reduce natural fuel accumulations and/or treatment of infestations of noxious weeds and replanting of conifers in failed conifer plantations would be implemented to accomplish the purpose and need.
- **Alternative 2 – Proposed Action**. Treatment areas within the Project area boundary were delineated to include those areas where some form of treatment was necessary to meet the purpose and need. First treatment areas were designed to reduce the intensity

and spread of wildfires in and around WUI. Fire and fuels treatments reduce the ladder and surface fuels within the lower and limited mid-level canopy as per the Fire and Fuels Objectives. Treatment areas near key transportation corridors and within the defense zone of the WUI were designed next. Treatment areas were designed to not only focus on those treatments needed to meet Fire and Fuel Objectives, but also meet Forest Health Objectives. Areas where the stands were considered overstocked with conifers and are in higher levels than can be sustained with changing environmental conditions are vulnerable to loss from insect, disease and wildfire. Forest health treatments are designed to reduce basal area and stocking to such a level that the stands are resilient to changing environmental conditions, increasing growth and vigor with reduced stand susceptibility to insect and disease attack and wildfire. These treatments occur within the lower and mid-level canopy.

- **Alternative 3 – Lower and Limited Mid-level Canopy Treatments, All Treatment Areas.** In Alternative 3, treatment areas would remain the same as in Alternative 2. Treatments within these areas would include only those needed to reduce surface and ladder fuels (within the lower and limited mid-level canopy levels) to achieve Fire and Fuels Objectives only. Under Alternative 3 there would be no additional treatments (i.e. additional thinning in the mid-level canopy) to address stand density and Forest Health Objectives.

Major conclusions are displayed in the following table:

Major Conclusions

Resource Area	Indicator	Alt 1	Alt 2	Alt 3
Cultural Resources (page 9)	The degree to which historic property values are diminished.	53 sites have the potential to be adversely affected if a uncharacteristically severe wildfire was to occur from untreated fuel accumulations. Artifact looting could occur from increased access and visibility of sites resulting from a uncharacteristically severe wildfire. Cumuluative effects are unlikely.	By implementing the Standard Protection Measures outlined in the Regional PA, Attachment B, the historic property values of 53 sites would not be diminished as a result of implementing this alternative. No cumulative effects are anticipated.	Similar Effects to Alternative 2.
Botanical TES (page 33) *Other plant species do not have habitat	Determinations for TES species			
	No effect	1 Threatened species *Calyptridium pulchellum*	1 Threatened species *Calyptridium pulchellum*	1 Threatened species *Calyptridium pulchellum*

Resource Area	Indicator	Alt 1	Alt 2	Alt 3
within the Project area, therefore would not be impacted by any of the alternatives.	May affect but is not likely to adversely affect	N/A	N/A	N/A
	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability	4 Sensitive species *Epilobium howellii* *Peltigera hydrothyria* *Hulsea brevifolia* *Cypripedium montanum*	4 Sensitive species *Epilobium howellii* *Peltigera hydrothyria* *Hulsea brevifolia* *Cypripedium montanum*	4 Sensitive species *Epilobium howellii* *Peltigera hydrothyria* *Hulsea brevifolia* *Cypripedium montanum*
Noxious Weeds (page 39)	Potential for Noxious Weed Spread	Increased risk of spread if wildfire was to occur in the area and fireline equipment does not follow Noxious Weed Prevention Practices (e.g. under extreme emergency no time for equipment cleaning)	Low risk of spread through use of design criteria for prevention of spread.	Similar Effects to Alternative 2.
Soils/Geology (page 45)	Potential for reduction in Soil porosity due to compaction	Compacted soils (in 4.55% of the Project area) would continue to recover over time with no additional disturbance.	Design criteria would minimize detrimental compaction of soils.	Similar Effects to Alternative 2.
	Soil Cover Remaining (Large Woody Debris)	Meets and/or exceeds current Regional Standards	Reduction, but would continue to meet and/or exceed Regional Standards	Similar Effects to Alternative 2.
Lands/Special Uses (page 57)	Effects to Special Uses Permitted in Project area.	No Effect	With implementation of Design criteria minimal to No effect	Similar Effects to Alternative 2.

Resource Area	Indicator	Alt 1	Alt 2	Alt 3
Terrestrial Wildlife (page 60) *Listed below are species that do not have habitat within or adacent to the Project area, nor are directly, indirectly or cumulatively effected by this Project therefore the Project would have no effect on them: **Valley Elderberry Longhorn Beetle** *Desmocerus californicus dimorphus* (T) **Bald Eagle** *Haliaeetus leucocephalus* (FSS) **Wolverine** *Gulo gulo*(FSS, C) **Willow Flycatcher** *Empidonax trailli* (FSS)	**No effect**	**California Spotted Owl** *Strix occidentalis occidentalis* (FSS) **Great Gray Owl** *Strix nebulosa* (FSS) **Northern goshawk** *Accipiter gentilis* (FSS) **Pallid bat** *Antrozous pallidus* (FSS) **Townsend's big-eared bat** *Corynorhinus townsendii* (FSS) **Western red bat** *Lasiurus blossevillii* (FSS) **Sierra Nevada red fox** *Vulpes vulpes necator* (FSS) **American marten** *Martes americana* (FSS) **Pacific fisher** *Martes pennanti pacifica* (FSS)	**Pallid bat** *Antrozous pallidus* (FSS) **Townsend's big-eared bat** *Corynorhinus townsendii* (FSS)	**Pallid bat** *Antrozous pallidus* (FSS) **Townsend's big-eared bat** *Corynorhinus townsendii* (FSS)

Resource Area	Indicator	Alt 1	Alt 2	Alt 3
(T)= Threatened (E)= Endangered (P)=Proposed (C)=Candidate (FSS)=Forest Service Sensitive	**May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability**	**N/A**	**California Spotted Owl** *Strix occidentalis occidentalis* (FSS) **Great Gray Owl** *Strix nebulosa* (FSS) **Northern goshawk** *Accipiter gentilis* (FSS) **Pallid bat** *Antrozous pallidus* (FSS) **Townsend's big-eared bat** *Corynorhinus townsendii* (FSS) **Western red bat** *Lasiurus blossevillii* (FSS) **Sierra Nevada red fox** *Vulpes vulpes necator* (FSS) **American marten** *Martes americana* (FSS) **Pacific fisher** *Martes pennanti pacifica* (FSS)	**California Spotted Owl** *Strix occidentalis occidentalis* (FSS) **Great Gray Owl** *Strix nebulosa* (FSS) **Northern goshawk** *Accipiter gentilis* (FSS) **Pallid bat** *Antrozous pallidus* (FSS) **Townsend's big-eared bat** *Corynorhinus townsendii* (FSS) **Western red bat** *Lasiurus blossevillii* (FSS) **Sierra Nevada red fox** *Vulpes vulpes necator* (FSS) **American marten** *Martes americana* (FSS) **Pacific fisher** *Martes pennanti pacifica* (FSS)

Resource Area	Indicator	Alt 1	Alt 2	Alt 3
Aquatic Wildlife TES (page 63) *Listed are species that do not have habitat withinor adacent to the Project area, nor are directly, indirectly or cumulatively effected by this Project therefore the Project would have no effect on them: *Central Valley Steelhead (T)* *Delta smelt (T)* *Hardhead (FSS)* *California Red Legged Frog (T)* *Limestone Salamander (FSS)* *Relictual slender salamander (FSS)* *Foothill Yellow-Legged Frog (FSS)* *Western Pond Turtle(FSS)*	**No Effect**	Moutain Yellow Legged Frog (C/FSS) Yosemite Toad (C/FSS)		
	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability	N/A	Moutain Yellow Legged Frog (C/FSS) Yosemite Toad (C/FSS)	Moutain Yellow Legged Frog (C/FSS) Yosemite Toad (C/FSS)
Aquatic Management Indicator Species (page 63)	Habitat conditions or alteration	Macro-inverttebrates and Pacific Tree Frog= No expected direct, indirect or cumulative effects to habitat	Macro-invertebrates and Pacific Tree Frog= Project Design Criteria expected to maintain habitat	Macro-invertebrates and Pacific Tree Frog= Project Design Criteria expected to maintain habitat

Resource Area	Indicator	Alt 1	Alt 2	Alt 3
Terrestrial Management Indicator Species (page 89)	Habitat conditions or alteration and their effects on species	Greatest effect on some species habitat would be loss or alteration due to uncharacteristically severe wildfire.	Although there would be minor alterations to habitat, not any one particular habitat would be significantly affected or cause effects on species dependent on that habitat.	Similar Effects to Alternative 2.
Hydrology (page 105)	Cumulative Watershed Effects (CWE's) Threshold Levels Reached	The only watershed considered to be at or near CWE prior to field investigations is a segment of 501.5005. Specifically, subdrainage 501.5005 has a sub-basin where CWE response is occurring, which includes Long Meadow.	None of the subdrainages exceeded the Upper TOC of 14%. All of the subdrainages have been inspected for CWE response in the field by an IDT or surveyed using various methods (e.g., SCI, Pfankuch); Baseline and Project CWE data and IDT observations suggest that there is a low potential for CWE response from the Proposed Action throughout the greater subdrainage 501.5005, but a localized CWE response is occurring in the Long Meadow sub-basin.	All of the subdrainages calculated above their Lower TOC% when adding in the Proposed Action, but none exceeded the Upper TOC of 14%. Since the treatment acreages would not change under Alternative 3, the %ERA calculation would be the same as in Alternative 2 resulting in the same conclusion, that is, none of the subdrainages exceeded the Upper TOC of 14%. Baseline and Project CWE data and IDT observations suggest that there is a low potential for CWE response from Alternative 3 throughout the greater subdrainage 501.5005, but a localized CWE response is occurring in the Long Meadow sub-basin.
Air Quality (page 166)	Degree of degradation of Air Quality from Smoke	High degree of long lasting unhealthy to severe graded air quality from potential uncontrolled wildfire(s). If an uncontrolled wildfire was to occur within the area, smoke would produce unhealthy, widespread, prolonged and sever periods of air quality degradation. Depending on upper level atmosphere Class 1 air sheds could be impacted.	With prescribed burning occuring on Air District designated affirmative Burn Days, only short-term impacts to air quality would occur in isolated areas. Potential air quality impacts from wildfires would be reduced with less ground fuels available.	Similar Effects to Alternative 2.

Resource Area	Indicator	Alt 1	Alt 2	Alt 3
Transportation System (page 184)	Effects of Transportation System	With minimal maintenance there is a continued potential for loss of infrastructure investment from erosion, wet weather use, and brush encroachment	Roads not meeting acceptable standards would be required to have maintenance, or reconstruction done for Project implementation. This has the potential to reduce erosion problems caused by transportation cooridors. Implementation of BMP and erosion control measures would reduce the impacts of such construction.	Similar Effects to Alternative 2.

For a summary of Forest Vegetation/Silviculture and Fire/Fuels major conclusions please refer to Table 2, Comparison of Alternatives on page 19.

Chapter 1 Purpose of and Need for Action

Document Structure

The Forest Service has prepared this Environmental Impact Statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the Proposed Action and alternatives. The document is organized into four chapters:

Chapter 1 Purpose and Need for Action: This chapter briefly describes the Proposed Action, the need for that action, and other purposes to be achieved by the proposal. This section also details how the Forest Service informed the public of the Proposed Action and how the public responded.

Chapter 2 Alternatives, including the Proposed Action: This chapter provides a detailed description of the agency Proposed Action as well as alternative actions that were developed in response to comments raised by the public during scoping. The end of the chapter includes a summary table comparing the Proposed Action and alternatives with respect to their environmental impacts.

Chapter 3 Affected Environment and Environmental Consequences: This chapter describes the environmental impacts of the Proposed Action and alternatives.

Chapter 4 Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.

Appendices: The appendices provide more detailed information to support the analyses presented in the environmental impact statement.

Index: The index provides page numbers by document topic.

Additional documentation, including more detailed analyses of Project area resources, may be found in the Project planning record located at Bass Lake Ranger District (BLRD) office in North Fork, California.

Background

The SNF-LRMP was amended in 2001 by the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD) (USDA-FS 1992, 2001b). Standards and Guidelines for project planning were to focus on the modification of fire behavior through fuels treatments. These treatments were to have the highest priority in areas described as Wildland Urban Interface/Intermix (WUI), (see map package; map2). In 2004, a Supplemental Environmental Impact Statement (USDA-2004a) was written to the SNFPA and a ROD was signed (USDA-FS 2004b). This ROD replaced the 2001 decision in its entirety. This decision recommended an ecosystem approach whereby the development and planning of projects would be based not only on fuels reduction treatments, but would create an overall approach by looking at all key elements within an ecosystem. WUI continued to be the highest priority area for treatments.

In July 2005, the BLRD completed the Fresno River Landscape Analysis. In the Fresno River Landscape Analysis, the State Highway 41 Corridor was determined as an area with greatest departure from desired conditions set-forth in the SNFPA ROD (USDA-FS 2004b) and where opportunity existed to move it closer to that desired condition. Although the Fish Camp Project is not located in the Fresno River Watershed it is still part of the area of concern along the Highway 41 corridor. This area includes high concentrations of recreational activity and human habitation.

Adjacent forests suffer with declining health from overcrowding and include habitat for species-at-risk (such as California Spotted Owl, goshawk and Pacific fisher).

Following management goals and direction from the SNFPA 2004 ROD (USDA-FS 2004b), treatment areas for the Fish Camp Project were developed. These treatment areas were based on the basic fire and fuels strategy which remained in the SNFPA 2004 ROD (USDA-FS 2004b); reducing the risk of wildland fire to WUI and to effectively modify wildland fire behavior by strategically placing a pattern of area treatments (known in the SNFPA 2004 ROD (USDA-FS 2004b) as SPLATs, see map3) across broad landscapes. In addition, this strategy was broadened to include the need to consider and provide for other important objectives to improve forest health by restoring and maintaining ecosystem structure and composition. A network of land allocations, designated as part of the SNFPA 2004 ROD (USDA-FS 2004b), have an associated set of desired conditions, management intents, and management objectives. From standards and guidelines management direction is provided for project planning and implementation. The vegetation and fuels treatment standards and guidelines are intended to (1) act as sideboards for local managers as they design projects to meet fuels and vegetation management objectives and respond to site-specific conditions, and (2) retain important components of habitat that are believed to be important to species associated with old forests, including large trees, structural diversity and complexity, and moderate to high canopy cover. At the project level, these standards and guidelines are used in conjunction with desired conditions, management intents, and management objectives for the relevant land allocation to determine appropriate treatment prescriptions (SNFPA 2004 ROD; USDA-FS 2004b).

As part of the SNFPA 2004 ROD (USDA-FS 2004b), an adaptive management and monitoring strategy designed to address high priority, key questions that relate to the uncertainties associated with management activities was to be initiated. In 2006, Region 5 (Pacific Southwest Region) of the Forest Service, as well as other Federal and State Agencies, entered into an agreement with the University of California whereby the university would act as a neutral third party to studying the effects of management actions associated with implementation of the SNFPA 2004 ROD (USDA-FS 2004) management direction. Focus was on the four key areas where the highest priority management questions exist (detailed and incorporated from SNFPA 2001 FEIS, Appendix E [USDA-FS 2001] and SNFPA 2004 FSEIS [USDA-FS 2004a]). These key areas include wildlife (specifically Pacific fisher/California spotted owl), fire and forest health, water quality and quantity, and public participation. This adaptive management study is known as Sierra Nevada Adaptive Management Study (SNAMP) and is focused on an area directly south of the Fish Camp Project. One of the key issues with the Fish Camp Project is it falls within the Pacific fisher habitat zone. Knowledge gained by the SNAMP project has been utilized in the design of the Fish Camp Project including; current movement patterns and 2008/2009/2010 denning sites (both birthing and maternal) of Pacific fisher that have been radio collared and intensively monitored within and outside of the Project area, and information about what type of habitat conditions are preferred by denning females.

Purpose and Need for Action

The Fish Camp Project area lies within the Big Creek watershed, where during the period before significant Euro-American influence, natural fires occurred frequently and were low intensity with return intervals ranging from five to ten years. During the past century, wildland fires have played a significant role around the Fish Camp Project area and the Southern Yosemite National Park area. Between 1911 and 2008 there have been eight fires within three miles of Fish Camp Project area. The majority of fires occurred between 1911 and 1934 and ranged in size from 106 to 3930 acres. These fires were mostly to the south and west of the Project area. Although there is no documented history of large fire occurrence in the Project area, numerous residual trees and cut stumps show witness to fire. In 1990 a 26 acre fire started in or near two adjacent plantations, causing severe damage to both. In 1924 an 800 acre fire to the south west of Fish Camp was stopped within a tenth of a mile of the community.

The areas east of the Fish Camp Project area received extensive logging between 1918 and 1925 which resulted in slow natural regeneration of conifer species. Railroad and ground-based logging activities as well as stand replacing fires have resulted in little of the area with trees over 100 years of age. The natural stands proposed for thinning generally consist of approximately 85 to 100 year old shade tolerant trees. In the early 1950's and 1960's, a large number of the brush fields, that resulted for either past management actions or historic wildfires were prepared and planted with conifer species. Due to fire exclusion and areas not logged during the early 1920's, conifer stands within the Fish Camp Project area have become densely populated with natural regeneration of fire intolerant species.

Existing Condition

Hundreds of small trees per acre are common beneath stands of white fir, sugar pine, incense cedar, and ponderosa/Jeffrey pine in the lower elevations and red fir in the higher elevations. These small understory trees consist of mostly shade tolerant incense cedar and white fir. Ponderosa pine and incense cedar have naturally reseeded into many areas where they are severely overstocked and create significant fuel ladders. Additionally this overstocking has created stands that can no longer successfully compete during natural disturbances such as drought conditions, insects/disease attacks and/or wildfire.

The community of Fish Camp borders the west side of the Project area. This Project also affects three Forest Service campgrounds, a State Snow Play area and a county refuse transfer site. Also within the Project is a 244 room hotel situated on 35 acres with numerous out buildings and guest cottages. There is also a special use permit for a wilderness pack station and horseback riding. Many of the homes in the Fish Camp community do not have adequate clearance to protect them if a fast moving wildland fire were to move into the subdivision. Compounding this problem is poor access in the subdivision, with narrow winding roads and only one main road as access in the event of a wildfire. These conditions create additional hazards and risks to public and firefighter safety during wildfire evacuation situations.

The Fish Camp Project area is located at the southern entrance to Yosemite National Park and as tourism increases recreational activities "spill" into the National Forest and the Project area. With high concentrations of recreation visitors during the height of the summer season, evacuations would be difficult if a fast moving fire started. Natural and/or human caused fires starting to the south of the Project or near the town of Fish Camp would have the greatest potential for threat.

The last century was unusually wet compared to prior centuries.[1] This wetter than normal period coupled with the exclusion of fire has set the stage for stands to become overcrowded with competing conifers, oaks and other vegetation. Changes in weather conditions over the past thirty years have placed stress on many of these stands. Inter-tree competition, drought, rising temperatures, and insect attacks are beginning to take a toll on both plantation and wild stands. White pine blister rust has also been killing a number of sugar pine over the past ten to fifteen years. Dead and down fuel loadings have been on the rise.

[1] Sierra Nevada Forest Plan Amendment, Record of Decision, 2004.

Desired Conditions

The underlying need(s) for this Project include:

- Protecting human communities from moderate to high intensity wild fires as well as minimize the spread of wildfires that might originate in urban areas into the forested lands created by unnaturally high levels of fuel ladders and dead material.
- Increasing the resiliency of overstocked stands to attack from insects, diseases, drought conditions, and/or wildfire.

In meeting the aforementioned needs the action must also achieve the following purposes:

- Reduction in the intensity and spread of wildfires across the landscape and near communities. The reason for this purpose is to provide a buffer between developed areas and wildlands where fire suppression capabilities are enhanced by modified fire behavior inside the WUI zones as well as provide a safe and effective area for fire suppression activities to occur (USDA-FS 2001, page 9).
- Reduction in stand density within the lower and mid-canopy layers of conifer stands, to provide for increased stand resiliency, growth and vigor. The reason for this purpose is to increase the capability for forested stands to withstand drought conditions, attacks from insects and diseases, and the effects from wildfire.

Additionally Alternative 3 of this document is analyzed as the noncommercial alternative as ordered by the Eastern District Court of California in [Sierra Forest Legacy, et. Al., v. Mark Rey, in his official capacity as Under Secretary of Agriculture, et. Al, Case No. 2:05-cv-00205-MCE-GGH]. The District Court ordered the FS to "Include a detailed consideration of project alternatives, including a non-commercial funding alternative, for all new fuel reduction projects not already evaluated and approved as of the date of this Memorandum and Order." Subsequent Regional Forester guidance concerning Judge England's decision indicates that the noncommercial funding alternative should be designed solely to meet the fuels reduction purpose and need. In a noncommercial funding alternative, it is not permissible to cut timber for the purpose of increasing economic returns beyond that needed to meet fuel reduction objectives. This court order could require development of an alternative to the Proposed Action should the Proposed Action include harvest of timber in excess of that needed to meet fuel reduction objectives

Proposed Action

The action proposed by the Forest Service to meet the purpose and need is:

- Treat surface and ladder fuels (live and dead) to interrupt wildfire spread and fire intensity levels. This is proposed to be completed utilizing thinning and biomass thinning of pre-commercial and commercial conifers, mastication and/or dozer piling and burning in order to improve the ability of firefighters to suppress and control wildfires and provide a better measure of safety for the public and personnel.
- Thin from below mixed conifer, white fir and pine stands, conifer plantations and small reproduction to reduce stand densities.
- Masticate brush/shrub patches in strategic locations.

- Utilize prescribed fire (Rx) as a tool to reduce natural and project-generated fuels through pile burning, understory and/or broadcast burning.
- Use prescribed fire and/or manual methods to treat infestations of noxious weeds, with the goal of eradication and preventing their spread into areas treated.
- Replant conifers within specific sites of failed conifer plantations.

The Proposed Action is described in more detail in Chapter 2 under Alternative 2, page 9.

Decision Framework

Given the purpose and need, the deciding official will review the Proposed Action, other alternatives, and their environmental consequences, in order to determine whether to implement the Proposed Action as described, select a different alternative or take no action at this time.

Forest Plan Direction

The Proposed Action and alternatives are guided by the SNF-LRMP, as amended by the SNFPA 2004 ROD [USDA-FS 2004b]. The SNF is subdivided into land allocations (management areas) with established desired conditions and associated management direction (Standards and Guidelines). Land allocations that are found within the Fish Camp Project boundary are shown on either individual maps for the specific land allocation or on the Land Allocations-Map 4. These maps are in the Map Package in Appendix A and include:

Wildland Urban Interface/Intermix (both Defense and Threat Zones). This land allocation encompasses 1947 acres within the Fish Camp Project boundary and is set in closest proximity to communities, areas with higher densities of residences, commercial buildings, and/or administrative sites with facilities. Of this acreage; 578 acres are designated as Defense Zone and 1369 acres are designated as Threat Zone. There were no local site-specific adjustments made to these boundaries as allowed by SNFPA 2004 ROD (USDA-FS 2004b) and are the zones mapped in the SNFPA 2004 FSEIS. As defined in the SNFPA 2004 ROD (USDA-FS 2004b), Defense Zones designated in the Project extend ¼ mile from private property lines. Threat Zones designated in this Project extend 1 ¼ miles out from the Defense Zone boundary. There are Forest-wide standards and guidelines for this land allocation which have been incorporated into the Project design criteria.

Southern Sierra Fisher Conservation Area (SSFCA). This land allocation encompasses the entire Fish Camp Project area (5,440 acres). The SNFPA 2004 ROD (USDA-FS 2004b) has set forth standards and guidelines for this land allocation that address protection measures for fisher den sites as well as direction for projects proposed in SSFCA (USDA-FS 2004b, pgs. 61-62). In these standards and guidelines it is left to wildlife biologists to develop design criteria that protect important habitat structures within fisher habitat. Design criteria for the maintenance and protection of key habitat elements for Pacific fisher have been developed based on current scientific information, issues raised during public scoping and standards and guidelines in the SNFPA 2004 ROD (USDA-FS 2004b). These are listed in Chapter 2, Design Criteria Common to All Alternatives starting on page 12.

California Spotted Owl Protected Activity Centers (PACs) and Home Range Core Areas (HRCA). This land allocation encompasses 475 acres of the Project area as suitable nesting habitat and nearly the entire Fish Camp Project area is suitable foraging habitat.

There are two PACs and associated HRCAs either entirely or partially within the Project boundaries. The 2004 SNFPA ROD (USDA-2004b) has set forth standards and guidelines for this land allocation that address mechanical treatments conducted to meet fuels management objectives in PACs located in the WUI defense zones and in threat zones where prescribed fire is not feasible and where avoiding PACs would significantly compromise the overall effectiveness of the landscape fire and fuels strategy (USDA-FS 2004b, pgs. 59-61). These, as well as the remaining standards and guidelines for this land allocation are incorporated into design criteria and are listed in Chapter 2, Design Criteria Common to All Alternatives starting on page 12.

Northern Goshawk Protected Activity Centers (PAC). This land allocation encompasses 176 acres of suitable nesting habitat in one PAC and nearly the entire Fish Camp Project area is suitable foraging habitat. The SNFPA 2004 ROD (USDA-FS 2004b) has set forth standards and guidelines for this land allocation which are similar to those for California spotted owl PACs (USDA-FS 2004b, pgs. 59-61). The standards and guidelines for this allocation are incorporated into design criteria and are listed in Chapter 2, Design Criteria Common to All Alternatives starting on page 12.

Old Forest Emphasis Areas. This land allocation is designated in approximately 1811 acres within the Fish Camp Project boundary. Mature forest habitat is described by California Wildlife Habitat Relationship (CWHR) types 4M, 4D, 5M, 5D, and 6 where outside of the WUI defense zones standards and guidelines are designed to maintain and enhance the structures associated with these forest types and the protection of the species habitat associated with these forest ecosystems (SNFPA ROD; USDA-FS, 2004b, pages 50-51). As such, standards and guidelines associated with wildlife species that prefer mature forest habitat are used as the standards and guidelines for this land allocation. These are incorporated into design criteria and are listed in Chapter 2, Design Criteria Common to All Alternatives starting on page 12.

Riparian Conservation Areas (RCA): This land allocation encompasses the entire Fish Camp Project boundary because of the extensive stream network within the Project boundary. The standards and guidelines, specifically the Resources Conservation Objectives (RCO) from the SNFPA ROD (USDA-FS 2004b), associated with this land allocation are incorporated into design criteria and are listed in Chapter 2, Design Criteria Common to All Alternatives starting on page 12.

Public Involvement

A Notice of Intent (NOI) to prepare an Environmental Impact Statement for the Fish Camp Project was published in the Federal Register on August 12, 2010. The notice asked that scoping comments on the Proposed Action be received no later than 30 days after the publish date. In addition, as part of the public involvement process, the Forest Service sent scoping letters to residents within a 1.5 mile radius of the Project area, to members and groups in the Native American community and to publics expressing interest in the Project. The Project was also posted in the Sierra National Forest Schedule of Proposed Action (SOPA) by July 1, 2009. Scoping letters were sent on August 16, 2010 requesting the public's input on the project. The scoping letter included an invitation to participate in a field trip and a news release announcing the public meeting which was also sent to the Sierra Star (local newspaper) on September 17, 2010. On September 28, 2010, the Forest Service held the public field trip to the Project area. The public field trip was attended by approximately 25 individuals from the local community, local fire safe council, and environmental community.

In conjunction with the written comments received during the scoping period and the issues associated with written comments (see below), the BLRD Interdisciplinary Team convened to discuss project planning, modifications to the Proposed Action, updates on base information collection, potential effects based on most recent information collected, review recommendations and items of concern that have been brought forward into this analysis. These recommendations led to the development of Alternative 3.

Issues identified from scoping comments were used to determine the scope of the analysis for the Fish Camp Project. Central to the scoping comment issues was the proper balance between forest functionality and wildfire susceptibility.

The DEIS Notice of Availability was published in the Federal Register on February 18, 2011 with the comment period ending April 4, 2011. The document was made available on the SNF website and hard copies of the document, compact disks or letters of notification were mailed to 53 interested parties.

Public Comments on the DEIS

In response to the Forest's request for comments during the DEIS comment period, Seven interested parties submitted responses. The SNF documented, analyzed, and summarized public comments. Although only substantive comments are required to be responded to in NEPA regulation, the forest chose to respond to all comments submitted. One hundred and forty seven (147) comments were responded to and these responses can be found in FEIS Appendix E. A decision was made to address all comments and/or statements received during the comment period.

Tribal Government and Native American Interests

Tribal Governments and Native American Interests representing constituents in the project area were sent all public correspondence and have consulted on aspects of the proposed projects. The following offices received mailing:

American Indian Council of Mariposa County, California Indian Basketweavers Association, Chaushilha, North Fork Mono Tribe, North Fork Mono Rancheria, Sierra Mono Museum, Southern Sierra Miwok Nation, Picayune Rancheria and the Mono Nation, a non-profit organization.

Significant Issues

Comments from the public and other agencies were used to formulate issues concerning the Proposed Action. There were no comments received from members or groups from the Native American community. The Forest Service separated the issues into two groups: significant and non-significant. Significant issues were defined as those directly or indirectly caused by implementing the Proposed Action. Non-significant issues were identified as 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; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-significant issues and reasons why they were found non-significant may be found in the Project record located at BLRD Office in North Fork, CA.

The Forest Service identified the following significant issue during scoping:

Wildlife

- Inappropriate size class snags in the future may impact snag dependent wildlife.
- Removal of trees greater than 12 inches may impact wildlife species.
- Reducing small patches of high intensity wildfire may impact wildlife.
- Mastication may negatively impact wildlife.

Forest Health

- Removal of 10–30 inch trees may not improve forest health.
- Forest heterogeneity may improve habitat for wildlife.
- Forest homogeneity may adversely impact wildlife habitat.
- Cutting trees grater then 20 inches may impeded ecosystem restoration/ old forest characteristic development.
- Mechanical harvesting equipment may impact noxious weed spread.

Economics

- Project as proposed may have negative effects on profit to US Government.; Trees with too many knots, bio mass issues.
- Mechanical thinning does not thin the forest as economically as prescribed burning.
- Manufacturing biomass product on the forest is not economical.

Wilderness

- Using logging equipment may impact wilderness values.

Community/Fire Suppression

- Treatment of vegetation for fuels beyond 200 feet for homes and communities will not decrease their susceptibility to wildfire.
- Mastication may negatively impact fire suppression.

The Interdisciplinary Team utilized the following “Indicators” to determine to what degree these issues were documented and addressed. These “Indicators” are focused on maintaining high quality wildlife habitat.

- The amount of Project area remaining in high canopy cover after treatment (measured by the average percent canopy cover in a stand remaining is not below 50% and a significant portion is at or greater 60%);
- The canopy cover remaining consist of trees greater than 20” in diameter;
- The changes in stand density would not create open stands;
- Areas within the Project area would maintain a degree of understory diversity, such as brush, shrubs and small trees;
- Large snags and downed woody material are available within the Project as well as an availability of enough “recruitment” material to maintain these levels into the future;
- An availability of movement corridors to link suitable habitat outside of the Project area to provide for habitat connectivity.

The Interdisciplinary Team for the Fish Camp Project developed Design Criteria Common to All Action Alternatives to address some of the significant issues that were focused on wildlife habitat quality and quantity.

Changes between the DEIS and the FEIS

Based on both public comment and Forest Service review, changes were made between DEIS and FEIS. The following types of changes and clarifications were applied to the FEIS:

Data Omissions – In cases where omissions in data were identified by the FS or the public, those omissions were fixed in the FEIS. Where data pertinent to the analysis was identified between DEIS and FEIS it was include and analyzed.

Corrections and Edits – Where typos or errors were identified they were correct.

Clarifications – Public comment inspired the clarification of items in many sections of the FEIS. These clarifications ranged from adding a few words to help the reader more fully understand the content and rationale of a section to expansion of summary and comparison tables. The design criteria were streamlined and clarified in the FEIS as well.

Additions – Alternatives suggested by the public were addressed.

Chapter 2 Alternatives, Including the Proposed Action

Introduction

This chapter describes and compares the alternatives considered to meet the purpose and need of the Fish Camp Project. It describes both action alternatives considered in detail as well as those eliminated from detailed study. The end of this chapter presents the alternative's fire and fuels and silviculture effects in tabular format so that the alternatives and their environmental impacts can be readily compared. Please see the table in the Summary titled Major Conclusions for the effects of other resources.

Alternatives Considered in Detail

The Forest Service is required to analyze a No Action alternative. The Proposed Action and one additional action alternative were considered in detail. The additional action alternative is the non-Commercial Funding Alternative, also referred to as the Lower and Limited Mid-Level Canopy Treatment alternative, which focused on limiting the quantity of material removed to just that needed to meet fire and fuels objectives in all treatment areas. This alternative was developed based, in part, using the "Indicators" for the significant issues where a higher degree of canopy cover would remain after treatment and stand densities would remain higher than in the Proposed Action.

Alternative 1 – No Action

Under the No Action alternative, current management plans would continue to guide management of the Project area. No thinning, either commercial, pre-commercial and/or biomass operations, of mixed conifer and pine stands, mastication of brush/shrub patches, prescribed burning to reduce natural fuel accumulations and/or treatment of infestations of noxious weeds and replanting of conifers in failed conifer plantations would be implemented.

Alternative 2 – The Proposed Action

Treatment areas within the Project area boundary were delineated to include those areas where some form of treatment was necessary to protect communities from wildfire and to improve forest health and resiliency. In developing the Proposed Action, first treatment areas were designed to create SPLATs to reduce the intensity and spread of wildfires in and around WUI. Treatment areas near key transportation corridors and within the defense zone of the WUI were designed next. Fire and fuels treatments are designed to reduce the ladder and surface fuels and occur within the lower and limited mid-level canopy [Fire and Fuels Objectives). Treatment areas were further designed to not only focus on those treatments needed to meet fire and fuel objectives, but areas where the stands were considered overstocked with conifers and are vulnerable to loss from insect, disease and wildfire (Forest Health Objectives) as well.

Treatments defined for forest health are designed to reduce basal area and stocking to such a level that the stands are resilient to changing environmental conditions, increase growth and are vigorous with reduced susceptibility to insect and disease attack and wildfire. These treatments occur within the lower and mid-level canopy.

Maintenance and/or reconstruction of forest roads that were determined to not meet Forest Service standards would be brought back up to standard prior to commercial thinning. Commercial thinning would be completed within the first two to five years of implementation. Areas where follow-up treatments are needed, such as slash piling/burning, prescribed understory burning and noxious weed treatments, would be prioritized based on proximity to WUI and completed as appropriated dollars became available. The Design Criteria Common to All Action Alternatives is incorporated as part of this alternative to address significant issues. A treatment area map (map 1) can be found in the Map Package in Appendix A.

Of the 5,440 total acres within the Project boundary, approximately 1,200 acres were analyzed as areas where some form(s) of treatment are proposed (so named as treatment areas). The remaining 4,240 acres have no treatments proposed due to slopes greater than 35 percent, standard and guideline limitations on treatment and/or no treatment is needed to meet the purpose and need.

In Alternative 2 (Proposed Action) the treatments would include:

- commercially thin mixed conifer, pine, and white fir stands on approximately 562 acres;
- commercially thin ponderosa and Jeffrey pine plantations on approximately 404 acres;
- pre-commercially thin by masticating approximately 41 acres of plantations;
- plant and hand release treated openings within commercial thin and mastication treatment areas on up to 10 acres;
- treat slash concentrations within commercially thinned stands by a combination of tractor or hand piling and burning or mastication;
- underburn on approximately up to 193 acres within 7 prescribed fire stands;
- underburn within portions of T8, 9, 10, and 12 on approximately 208 acres;
- perform maintenance on approximately 41.9 miles of forest system roads;
- perform reconstruction on approximately 12.9 miles of forest system roads;
- construct 0.5 miles of temporary road; and
- manually pull and/or prescribed burn of noxious weed patches.

Though a total of 1,200 acres are analyzed for the treatments listed above, design criteria common to all alternatives and standards and guidelines from SNFPA ROD (USDA-FS 2004b) dictate areas where treatments cannot occur to reduce and/or eliminate adverse effects on particular resources. It is estimated that excluding these sensitive areas, for example, cultural resource areas, botanical species areas, wildlife habitat areas, and aquatic species areas from the treatment areas where no treatment would occur, a total of 850 – 1,000 acres would remain for treatments as proposed.

Alternative 3 – Lower and Limited Mid-Level Canopy Treatments, All Treatment Areas (Non-Commercial Funding Alternative)

In Alternative 3, treatment areas would remain the same as in Alternative 2, treatments within these areas would include only those needed to reduce the surface and ladder fuels (within the lower and limited mid-level canopy levels) to achieve fire and fuels objectives. Under Alternative 3 there would be no additional treatment (i.e. additional thinning in the mid-level canopy) to fully address stand density and forest health objectives. This alternative was developed based, in part, using the “Indicators” for the significant issues where a higher degree of canopy cover would remain after treatment and stand densities would remain higher than in the Proposed Action. In treatment areas consider conifer plantations, fire/fuels objectives would be based on the need to break-up the continuity of crowns created by stands that are considered all one age (even-aged). This includes the need to remove some material that would be considered commercially sized. In treatment areas where wild stands occur (generally areas outside of plantations), the break-up of crown continuity would not be the main focus, but the ability to raise the height of the canopy base (the average height of the bottom layer of branches) where fire/fuels objectives are met. This includes the need to remove some material that is considered pre-commercially sized. Maintenance and/or reconstruction of forest roads that were determined to not meet Forest Service standards would be brought back up to standard. Mechanical thinning would be completed within the first two to five years of implementation. Areas where follow-up treatments are needed, such as slash piling/burning, prescribed understory burning and noxious weed treatments, would be prioritized based on proximity to WUI and completed as appropriated dollars became available.

The Design Criteria Common to All Action Alternatives is incorporated as part of this alternative to address significant issues. A treatment area map (map 1) can be found in the Map Package in Appendix A.

In Alternative 3, the treatments would include:

- mechanically thin by mastication and/or hand-treatment, mixed conifer, pine, and white fir wild stands on approximately 562 acres;
- commercially thin ponderosa and Jeffrey pine plantations on approximately 404 acres;
- pre-commercially thin by masticating approximately *41* acres of plantations;
- plant and hand release treated openings within commercial thin and mastication treatment areas on up to *10* acres;
- treat slash concentrations and pre-commercial material within stands with a combination of hand cutting, tractor piling, and burning or mastication;
- underburn on approximately up to 193 acres within 7 prescribed fire stands;
- underburn within portions of T8, 9, 10, and 12 on approximately 208 acres;
- perform maintenance on approximately 41.9 miles of forest system roads;
- perform reconstruction on approximately 12.9 miles of forest system roads;
- construct 0.5 miles of temporary road; and
- manually pull and/or prescribed burn of noxious weed patches.

Though a total of 1,200 acres are analyzed for the treatments listed above, design criteria common to all alternatives and standards and guidelines from SNFPA ROD (USDA-FS 2004b) dictate areas where treatments cannot occur to reduce and/or eliminate adverse effects on particular resources. It is estimated that excluding these sensitive areas, for example, cultural resource areas, botanical species areas, wildlife habitat areas, and aquatic species areas from the treatment areas where no treatment would occur, a total of 850 – 1,000 acres would remain for treatments as proposed.

Design Criteria

The design criteria listed by resource area below are direction to follow during implementation. As listed, they can be directly from the SNF-LRMP (USDA-FS 1992) and SNFPA ROD (USDA-FS 2004b) Standard and Guidelines (S&G); Forest Service Manual/Handbook directions; Best Management Practices (BMP); based on past implementation experience; legal requirements; based on the best science available where they are used in addition to standards and guidelines and/or have been developed to address significant issues.

Cultural Resources

Cultural resources will be protected through implementation of Standard Protection Measures of the Regional Programmatic Agreement (PA), the primary protection measure being avoidance for all project activities, including resource design criteria. The appropriate specialist or representative will approve all landings and temporary roads prior to Project implementation as needed (Appendix B of the PA).

Botany: Rare Plants and Noxious Weeds

Project design criteria for protection of Forest Service Sensitive plants include:

a) All short-leafed hulsea populations will be flagged for avoidance (SNF 1992 LRMP S&G #s 67 and 68, SNFPA 2004 ROD S&G # 125).

b) Stream reaches containing populations of the veined water lichen will be flagged for avoidance and will not be used for drafting (SNF 1992 LRMP S&Gs# 67 and 68, SNFPA 2004 ROD S&G # 125).

c) Open granitic and/or gravelly areas in or adjacent to units M08, T14a-b, T21a-d, T27, and T30 will not be driven through for Project implementation nor used for parking of vehicles, heavy equipment nor used as log landings. This is to ensure protection of suitable habitat for the following sensitive plant species that have not been discovered in the Project area but may exist: Mono Hot Springs evening primrose, Kelloggs' lewisia, and Yosemite bitterroot. In the event that the granitic habitat occurs within a unit, the botanist will flag suitable habitat for avoidance in coordination with timber and/or fuels staff (SNF 1992 LRMP S&Gs # 67 and 68, SNFPA 2004 ROD S&G # 125).

Project design criteria for prevention of spread of noxious weeds:

a) All heavy equipment used for implementing the Project will be washed before arriving on site to remove soil and seeds of noxious weeds. This is to ensure that weed seeds or propagules are not inadvertently introduced into the Project area (SNFPA 2004 ROD S&Gs # 38 and 39; USDA Forest Service FSM 2081.3, Timber Sale Contract Clause B.6.35).

b) Infestations of noxious weeds occurring in treatment units or other areas such as landings where they are likely to be spread as a result of Project activities will be removed by Forest Service personnel prior to Project implementation. Because these areas will still have soil contaminated with seeds of the weeds, a buffer zone will be shown on the timber sale contract and flagged for avoidance to prevent heavy equipment from transporting seeds to other areas within the Project boundary and beyond. In some cases it may be necessary to wash equipment after working in an infested unit prior to moving to a clean area elsewhere within the Project boundary and/or upon exiting the Project area altogether (SNFPA 2004 ROD S&Gs # 38, 40, 48; USDA Forest Service FSM 2081.3, Timber Sale Contract Clause B.6.35).

c) Any seeding, planting, or mulching for erosion control will be pre-approved by the Forest Botanist to minimize the likelihood of accidental introduction of noxious weeds and to ensure compliance with the FS Pacific Southwest Region Native Plant Policy (SNFPA 2004 ROD S&Gs # 38, 40; USDA Forest Service FSM 2081.03; R5 Native Plant Policy, 1994)

Geology/Soils

a) Leave a 100-foot wide buffer of 100 percent soil cover below large rock outcrops especially in treatment units T-06, T-10a-d, T-14a-b, T-17a-d, T-18a-d, T-21a-d, and T-28a-j. These areas have a high potential to generate run off that can cause accelerated erosion on soils down slope (FSM 2500 – Watershed and Air Management, Chapter 2550 – Soil Management).

b) Limit mechanical operations, where sustained slopes exceed 35%, except where supported by on-the-ground interdisciplinary team evaluation (SNF-LRMP S&G 125).

c) Maintain 50% soil cover over all treatment areas. Where shrub species predominate, attempt crushing before piling to create small woody fragments left scattered over the site for soil cover and erosion protection (SNF-LRMP S&G #130).

d) Maintain at least five well-distributed logs per acre as large woody debris (LWD) representing the range of decomposition classes defined in the (SNFPA ROD S&G 10).

e) Provide for road surface stabilization (gravel) on roads over 5% grade that are located on sensitive soils, including Ultic Haploxeralf soils (SNF- LRMP S&G #129) and are affecting soil productivity and/or water quality.

Lands/Special Uses

1. Forest Service project managers will notify permit holders and agencies, in person or in writing, Project activities including mastication, pre-commercial thinning and/or understory prescribed fire will be implemented in Forest areas that may affect their authorized special uses or agency jurisdictions. A list of permit holders is located in the Project record. Forest Service managers responsible for implementation will work with permit holders to ensure authorized improvements and/or right-of-ways are clearly identified on all contracts and visible during Project implementation. Appropriate protection measures will be put in place.

Recreation and Recreation Special Uses

A. A Limited Operating Period (LOP) (no harvest activity) will be established for T-6, T-14a, T-14b, and T-21d adjacent to the Big Sandy Campground. The LOP is implemented from Memorial Day Weekend to Labor Day weekend during peak summer camping season.

B. An LOP will be established for units T-8a, T-b, and T-9 adjacent to the Goat Meadow Snow Play Area. To avoid conflicts with permit holders and Forest visitors, Project activities at or near the Goat Meadow Snow Play Area. No harvest activities will be permitted between Memorial Day and Labor Day. If Project activities occur at or in close proximity to the Goat Meadow Snow Play area the parking lot should be fully accessible to the public on weekends.

C. The parking area at Goat Meadow Snow Play Area will not be used for a landing or staging area for Project related equipment.

D. All activity fuels and slash will be pulled out of and at least five feet away from established Forest Service or permittee trails and any damage by Project activities will be repaired to pre-Project conditions.

E. An LOP (no harvest activities) will be established for Project activities that occur in the vicinity of the Yosemite Trails Pack Station (YTPS) base facility or inside units T-7a, T-10a, T-10b, T-18a and T-18b with YTPS trails during the peak user months from Memorial Day through Labor Day.

Wildlife – Terrestrial

Many standards and guidelines address wildlife and the Project includes compliance with them all however for brevity's sake those that are particularly important for managing wildlife and wildlife habitat and/or have sparked public interest related to the Fish Camp Project area are listed here.

Down Woody Material: "Determine down woody material 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. Consider the effects of follow-up prescribed fire in achieving desired down woody material retention levels." This will be met by maintaining at least five well-distributed logs per acre as large woody debris (LWD) representing the range of decomposition classes from the Geology/Soils design criteria throughout the implementation of this project. (SNFPA ROD S&G#10)

Snag Retention: "Design projects to implement and sustain a generally continuous supply of snags and live decadent trees suitable for cavity nesting wildlife across a landscape. Retain some mid- and large-diameter live trees that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure. When determining snag retention levels and locations, consider land allocation, desired condition, landscape position, potential prescribed burning and fire suppression line locations, and site conditions (such as riparian areas and ridge tops) avoiding uniformity across large areas.

The general guidelines for large-snag retention are as follows:

- Westside mixed conifer and ponderosa pine types – four of the largest snags per acre.
- Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units. Consider leaving fewer snags strategically located in treatment areas within the WUI. When some snags are expected to be lost due to hazard removal or the effects of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels." (SNFPA ROD S&G#11)

Old Forest Associated Species: Assess the potential impact of projects on the connectivity of habitat for old forest associated species. **(**SNFPA ROD S&G #28**)**

Forested Linkages: Consider retaining forested linkages (with canopy cover greater than 40 percent) that are interconnected via riparian areas and ridgetop saddles during project-level analysis. **(**SNFPA ROD S&G #29**)**

Limited Operating Period for Spotted Owls and Northern Goshawks: Should surveys locate activity centers or active nests for California spotted owls or Northern goshawks, LOPs restricting vegetation treatments during the LOP period will be applied within a ¼ mile radius of the activity center or nest. Should a great gray owl nest be located, the nesting location will be protected by an LOP. The district biologist will be notified when a nest or den of any Threatened (T), Endangered (E) Candidate (C), Proposed (P), or Forest Service Sensitive (FSS) species are discovered within or adjacent to a treatment area and an LOP would be established. All areas within the Project area have been surveyed to regional protocol for California spotted owl and Northern goshawk. **(**SNFPA ROD S&G #75&76)

Limited Operating Period for Fisher Den Sites (SNFPA ROD S&G #85**):** Protect fisher den site buffers from disturbance with a limited operating period (LOP) from March 1 through June 30 for vegetation treatments as long as habitat remains suitable or until another Regionally-approved management strategy is implemented. The LOP may be waived for individual projects of limited scope and duration, when a biological evaluation documents that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing, and specific location. **(**SNFPA ROD S&G #85**)**

Fisher Den Site Management: Avoid fuel treatments in fisher den site buffers to the extent possible. If areas within den site buffers must be treated to achieve fuels objectives for the urban wildland intermix zone, limit treatments to mechanical clearing of fuels. Treat ladder and surface fuels to achieve fuels objectives. Use piling or mastication to treat surface fuels during initial treatment. Burning of pile debris is allowed. Prescribed fire may be used to treat fuels if no other reasonable alternative exists. **(**SNFPA ROD S&G #86)

Management in Southern Sierra Fisher Conservation Area: Prior to vegetation treatments, design measures to protect important habitat structures as identified by the wildlife biologist, such as large diameter snags and oaks, patches of dense large trees typically ¼ to 2 acres, large trees with cavities for nesting, clumps of small understory trees, and coarse woody material. For example, use firing patterns, place lines around snags and large logs, and implement other prescribed burning techniques to minimize effects to these attributes. Use mechanical treatments when appropriate to minimize effects on preferred fisher habitat elements. **(**SNFPA ROD S&G #90**)**

Pacific Fisher Den Site Buffers: The SNFPA ROD 2004 (USDA-FS 2004b) requires a minimum 700-acre buffer around fisher birthing and kit rearing dens, and this buffer consists of the best quality and most contiguous habitat. Standards and guidelines for management actions within these buffers are: #85 (creation of an LOP during breeding and rearing season); #86 (mechanical treatment of surface and ladder fuels only, if den site within WUI); and #87 (mitigation of disturbance by recreational users).

Southern Sierra Fisher Conservation Area Desired Conditions: Within known or estimated female fisher home ranges outside the Wildfire Urban Interface Zone (WUI), a minimum of 50 percent of the forested area has at least 60 percent canopy cover. The entire Project area is within the Southern Sierra Fisher Conservation Area (SSFCA), and there are approximately 2230 acres of WUI within the Fish Camp Project boundary. (SNFPA ROD, pg. 41)

The following management actions which expand upon the S&Gs in the LRMP will help maintain and/or enhance important Pacific fisher and American marten habitat. These measures include information from the 2008 Conservation Biology Institute Document "Baseline Evaluation of Fisher Habitat and Population Status and Effects of Fires and Fuels Management on Fishers In the Southern Sierra Nevada, Final Report to USDA Forest Service Pacific Southwest Region" (Spencer et al 2008); "An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests" (North et al 2009); and Sierra Nevada Adaptive Management Study Integration Team discussions, fieldtrips to the Project area, as well as Forest Service Standards and Guidelines and Land Allocations stated previously.

- Maintain 50-60% canopy cover immediately post-harvest.
- Thinning will not remove any trees larger than 30-inch dbh (SNFPA ROD S&G # 6).
- Protect all suitable fisher denning habitat with an LOP restricting vegetation treatments from March 1 through June 30. This LOP will protect reproductively active fisher and young that may be present in the Project area from treatment actions during their denning and early rearing periods.
- Protect all suitable marten denning habitat with an LOP restricting vegetation treatments from May 1 through July 31. This LOP will protect reproductively active marten and young that may be present in the Project area from treatment actions during their denning and early rearing periods.
- Snags will be felled only if they meet the definition of a danger tree (as described in the Engineering Design Criteria), have the potential to fall across prescribed fire control lines, and/or pose a threat to firefighter safety during prescribed fire implementation. Down logs created as a result of snag felling will remain in the stand where needed to meet down log requirements of SNFPA ROD S&G #10. Snags not meeting the criteria of a danger tree will remain as standing snags within the Project area.
- Retain dense groups of larger trees (greater than 30-inch dbh) with touching crowns at the rate of approximately one group per 2.5 to 3.5 acres. Ideally these groups would contain "defect" trees, those that have cavity and platform creating defects (mistletoe, rot, fork topped, broken limbs and tops) for pacific fisher denning and resting sites. Within these large tree groups, all trees over 20" dbh will be retained. These large tree groups will generally have a residual basal area of 240 ft^2 or more for mixed conifer and 210 ft^2 or more for pine and in many instances may reach 300 to 400 ft^2 per acre. Retention of these large tree groups with higher basal areas and the inclusion of defect trees are designed to maintain the integrity of suitable fisher denning and resting sites throughout the treatment units. Non-treated areas within proposed treatment units, such as riparian areas and steep slopes, will also provide extensive areas of tree group retention as no treatments will be occurring in these areas. Large conifer retention groups, combined with non-treatment areas outside of Project units will help maintain habitat heterogeneity throughout the treatment units and the Project area as a whole.
- Within the Fish Camp Unit T-9, a 5 acre inclusion of decadent, high quality, dense fisher/spotted owl habitat was identified by the marking crew and field verified by the

wildlife biologist. A number of predominant trees were noted within this inclusion. Historic aerial photos showed that this inclusion was not previously cut during the extensive railroad logging that occurred in the Sugar Pine and Fish Camp areas throughout the turn of the century. Due to the high habitat value present in this stand, and in accordance with Standard and Guideline #90 from the SNFPA ROD, this unique habitat inclusion was removed from the treatment unit and will not be available for commercial entry.

- To maintain decadent stand characteristics within the treatment units, conifers >16" dbh with structural decadence and/or the potential to become future snags will be identified for retention within the treatment areas. SNFPA ROD S&G #11 provides direction for retention of these structural elements. Within treatment units, conifers with the greatest existing or potential for structural decadence will be retained at an average of 1 every 100 feet. Conifers will be selected using the following characteristics listed in order of priority: evidence of known or potential cavities; broken top; conks or other heart-rot indicators; mistletoe or other abnormal witches broom formation or other diseased or insect damaged trees; teakettle branches; forked top; or broken large branches.
- Black oaks will be retained throughout the Project area. Within the treatment areas, conifers will be removed that overtop black oaks 10 inches dbh and larger, or that otherwise restrict sunlight from reaching them (e.g. from the south and west) now or within 15 years following treatment; the amount of conifer removal will be limited by the overall basal area thinning prescription thresholds. Conifer canopy gaps created through this process not only help promote and retain the vigor of black oaks, but also create habitat heterogeneity. Hiding cover around oaks, such as shrubs and small trees will be retained around 2-3 decadent oaks per acre. These oak retention areas will be protected with a buffer area 35 feet from the bole, or to the dripline, whichever is greater, where no thinning or fuels treatments will occur.
- Promote diversity in pine plantation treatment areas larger than 5 acres by creating 1/10 acre openings associated with young black oaks between 4" and 12" dbh, where present, on an average of 1 opening for every 5 acres to encourage diameter growth of the oak through increased sunlight, release the oak from competition, and encourage future stand heterogeneity. To achieve this, Ponderosa and Jeffrey pine trees within pine plantations will be removed from a 180° swath on the Southern aspect around crowded young black oaks for a 50' radius. Species diversity will be increased by selecting vigorous conifer species other than ponderosa and Jeffrey pine for retention during thinning where present. Hardwoods are not planned for removal. (SNFPA ROD S&G #3; #26).
- Shrub and understory diversity will be retained throughout the Project area. Understory vegetation will be maintained in Old Forest Linkages associated with riparian areas (cooler, moister sites--RMAs); black oak buffer zones; as well as areas where no treatment will be conducted such as heritage resource sites, botanical areas, slopes >35%, and rocky areas. Tree species associated with riparian areas, such as dogwoods, alders, and willows are not planned for removal. Post sale treatments will retain pockets of understory growth spread throughout the treatment units so that 15-20% of the total understory growth will be maintained in 1/10 acre pockets within plantation treatment units and ¼ acre pockets within wild stand treatment units. This will preserve stand diversity while decreasing the threat posed by ladder fuels.

- The district biologist will be notified immediately if a nest or den of any TESCP species is discovered within or adjacent to a treatment area so that proper protection measures can be identified and implemented.
- Standards and Guidelines 28 and 29 provide guidance for developing and maintaining adequate habitat connectivity within riparian areas. Recent studies (Spencer 2008; North et al 2009) have also shown that fisher utilize riparian areas as travel corridors between high quality habitat. To provide for this habitat connectivity, design criteria have been developed to incorporate and expand upon established riparian area management zones; i.e. Streamside Management Zones (SMZ) and Riparian Management Areas (RMA) associated with perennial streams (Class I). The forest wildlife biologists have termed these zones Old Forest Linkages (OFL). They incorporate and expand upon the measures required for SMZs and RMAs. OFLs consist of buffers measuring 300 feet total on either side of perennial streams. Design criteria for these Old Forest Linkages are detailed in Table 1 and Figure 1.

Table 1: Riparian Area Management Zones

▪ **Distance from Stream***	▪ **Vegetation Management Activities Allowed within zone**	▪ **Zone Designation**
▪ 0-50 feet	▪ No Activities Allowed	▪ SMZ/RMA/OFL
▪ 50-100 feet	▪ No ground disturbing equipment allowed into area (dozers, skidders, etc.) Activities allowed include hand-felling of trees smaller than 12”dbh, pile-burning, and equipment reach-in with boom arm. Canopy cover is to remain ≥60%.	▪ SMZ/RMA/OFL
▪ 100-150 feet	▪ Mechanical entry is allowed. Trees ≤12” dbh may be removed for fire and fuels reduction purposes by equipment. Canopy cover is to remain ≥60%.	▪ OFL
▪ 150-300 feet	▪ Mechanical entry is allowed. Thinning from below will occur. Canopy cover is to remain ≥60%.	▪ OFL

▪ *Distance from Stream for Activities is measured and applied to each side of the stream from bank-full left and bank-full right.

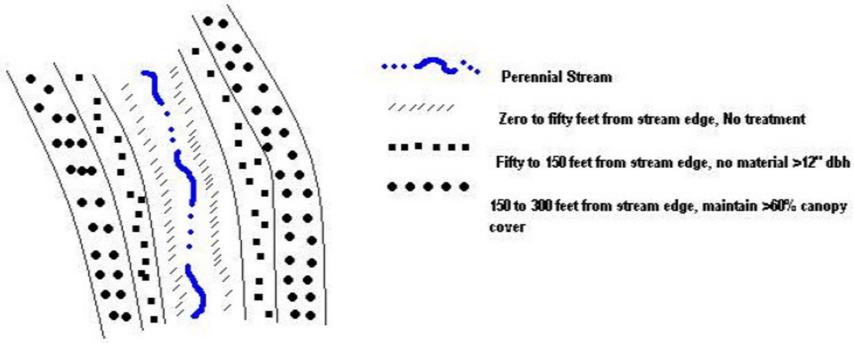

Figure 1: Associated Bounds and Treatments within Old Forest Linkages

Wildlife – Aquatics

Applicable aquatic wildlife species and riparian habitat standards and guidelines are from the 2004 Sierra Nevada Forest Plan Amendment, Final Supplemental Impact Statement and Record of Decision (USDA-FS 2004b) (S&Gs #91-124), the existing Sierra National Forest Land and Resource Management Plan direction (USDA-FS 1992) (S&Gs #66-79), Forest Service handbook (FSH) 2509.22 Sierra Supplement #1 for treatments within Streamside Management Zones (SMZ, USDA 1989), Best Management Practices and other applicable laws and regulations (USDA-FS 2000a). Generalized SMZ designation is outline in Table 2 and mapped in the Project Hydrology Report (Stone 2010).

Table 2 Summary of Relationship between Feature Types, RCA Widths, Stream Classes, SMZ Widths, RMA Widths, and Stream Orders (and other GIS data)

Feature Type	RCA Width	Stream Class	SMZ Width	RMA Width	Corresponding GIS Layer Stream Order
Perennial Streams	300 feet	I	At least 100 ft	100 feet	4+
Seasonally Flowing Streams	150 feet	II	At least 75 ft	N/A	3
		III	At least 50 ft		2
		IV	At least 25 ft		1
		V	None required		-
Streams in Inner Gorge	Top of inner gorge	Varies			
Special Aquatic Features (fens, bogs, springs, seeps, lakes, ponds, wetlands, etc.)	300 feet	N/A	N/A	100 feet	Either identified on GIS layers (meadows, springs, lakes), or identified in the field

Project specific design criteria implementing the above regulation and guidance include:

a) Class I SMZs are within or adjacent to treatment areas: M-09, RX-02, RX-03, RX-04, RX-05, RX-06, RX-09, T-05, T-06, T-08, T-07, T-10, T-14, T-15, T-16, T-17, T-18, T-20, T-22, T-28, T-29, and T-4. Old Forest Linkage Prescriptions apply to these SMZs.

b) Special Aquatic Features: Do not allow mechanical equipment within 100 feet of meadows or other special aquatic features. Includes treatment areas: M-13, M-14, RX-06, T-07, T-10, T-12, T-13, T-14, T-15, T-16, T-17, T-18, T-19, T-20, T-21, T-22, T-27, T-28, T-30, and T-40.

c) Applicable to all SMZs:

   i. Do not allow heavy mechanical equipment within SMZ.

   ii. To protect bank stability, do not cut streambank trees (trees with drip line extending to or over edge of streambank).

   iii. Do not cut any tree located within a channel.

   iv. When lighting piles, start burn from one end only to allow escape route for any species inhabiting piles.

   v. No lighting into SMZs, but fire can creep into zone.

d) For water drafting, use a screened intake device and pumps with low entry velocity to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats. A Hydrologist or Aquatic Biologist would approve water-drafting sites. See Best Management Practices (BMP) 2-21 in Appendix B for specific requirements.

e) If newly listed or unknown occurrences of Federally listed threatened, endangered, proposed, candidate or Forest Service sensitive aquatic species are found within the affected Project area during sale preparation and implementation, additional species protection measures may need to be imposed by the district fisheries and aquatic biologist.

Hydrology

Use all applicable watershed standards and guidelines from the SNFPA ROD (S&Gs #95-124) (USDA-FS 2004b), the existing SNF- LRMP direction (S&Gs #120-131) (USDA-FS 1992), Forest Service handbook (FSH) 2509.22 Sierra Supplement #1 for treatments within Streamside Management Zones (SMZ, USDA 1989), and design measures to protect water quality and ensure watershed health that are detailed by *Water Quality Management for Forest System Lands in California*, *Best Management Practices* (USDA, 2000).

Project specific implementation of the mentioned S&Gs and policy documents include:

1. Stream Crossings: To minimize the potential for project-related effects on hydrologic connectivity, existing crossings would be used whenever possible. In the event that it is necessary to construct a temporary crossing, the methods used for construction would be selected to avoid or minimize detrimental soil and vegetation disturbance and to maintain hydrologic connectivity between upstream and downstream features (Appendix 2 of hydrology specialist report details a low impact crossing methodology). All temporary crossings would be removed following the completion of project-related activities and would be treated as necessary to restore to pre-Project conditions. Implementation of the activity-specific BMP's would further ensure that hydrologic connectivity in streams and special aquatic features are not adversely affected.

2. If treatment of wild/mixed stands or plantations does need to occur within the 100 foot meadow SMZ:

    a. If the slope gradient is less than or equal to 10%, and the soil has a low erosion hazard and low sensitivity, then light-on-the–land equipment can be used to pre-commercially thin within the SMZ provided that:
        i. the equipment minimizes the amount of turning within the SMZ. Where possible, the equipment should reach into the SMZ or roll straight into and out of the SMZ to minimize soil disturbance.

    b. If the slope gradient is greater than 10% and/or the soil has a moderate to high erosion hazard and/or a moderate to high sensitivity, then thinning should be done hand, i.e., trees should be felled by hand, bucked, and left in place or end-lined out of the SMZ.

    c. All ground disturbance that could cause concentrated flow and/or accelerated erosion will be restored to pre-disturbance condition, with interim measures to protect the soil in order to allow at least 50% vegetative ground cover to return (protective measures could include placement of slash, mulch, weed-free straw, waddles, etc.).

3. Treatment units T-16, T-17a-d, T-19a-b, T-22a-c, T-28a-j that are within subwatershed 501.5005 (map 9) and the Long Meadow Creek drainage will require light-on-the-land mechanical treatment or deferral of treatment. Light-on-the land treatment includes: cut-to-length harvest system or whole tree yarding system, grapple piling, or prescribed fire. Deferral of treatment areas includes spacing out disturbance over time to allow initial treated areas to recover (at least three years) before other areas are treated.
    a. Management prescription for Streamside Management Zones (SMZ).
        i. Do not treat vegetation within the SMZs of Class I or II streams in sub-watersheds over the lower threshold of concern (TOC).
        ii. In the outer 50 feet of other SMZs, thin trees to reduce fuel loading by:
            1. Removing ladder fuels (intermediate and suppressed trees)
            2. Removing diseased trees that will fall away from riparian areas, and
            3. Hand-piling slash as necessary to reduce the effects of under burning
            4. maintaining trees with broken tops for source of large woody debris (LWD) recruitment
    b. The hydrologic connectivity of roads:
        i. Spot rocking of roads or out sloping road surfaces to quickly direct runoff from the road surface rather than concentrating flows in an inboard ditch and routing it to the stream channel;
        ii. Installing rolling dips and /or additional relief culverts to minimize the length of road drainage entering stream channels, with outlet treatments to minimize the risk of fill slope erosion; and

iii. Rocking of ditches to reduce flow velocity in the ditch, prevent ditch erosion, and encourage deposition, where other techniques are not feasible.

Silviculture

Based on SNFPA ROD (USDA-FS 2004b) S&Gs for mechanical treatments, as well as design criteria, silvicultural prescriptions will be written utilizing thinning from below techniques with basal area levels for stand species composition (SNF- LRMP S&G 17).

The planning and implementation of all activities shall use integrated pest management (SNF-LRMP S&G #117):

a) An LOP would be imposed in well stocked stands heavy to fir (over 50% fir) where operations could begin August 1st or later when the sap is not running (fir bark is much more easily dislodged when the sap is running than later in the year). The appropriate specialist or representative will determine which stands require an LOP during the thinning layout phase as needed.

b) To minimize the threat of insect attack, all pine logs created as a part of harvest operations will be removed from the sale areas as either logs or biomass material within 6 weeks of creation. Unutilized pine material will not be concentrated but spread to dry quickly or chipped and spread. Pine logs greater than 3 inches in diameter that are created between July 1st and October 15th and left in the stand will not exceed 8 feet in length.

c) Commercial thinning operations taking place before July 1st or after October 15th in pine stands will require additional measures to minimize creation of pine slash concentrations. Additional bucking of slash may be needed to minimize creation of favorable insect breeding habitat. Any pine logs greater than 3 inches in diameter created after October 15th or before July 1st left in the stand should not exceed 4 feet in length. Precommercial thinning of pine stands should not take place before July 1st or after October 30th each year.

d) Where whole tree yarding is utilized, careful consideration must be given to the protection of the residual trees from damage. Rub trees (previously designated for removal) and/or rub logs should be retained where needed to minimize damage. These will then be removed upon completion of yarding. Skid trails should be as straight as possible and approved prior to skidding. Landing size should be kept to a minimum especially in areas where additional trees must be felled to create landings.

e) To minimize landing size, logs/biomass should be removed as quickly as feasible from landings during skidding operations and not allowed to accumulate. During post sale treatments, 15 to 20 percent of the understory growth would be retained within plantations and wildstands in pockets approximately 1/10 acre in size. (When determining understory pockets to be retained, understory pockets around oaks, groupings of larger diameter trees, steep slopes, draws, etc. within treatment units would be included.) Understory pockets would not be retained in locations where they would jeopardize the effectiveness of planned fuels treatments. (SNF- LRMP S&G #113, and 114).

Fuels

SNFPA ROD (USDA-FS 2004b) S&G #3 addresses fuels treatments. Project specific S&G #3 implementation criteria include:

a) The utilization of prescribed fire to maintain appropriate levels of surface and ladder fuels to meet fire and fuels objectives will be conducted in prescribed fire treatment areas and portions of T-8b north of road 5S06, T-9, portion of T-10b north of road 5S06 and all except the very east portion of T-12. To reduce the potential impacts (fire effects) that may occur with the implementation of prescribed fire, the following criteria would need to be considered in the areas where prescribed fire would be used:

b) Prescribed fire areas should be considered where there are larger residual trees (of size less susceptible to fire damage) with light fuel loadings, and/or areas where conifer reproduction is not being used for re-generation of openings.

c) Prescribed fire will be conducted as outlined in a burn plan, to minimize effects to trees during active growing period and within Pacific fisher denning habitat areas.

Engineering

a) Maintain all National Forest Transportation System (NFTS) roads to standards established in the Forest Service Handbook 7709.58. Perform road maintenance, reconstruction and new road construction activities to support Project access needs. Insure drainage structures are functional and stable to prevent potential resource damage and degradation of water quality (SNF- LRMP S&G #78, #79, #124, #206 and BMPs).

b) Perform a final field review of Project roads to determine reconstruction needs prior to Project activities. Where economically feasible, place aggregate on existing native surface roads located in areas with High and very High Soil Erosion Hazard ratings (SNF- LRMP S&G #129).

c) Close temporary roads required for unit access upon completion of use; remove all culverts, rip and ditch landings, construct waterbars, block the entrance with a log and dirt berm, and disguise the entrance with brush to discourage additional traffic. (FS Handbook (FS Handbook 2409.15, Sec.51.8)

Roadways will be managed for safe passage by road users. This will include the management of hazards associated with roadside vegetation, including the identification and mitigation of danger (hazard) trees. A danger tree, as defined in Forest Service Handbook (FSH) 7709.59, Chapter 40, is a standing tree (live or dead) that presents a hazard to people due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem, or limbs and the direction of lean of the tree (FSH 6709.11, Glossary). Selection criteria guidelines for the marking and removal of danger trees will be tiered to the BLRD Hazard Tree Environmental Assessment, (USDA-FS 2006a).

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Based on NEPA case law as described in *NEPA Models and Case Lists, Third Edition*, alternatives can be eliminated if the proposed alternative (1) does not achieve the purpose and need; (2) has substantially similar consequences as alternatives considered in detail; (3) is not significantly distinguishable from alternatives already being considered; (4) is infeasible; (5) is ineffective; (6) is inconsistent with basic policy objectives for the action; or (7) if the existing range of alternatives sets forth alternatives necessary to permit a reasoned choice (Schmidt 2009).

Public comments and internal scoping that suggested alternatives or components of an alternative that were considered but subsequently eliminated from detailed study are described below. The explanation for the elimination of the alternative from further full analysis is also included.

Alternative proposing to increase or create potential for large snags and down logs (>20" DBH) in units with little representation

This alternative is the Proposed Action with the addition of increasing the numbers of large snags >20 inches dbh. Large standing or down fuels in fact contribute to additional fuel loading and, in larger numbers, may increase fire severity potential , especially in areas where the risk is already above the desired condition class. The snag inventory for the Fish Camp Project area shows that the Project meets or exceeds current standards for the area as a whole. It is not necessary to ensure snag sufficiency in every unit. Intentionally creating snags also has the potential to artificially induce higher than normal insect populations which could lead to mortality above that which would maintain or enhance tree vigor in the remaining stands. An additional mitigation measure leaving clumps of larger trees (generally larger than 20 inches dbh) maintains a stocking level higher than that needed to promote stand vigor in these clumps, likely leading to higher mortality and, thus greater numbers of larger snags and down logs. For these reasons, consideration of additional larger snags and down log does not create a significantly different alternative.

Alternative limiting tree removal diameter to 10 inches or smaller

The environmental effects of limiting treatments to only those necessary to meet fire/fuels objectives (generally, small diameter trees) were thoroughly analyzed for the non-plantation (wild) stands in Alternative 3. A separate alternative limiting tree removal diameter to 10 inches or less would have substantially similar consequences as Alternative 3. Limiting treatments in plantations to trees with less than 10" diameters would not fully meet the fire/fuels purpose and need. Most plantations have very few trees smaller than 10". The fire risk in these areas comes from the dense stocking resulting in touching crowns. Removing 10" and smaller trees does little to address this fire/fuels concern and therefore does not meet the purpose and need for treatment in plantations. Additionally this alternative does not meet the need for stand density reduction.

Alternative maximizing the use of fire as the agent for achieving the Project objectives.

Over the last 30 years, wildfire in the Sierra Nevada Range has burned an average of about 43,000 acres per year. In the last ten years, that average has risen to about 63,000 acres per year (FS, 2004). The lack of periodic fires within the Project area has resulted in a forest predisposed to stand replacing fire and insect attack. Considering the current condition of the forest, the reintroduction of fire as a sole management tool would be impractical and unmanageable in scope and very likely result in devastating and high severity stand replacing wildfires. Additionally, air quality restrictions could make implementation in a timely manner very difficult. Therefore this alternative is ineffective as a method of meeting the need for ecological restoration particularly in terms of fire resiliency of the forest. Additionally, It does not meet the purpose and need for public health and safety.

Alternative limiting treatments to 200 foot zones from structures.

The purpose and need for this Project is not solely focused on the reduction of wildfire intensity and spread into and out of the WUI, but includes the need to reduce the threat of uncharacteristically severe wildfire in the general forest and maintain sustainable, resilient forested stands throughout the area by reducing stand density. Limiting treatments to this limited area does not meet the purpose and need for either the fire/fuels or forest health objectives. Additionally, treating only 200 feet adjacent to private property does not meet current policy (USDA-FS 2004, FSEIS) defining treatments in the Defense Zone WUI within a ¼ mile zone where structures and other human development meet or intermingle with wildlands.

Comparison of Alternatives

Table 3 provides a brief summary of the alternatives and their environmental impacts in comparative format.

Table 3: Comparison of Alternatives

Measure or Effect	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3
Total Project area =5,440 acres; Total Acres Analyzed in Treatment Areas = 1,200 Estimated Acres by Alternative to be Treated by Treatment Area Type:			
Thinninng	0 Acres	Commercial Thin= 966 acres	Commercially Thin Plantation= 404 acres
Mastication	0 Acres	41 acres	604 acres
Rx Fire (Rx in T units)	0 Acres	193 acres 208	193 acres 208
Total miles of Road	42.2	42.2	42.2
Maintenance	0	41.9	41.9

Measure or Effect	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3
Reconstruction	0	12.9	12.9
Temporary	0	0.5	0.5
New Road	0	0	0

Fire/Fuels Objectives: Fire behavior spread and intensity is reduced as measured by crown fire potential is highly unlikely and non-sustainable; flame lengths < 4 feet; Rate of Spread 50% of pre-treatment; line construction rates are doubled from pre-treatment (SNFPA ROD (USDA-FS 2004b))									
Measures:	Forest Plantation – Further Future Conditions	Forest-Mod. To Heavy Fuel level Areas	Forest-Plantation	Forest areas-thinned Heavy Fuels	Forest areas-thinned Fuels treated	Forest plantation Fuels treated	Forest areas-thinned Heavy Fuels	Forest areas-understory thin	Forest Plantation untreated
Fuel Model (Resultant)	SH5	TU5	SH2	TU5	TL8	TU1	TU5	TU5	SH2
Predicted Rate of Spread (chains/hour)	68	11	8.5	11	7.5	3.5	11	11	8.5
Predicted Flame Length (feet)	16	8.5	5	8.5	4	2	8.5	8.5	5
Predicted Fireline Intensity (BTU/ft²)	2259	606	217	606	117	27	606	606	217
Predicted Crown Fire Potential (Yes/No; Type)	Yes- Crown	Yes Crown	Yes Crown	Yes Crown	No Surface	No Surface	Yes Crown	Yes- Crown	Yes Crown
Resistance to Control (High, Moderate, Low)	Extreme	Mod/ High	Mod	Mod/ High	Low / Mod	Low	Mod/ High	Mod/ High	Mod
Forest Health Objectives: Reduce stand densities and improve tree vigor and overall forest health. Measured Desired Stocking levels by Species: Pine= 135 ft²/acre; White Fir= 240 ft²/acre; Mixed Conifer= 210 ft²/acre (SNFPA ROD (USDA-FS 2004b).									
Estimated Range of Basal Area Remaining (ft²/acre) for ≥10-inch dbh trees	Plantations = 120 - 320ft^2 Wild Stands = 120 - 480ft^2			Plantations = 120 – 140ft^2 Wild Stands = 120 – 240ft^2 (pockets to 360ft^2)			Plant. = 120 – 200ft^2 W/Stands = 120 – 480ft^2		
Estimated Range of Stems per Acre Remaining for ≥10-inch dbh trees (# trees/acre)	Plantations = 103 – 220 trees Wild Stands = 75 to 190 trees			Plantations = 55 – 93 trees Wild Stands = 45 to 85 trees			Plant. = 58 to 96 trees. W/Stands = 75 – 190 trees		

Habitat Indicators (From Issue, page 7):			
Estimated Range of Canopy Cover Remaining (%)	Plantations = 39 -100% (majority 50%+) Wild Stands = 39 – 100% (majority 75%+)	Plantations = 39 – 85% (majority 50%+) Wild Stands = 39 – 85% (majority 60%+)	Plantations = 39 – 86% (majority 50%+) W/Stands = 39 – 85% (majority 75%+)
Estimated Range of Tree Diameter Remaining (≥ 10" dbh)	Plantations = 10 - 29 Wild Stands = 10 - 48	Plantations = 10 - 29 Wild Stands = 10 – 48 Avg. dia. all stands would increase	Plantations = 10 - 29 Wild Stands = 10 – 48 Avg. plantation dia. would increase
Large Snag and Down Wood Standard for Treated Areas	N/A	Listed in Design Criteria Common to All Alternatives (pages 12)	Listed in Design Criteria Common to All Alternatives (pages 12)
Movement Corridors Addressed (Yes or No)	Yes, with assumption corridors are present currently	Yes, addressed as Old Forest Linkage Areas on page 20.	Yes, addressed as Old Forest Linkage Areas on page 20.

Chapter 3 Affected Environment and Environmental Consequences

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 other alternatives. Together, these descriptions form the scientific and analytical basis for the comparison of effects in Chapter 2.

Past, Present and Reasonably Foreseeable Actions

According the 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 contributions 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 nearly be impossible. Second, providing the details of past actions on an individual basis would not 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 have. Third, public scoping for this Project did not identify any public interest or need for detailed information on individual past actions. Finally, the CEQ issued an interpretive memorandum on June 24, 2005 regarding analysis of past action, 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 EIS is also consistent with Forest Service NEPA Regulations (36 CFR 220.4(f)) (July 24, 2008), which states, 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 reasonably 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 addressing the cumulative effects of the No Action Alternative the SNF considered the definition of cumulative effects from 40 CFR 1508.7:

"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." (emphasis added)

As according to this definition to have a cumulative effect an action must be taken. As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects.

Table 4: Past, Present and Reasonably Foreseeable Actions Contributing to Cumulative Effects by Resources Action

Activity Type	Description	Year	Unit Of Measure	Air Quality	Aquatics	Botany	Fuels/Fire	Fuels	Cultural Res.	Vegetation	Soil	Transportation	Watershed	Wildlife
Roads/Trails USFS, County, State owned and maintained	Includes the network of inventoried road/trail systems within Project subwatersheds	On-going	86 miles	X	X	X			X		X	X	X	X
Campground and other USFS Owned Facilities	Big Sandy Campground, Little Sandy Campground, Summerdale Campground, Goat Meadow Snow Area;	Existing	4 sites		X		X				X		X	X
Past/Current USFS Timber Sales within Fish Camp subwatersheds	Includes: 1) Green Timber Sales 2) Salvage Harvest 3) Thinning	1) 1980s 2) 1990s 3) 2000-Current	1) 2,640 acres 2) 1,532 acres 3) 189 acres	X	X	X	X	X	X	X	X	X	X	X
Vegetation Management Plantation Maintenance	Clearcutting, thinning, hand release, chemical release, and planting in plantations <30 yrs old.	1980s	115 acres	X	X	X	X	X	X	X	X		X	X
Fish Camp Railroad Yosemite Pack Station Infrastructure	Special Use Permits which include buildings, amphitheater, RR track, corrals, and trails.	Existing	Approx. 25 acres										X	X

Activity Type	Description	Year	Unit Of Measure	Air Quality	Aquatics	Botany	Fuels/Fire	Fuels	Cultural Res.	Vegetation	Soil	Transportation	Watershed	Wildlife
Power Line	Power Line Corridor	Existing	Approx.4.5 mi				X							
Big Creek Ditch Diversion	Madera Irrigation Historical Ditch System	1850s	Approx. 3 miles		X								X	
Roadside Hazard Tree Removal	Removal of damaged, rotten, dead trees to abate roadside hazard using timber sale contracts.	2003-present	41 miles	X	X	X	X		X	X	X	X	X	X
Fire/Fuels Management Activities	Includes Fuelbreak Construction and Maintenance, Rx Burning, ladder fuel removal, mastication	1980s-present	Approx. 600 acres	X	X	X	X	X	X	X	X		X	X
Private Land Infrastructure for communities of Fish Camp, Cedar Valley and Fish Camp	New home construction, power, water, private roads	Ongoing	378 acres	X	X	X	X	X		X	X		X	X
Private Land-Vegetation Management in communities and other private lands	Timber harvesting, land type conversions Hazard fuels reduction	Ongoing	Individual Community Private Acres	X	X	X	X	X		X	X		X	X

Activity Type	Description	Year	Unit Of Measure	Air Quality	Aquatics	Botany	Fuels/Fire	Fuels	Cultural Res.	Vegetation	Soil	Transportation	Watershed	Wildlife
Special Use Permitted Activities	Yosemite Trails Pack Station and trails; Camp Green Meadows; Allen Bee Company Apiary (2 sites), Madera Irrigation District, Mast Yower	Ongoing	Various Measures-Mapped Locations										X	X
Motorized Recreation	Pleasure driving; 4x4, OHV, and snowmobile uses of system and temporary roads	Ongoing	Approx. 160 miles	X	X	X					X	X	X	X
Livestock Grazing	Soquel Allotment	Ongoing	Soquel Mdw Pasture		X	X	X		X		X		X	X
Fish Camp Project	Vegetation Mgmt Project	Project proposal being developed 2009-2010	2,000 to 3,000 acres		X	X	X	X	X	X	X	X	X	X

Cultural Resources

The direct, indirect and cumulative effects below are summarized from the Fish Camp Project Cultural Resources Report (Mogge, M. 12/16/2010).

Affected Environment

All throughout the SNF are the remnants of past cultures that illustrate the centuries-old relationships between people and the land. These cultural resources hold clues to past ecosystems and human adaptations to them, provide links between living communities and the Forest's unique prehistoric and historic land uses, and help transform a visit to the woods into an encounter with history. These cultural resources comprise an irreplaceable and non-renewable resource record of past human life and land use. This record is contained in properties with archaeological and historical research value, and locations of cultural importance to local Native American groups.

Archaeological and Historic Values

Cultural resources are the buildings, sites, areas, architecture, and properties that bear evidence of human activity and use across the landscape, and have scientific, historic, and cultural importance. Cultural resources are not distributed equally across this landscape, but clustered according to the natural resources that were being used (e.g. acorn groves, timber stands, water, mineral locations). With new discovery upon almost every new survey effort, there continue to be many undiscovered cultural resources in the SNF.

Physical remains of over 10,000 years of human history are found throughout the SNF. Except for the last century and a half of written history, the only record of this long human use is the remains left by the original native people and their descendants. At the time of contact with Euro-Americans, in the late 1700s and early 1800s, the Fresno River was the boundary between the southern Sierra Miwok to the north and west, and the Chukchansi Yokuts to the south and east. The Western Mono occupied the area around what is now Bass Lake. The boundaries between the groups were ambiguous, with a lot of overlap in the area between the Miwok, Yokuts and Mono.

The processes of subsistence, the hunter-gatherer lifestyle, and the resulting indigenous land use are seen in the archaeological record with features common to the material culture of the native people of the Sierra Nevada (e.g. village sites, bedrock mortars, stone tool artifacts). Some of these sites have ethnographic documentation that indicates a fairly recent history of tribal use; in some cases, tribal use continues at sites that have an occupational history that spans thousands of years.

Historic-era cultural resources reflect particularly the cultural and economic products of the rapid pace of technological achievement in the last 150 years imposed on the terrain of the Sierra Nevada. These resources often reflect environmental changes resulting from industrial and technological advances in resource extraction, landscape use, and management. Sites include remnants of exploration and settlement, Forest Service administration, grazing/range management, mining, transportation, travel, tourism and recreation, and the forest products industry. Each of these themes has an array of associated sites and features. For example, features associated with railroad logging operations may be work camps, refuse dumps, railroad grades, trestles, and discarded equipment.

Native American Cultural Values

Federally Recognized tribal governments with interest in the SNF, as elsewhere in the United States, have a special political and legal relationship with the U.S. Government. Federally Recognized tribes are beneficiaries of a trust relationship with the Federal government. The Forest Service consults regularly with Federally Recognized and Non-Federally Recognized tribes and other interested parties and is responsible for considering tribal interests.

There is a deep and abiding concern with many Native American people about what occurs in their aboriginal territory. The SNF honors the traditional ties that many tribal communities and Native American people have to this portion of the Sierra Nevada. Access to and use of the Forest and other public lands is critical for many Native American people, as community identity and cultural survival are dependent on continued access to ceremonial and sacred places, cemeteries, traditional gathering areas, traditional cultural properties, and resources at a variety of locations on forest land. Certain plants, animals, and locations provide for many needs, including food, medicine, utilitarian type materials, and ceremonial items. Specific resources insure that significant cultural traditions, such as basket weaving, survive and continue. These areas contribute to the tribal communities' way of life, their identity, their traditional practices and cohesiveness.

Consultation with tribes, the local Native American communities, and other interested parties to identify other cultural values, including contemporary Native American interests, was initiated with a Public Scoping Letter that was sent on August 16, 2010, to members and groups in the Native American community in accordance with the Regional PA, NHPA, and other laws and regulations. Consultation has consisted of meetings, letters, and presentations, and is documented in the project record.

<u>Cultural Resource Management</u>: In the area of potential effect, the results of twenty seven years of cultural resource surveys and investigations have identified 53 archaeological properties that are associated with themes of SNF history. Most sites represent prehistoric life ways; other sites represent historic-era land uses.

The SNF manages those cultural resources eligible for listing on the NRHP. The Forest does not manage or protect ineligible properties in project activities, unless there is local interest in preservation. NRHP eligibility has not been determined for every cultural resource in the Project area. Unevaluated sites are considered potentially eligible, and are managed as if eligible until such time as they are evaluated.

Contemporary Native American interests can include traditional cultural properties (sites associated with cultural practices or beliefs that are rooted in history and important in maintaining cultural identity), and plant gathering sites for basket materials, medicines, and food resources. The SNF manages such known sites as cultural resources under the provisions of the NHPA, but where the interests of native people are considered to achieve a mutually beneficial outcome during project implementation. The location of these sites is also kept administratively confidential. The SNF would maintain appropriate access to sacred and ceremonial sites, and to tribal traditional use areas, and has consulted with affected tribes and tribal communities to address access to culturally important resources and areas in this project analysis.

Methodology for Analysis

Data Sources

Existing information from cultural resource records, historic archives, maps, and Global Information System (GIS) spatial layers was reviewed to provide specific information about cultural resources, or the likelihood that unidentified properties might exist in non-inventoried areas.

The majority of the project had been adequately surveyed for prior projects between 1983 and 2007. Between 2008 and 2010, additional surveys were completed in previously unsurveyed areas. For areas that had never been surveyed, new survey was conducted using a combination of intensive (0 – 30 meter transects) and cursory (50+ meter transects) coverage. Intensive survey was done in clear and/or non-steep terrain. Cursory survey was done where terrain was very steep or had dense brush cover.

Cultural Resource compliance for this project is documented in *Fish Camp Adaptive Management Project (Draft),* ARR R2007051551043. This report, which describes the location and composition of the cultural resource sites within the Project boundary, is kept administratively confidential under the provisions of the Archaeological Resource Protection Act of 1979, 36 CFR 296 and 36 CFR 800.11(c) *Confidentiality*.

Spatial Analysis

The location and extent of the cultural resource is the unit of spatial analysis when considering effects in action alternatives. For some cultural resources (e.g., Traditional Cultural Property), the setting beyond the cultural resource location must also be considered when determining whether an adverse effect would occur.

Effects Timeframes

- Short-term effects occur within one year.
- Long-term effects occur up to 20 years.
- Cumulative effects are analyzed at a 20-year interval.

Measurement Indicator and Rationale

When assessing direct, indirect, and cumulative effects, assessments are based on a historic property possessing at least one of the following NRHP values (36 CFR 60.4(a – d)) unless specific information already exists:

- Prehistoric archaeological site: Criterion A, C and D
- Historic archaeological sites: Criterion A, B and D
- Historic structures: Criterion A, B, and C

An undertaking can have no effect, no adverse effect, or an adverse effect on a historic property or cultural resource. An adverse effect to a cultural resource can occur when an undertaking directly or indirectly causes alterations in its character or use. An adverse effect on a cultural resource occurs when an undertaking alters its important characteristics and is measured by the degree to which it diminishes its location, design, setting, materials, workmanship, feeling or association (Integrity Measures) (36 CFR 800.5(a)(1)). These integrity measures can also be used to characterize the nature of any potential effects, whether they are direct, indirect or cumulative effects; and their severity. The degree to which cultural resource values are diminished will be used to measure the direct, indirect and cumulative effects of the proposed project.

When the nature and scope of a proposed project is such that its effects can be reasonably predicted and appropriate measures can be undertaken to ensure that the values of cultural resources are not affected in any way, then those cultural resources may be managed in a manner which ensures that their values are preserved.

Alternative 1 – No Action

Direct and Indirect Effects

Direct effects under this alternative could happen should a uncharacteristically severe wildfire occur resulting from untreated fuel accumulations. The lack of fuels reduction management could result in higher intensity wildfires, thereby potentially adversely affecting 53 cultural resources within the Project boundary, especially those with wooden components. Should a wildfire occur, indirect effects could occur as a result of increased access to and visibility of cultural resources leading to increased likelihood of adverse effects from artifact looting.

Cumulative Effects

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Alternative 2 – Proposed Action

Direct and Indirect Effects

There are a total of 53 cultural resource sites that have the potential to be affected by implementing this alternative. One of these sites is an historic railroad logging system that has 30 separate features that have the potential to be affected. These features include: railroad grades. spur grades, log chutes that retain intact earthworks and features such as sheave posts, camps, trestle remains, non-residential work areas and trash dumps. All of these cultural resource sites and features will be protected through the application of Standard Resource Protection Measures (Regional PA, Attachment B). Therefore there would be no affect to cultural resources.

Cumulative Effects

According 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). As all cultural resource sites within the Project area would be protected through project design features it is anticipated there would be no affects from this action alternative. Since there would be no direct or indirect effects, there are no cumulative effects for Alternative 2.

Alternative 3

Direct and Indirect Effects

There are a total of 53 cultural resource sites that have the potential to be affected by implementing this alternative. One of these sites is an historic railroad logging system that has 30 separate features that have the potential to be affected. These features include: railroad grades. spur grades, log chutes that retain intact earthworks and features such as sheave posts, camps, trestle remains, non-residential work areas and trash dumps. All of these cultural resource sites and features will be protected through the application of Standard Resource Protection Measures (Regional PA, Attachment B). Therefore there will be no affect to cultural resources.

Cumulative Effects

Since there would be no direct or indirect effects, there are no cumulative effects for Alternative 2.

Botany: Rare plants and Noxious Weeds ____

The direct, indirect and cumulative effects to Threatened, Endangered and Sensitive botanical species and noxious weed analysis are summarized below from the Biological Assessment and Evaluation for the Fish Camp Project (Clines, J. 12/17/2010).

Affected Environment

Rare Plants

General description of the vegetation with an emphasis on rare plant habitat: The Fish Camp Project area is on the west slope of the central Sierra Nevada, and ranges in elevation from 5,000 to 8,000 feet elevation. The Project area falls within the Sierra Nevada Ecological Section (M261E) in the USDA Forest Service National Hierarchical Framework of Ecological Units (Miles and Goudey, 1997). Vegetation varies from ponderosa pine and mixed conifer forest at lower elevations, to red fir and lodgepole forests at the higher elevations, with montane chaparral and montane meadows scattered throughout the area. The southeastern region of the Project area has some areas of rock outcrops, which though often considered “barren” sites, are characterized by a suite of diverse native species adapted to live in the desert-like conditions of these exposed areas. These outcrops are not generally included in areas proposed for treatment as they do not have trees but they provide habitat for rare plant species, thus are protected for this reason. This summary of the vegetation within the Fish Camp Project area sets the stage for analyzing effects of the alternatives on Forest Service Sensitive Plants by examining project effects on their habitat.

Riparian vegetation is adapted to wet or moist conditions and is found along streams and in meadows, springs, and seeps. Riparian vegetation along streams varies considerably within the Project area, ranging from clearly defined bands of riparian forest dominated by white alder (*Alnus rhombifolia*), mountain alder (*A. incana* ssp. *tenuifolia*), willow (*Salix* spp.), and Oregon ash (*Fraxinus latifolia*) to simply a strip of herbaceous riparian plants with upland forest trees growing next to the stream.

Meadows and fens: There are several meadows within the Project area: Long Meadow, Goat Meadow, Buffin Meadow, as well as several unnamed meadows. Meadows are defined as openings in forests which generally have high water tables dominated by herbaceous vegetation that is adapted to wet conditions. Meadows are typically heterogeneous, containing patches of different plant assemblages in response to variations in moisture, drainage, elevation within a given meadow. Overall, meadows can be classified as dry, moist, or wet; and montane, subalpine, or alpine (Ratliff, 1985). Some meadows contain areas of peat soils called fens. Fens are areas of perennial saturation where peat soils form because accumulation of organic matter exceeds decomposition (Cooper and Wolf, 2006). Fens are of significance because of their contribution to hydrologic function in meadows and because they provide habitat for several rare plant species.

Forest Service Sensitive Plant Species in the Project area

Sensitive species are those species that have been specifically designated by the Regional Forester as needing special management in order to prevent them from losing long-term viability or becoming federally listed as endangered or threatened; either because they are naturally rare or because their numbers have been reduced by human causes. In the SNF the former is generally the case. Much has been written about endemism and rarity in the California flora (e.g. Fiedler, 2001: http://www.cnps.org/cnps/rareplants/inventory/rarity.php; and Shevock 1996: http://ceres.ca.gov/snep/pubs/web/PDF/VII_C24.PDF). Based on a review of the scientific literature, historical collections available through the Consortium of California Herbaria (an online search tool which allows viewing of specimens housed at most major herbaria in the state since scientific collecting began), there is no reason to suspect that the species known or suspected to be present in the Fish Camp Project area were significantly more common in the past.

Table 5 shows the Forest Service Sensitive Plants that are known to occur or that may occur within the Fish Camp Project area based on the fact that suitable habitat is present. Species known to occur within the overall Project boundary or along access roads to the Project area are shown in bold text:

Table 5: Forest Service Sensitive Plants

	OCCURRENCE IN FISH CAMP AREA	HABITAT REQUIREMENTS
SPECIES		
Bruchia bolanderi BOLANDER'S CANDLE MOSS	None known to occur but suitable meadow / streambank habitat present.	RIPARIAN/MEADOW. Vertical banks of streams, 5000-7500 feet.
Camissonia sierrae ssp. *sierrae* MONO HOT SPRINGS EVENING PRIMROSE	None known to occur but rocky/gravelly habitat present.	ROCKY/GRAVELLY. Gravel and sand pans and ledges associated with outcrops in chaparral, ponderosa pine, mixed conifer and red fir/lodgepole forests, 4500 – 8500 feet.
Cypripedium montanum MOUNTAIN LADY'S SLIPPER ORCHID	None known to occur, many populations occur within 5 miles of Fish Camp Project area, but none were found during surveys in 2009 and 2010	FORESTED. Moist areas and dry slopes in late-successional conifer forest. Known from the vicinity of Fish Camp to the west of the project, Mariposa Grove, Wawona, Sugar Pine, and Nelder Grove; 4000-7200 feet.
Epilobium howellii SUBALPINE FIREWEED	None known to occur. The nearest occurrence is about 3 miles away	RIPARIAN/MEADOW. Meadow edges, moist ditches and streamsides in conifer forest, 5000-8800 feet.
Fissidens aphelotaxifolius BROOK POCKET -MOSS	None known to occur but habitat is present.	RIPARIAN/MEADOW. Rocky substrate in streams, < 6300 feet.
Helodium blandowii *BLANDOW'S BOG-MOSS*	None known to occur but fen habitat is present in Long Meadow.	RIPARIAN/MEADOW. Wet meadows, fens, and seeps in coniferous forests, 6500 – 9500 feet.
Hulsea brevifolia **SHORT-LEAFED HULSEA**	**Three occurrences known, in dry forested habitat.**	**FORESTED. Granitic or volcanic soils in openings and under canopy in mixed conifer and red fir forest, 5000 – 9000 feet.**
Lewisia disepala YOSEMITE LEWISIA	None known to occur but rocky habitat present.	ROCKY/GRAVELLY. Granitic sand and gravel in ponderosa pine, mixed conifer, and upper montane coniferous forest, 4000 – 7500 feet.
Lewisia kellogii ssp. *kelloggii* KELLOGG'S LEWISIA	None known to occur but rocky habitat present.	ROCKY/GRAVELY. Open, gravelly flats in mixed conifer and subalpine forest, 6000 – 11,000 feet.
Meesia triquetra **THREE-RANKED HUMP-MOSS**	**One large occurrence in Long Meadow.**	**RIPARIAN/MEADOW. Fens in montane meadows within conifer forest, 4500 – 8000.**
Meesia uliginosa ONE-NERVED HUMP MOSS	None known to occur but suitable fen habitat present.	RIPARIAN/MEADOW. Fens in montane meadows within conifer forest, 7500 – 9000 feet.
Peltigera hydrothyria **VEINED WATER LICHEN**	**None known within Project boundary but occurs along a major access road to the project where hauling of logs will occur**	**RIPARIAN/MEADOW (AQUATIC)/Cold, clear, unpolluted streams in conifer forests, 4000 – 8000 feet.**
Trifolium bolanderi BOLANDER'S CLOVER	None known, most likely absent due lack of detection during many surveys	RIPARIAN/MEADOW. Montane meadows in mixed conifer forest, 6800-

	over the past 20 years.	7300 feet.

Noxious Weeds

Invasive non-native plants (weeds) are species which, if allowed to spread, cause ecological and economic damage. Invasive weeds may be officially listed as “noxious” at the federal or state level. The California Invasive Plant Council (Cal-IPC, 2006) assigns ratings of high, moderate, or limited ecological impact statewide based on ecosystem impacts, potential for invasiveness, and ecological distribution. Weeds on the California Noxious Weed list with ratings of “A” or “B” are of highest priority for state and county weed managers (CDFA, 2010). New infestations of State A and B rated weeds are controlled promptly by county or California State Department of Food and Agriculture biologists or by Forest Service employees in cooperation with county agriculture department staff.

Surveys conducted in 2005 (for permit reissuance for Yosemite Trails Pack Station) and in 2010 for this project revealed that the primary invasive weed species in the Fish Camp Project area are bull thistle (*Cirsium vulgare),* and common mullein (*Verbascum thapsus*). There is one patch of an escaped invasive ornamental plant, rose campion (*Lychnis coronaria*). No California State Noxious Weed species are currently known from this area, although spotted knapweed was detected and eradicated in the Fish Camp area about 10 years ago by the California Department of Food and Agriculture. Figure 2 shows the locations of these species in relation to the treatment units and access roads within the Project area:

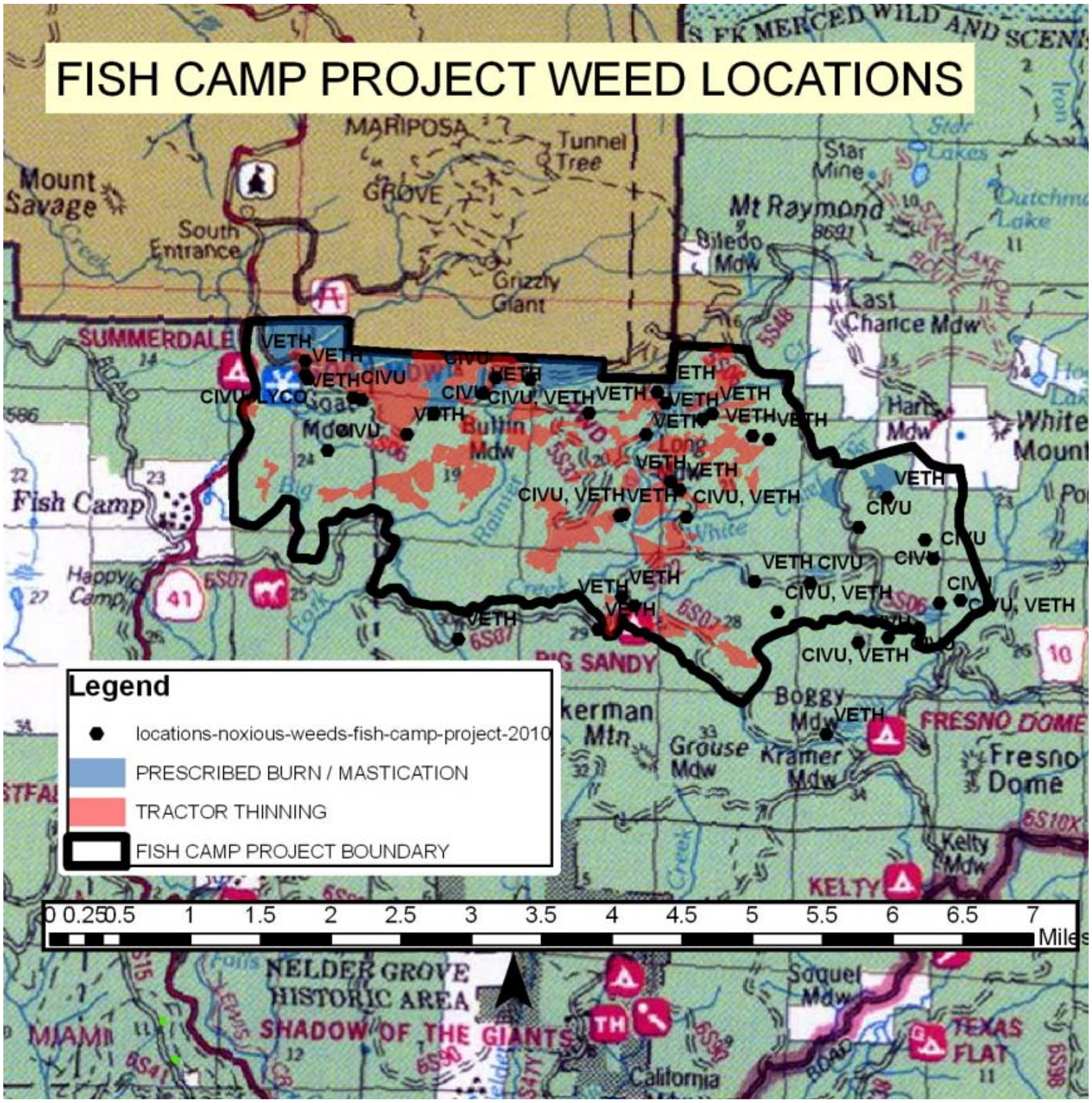

Figure 2 Locations of invasive weeds in the Fish Camp Project area: CIVU = bull thistle, VETH = common mullein, LYCO = rose campion

Bull thistle (*Cirsium vulgare*) - CIVU. There are infestations of bull thistle in or adjacent to units T8a, T9, T-16, RX-55, and along access roads to and within the Project area. Although not as highly invasive as other noxious thistles, bull thistle competes with and displaces native species and decreases forage values in meadows and uplands at elevations up to 7,000 feet (Randall, 2000). Cal-IPC rates bull thistle as having moderate ecological impact, but notes that this species can be very problematic regionally, and especially in riparian areas (Cal-IPC, 2006). Bull thistle has been found at elevations higher than 7,000 feet in the Sierra Nevada (e.g. up to 8795 feet at Sonora Pass on the Stanislaus National Forest (UC Berkeley, 2010).

Common mullein (*Verbascum thapsus*) – VETH. There are infestations of common mullein in units T8a, T16, T8b, T9 (2), T18a, T28h, and along access roads to and within the Project area. Mullein is considered a Cal-IPC weed of limited ecological impact at the State level, and generally is not considered one of the more damaging wildland weeds in the SNF. However, common mullein is a biennial plant with high seed production, often over 100,000 seeds per plant. Although most seeds at or near the soil surface germinate rapidly, buried seeds can remain viable for 35 to 100 years (Pitcairn, 2000). After soil disturbance, especially fire, high densities of mullein plants can prevent natural revegetation with native species (Pitcairn, 2000), thus it is considered important to control and prevent the spread of this weed as part of the Fish Camp Project's objectives.

Rose campion (*Lychnis coronaria*) – LYCO. There is a patch of rose campion near the Goat Meadow parking lot in Unit T-08a. Rose campion is native to southeastern Europe, and while it is not rated as a California noxious weed nor rated by Cal-IPC, it has been observed to spread into wildlands and when small infestations are encountered in the Forest, it is controlled as time and funds permit. This is a species commonly planted in gardens and often seen persisting and spreading from old homesteads on the Forest, although it does not appear to be as aggressive as many of the higher priority noxious weeds in the SNF.

A coordinated program for inventorying, controlling and preventing the spread of noxious weeds and invasive non-native plants has been ongoing in the SNF since 1998. The SNF is a founding member of the Sierra-San Joaquin Noxious Weed Alliance (a Weed Management Area (WMA) for Mariposa, Madera, and Fresno counties). The WMA brings together landowners and managers (private, city, county, State, federal) for the purpose of controlling invasive weed species in a cooperative manner. The relatively "clean" or uninfested state of the Forest in the Fish Camp Project area can be directly attributed to the efforts of this group in treating weeds on lands leading up to the SNF, and to the strong weed management program in nearby Yosemite National Park.

Alternative 1 – No Action

Under the No Action alternative, known sites for botanical resources would continue to be managed to maintain present diversity of the species as specified in the SNF- LRMP (USDA-FS 1992) and SNFPA ROD (USDA-FS 2004b).

Direct Effects

No direct effects would occur to Forest Service sensitive plants if the No Action alternative is chosen because project activities would not take place.

Indirect and Cumulative Effects

Indirect effects have the potential to occur to Forest Service Sensitive plants under the No Action alternative primarily from the potential of uncontrolled wildland fire. Uncontrolled wildfire has the potential to cause significant disturbance to soil, ground cover and canopy cover, placing Forest Service sensitive riparian species at risk, since these types of plants normally do not regenerate after unusually high-intensity fires. Through suppression actions, fires can also allow the opportunity for the spread of invasive weeds, which can affect Forest Service sensitive species through competition of resources.

The invasive weeds currently in the Project area would continue to spread without manual control.

As no action is being taken by the SNF under the No Action alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Alternative 2 – Proposed Action

Direct and Indirect Effects

The following direct effects to sensitive plants are possible as a result of timber harvest or fuels reduction activities: Direct killing of plants when equipment runs over them or parks on them, when logs are skidded or dragged over them, when slash piles block their light, and when piles are burned directly over them and the heat intensity is too great to survive. Mastication could directly kill plants by running them over or by covering them with a dense layer of chipped wood and limbs.

Plants of Riparian, Meadow, and Aquatic Habitats: For the known occurrence of veined water lichen (known to occur along Road 6S07, accessing the Project area), there should be no direct effects because the project is designed specifically to prevent the use of the area for drafting of water. There may be some additional dust that reaches this stream and briefly affects the lichen but this would be alleviated by standard dust abatement practices and should be of short duration. The population of three-ranked hump-moss in Long Meadow fen will be protected by the 100 foot buffer for Long Meadow. For all other riparian dependent Sensitive plant species that may occur in the Project area, the project is designed to protect their habitat and no direct or indirect effects are expected.

Plants of Rocky/Gravelly Habitats: No plants of rocky habitats were found during surveys of the Project area, but these rocky areas were not specifically surveyed as no treatments were proposed within them. The project has been designed to prevent incidental effects to rocky/gravelly areas, thus no direct or indirect effects would occur to the three species that may be present: Mono Hot Springs evening primrose, Yosemite bitterroot, or Kellogg's lewisa.

Plants of Forested Habitats: The short-leafed hulsea populations in the treatment units and along access roads will all be flagged for avoidance, thus no direct effects would occur. Positive indirect effects may result from opening of the canopy near the populations as they respond positively to this type of disturbance as evidenced by observations of response to fire and thinning (Clines, personal observation). Any mountain lady's slipper plants would be most likely to be within 150 feet of streams, thus are unlikely to experience severe effects. However, no plants were found during surveys or by the marking crew (who are well-trained to recognize these plants and cover the treatment units thoroughly). Thus no direct or indirect effects are expected for this species.

NOXIOUS WEEDS AND INVASIVE NON-NATIVE PLANTS

Ecosystem health is threatened by the spread of invasive non-native weeds in a variety of ways. Dense infestations can reduce native biodiversity, compete with threatened, endangered and sensitive (TES) plant species, reduce wildlife habitat quality and quantity, modify vegetative structure and species composition, change fire and nutrient cycles, hybridize with native species, and degrade soil structure (Bossard *et al*, 2000).

Because the project is designed to improve the ecosystems of the Project area by removing known infestations of invasive weeds and to prevent the introduction and spread of new infestations or species of weeds, there will be beneficial direct and indirect effects.

Cumulative Effects

No cumulative effects are expected for Botanical Resources as the project has been designed to eliminate direct and indirect effects to rare plants and to avoid the introduction and spread of noxious weeds.

Positive cumulative effects for invasive weeds are expected in that the Project area will have a reduced number of infestations of invasive weed species over the long term beginning with the actions proposed in this project.

Alternative 3

Direct, Indirect and Cumulative Effects

From the standpoint of effects to TES plants and the risk of introduction and spread of noxious weeds, the effects would be the same as for Alternative 2. The treatments cover the same number of acres in the same places as in Alternative 2, with no commercial logging.

Geology/Soils

The direct, indirect and cumulative effects to the geologic and soils resources are summarized from the Soils Resource Report for the Fish Camp project (Gallegos, A. 1/28/2011).

Methodology for Analysis

Data used to determine projected effects to the soil resource include: the Soil Survey of the SNF, (Giger, 1993), site specific data from soil transects collected in 2007, following the Region 5 Protocol for Soil Monitoring (TenPas, 2005) and past monitoring of similar projects using BMP Monitoring Protocols (USDA, 2002) and the Region 5 Soil Monitoring Protocol.

Soil resource management is achieved by maintaining soil productivity using Regional Soil Quality Standard and Guidelines and management direction provided in the Forest Land Management Plan – SNF, 1991. Soil productivity is evaluated within an Activity Area. An Activity Area is the area of land dedicated to growing vegetation which soil quality standards for soil productivity are applied. It is that area within a management area where soil disturbing activities take place and is of practical size for management, sampling, and evaluation. Activity areas include timber harvest units and fuels treatment units within the Fishcamp Project area. System roads and trails and other areas not dedicated to growing vegetation are not included as part of activity areas.

The project proposal could affect soil productivity in the Fish Camp Project area by reducing 1) soil cover, 2) soil porosity, 3) large woody debris (LWD) and 4) disturbance of surface soils.

1. The main soil physical property that can be affected by the Proposed Action is porosity, the space between individual soil particles. Soil hydrologic function is primarily dependent on the size and arrangement of soil pores, or pore geometry. Soil pore geometry also controls the transmission of air through soils, which is critical for plant growth. When porosity is decreased, the soil becomes denser, making it more difficult for roots to penetrate. Maintenance of natural soil porosity is important for maintaining healthy native plant communities and for maintaining the hydrologic function of the soil. Severe losses of porosity through soil compaction decrease the water and air available to plant roots, creating droughty and/or anaerobic conditions as well as physically inhibiting root growth. Soil hydrologic function is usually impaired as water storage capacity, infiltration, and permeability decrease, thus increasing runoff and the subsequent potential for erosion and cumulative watershed effects. Soil compaction diminishes soil porosity, and decreases the transmission of water, nutrients, and air to roots. Severe compaction can inhibit root growth when the soil becomes too dense for roots to penetrate easily. Finally, compaction decreases infiltration and hydraulic conductivity, the movement of water into and through soils, which in turn increases surface runoff and erosion potential. Severely compacted soils could take at least 50 years to recover. Bulk density (ratio of soil mass to soil volume) and soil strength (penetration resistance) are two widely accepted indirect means of measuring changes in porosity in the field. Qualitative indicators of compaction include platy soil structure, loss of soil structure (e.g. puddling), impressions or ruts in the mineral soil surface, and in some cases, redoximorphic features that indicate a recent change in soil aeration. Redoximorphic features are soil properties associated with wetness that results from reduction and oxidation of iron and manganese compounds after saturation and desaturation with water. Both quantitative and qualitative indicators will be used to describe compaction. Use of heavy equipment, especially rubber tired skidders, for logging and tractor piling could

compact soils, in the upper 12" of the soil profile. Soil compaction can have a detrimental effect on soil productivity on fine-textured soils that are moist or at optimal soil moisture conditions for soil compaction. Soil compaction is not a concern in coarse textured soils. In fact, soil compaction has been found to have an increase in soil productivity by increasing the available water holding capacity of the soil (Powers, et al 2008). Soils have been classified into sensitive and non-sensitive soils types for the purpose of identifying soils that are susceptible to detrimental soil compaction. *Soil porosity should be at least 90 percent of total porosity over 85% of an activity area (stand) found under natural conditions. A ten percent reduction in total soil porosity corresponds to a threshold for soil bulk density that indicates detrimental soil compaction.*

2. Soil productivity is dependent on the amount of soil organic matter available to prevent significant short or long-term nutrient cycle deficits, and to avoid detrimental physical and biological soil conditions. Soil organic matter should include fine organic matter and large woody debris.
   a. Fine organic matter provides soil nutrients and protects the soil by providing soil cover. Soil cover or the lack of soil cover can affect soil productivity by removal of surface soils from accelerated erosion. Accelerated erosion is erosion that occurs at a rate over and beyond normal, natural or geological erosion, primarily as a result of human activity. Soil loss should not exceed the rate of soil formation (approximately the long-term average of 1 ton/acre/year). Sufficient soil cover should be maintained to prevent accelerated soil erosion from exceeding the rate of soil formation. Ground cover will be at least 50% on ground slopes less then 35% and on slopes greater then 35%, ground cover will be determined by the ID team. Replenishment of fine organic matter to preexisting conditions could occur in less then 10 years as forests shed their needles and leaves and accumulate on the forest floor.

   b. Large organic matter or large woody debris, provides habitat for soil micro-organisms including fungus, soil insects and soil bacteria. All of these organisms are critical for soil health and soil productivity. The loss or reduction of large woody debris in a forest could last anywhere from 10 to 50 years, depending on the number of decadent trees or snags that are left in the stand after treatment. At least 5 well distributed logs per acre, representing the range of decompositions classes, should be left on the forest floor after the Proposed Action is completed.

3. Soil productivity can be reduced or impacted from displacement of surface soils. Surface soils include valuable amounts of organic matter and nutrients that are critical for productive soils. Surface soils can be disturbed by logging and mastication equipment operating in the forest, by tractors piling slash and by construction of roads and skid roads from excavation of the soil to construct a road or skid trail prism. The surface area of new roads will result in a loss of soil productivity for that area. Disturbance of surface soils by logging and mastication equipment could result in reduced soil productivity. The Sierra LRMP provides direction for avoiding tractor logging on sustained slopes that exceed 35%. There are no slope limitations for mastication equipment in the LRMP. Mastication equipment can operate on slopes up to 55% slopes. There has been no systematic monitoring of mastication work on slopes greater then 35% on the SNF.

Affected Environment

The following information addresses the affected environment or existing pre-treatment soil condition, the environmental consequences of the Proposed Action to soil productivity; mitigations measures proposed to reduce the impacts of the Proposed Action and a monitoring plan to ensure that Forest Standard and guidelines are met to maintain soil productivity.

Existing Condition

Soils in the proposed Project area vary in their sensitivity to management. Soils with higher clay content and soil moisture have the highest potential to reduced soil porosity. Soil compaction can occur down to 12" deep.

- There is a concern that areas proposed for ground based harvest have soils that are highly susceptible to reduction of soil porosity caused from compaction by heavy equipment operating when soils are moist or wet.
- There a concern that prescribed fire and tractor piling will reduce soil cover and accelerated erosion could result in a loss of soil productivity.
- There is a concern that ground based harvest systems on slopes that are too steep will displace surface soil horizons that could result in accelerated erosion and reduced soil productivity.

The Project area as defined, borders the community of Fish Camp to the west and Yosemite National Park to the north. The soils developing in the area were formed from residual parent material. The parent material is mainly granitic rock with few localized areas of andesitic, basaltic, and metasedimentary rock formations. The Project area is being deeply dissected by localized dendritic stream systems. Some of the major factors affecting soil formation in the area are elevation and water regimes. Though not extreme, water regimes and elevation do have an accumulative effect on soil formation in the Project area. Elevation in the Project area ranges from approximately 5000 to 7200 ft and precipitation increases with rising elevation.

The Fish Camp Project area is underlain with seven soil types and rock outcrop that combine into six soil map units (Giger, 1993). See Fish Camp Soils Map (Fish Camp soils report) showing location of treatment units and soil map units within the Fish Camp Project area. The major soil series located in the area are the Chaix, Chawanakee, Umpa, Ultic Haploxeralf, Entic Xerumbrepts, and Ledford families. The Chawanakee, Ledford and Entic Xerumbrept soils are shallow soils and are sensitive to disturbance from displacement of the A horizon. Soil map units with high amounts of impervious surfaces such as rock outcrop or shallow soil are most susceptible to runoff and subsequent surface erosion of soil adjacent to the rock outcrop. Soil map units with shallow soils and rock outcrop component include soil map units 123, and 143. These soil map units are distributed throughout the proposed Project areas and are a concern for increased runoff and potential accelerated erosion of soil below the rock outcrop and within the shallow soil. Rock outcrop is located in or adjacent to treatment units T-06, T-10, T-14, T-17, T-18, T-21, and T-28. The Ultic Haploxeralf soils have a moderate compaction hazard and are located in treatment units T-9, T-7a, T-10a, T-8b, T-10d, T-12, T-8a, T-18a, T-5, T-7b, T-10b and T-10c.

See Table 6 for a list of soils in the Project area and soil interpretations that are considered in the effects analysis and design of the project. See Table 7 for a list of physical properties of the soils that occur within the Project area.

Table 6: Summary of Soil Map Units in the Fish Camp Area

Soil Map Unit	Acres	Map Unit name	Max Erosion Hazard	Runoff Potential	Compaction Hazard	Treatment Units
118	10	Chaix Family, 5 to 35 percent slopes	Mod to High	Low	Low	T-14a, T-14b
120	4	Chaix Family, deep, 5 to 45 percent slopes	Mod to High	Low	Low	T-13
123	194	Chaix-Chawanakee Families-Rock Outcrop complex, 35 to 6 5 percent slopes	High to V High	Mod to High	Low	RX-05, RX-03, T-18c, T-18b, T-13, T-18a, T-18d, T-16, T-17b,T-17a, T-19
124	2	Chaix-Holland Families complex, 15 to 35 percent slopes	High	Low	Low	T-7b,
143	430	Ledford Family-Entic Xerumbrepts-Rock Outcrop associati on, 10 to 45 percent slopes	Mod to High	Mod	Low	M-08, T-16 T-28e, T-20a T-22c, T-28b T-22b, T-19 T-21d, T-13 T-21c, UT-17a, T-28a T-17a, T-28f T-28h, T-21a T-28c, T-28i T-28j, UT-17b, T-28d T-20b, T-6 T-28g, T-22a T-21b, T-27
171	440	Ultic Haploxeralfs, deep, 15 to 50 percent slopes	Mod to High	Low	Mod	RX-04, T-9 T-7a, T-10a T-8b, T-10d T-12, T-8a T-18a, T-5 T-7b, T-10b T-10c

176	33	Umpa family, deep, 20 to 60 percent slopes	Mod	Low	Low	M-14, M-08

Table 7: Description of Soil Taxonomic Units

Soil Family	Taxonomy Name	Temperature Regime	Soil depth (inches)	Texture	Hydro Grp	Drainage Class
Chaix	80%	Mesic	A: 0-6; B: 6-36	A: Coarse Sandy Loam B: Coarse to Gravelly Sandy Loam	B	Somewhat excessively drained
Chaix, deep	75%	Mesic	A: 0-6; B: 6-36	A: Coarse Sandy Loam B: Coarse to Gravelly Sandy Loam	B	Well Drained
Chawanakee	35%	Mesic	A: 0-4; B: 4-20	A: Coarse Sandy Loam B: Coarse Sandy Loam	C	Somewhat excessively drained
Rock Outcrop	15%					High Runoff
Ledford	50%	Frigid	A: 0-8; AC: 8-18	A: Coarse Sandy Loam AC: Coarse Sandy Loam	B	Somewhat excessively drained
Entic Xerumbrepts	20%	Frigid	A: 0-8; B: 8-18	A: Sandy Loam B: Gravelly Coarse Sandy Loam	C	Somewhat excessively drained
Ultic Haploxeralfs, deep	75%	Frigid	A: 0-8; B: 8-50	A: Cobbly Sandy Loam B: V Cobbly to Stony Loam	B	Well Drained
Umpa, deep	70%	Frigid	A: 0-6; B: 8-32	A: Bouldery Sandy Loam B: V Stony Coarse Sandy Loam	B	Well Drained

Areas proposed for ground based harvest systems generally have slopes less than 35%. However, some areas exist where slopes exceed 35% and tractor logging could result in soil disturbance that mixes or removes soil below the A horizon. Tree removal on these steeper slopes would be "end-lined" onto more gentle slopes to avoid mechanical disturbance on the steeper slopes.

Soil Productivity

Soil conditions have been reviewed in the Fish Camp Project area. Twenty two soil transects consisting of 20 points per transect were collected to characterize soil conditions using the 2005 Framework Soil Monitoring Methods Protocol. Data for soil cover, soil disturbance, soil compaction and large woody debris were collected along transects and summarized and documented in a monitoring report by Stewart and Courter, 2007. This report will serve as baseline conditions from which to compare soil conditions in the future. The following is a summary of existing soil conditions for the Fish Camp Project area based on data collected from the soil transects for the Project area and from vegetative inventories.

Table 7 summarizes existing soil conditions in the Project area. The Project area has an average soil cover of 95%, total D2/D3 disturbance is 1.82%, soil compaction is 4.55%, and there are 19.77 pieces of LWD/ac. Data from the 22 soil transects indicate that the Project area is maintaining soil productivity and the criteria for soil productivity are being met for soil cover, disturbance, compaction, and large woody debris. Table 8 - Summary of Disturbance Levels from Soil Transect Inventory.

Table 8: Soil Disturbance

Soil Transect Data	Average Over All Transects
Slope Gradient	14.95 %
Soil Cover	95.08%
D1 (minimal disturbance)	7.95%
D2 (moderate disturbance)	1.59%
D3 (heavy disturbance)	.23%
Total Disturbance D1/D2/D3	10.23%
Total Disturbance D2/D3	1.82%
Compaction	4.55%
LWD (points/transect)	7.91
LWD (logs /acre)	19.77

Desired Condition

Soil physical, chemical, and biological properties that support the productive capacity of the land, its ecological processes, such as, hydrological function of watersheds, and the ecosystem services identified in land management plans.

Regulatory Setting (Applicable Laws, Policies, and Regulations)

Laws, regulation and policy direction on soil management relevant to the proposed project and affects on soil resources includes the following:

National Forest Management Act of 1976: Renewable Resource Program. "(C) recognize the fundamental need to protect and where appropriate, improve the quality of soil, water, and air resources."

Forest Service Manual (FSM) 2500 – Watershed and Air Management, Chapter 2550 – Soil Management, 2010: FSM 2500 defines Forest Service policy on managing soil productivity and components of soil productivity.

SNF- LRMP Soils Standards and Guidelines for General Forest

The SNF- LRMP provides for soil management standards and guidelines to all management areas and analysis areas or aggregates of analysis areas (USDA, 1991). These S&Gs are as follows:

1. Avoid tractor logging on highly erodible soils, where sustained slopes exceed 35%, except where supported by on-the-ground ID team review (see LMP S&G 125).

2. Apply appropriate erosion prevention measures on all ground disturbing activities (FSH 2409.23) prior to fall storms (October 1) and immediately upon completion of activity begun after November 1 (see LMP S&G 127).

3. Apply appropriate erosion prevention measures on high erosion hazard soils under the following conditions: (see LMP S&G 128).

    a. When exposed soils from an average of several 500-foot linear transects:

        i. Exceed 150 feet on slopes of 15-35%,
        ii. Exceed 75 feet on slopes 35-65%,
        iii. Exceed 25 feet on slopes over 65%,

    b. On linear disturbances, such as skid trails and fire lines, cross-drain area at the following intervals:

Interval between Cross-Drain (feet)

% Slope	HEHR	VHEHR
0-15	150	125
15-35	75	45
35-65	35	20
65+	15	15

4. Road construction on areas with High and Very High Erosion Hazard will follow standards on areas with High and Very High Erosion Hazard will follow standards in FSM 2521 Sierra Supplement No. 8, which gives direction concerning stabilization and road surface drainage (see LMP S&G 129 and LMP Letter of Correction, USDA, 2009).

5. Plan and execute activities such as timber harvesting, site preparation and fuels reduction on soils sensitive to loss of productivity by using the following standards.

   a. Avoid mixing or removing soils below the A horizon. Roads, skid trails, fire lines and log landings are exceptions.
   b. On completion of a ground disturbing project on less than 35% slope, maintain an average accumulation of 50% protective ground cove density in the 1 to 100-hour fuels with some 1000-hr fuels up to 10" in diameter. Note: the 10" diameter logs conflicts with the Regional Soil Standard and Guideline recommendation for desired logs of at least 20 inches in diameter and 10 feet long.
   c. On slopes over 35% with very High and /or High Erosion Hazard soil, an ID team will evaluate ground cover needs and develop prescriptions.

Alternative 1 – No Action

Direct Effects and Indirect Effects

Under Alternative 1, soil conditions would not change from the existing conditions. Soil transect data indicates that soil cover and large woody debris (LWD) are meeting Regional Soil Standard and Guideline thresholds. Soil cover will increase and LWD will increase. The average soil cover is 95% and the average number of LWD is approximately 20 logs/acre. This is well over the guideline of five logs per acre. The proposed Project area is meeting soil management indicators. Some areas have 10-12% detrimentally disturbed and compacted soils including Treatment Units 10 and 19. The average throughout the Project area for detrimental disturbed and compacted soils is approximately 4.55%. Detrimentally disturbed and compacted soils will continue to recover over time.

If vegetation is left in its current state of high fuels and high wildfire risk, it is inevitable that a wildfire will occur. Many areas within a potential wildfire area would not meet soil quality standards in terms of soil cover and surface erosion rates in a fire event. Soil cover would be less than 20% and some soils would develop hydrophobic conditions. Accelerated erosion will occur, especially during precipitation events. Soil Productivity will be reduced in some areas by at least one site class. Past monitoring of wildfire areas on the nearby Stanislaus National Forest has found that bare ground averaged about 70% by spring of the first year and by spring of the second year bare ground averaged 27% (Janicki, 2003). In a study conducted by Berg and Azuma (2002) bare ground and evidence of surface erosion recovered to pre-fire conditions within four to five years after a wildfire. Large woody debris would probably be consumed in a fire and long term soil productivity could be decreased.

This alternative is in full compliance of the National Forest Management Act of 1976, the Forest Service Manual (FSM) 2500 – Watershed and Air Management, and the Sierra National Forest Plan and Amendments.

Cumulative Effects

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects.

Alternative 2 – Proposed Action

Direct Effects and Indirect Effects

The following is a discussion of the various kinds of treatments proposed and their potential direct and indirect effects to the soil resource.

Commercial and Biomass Thinning activities (mechanical harvesters), Mastication operations, Pre-commercial Thin/Release operations, and Tractor Piling operations use equipment that includes steel tracked heavy equipment and rubber tired tractors. These activities have the potential to impact the soil resource by mechanically disturbing the soil and/or compacting soil. Planting and hand release operations do not affect the soil resource.

Soil Disturbance and Soil Porosity or Soil Compaction

Mechanical harvesters and rubber tired tractor skidders used for the proposed commercial and biomass thinning, tractor piling, and mastication would cause soil disturbance and their use poses increased risk of detrimental soil disturbance, detrimental soil compaction and accelerated soil erosion. Standard operating procedures such as cross ditching skid trails for erosion control would reduce the risk of erosion and promote surface soil stabilization and re-vegetation. Tractor logging is proposed for areas with slopes under 35%, which would reduce excessive soil displacement. Areas of slopes in excess of 35% are to be logged with a cut-to-length logging system or logs will be favorable skidded to prevent undue soil disturbance. The soils in this Project area are highly productive so rapid natural re-vegetation is expected.

Ultic Haploxeral soils are moderately susceptible to soil porosity loss, due to compaction from heavy equipment, such as rubber tired skidders and mechanical harvesters operating when soils are moist or wet. Ultic Haploxeral soils occur in treatment areas T-5, T-7a, T-7b, T-8a, T-8b, T-9, T-10a, T-10b, T-10c, T-10d, T-12, and T-18a. In order to minimize detrimental soil compaction, soil moisture needs to be dry enough to reduce the susceptibility to compaction during thinning and biomass removal operational periods. The ideal moisture content varies between soils and should not be above 14% to prevent soil compaction. A design feature requiring a soil scientist or other earth scientist to be consulted prior to mechanical equipment operating on soils that have a moderate soil compaction hazard is a component of the project. The standard operating period from June 1 to October 15 and avoidance of operating mechanical equipment on soils with more than 12% soil moisture would minimize detrimentally compacted soils in an average rain year (See Soil Design Measures). Areas with detrimentally compacted soils would be less than 15% for most of the treatment areas. Some portions of the commercial thin or biomass treatment areas (Units T-10 or T-19) could have detrimentally compacted soils in excess of 15%. Subsoiling may be required in these units if soil compaction exceeds 15% of the treatment unit. Detrimentally compacted soils in excess of 15% could occur for at least 1 year, until after tractor piling of slash has occurred in the second year of project implementation. Subsoiling landings (BMP 1-16) and primary and secondary skid trails would result in less than 15% of the treatment areas with detrimentally compacted soils. Soil productivity would be reduced in areas with detrimentally compacted soils for 1 or 2 years.

There are no potential indirect effects of Alternative 2 as soil compaction would be kept to less than 15% of an activity area and erosion control measures are implemented in a timely manner. There could be an occasional summer storm event that could cause accelerated erosion of bare exposed soils. In the event that this should occur soil erosion sites would be restored to pre-storm conditions.

Large Woody Debris (LWD)

Commercial thinning, biomass removal and tractor piling would probably reduce existing fuel loads to levels where fire hazards and fuels achieve the desired conditions. After treatment, on the ground fuel loads are expected to be no more then 5 – 10 tons/acre (see Fire/Fuel Section). This would probably reduce existing LWD to no less than 25% of existing levels (existing levels average 20 logs/acre), which will still be higher than the minimum five logs per acre that is needed to meet the LWD desired condition.

Soil Cover

In areas where tractor piling of slash is planned, leave at least 50 percent well distributed soil cover for erosion protection on slopes under 35%. If slopes are greater than 35%, soil cover should be at least 70%. Past observations on the SNF have found that this amount of soil cover generally prevents accelerated erosion. A buffer of 100 feet would be provided around rock outcrop to prevent accelerated erosion of the adjacent soils from rapid runoff from rock outcrops.

Mastication Treatment Areas

Areas planned for mastication pose little risk of reducing soil productivity. This includes treatment units M-8 and M-14. The masticator equipment reduces erosion potential by increasing soil cover and generally causes little soil disturbance and compaction. Soil masticating equipment generally does not result in compacted soils because the equipment has lower ground pressures then conventional logging equipment and because this treatment creates a bed of chips that the masticator travels over. Most mastication treatment will be on slopes less the 35%; however some areas with slopes in excess of 35% will be treated. This will probably occur in the north end of treatment unit M14. Some soil disturbance will probably occur where the masticator makes turns during the operations. Soil disturbance will be higher on steeper slopes.

Prescribed Fire

Areas planned for prescribed fire pose little risk of causing significant effects to soil productivity based on the past performance of the prescribed fire program on the SNF. Past prescribed fires on the forest has resulted in low burn intensity in most areas. Prescribed fire burns in a mosaic pattern leaving patches of unburned vegetation and patches of burned areas, where duff and litter is completely consumed. Most trees are left undamaged, except for a few small patches that have burned at moderate burn intensity with moderate burn severity. Soil quality standards have been met from past prescribed fires and are expected to be met from the Proposed Action. Soil cover of 50% is expected to be met in the prescribed fire treatment areas.

Cumulative Effects

Cumulative soil effects have been addressed under the cumulative watershed effects (CWE) section under the Hydrology/Water Quality Section. Cumulative soil effects have been addressed under the cumulative watershed effects (CWE) section under the Hydrology/Water Quality Section. Analysis of cumulative soil effects use the Equivalent Roaded Acre (ERA) Model, which is used in the CWE analysis. The ERA model quantifies disturbance based on the degree of disturbance as compared to an acre of road and measured relative to disturbance in a given watershed. ERAs reflect changes to Soil Hydrologic Function, and are an indicator of rutting potential, erosion potential and loss of water control. See Fish Camp Project CWE Analysis (Gallegos, 2010) for a full description of assessment and assumptions including list of past, present and future foreseeable actions. The Forest Service Pacific Southwest Region (R5) methodology is used to determine the overall disturbed footprint. The disturbed footprint is a semi-quantitative measure of acres of detrimental soil disturbance and hence an approximation of change in Soil Quality as defined by the R5 Soil Quality Standards (USDA-FS 1995).

The Fish Camp CWE Assessment modeled recovery from previous management actions over a 30 year time span for 8 subdrainages for the existing condition and No Action Alternative. One of those subdrainages (501.5055) has evidence of cumulative watershed effects. If this alternative is selected, subdrainage 501.5055 would recover over time. Other planned actions that are not part of this decision would still occur, but the total ERAs in the project sub-watersheds would be lower than if the project was implemented..

Five of those subdrainages (501.5004, 501.5005, 501.5006, 501.5007 and 501.5053) will exceed their lower threshold of concern for cumulative watershed effects after the project is implemented, but not their upper Threshold of Concern of 14%. Subdrainages 501.5005 and 501.5006 have a low potential of incurring CWE and the other subdrainages have an unlikely potential of incurring CWE. Evidence of existing CWE in the Long Meadow Creek portion of subwatershed 501.5005 and planned mechanical treatments in the SMZ of Long Meadow make this subwatershed vulnerable to CWE. Implementation of Soil and Water Conservation Best Management Practices and other design measures, including subsoiling of detrimentally compacted soils will minimize effects to the soil resource. No significant impacts to soil productivity are expected if soil cover is over 50%, detrimental soil disturbance and detrimental soil compaction is limited to no more than 15% of a treatment unit; and large woody debris is at least five logs per acre.

Alternative 3

This alternative would receive treatment only to achieve fire and fuels objectives and limit treatments to mechanical clearing of ladder and surface fuels.

There is no difference between Alternative 2 and Alternative 3 to the soil resource (see effects analysis for Alternative 2). Fewer larger trees will be logged in the (T) treatment areas. The same or similar equipment will be used to implement either action Alternative.

Lands/Special Uses

The direct, indirect and cumulative effects to Lands and Special Uses are summarized from the Lands and Specials Uses Report for the Fish Camp Project (Nooney, K. 1/28/2011).

Affected Environment

Most of the National Forest System (NFS) lands inside the Project area have Acquired Land status. Formerly owned by the Madera Sugar Pine Lumber Company, all of the lands inside the Project area were obtained by the Forest Service through land exchange in 1930, with the exception of 425 acres of Reserved Public Domain lands inside Sections 22, 23, 26 and 27, Range 22 East, Township 6 South, Mount Diablo Baseline & Meridian. The only treatment scheduled in these 425 acres of the Project area is mastication planned in units M-08 and M-14.
There are a few Land-type special-uses authorized under permit within the Project area including: one apiary site off road 5S43C; a Mariposa County-owned garbage transfer station at Goat Meadow off Road 5S06; approximately 4000 lineal feet of telephone line buried along the Jackson Road (Forest Road 6S07) leading east from Tenaya Lodge to the Yosemite Trails Pack Station (YTPS), and approximately 165 feet of overhead telephone line providing service to YTPS.

The apiary site consists of a flat area surrounded by an electric fence where up to 100 hives of bees are located. The transfer station is the refuse collection site for all residents of Mariposa County living in the Fish Camp Area. The permit area consists of an access road, fee collection hut and fenced area. The phone line right-of-way begins at the gate on Road 6S07, buried a minimum of 30 inched below grade, and is staked and posted along the route with buried utility signs. The underground phone service comes to the service at a utility pole before the YTPS base facility and continues to YTPS overhead connected to trees. All of these uses have been authorized under permit for years and are easily recognizable features on the landscape.
The Madera Irrigation District’s water conveyance Ditch built in the 1870’s is not authorized under permit or easement; the ditch predates the proclamation of the Forest and does not require an authorization. This feature is located adjacent to Road 6S07 and is located close to the southwest boundary of the Project area. A research mast tower located near Big Sandy Campground is authorized under agreement to support the Sierra Nevada Adaptive Management Project.

The Forest Service holds a permanent, full public easement for Road 6S07 across private property located east of Highway 41 in the Fish Camp area. The Forest Service does not hold an easement for the portion of the Star Lakes Road on private property; this road turns into Forest road 5S43 at the private land-Forest Service boundary. The Forest does not hold an easement with the National Park Service for that portion of 5S06 located on NPS administered lands. This road intersects with Highway 41 south of the Park’s Wawona entrance station, providing access to the Goat Meadow Snow Play Area and the forest beyond.

Land uses authorized under permit located adjacent to, but outside, the Project area include one apiary site, the YTPS base facility, and the Madera Irrigation District’s gauging station. The YTPS base facility is located adjacent to Road 6S07 and consists of an office, residence, barracks, sales office, tack rooms, corrals, water tanks, water lines, septic tanks and other infrastructures. The Madera Irrigation Station consists of a parking area and facility located next to a stream gauging station adjacent to the MID Ditch to measure the flow of water flow in the Ditch.

Alternative 1 – No Action

Direct, Indirect and Cumulative Effects

Under the No Action alternative, current management plans would continue to guide activities in the Project area. This includes all ongoing activities with existing decisions or permits that would not change if this alternative was selected.

While special-use permittees would continue to perform hazardous fuels reduction around the facilities they operate, they would be limited to the standard 30 feet required by the Forest Service. Under consultation and in coordination with the Forest Service, permit holders may be able to extend fire clearances around their facilities to meet the 100 foot requirement of the State of California. There would be little protection from moderate to high intensity fires.

The continuation of natural fuels build-up could pose a wild fire threat to permit holder improvements, and for commercial permit holders, a loss of revenue. Overstocked stands have the potential to be effected by epidemic infestations of bark beetles and, in combination with disease, and/or drought-induced mortality, the forested areas the commercial permit holders depend on for their livelihood are at risk. Commercial permit holders would likely experience loss of revenue because forest visitors they depend on may be hesitant to visit parts of the forest that have high tree mortality. As public safety concerns (mainly from snag densities and high fire danger) increase there would be the potential need for areas to be closed to public access.

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Alternative 2 – Proposed Action

Direct Effects

Implementation of Alternative 2, like the No Action alternative, would not change management or permitted activities within the Project area. The activities associated with the Proposed Action would include commercial, pre-commercial and biomass thinning of conifer stands and prescribed burning (understory and pile) with associated post-activity treatments. Implementation of this alternative may have direct effects to permitted operations and general recreation inside the Project area. Design criteria have been developed to minimize the impacts that could occur from the implementation of this alternative and are listed on page 13.

The County Transfer Station and Goat Meadow Snow Play area are located within the T-8a Unit. Stand thinning activities, product hauling, use of the parking area for a landing, and other operations that occur during summer or winter months have the potential to interfere with access to and operations at the County Transfer Station, and Special-Use permitted activities including the Pioneer Wagon Train and Shadow of the Giants recreation events, the Camp Wawona and Tenaya Lodge outfitting and guiding operations. Dispersed camping that occurs in the area may be limited or restricted if operations occur during summer months. If project operations occur during winter months, snow play activities at the Snow Play area may be affected.

Yosemite Trails Pack Station uses a network of Forest roads and permitted trails for their riding clientele in summer months. Trails permitted to YTPS are located in units T-7a, T-9, Rx55, T-12, T17a, T-17C, and T-18a. Project activities including chainsaw use, felling of trees over trails, skidding, piling of logging slash and other operations have a high potential to affect the recreation experience of YTPS clients and other forest users. Hauling of equipment and forest products on Road 6S07 has the potential to interrupt activities authorized under permit to YTPS.

Unit T6 is located near an authorized apiary site off road 5S43C. Noise and vibrations from project activities may cause honey bees to act more aggressively than normal. If worker safety becomes an issue during project activities, Forest Service project managers would work with the permit holder to minimize safety concerns.

Unit T14e is located near a research Mast Tower that was installed to support the Sierra Nevada Adaptive Management Project. The tower is located in a clearing and is clearly visible.

Units T-14b and T-5 are plantation units located near Big Sandy Campground. Project activities in from June-September could affect the experiences of people who are using the Campground.

Transportation of project personnel, equipment and forest products would not occur on the Star Lakes Road (5S43) located on private property because the Forest Service does not hold an easement to use this road for project purposes. In addition, the road through private property is very narrow and goes through a congested residential area.

The Forest used to hold a Special Use Permit for the portion of Road 5S06 located on National Park Service lands. That permit expired in the mid-1980's and was not replaced by another road permit or easement. The Forest has does not have the authority to haul forest products on the NPS portion of this road. Transportation of project personnel, equipment and forest products would not occur on Road 5S06 until the Forest receives an authorization from the NPS to use the road for project purposes.

Indirect and Cumulative Effects

Indirect effects are predicted to be minimal, limited to aesthetic perceptions of changes noted by forest visitors. Due to unit layout and design there are no anticipated cumulative effects to Lands and Recreation Special Uses, or developed and dispersed recreation resulting from this action.

Alternative 3

Direct, Indirect and Cumulative Effects

The effects of this alternative would be similar to that of Alternative 2.

Terrestrial Wildlife

The direct, indirect and cumulative effects to the terrestrial wildlife species are summarized from the Biological Evaluation/Biological Assessment (BE/BA) for the Fish Camp Project. (Otto, A., 2010).

Affected Environment

The Fish Camp Project is located within both Madera and Mariposa counties on the BLRD of the SNF. The Project boundary encompasses 5,440 acres within the South Fork Merced River HUC 5 watershed. (USDA USFS 2010). Most of the Northern boundary of the project abuts Yosemite National Park, while the eastern and western boundaries are bordered by private lands. The community of Fish Camp lies at the western edge of the Project area, and it is within a WUI forest designation. The proposed project ranges from 5,000 feet to 8,000 feet in elevation. Primary vegetation types include: Sierra mixed conifer (62% of the Project area), Jeffrey pine (16% of the Project area), red fir (9% of the Project area), and ponderosa pine (6% of the Project area). Montane chaparral habitat is present in 3% of the Project area. The remaining habitat types each represent less than 1% of the Project area and include mixed chaparral, white fir, wet meadow, rocky outcrop, lacustrine, and montane riparian areas. See figure 3.

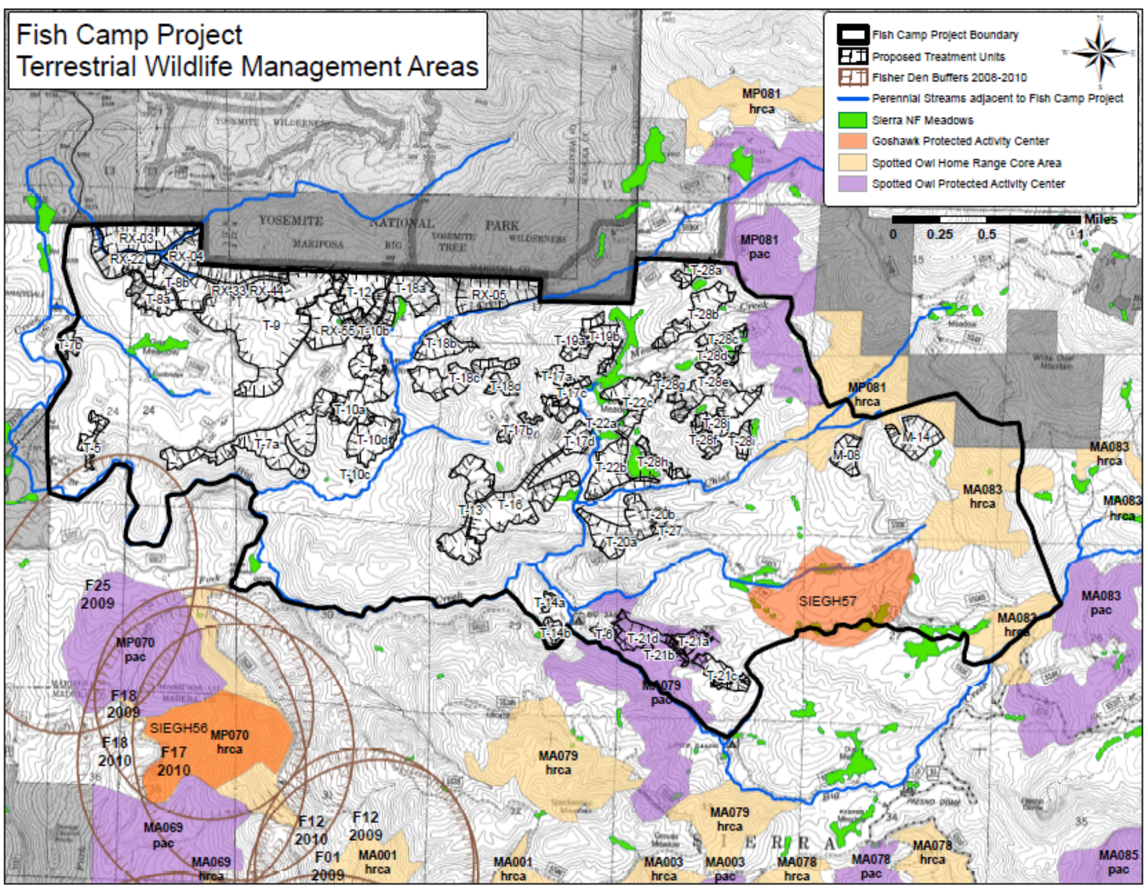

Figure 3: Terrestrial Wildlife Management Areas

As part of the effective environment monitoring of fisher and high quality fisher habitat within the Fish Camp Project area and the surrounding 4 key-subwatersheds will be conducted by Rick Sweitzer, UC Berkeley fisher team, as part of the Sierra Nevada Adaptive Management Project

(SNAMP). More information regarding SNAMP can be found on-line at http://snamp.cnr.berkeley.edu/).

Management and Regulatory Framework

Specific Forest Service requirements for managing Federally Listed and Forest Service Sensitive species and their habitats are defined in the following documents.

- National Forest Management Act (NFMA)
- Forest Service Manual and Handbooks (FSM/FSH-2670)
- Endangered Species Act (ESA)
- Sierra National Forest Land and Resources Management Plan (LRMP)
- 2004 Sierra Nevada Forest Plan Amendment (FSEIS and ROD)

All Standards and Guidelines from the Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment for managing wildlife and wildlife habitats will be adhered to in this project. Additional Terrestrial Wildlife Project Design Criteria common to all alternatives can be found in Chapter 2 of this document and in Section IICiii of the project BE/BA (Otto , A., 2010).

Methodology for Analysis

A total of 13 terrestrial wildlife species were identified as Federally listed, or that are candidates for listing, or that are Forest Service Sensitive Species, and that also may inhabit the Project area or nearby areas. These species were determined by reviewing the USFWS on-line data base on October 5, 2010 (http://sacramento.fws.gov/es/spp_list.htm). Forest Service Sensitive Species were determined by reviewing the USFS Pacific Southwest Region's Sensitive Species List on June 8, 1998, as amended on March 6, 2001, May 7, 2003, and October 15, 2007.

The 13 species were evaluated to determine whether they or their habitats exist, or potentially exist, in or near the Project area. If the species or their habitats do exist in the area, then they were further assessed to determine whether there was potential for the species or its habitat to be directly, indirectly, or cumulatively affected by the project. 9 of the 13 species met these criteria, therefore they were analyzed in detail in the project BE/BA. Table 9 summarizes the species habitats, area of consideration, and the rationale for including them in detailed analysis within the project BE/BA.

Four of the 13 species were not analyzed is the project BE/BA because they either do not occur in the Project area, or do not have habitat within or adjacent to the Project area, nor are affected directly, indirectly, or cumulatively by this project. Table 9 summarizes those species habitats, area of consideration, and the rationale for not including them in detailed analysis within the project BE/BA. The Fish Camp Project will have no effect on the following four species or their habitat, therefore they were not analyzed in detail in this BE/BA:

- Valley Elderberry Beetle (Desmocerus californicus dimorphus) Federally Threatened
- Bald Eagle (Haliaeetus leucocephalus) Forest Service Sensitive
- Wolverine (Gulo gulo) Federal Candidate Species; Forest Service Sensitive
- Willow flycatcher (Empidonax trailli) Forest Service Sensitive

Table 9: Special Status species on the Sierra NF and a summary of their habitats, area of consideration, and rationale for inclusion within the BE/BA detailed analysis.

Species (Elevation Range in Feet)	Habitat	Analysis Boundary	Rationale [a]
California wolverine (Elevation 7,000'-12,000')	Use a variety of habitats. Dens include snow-covered roots, standing or down logs with large cavities, holes under coarse woody debris, old beaver lodges, bear dens or rocky areas.	Not known to occur in SNF	There are no known locations and no suitable habitat for California Wolverine in or adjacent to the Fish Camp Project. This species will not be analyzed further in this document
Bald eagle (< 10,000')	Winter habitat in the Sierra NF, day perches, roost sites and foraging sites along large open waters with abundant prey. Known nest sites are at Bass Lake and Shaver Lake.	½ mile from large water bodies	There are no known locations and no suitable habitat for Bald Eagle in or adjacent to the Fish Camp Project. This species will not be analyzed further in this document
Valley Elderberry longhorn beetle (< 3,000')	Habitat consists of elderberry shrubs in Great Valley Oak Riparian Forests below 3000 feet in elevation	Within ¼ mile of Project area	The Fish Camp Project ranges from 5,000' to 8,000' in elevation which is well above the elevational range of VELB. This species will not be analyzed further in this document
Willow flycatcher (2,000'-8,000')	Western Sierra Nevada's Found in willow-dominated riparian areas, including moist meadows with perennial streams and smaller spring-fed or boggy areas	Within wet meadows	The Fish Camp Project does not propose any treatments within a minimum 100 foot radius of wet meadows. The nearest known sighting of Willow Flycatcher is over 18 miles away from Project boundary.
California spotted owl (>8,000')	Sierra Nevada province in CA. Need at least 40% canopy closure and an average dbh of 11 inches	½ mile around Project boundary	Potential impacts to the California spotted owl and/or its habitat will be analyzed in this document
Northern goshawk (<10,000')	Dense mature conifer and deciduous forests interspersed with meadows, other openings and riparian areas. Found in Mixed Conifer to Lodge pole Pine	½ mile around Project boundary	Potential impacts to the Northern goshawk and/or its habitat will be analyzed in this document

Species (Elevation Range in Feet)	Habitat	Analysis Boundary	Rationale [a]
Great gray owl (4,500'-7,500')	Found in large moist montane meadows surrounded by dense forest of medium to large mixed conifer and red fir.	½ mile around large meadows (15 acres +) or meadow complexes	Potential impacts to the Great Gray Owl and/or its habitat will be analyzed in this document
Pallid bat (<6,000')	Uses a variety of habitats. Depends on oak woodlands for foraging. Roosts in mines, snags, and in crevices in oaks	¼ mile around Project boundary	Potential impacts to the pallid bat and/or its habitat will be analyzed in this document
Townsend's big-eared bat (<10,000')	Found throughout the Sierra Nevada. Inhabits isolated areas with low human disturbance.	¼ mile around Project boundary	Potential impacts to the Townsend's big-eared bat and/or its habitat will be analyzed in this document
Western Red Bat (<3,000')	Uses a variety of habitats. Prefers edges or habitat mosaics that have trees for roosting and open areas for foraging	¼ mile around Project boundary	Potential impacts to the Western red bat and/or its habitat will be analyzed in this document
American marten (>7,200')	Found in mesic, late successional coniferous forests. Dens are in trees, snags, downed logs and rocks in structurally complex old forests.	3.1 mile radius around Project area	Potential impacts to the American marten and/or its habitat will be analyzed in this document
Pacific fisher (5,000'-8,500')	Coniferous and mixed forests with high canopy closure and late successional old-growth forest structural elements. Den and rest sites associated with water or riparian habitats. Rest sites include large standing conifers or hardwoods (snags or live trees). Dens occur in cavities of standing large diameter conifers or hard-woods (snags or live trees)	3.1 mile radius around Project area	Potential impacts to the Pacific fisher and/or its habitat will be analyzed in this document.
Sierra Nevada red fox (7,000'-12,000')	Red fir and lodge pole pine in subalpine and alpine fell-fields of the Sierra Nevada. Dens seem to be in rock/talus slides or earthen excavations/holes.	3.1 mile radius around Project area	Potential impacts to the Sierra Nevada red fox and/or its habitat will be analyzed in this document.

Mitigation and Monitoring

This project integrates management design measures that help mitigate potential impacts to wildlife habitat. These measures include, but are not limited to, Limited Operating Periods to avoid breeding seasons, Riparian management areas, streamside management zones, and Old Forest Linkages for perennial streams. These design criteria were developed to maintain habitat connectivity, special habitat elements for terrestrial wildlife species, and limit the amount of behavioral disruption during project implementation and post-treatment. Project design criteria are outlined in Chapter 2 of this document.

Key Wildlife Componants

Down Woody Material: (S&G#10) "Determine down woody material 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. Consider the effects of follow-up prescribed fire in achieving desired down woody material retention levels." This will be met by maintaining at least five well-distributed logs per acre as large woody debris (LWD) representing the range of decomposition classes from the Geology/Soils design criteria throughout the implementation of this project.

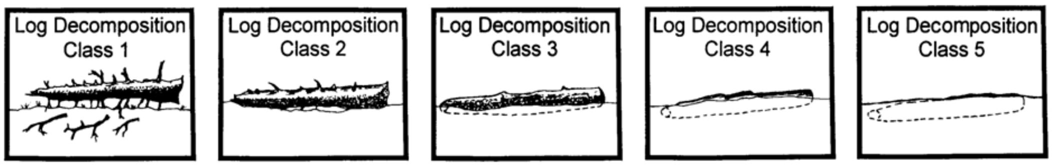

Figure 4: FIA Plot data Log Decomposition Classes

Snag Retention: (S&G#11) "Design projects to implement and sustain a generally continuous supply of snags and live decadent trees suitable for cavity nesting wildlife across a landscape. Retain some mid- and large-diameter live trees that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure. When determining snag retention levels and locations, consider land allocation, desired condition, landscape position, potential prescribed burning and fire suppression line locations, and site conditions (such as riparian areas and ridge tops) avoiding uniformity across large areas.

The general guidelines for large-snag retention are as follows:

- Westside mixed conifer and ponderosa pine types – four of the largest snags per acre.
- Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units. Consider leaving fewer snags strategically located in treatment areas within the WUI. When some snags are expected to be lost due to hazard removal or the effects of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels."

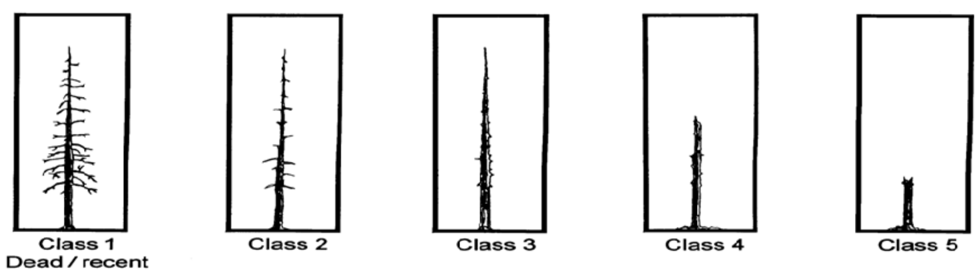

Figure 5: FIA Plot data Snag Decay Classes

Alternative 1 – No Action

Under the No Action alternative, current management plans would continue to guide management of the Project area. No thinning, either commercial, pre-commercial and/or biomass operations, of mixed conifer and pine stands, mastication of brush/shrub patches, prescribed burning to reduce natural fuel accumulations and/or treatment of infestations of noxious weeds and replanting of conifers in failed conifer plantations would be implemented to accomplish the purpose and need.

Direct Effects

There would be no direct effects to any terrestrial wildlife species under this alternative because there would be no new activities conducted that would change habitat conditions.

Indirect Effects

There may be indirect effects to terrestrial wildlife habitat if Alternative 1 is selected as no fuels treatments would occur and the continued immediate threat of uncharacteristically severe wildfire would remain unabated. Additionally, in failing to reduce stand density, drought stress and subsequent insect and disease mortality would exacerbate the threat of uncharacteristically severe wildfire. Furthermore, the high probability of a drying climate change in the Western United States would potentially further compound these effects.

Cumulative Effects

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Alternative 2 – Proposed Action and Alternative 3-Lower and Limited Mid-Level Canopy Treatments, All Treatment Areas

Direct Effects

There are no expected direct effects to the great gray owl, Townsend's big-eared bat, and western red bat, from the implementation of Alternative 2 or Alternative 3 due to a lack of suitable habitat for those species within the Project area.

Direct effects from the implementation of Alternative 2 or Alternative 3 may occur to California spotted owl, northern goshawk, American marten, Pacific fisher, Sierra Nevada red fox, and pallid bat, although the potential effects would be limited to short-term noise disturbance of the project management, which potentially could lead to an energetic expense from avoidance reactions. No direct mortality from project activities is expected to occur to these species. Limited Operating Periods (LOP) will be implemented, for a variety of species, to protect nest and densites, as described in the BE/BA. In particular, a fisher LOP would be implemented for all suitable fisher habitat, throughout the Project area, regardless of whether a densite buffer is present. This would protect fisher den sites that may be occupied, but not identified through the SNAMP project.

Indirect Effects

Habitats in the Project area are defined according to the "California Wildlife Habitat Relationship" (CWHR), as shown in Map 6 in the Map Package. Detailed CWHR assessment can be found in Appendix C and G of the Fish Camp Terrestrial Wildlife BE/BA (Otto 2010). Species specific habitat needs as well as the habitat availability within the Project area are listed within the following effects analysis. The effects analysis further describes the changes to this habitat for each alternative. Additional information on CWHR habitat types and canopy cover can be found in Appendices C of this document.

Effects to Terrestrial Wildlife Habitat: The *ExistingVegetation* GIS feature class was refined for the Fish Camp Project using existing structure analysis from more than 90 stand examination plot data collected in 2009-2010 throughout the Project boundary, as well as forest aerial photography interpretation from the 2001 flight-line, and one meter resolution satellite imagery from the National Agricultural Imagery Program (NAIP). Plantation CWHR vegetation typing was refined through field verification as well as aerial photo interpretation by the district silviculturist. Based on past experience with similar situations and professional judgment, the district silviculturist was able to estimate the anticipated changes to CWHR habitat throughout the treatment units based on the various stand prescriptions and proposed alternatives. Summary Table 10 shows CWHR vegetation changes that are expected to occur through implementation of Alternatives 2. There will be no anticipated CWHR habitat changes through the implementation of Alternative 3, as this alternative proposes to treat for fire and fuels reduction purposes only there would not be any resulting change to the mid and upper level stand structure.

Table 10: Action Alternatives Summary of changes to CWHR Forest Type within treatment units of the Fish Camp Project

		Alternative 2	Alternative 3
CWHR Habitat Type Pre-treatment	**CWHR Habitat Type Post-treatment**	**Number of Acres of Habitat Type Change**	**Number of Acres of Habitat Type Change**
Sierra Mixed Conifer (SMC) 4D	SMC4M	22 acres	0 acres
Ponderosa Pine (PPN) 4D	PPN4M	9 acres	0 acres
Total Acres CWHR Habitat Density Change		31 acres	0 acres

Total planning area acreage for the Fish Camp project is 5,440 acres, and treatments units are planned for approximately 1200 of those acres. A total of 31 acres, or 3% of the total acreage of treatment units are anticipated to have changes in CWHR density under Alternative 2. These changes in CWHR habitat density are spread across 11 treatment units detailed in Appendix G of the Fish Camp Project Terrestrial Wildlife BE/BA (Otto 2010). There are no anticipated changes to CWHR habitat density or type with the implementation of Alternative 3.

The projected changes to CWHR habitat under the proposed Alternative 2 may result in short term effects in the way terrestrial wildlife species utilize the habitat. Individuals may leave treatment areas during project implementation, and would likely rely more heavily on other areas of their home range. The canopy cover in the Project area is expected to convert to higher quality habitat within 5-15 years after completion of the management actions as the remaining tree crowns grow and the understory develops. The resulting stand also would show increased health, growth rate, and resistance to large scale stand replacing wildfire.

There are no expected indirect effects to the following species due to lack of suitable habitat within the Project area: Great gray owl, Townsend’s big-eared bat, and western red bat.

Indirect Effects are summarized below for the following species: Pacific fisher, California spotted owl, Northern goshawk, Pallid bat, Sierra Nevada red fox, and American marten.

Pacific Fisher: CWHR type changes are projected for 31 acres spread throughout 11 of the 55 treatment units if Alternative 2 is implemented. Alternative 2 is the most aggressive management alternative and shows the greatest amount of change in CWHR 2.1 fisher habitat scores. These changes are relatively minor however, and the percentage of CWHR 2.1 habitat retained ranges from 98.57% to 99.75%.

If Alternative 2 were implemented there would be an average of 47 large (greater than 20” dbh) live trees per acre remaining that may serve as fisher denning or resting sites post treatment. There are also currently 5 standing dead conifers per acre ≥18” dbh which may be used as fisher denning and resting sites throughout the Fish Camp treatment units. Snags will only be removed if they meet the definition of a danger tree. All currently marked danger trees (intended for removal) are immediately adjacent to roadways in the Project area and on average less than 1 danger tree per acre is marked for removal. There are additional black oaks throughout the Project area that may serve as denning or resting sites that are not accounted for in these numbers of trees per acre. Considering 17 trees per acre as an estimate for the numbers of available resting and denning sites required by a fisher throughout their home range, the remaining numbers of live and dead trees per acre calculated for the Fish Camp Project area appears adequate for maintaining these important habitat structures throughout the treatment areas, exceeding this figure by 300%. As the majority of large trees >20”dbh would be retained through the implementation of Alternative 2, and all snags that do not meet the definition of a danger tree will be retained, the Fish Camp Project area will continue to provide adequate numbers of resting and denning structures for fisher.

There may be a short-term reduction in prey availability within some areas of the treatment areas; however, long-term positive effects of treatment should promote the growth and re-growth of understory vegetation, which provides forage for prey species, as well as hiding and thermal cover. The horizontal and vertical diversity of forest vegetation structure and species also may be improved in some sites as a result of partially opening the forest overstory, particularly with Alternative 2. This in-turn would bring greater biodiversity into the stands, promoting greater prey species abundance and diversity.

Habitat connectivity will be maintained throughout the implementation of this alternative by design criteria common to all Alternatives including Old Forest Linkages (OFLs), retention of shrub understory throughout treatment units, large tree groups, and areas between units where no treatments will occur. The inclusion of untreated areas along steep sloped regions and riparian corridors (primarily Big Creek, Rainier Creek, White Chief Creek, and several unnamed perennial tributaries) will maintain habitat connectivity and fisher dispersal routes.

The untreated areas, interconnected with OFLs will accommodate daily fisher movements as well as dispersal movements, providing habitat connectivity throughout the Fish Camp Project area and dispersal routes to the north and south. Fisher should also retain movement opportunities between adjacent high quality habitat areas such as Nelder Grove and Yosemite Mountain Ranch. These areas of no treatment are mapped in the project BE/BA and provide a visual representation of movement capabilities throughout the Project area during project implementation and post-treatment. Additionally, with Design Criteria Common to All Action Alternatives, the inclusion of large tree groups and the preservation of understory vegetation in cooler, moister sites within treatment units would maintain heterogeneity of the habitat post treatment and aid in fisher movements.

Design criteria common to all action Alternatives includes a LOP from March 1 through June 30 which will be applied to all potential fisher denning habitat and should limit potential disturbance to females during denning and kit rearing. Units with a fisher LOP are outlined in the project BE/BA. The Fish Camp project will adhere to Standard and Guideline 86 for fisher den sites within the Project area.

Disturbance of habitat may result in short term effects in the way fisher utilize the habitat. Fisher may leave treatment units during project implementation, and will likely rely more heavily on other areas of their home range. Individual energetic expenses may be increased if fishers have to travel farther to forage, however with areas of adjacent suitable habitat outside treatment areas but within their home range, it is unlikely this would result in individual mortality.

Habitat disturbance in the Project area may lead to increased predation of fisher by mountain lion, bobcat, or coyote. Predation potential could increase if an individual fisher were to move into unfamiliar habitat, although this would be unlikely as all male and female home ranges extend beyond the Fish Camp Project boundary. Habitat disturbance in the Project area may also exacerbate individual fisher mortality induced by disease. The degree of these potential effects are unknown, but may be illuminated through the SNAMP research.

Alternative 3 would focus solely on treating surface and ladder fuels (within the lower and limited mid-level canopy levels) needed to achieve fire and fuels objectives. There would be no additional treatments to address stand density/forest health objectives.

Without density management of the stands for forest health purposes, insect and disease induced mortality of trees throughout overstocked stands will remain a threat to fisher habitat. Minor outbreaks of disease or insect infection can be beneficial in creating decadent habitat characteristics; however extensive outbreaks which can occur during drought periods can drastically affect large contiguous blocks of land. Habitat effects could be similar to those that would occur with severe wildfire and could ultimately lead to habitat fragmentation or vegetation type conversions.

Long-term positive effects of fuels treatments (due to the reduction of fire hazard) outweigh the short-term negative effects of fuel treatments (due to immediate loss of forest biomass) on fisher, especially when assuming a more severe fire regime in the future. Vegetation treatment has short-term impacts to habitat quality, particularly over the first year, however, new understory growth within the first two years by herbaceous, as well as woody vegetation, can also lead to habitat enhancement for a variety of wildlife, including fisher and fisher prey species, in the form of new forage and hiding/thermal cover. Habitat recovery following an uncharacteristically severe wildfire will take considerably longer—based on the silvicultural report prepared for this project an estimated 90-110 years if brought back to conditions similar to the historical logging that occurred around Fish Camp.

California Spotted Owl: Suitable spotted owl foraging habitat consists of mature conifer stands with a minimum average dbh of 11", a minimum canopy cover of 40%, and high quantities of down logs and standing snags. Suitable nesting habitat has canopy cover of ≥60%, and large diameter trees with cavities, mistletoe brooms, and other structures suitable for nesting platforms. Within the Project boundary there are approximately 2,361 acres of suitable nesting habitat and 3,933 acres of suitable foraging habitat.

Three historic spotted owl activity centers are present within the Project area, with one of those activity centers overlapping proposed treatment units T21a-d. Additionally, there are several PACs and HRCAs within a 1.3 mile buffer of the Project area where no work is proposed but owls could experience some noise disturbance from project implementation. These include portions of the following PAC/HRCAs: MP070, MA079, MA083, MA069, MA001, MA003, MA078, and MA085. This noise disturbance will be minimized by geographic features such as ridgetops and canyons that will buffer mechanical noise.

The Fish Camp Project proposes to maintain the highest canopy closure possible while still meeting fire and fuels objectives, and under Alternative 2 managing for forest health and stand density as well. The prescriptions aim for a canopy closure of not less than 50%, with a preference for 60% or greater immediately post treatment. All S&Gs from the SNFPA ROD (USDA 2004) will be followed in the implementation of this project. As this project proposes thinning from below, very few changes in CWHR habitat type are expected to occur throughout the entire Fish Camp Project area. No CWHR changes will occur in Spotted Owl PACs.

Table 11 shows the proposed treatment areas of the Fish Camp Project in relation to the California spotted owl PACs and HRCAs present in the area. Appendix C in the Terrestrial Wildlife BE/BA (Otto, A. 2010) provides additional habitat information for CWHR changes expected to occur for each proposed project alternative while Appendix G displays detailed unit based CWHR changes.

Table 11: Fish Camp Project Proposed Treatment Units within California spotted owl PACs or HRCAs

SNF PAC/ HRCA ID	Treatment Proposed for area	NEPA Unit # of Treatment	Acreage of PAC/ HRCA proposed for treatment	CWHR Pre-treatment	CWHR Post-treatment	Comments
MA079 PAC	Commercial thin	Unit T21a Plantation	9	JPN4M	JPN4M	No changes to CWHR type are expected. Canopy closure will be maintained at 60% or greater where currently available
		Unit T21b Plantation	1	SMC4M	SMC4M	
		Unit T21c Plantation	3	JPN4M	JPN4M	
		Unit T21d Wild stand	23	SMC4D	SMC4D	

NOTE: JPN=Jeffrey Pine; SMC=Sierra Mixed Conifer

California spotted owl protocol surveys were conducted throughout the Fish Camp Project area and did not locate any California spotted owl nests within the project. Spotted owl presence was noted adjacent to the Project area in Yosemite National Park. Proposed treatment units partially overlap one historic California spotted owl PAC (MA079). Treatment Units T-21a-d proposed to commercially thin 36 acres of plantation and second growth wild-stands within the northernmost portion of California spotted owl PAC MA079. Canopy cover will not be reduced below 60% where currently available to meet S&G 7. Additionally, a LOP from March 1 through August 15 will be applied to Units T-21a-d to minimize disturbance to breeding owls.

The Fish Camp Project forest vegetation types are primarily Westside mixed conifer and Ponderosa/Jeffrey pine, which as part of S&Gs requires maintaining four of the largest snags per acre distributed irregularly across the landscape (USDA 2004b). The Fish Camp Project will retain an average of 9 snags ≥11” dbh and 5 large snags ≥18” dbh across the treatment units, exceeding the minimum requirement set forth in the SNFPA ROD. The Fish Camp Project will also retain an average of 47 large (≥20” dbh) live conifers per acre to serve as replacement snags in the future as some of these large trees receive environmental damage and decadence or succumb to disease and/or insect attacks (as set in the Design Criteria Common to All Action Alternatives section).

Quantitative information on the ideal levels of coarse woody debris (CWD) retention levels are limited, however a synthesis of the available literature is available in RMRS-GTR-105 “*Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest”* (Brown et al. 2003). This study examined available literature on the ecology of CWD, its importance to wildlife and soils, its contribution to potential fire behavior, historical stand structures and large fuel accumulations, and potential re-burn severity as a basis for identifying optimum quantities of CWD (Brown et al. 2003). CWD is typically defined as dead standing and downed pieces of wood larger than 3 inches in diameter (Harmon et al 1986, Brown et al 2003). For warm, dry ponderosa pine and Douglas-fir forest vegetation types, Brown et al. (2003) recommend retaining between 5-20 tons per acre of CWD ≥3” dbh. Larger logs (≥8” dbh) are used more frequently by a variety of wildlife species, while also posing a lower fuels loading threat for high severity fire since they are classified as >1,000 hour fuels. Prescribed burning proposed for the Fish Camp Project is of low intensity, and generally does not consume fuels >1,000 hours (≥8 dbh). Therefore nearly all logs ≥11 dbh should remain as CWD within the Fish Camp treatment units, leaving an average of 12 tons per acre, which is well within the range (5-20 tons/acre) suggested by Brown et al. 2003 for warm, dry ponderosa pine and Douglas-fir forests.

This Project proposes to thin from below, mostly reducing understory vegetation. There is a potential for noise disturbance to spotted owls during project implementation from an increase in human presence, operating equipment, and transportation of materials. Owl activity centers or nests near unit operations will be protected by a ¼ mile LOP during the breeding season from March 1-August 15. This LOP will minimize disturbance to breeding owls. California spotted owls in proximity to work crews and vehicles during project implementation may be disturbed sufficiently to leave the immediate area, resulting in a small energetic expense. Owls may also experience a missed feeding opportunity due to increased anthropogenic activity in the area. These potential effects are expected to be of short duration during the period of active vegetation removal.

There are approximately 200 acres of proposed understory burning as a primary fuels treatment throughout the Fish Camp Project area. No prescribed burning is proposed in any California spotted owl activity centers as a primary treatment. Low intensity prescribed burning may occur throughout treatment units T-8, T-9, and T-12 as a secondary fuels maintenance treatment. Understory burning and commercial thinning activities may eliminate some woodrat nests within the Project area, which could lead to a decrease in available prey items and therefore an indirect effect to the California spotted owl. Since the scope of the primary proposed burning is limited within the Project area to 200 acres, and any burning occurring as a secondary fuels treatment will be of low intensity, this effect will be negligible. Although there may be a short term decrease in woodrat numbers, it is anticipated that woodrats would return to treated areas from adjacent areas within a few years. Additionally, availability of other prey items such as flying squirrels should remain constant as their nests/dens occur higher in the canopy and would not be affected by an understory burn.

Northern goshawk: Within the Fish Camp Project boundary there are approximately 2,456 acres of suitable nesting habitat, and 4,128 acres of suitable foraging habitat. Northern goshawk surveys were conducted in the Fish Camp Project area from July 26, 2010 through August 17, 2010. Surveys located one northern goshawk nest, and a 200 acre PAC number SIEGH57 consisting of the highest quality goshawk habitat was created around this nest tree. This is the only northern goshawk PAC present within the Fish Camp Project boundary, and no Fish Camp treatments overlap this PAC due to the fact that this lies within the hydrology study area for the Sugar Pine Adaptive Management Project (SPAMP).

No direct effects to northern goshawks are anticipated from the proposed Fish Camp treatment units. This is due to the fact that surveys were conducted throughout the Project area and did not locate any goshawks within Fish Camp treatment units and no treatment units overlap northern goshawk PACs. One goshawk nest was located within the hydrology study area for the Sugar Pine Adaptive Management Project, and potential cumulative effects to goshawks will be discussed in the cumulative effects assessment. Goshawks in proximity to work crews and vehicles during project implementation may be disturbed sufficiently to leave the immediate area, resulting in a minor energetic expenditure. All northern goshawk nest sites located within the Project area will be protected by a ¼ mile LOP during the breeding season from February 15 through September 15. This will minimize disturbance to breeding goshawks.

There may be a disturbance to northern goshawk prey base during project implementation. Birds, squirrels, and other small animals may leave treatment areas for the short term period when lower canopy fuels are being removed. However, these animals should return to the area shortly after work is completed. An LOP will be enforced in all goshawk PACs within the Project area so no work would occur during breeding season. It is expected that individual goshawks foraging in areas where vegetation removal work occurring would move to adjacent areas of the forest to forage.

Pallid Bat: Suitable roosting and maternal cavity habitat may be affected in treatment areas where trees from 20” to 30” dbh may be harvested, since conifer trees in that size class may have suitable cavities for pallid bat roosts and maternal sites. As this project proposes to thin from below, a relatively small number of trees in that size class have been proposed for removal. Potential suitable habitat occurs across the majority of the Project area, so it is possible that some suitable roost or maternal trees may be removed. Post-treatment foraging opportunities should be enhanced or not significantly changed because understory vegetation will be cleared in some areas and retained in others which will provide a diversity of microhabitats for ground dwelling insect prey.

Sierra Nevada red fox: There have been no verified detections of the Sierra Nevada red fox on the BLRD despite numerous Forest Service and research carnivore monitoring surveys. These include 3 years of intensive camera surveys conducted by the UC Berkeley SNAMP fisher crew, which are designed to detect small carnivores, as well as the ongoing SNFPA carnivore monitoring study (1996-2009) which has utilized track plates as well as cameras (Sweitzer personal communication, Truex 2008, Zielinski et al 2005). There have been 7 incidental sightings of Sierra Nevada red fox on the BLRD from 1964 through 1994, most of which have been reported by forest visitors with limited experience at mammal identification. These sightings are likely misidentifications of gray foxes, which usually have some degree of rusty/reddish color, and are common inhabitants of the SNF. All incidental sightings occurred below the 5,000 foot elevation zone in areas heavily used by recreational visitors (ie: Bass Lake). There are no Sierra Nevada red fox sightings in the California Fish and Game CNDDB database from 1977-present on the BLRD.

Sierra Nevada red foxes in proximity to work crews and vehicles during project implementation may be disturbed sufficiently to leave the immediate area or may miss a foraging opportunity, resulting in an energetic expense. However, this is unlikely as the majority of the Project area lies below the primary elevational range of the Sierra Nevada red fox, and the fact that red foxes have not been detected within the Project area, or anywhere else on the district despite numerous surveys. These include 3 years of intensive camera surveys conducted by the UC Berkeley SNAMP fisher crew which are designed to detect small carnivores, as well as the ongoing SNFPA carnivore monitoring study (1996-2009) which has utilized track plates as well as cameras.

Habitat connectivity will be maintained throughout the implementation of all Action Alternatives by design criteria common to all alternatives including OFL, and no treatment areas. The inclusion of untreated areas along steep sloped regions and riparian corridors (primarily Big Creek, White Chief Creek and several unnamed perennial tributaries) will maintain habitat connectivity and SN red fox dispersal routes.

Long-term positive effects of fuels treatments (due to the reduction of fire hazard) outweigh the short-term negative effects of fuel treatments (due to immediate loss of forest biomass) on Sierra Nevada red fox, especially when assuming a more severe fire regime in the future from potential changes in climate. Habitat within the Fish Camp treatment units is expected to recover within 5-10 years post-treatment, and should reach current conditions within 15 years. Habitat recovery following a severe wildfire will take considerably longer, an estimated 90-110 years based on the Silviculture report prepared for this project.

The Fish Camp Project proposes to maintain the highest canopy closure possible while still meeting fire and fuels objectives, and under Alternative 2 managing for forest health and stand density as well. The prescriptions aim for a canopy closure of >50%, with a preference of greater than 60% immediately post treatment. All S&Gs from the SNFPA ROD 2004 (USDA 2004b) will be followed in the implementation of this project. As this project proposes thinning from below, very few changes in CWHR habitat type are expected to occur throughout the entire Fish Camp Project area. Under the most aggressive Alternative (Alternative 2) 31 acres of CWHR habitat will experience a density type change spread across 11 treatment units. No changes to CWHR habitat type will occur in units above 7,000 feet in elevation.

Habitat disturbance in the Project area may lead to increased predation of Sierra Nevada red fox by mountain lion, bobcat, or coyote. Habitat disturbance in the Project area may also exacerbate individual red fox mortality induced by disease. The degree of these potential effects is unknown.

American Marten: The Fish Camp Project ranges from 5,000’ to 8,000’ in elevation, considerably limiting the potential impacts to martens which are most often found above 7,200’ in elevation. At the far eastern edge of the Fish Camp Project boundary there are approximately 550 acres, (10% of the Fish Camp Project boundary) that are considered suitable marten habitat based on elevation and CWHR habitat typing. Mastication units M-14 and M-08 are adjacent to marten habitat and will have a LOP from May 1 through July 31. This LOP will protect reproductively active marten and young that may be present in the Project area from treatment actions during their denning and early rearing periods.

Status and trend monitoring for fisher and American marten was initiated in 2002 by the SNFPA Carnivore Monitoring Program. The monitoring objective is to be able to detect a 20 percent decline in population abundance and habitat (USDA Forest Service 2006). From 2002 – 2008, 439 sites were surveyed throughout the Sierra Nevada on 1,286 sampling occasions, with the bulk of the sampling effort occurring within the Southern Sierra fisher population monitoring study area (USDA Forest Service 2009). Sampling for this program occurs throughout late spring and into fall, with no sampling occurring during the winter months. There are 10 sample stations located within a 3 mile radius of the Fish Camp Project boundary. Two of these stations are within the Fish Camp Project boundary and have not detected marten for five sample years. Of the remaining 8 sample stations: 6 have not detected marten to date during the SNFPA monitoring program, 2 did not detect marten for 1 sample year, 2 for 4 sample years, and 2 for 6 sample years. The final 2 stations lie to the northeast of the Fish Camp Project boundary and have each detected marten, one station detected marten 1 of 2 years, the other detected marten for 3 years out of 5. (USDA Forest Service 2009). The nearest marten detection from the SNFPA carnivore monitoring program is over 2.5 miles east from the Fish Camp Project boundary (USDA Forest Service 2009).

More intensive camera sampling (concentrating primarily on locating Pacific fisher) has been conducted by the UC Berkeley fisher crew beginning fall 2007 throughout the Fish Camp and Sugar Pine Projects and the surrounding area. This sampling effort is active year-round. Cameras have detected marten in several 1km^2 grids in and around the Fish Camp Project, however all detections occurred at or above the 6,000' elevation level mostly during the winter and early spring months when no management activities would occur due to snow.

Much of the Project area receives heavy volumes of snow throughout the winter, and no proposed vegetation management activities would occur in the winter months, limiting potential disturbance to marten. Additionally, a marten LOP from May 1 through July 31 will be instituted for all treatment units at and above the 7,000' foot level.

The *Existing Vegetation* GIS feature class was refined for the Fish Camp Project using existing structure analysis from more than 90 stand examination plot data collected in 2009-2010 throughout the Project boundary, as well as forest aerial photography interpretation from the 2001 flight-line, and 1 meter resolution satellite imagery from the NAIP. Plantation CWHR vegetation typing was refined through field verification as well as aerial photo interpretation by the district silviculturist. Based on past experience with similar situations and professional judgment, the district silviculturist was able to estimate the anticipated changes to CWHR habitat throughout the treatment units based on the various stand prescriptions and proposed alternatives. Summary tables are shown below for the CWHR vegetation changes that are expected to occur through implementation of Alternatives 2. There will be no anticipated CWHR habitat changes through the implementation of Alternative 3, as this alternative proposes to treat for fire and fuels reduction purposes only.

Treatment acres relative to existing vegetation were based on mapping and field visits conducted by the district silviculturist. These field visits refined the base vegetation layer and determined the net acres of treatment. As shown in Table 10 on page 68 there would be no anticipated CWHR habitat changes with the implementation of Alternative 3. None of the CWHR changes are expected to take place within marten habitat.

Marten in proximity to work crews and vehicles during project implementation may be disturbed sufficiently to leave the immediate area or may miss a foraging opportunity, resulting in an energetic expense. However, this is unlikely as the majority of the Project area lies below the primary elevational range of marten, and marten activity within the Project area as detected by the SNAMP fisher crew appears to be confined predominantly to the winter months when no vegetation management activities would occur.

Habitat connectivity would be maintained throughout the implementation of all action alternatives by design criteria common to all alternatives including OFL, and no treatment areas. The inclusion of untreated areas along steep sloped regions and riparian corridors (primarily Big

Creek, White Chief Creek, and unnamed perennial tributaries) will maintain habitat connectivity and marten dispersal routes.

Marten habitat preferences and structure is similar to fisher habitat, though martens have a higher elevational range. Project design criteria, specifically for fisher habitat, will ensure that sufficient legacy structures (large trees with defects, large snags, and large downed logs) would remain after treatment and follow-up treatments to maintain habitat suitability for martens as well. An LOP from May 1 to July 31 would be applied to a 100-acre buffer around known marten den sites which would reduce potential disturbance to martens during the reproductive season. There are no currently known marten den sites within the Fish Camp Project area, therefore an LOP would be applied to all treatment units at and above the 7,000 foot elevation level.

The Fish Camp Project proposes to maintain the highest canopy closure possible while still meeting fire and fuels objectives, and under Alternative 2 managing for forest health and stand density as well. The prescriptions aim for a canopy closure of >50%, with a preference of greater than 60% immediately post treatment. All S&Gs from the SNFPA ROD 2004 (USDA 2004b) would be followed in the implementation of this project. As this project proposes thinning from below, very few changes in CWHR habitat type are expected to occur throughout the entire Fish Camp Project area. Under the most aggressive Alternative (Alternative 2) 31 acres of CWHR habitat would experience a density type change spread across 11 treatment units. All changes to CWHR habitat would occur in units below 7,000 feet in elevation. No habitat that is currently suitable for denning would be reduced below suitable denning habitat. Habitat disturbance in the Project area may lead to increased predation of marten by mountain lion, bobcat, or coyote. Habitat disturbance in the Project area may also exacerbate individual marten mortality induced by disease. The degree of these potential effects are unknown, but may be illuminated through the SNAMP research.

Long-term positive effects of fuels treatments (due to the reduction of fire hazard) outweigh the short-term negative effects of fuel treatments (due to immediate loss of forest biomass) on marten, especially when assuming a more severe fire regime in the future. Habitat within the Fish Camp treatment areas is expected to recover within 5-10 years post-treatment, and should reach current conditions within 15 years. Habitat recovery following a severe wildfire would take considerably longer—based on the silvicultural report prepared for this project an estimated 90-110 years if brought back to conditions similar to the historical logging that occurred around Fish Camp.

Cumulative Effects

Potential Cumulative Effects by Species

The following is a cumulative effects assessment for terrestrial wildlife species considering past, present, and reasonably foreseeable activities. Additional details of cumulative effects can be found in the Terrestrial Wildlife Biological Evaluation and Biological Assessment (BE/BA), as well as Chapter 3 of this EIS. The CEQ 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.” Therefore, we use the existing conditions to reflect the aggregate impact of prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Pacific Fisher

Assessment Area: For this cumulative effects analysis of past, present, and reasonably foreseeable activities on the fisher we will use three levels of analysis. The first assessment level is at the multiple home range scale. We chose to buffer the Fish Camp Project area by the size of an average female home range. We used 7,000 acres as the average home range size for a female fisher, which is based on the average female fisher 95% fixed kernel reported by SNAMP (28.4km^2 approximately 7,018 acres) for all female fishers tracked by the UC Berkeley SNAMP fisher crew in 2008-2009. This leaves us with an assessment area that consists of a 4-mile buffer surrounding the Fish Camp Project area. This buffered area measures 73,210 acres, and would incorporate any female fisher home ranges that would overlap or adjoin the Project area. This should show any potential cumulative effects to individual females surrounding the Project area.

The second level of assessment for cumulative effects encompasses all suitable fisher habitat on the BLRD ranging from 4,500 to 8,000 feet in elevation. This boundary represents the portion of the SSFCA that is present on the Bass Lake RD and equates to approximately 323,500 acres, or approximately 46 adult female fisher home ranges. This boundary is consistent with the genetic data reported by (Tucker et al. 2009) which used the program "Geneland" to assign genetic subpopulations within the larger SSFCA encompassing the Sierra and Sequoia National Forests. Through analysis of genotypes 3 distinct "subpopulations" emerged: (1) the North population which encompasses most of the BLRD including the Chowchilla Mountains and Shuteye area, (2) the Central population which encompasses a small eastern portion of the BLRD, the entire High Sierra RD of the SNF, and the northern portion of the Sequoia NF, and (3) the South population which encompasses the Southern Sequoia NF and Kern Plateau (Tucker et al. 2009). Therefore, this second level boundary of assessment for cumulative effects for the Fish Camp Project encompasses 100% of the North subpopulation and around 10% of the Central subpopulation nearest to the San Joaquin River. This should show any potential cumulative effects to the North population.

The third and final level of assessment is at the range of the entire SSFCA. The SSFCA encompasses the known occupied range of the Pacific fisher in the Sierra Nevada and measures 1,018,000 acres. We will tie all three assessment levels together and show any potential cumulative effects to the Southern Sierra fisher population as a whole.

Fish Camp Project: As discussed in the direct and indirect effects section, the most aggressive management action alternative (Alternative 2) of the Fish Camp Project will have minimal effects to fisher habitat (CWHR 2.1 habitat). Specifically, all action alternatives will retain a high degree of overstory forest canopy cover (>50% with a preference of greater than 60%, when conditions allow); all trees >30 inches dbh, and all snags, will be retained during mechanized treatments, except where they pose an immediate safety hazard. Trees >20 inches dbh will be retained, in adequate quantity, to help assure availability of resting and denning structures now and into the future. Black oaks also will be retained, as well as large tree groups. The project will not impede movement or dispersal to other currently connected suitable habitat areas because habitat connectivity will be maintained within and adjoining the Project area. And no treatments will occur throughout suitable fisher habitat during their breeding season (refer to the effects analysis of the Fish Camp Terrestrial Wildlife BE/BA (Otto, A. 2010). There are currently no hazard tree removal timber sales within the Fish Camp Project area. The nearest road hazard sale is the Oliver/Silver Hazard Reoffer, which is a current sale located southwest of the community of Fish Camp, along Forest Road 5S66 which will occur during summer 2011. The last Hazard tree timber sale within the Fish Camp Project area was the White Hazard Timber Sale that terminated in 2002. This sale was located along Forest Road 5S06 in the eastern edge of the Project area. This project is analyzed as part of the current conditions within the Fish Camp Project area.

All action alternatives also may result in long-term positive effects to the fisher by: 1) reducing the potential for Un-characteristically severe, stand eliminating wildfires; and 2) promoting the growth and re-growth of understory vegetation, which provides forage for prey species, as well as hiding and thermal cover. The horizontal and vertical diversity of forest vegetation structure and species also may be improved in some sites as a result of partially opening the forest overstory, particularly with Alternative 2. This in-turn would bring greater biodiversity into the stands, promoting greater prey species abundance and diversity, including promoting the establishment and improved growing conditions of black oaks, which are important components of fisher habitat. All of these factors combined outweigh the short-term negative effects of treatments (due to immediate partial loss of forest biomass and disturbance), especially considering that a more severe fire regime is predicted for the future, and without fuels reduction, large scale, stand replacing wildfires would most likely cause serious and significant impacts to the population.

Other Current and Future Land Management Projects on the Bass Lake RD: Currently there are four land management projects on the Bass Lake District that are of the size that could influence the cumulative effects on fisher habitat. Thinning treatments have been completed for three of the four projects, including: Sonny Meadows North (with 955 acres of treatments), Sonny Meadows South (with 1,400 or more acres of commercial thinning), and Rush Creek (approximately 500 acres of commercial thinning). Post-harvest follow-up treatments are still in the implementation phase for these three projects. It was determined that treatments for Sonny Meadows North, South, Graham Mountain, and Rush Creek would not result in loss of suitable habitat, although temporary, activity-related disturbances were expected within proximity of management activities. Overall habitat suitability will increase over the long term as a result of the completed treatments, and these projects will not increase habitat fragmentation since post-harvest habitat will remain suitable.

Two road hazard-tree sales have been completed on the district over the past 2 years in the Minarets area and surrounding Bass Lake. Several other road hazard sales are in the planning stages, with implementation expected in 2011-2012. No fisher den sites are located within any of the road hazard tree sale boundaries. Hazard tree removal may eliminate some potential fisher rest sites, but because hazard trees are identified in proximity to roads, campgrounds and other developed sites, the likelihood for use by fishers is minimal.
Not all hazard trees are snags, in fact, many hazard trees are otherwise healthy, live trees that threaten the safety of roads and structures. Some examples of this include: 1. Trees that are "heavy leaners". These types of trees are often without rot, cavities, or other type of habitat features. 2. Trees located on cut banks of roads. Many of these may be young, decently growing, defect-free trees that have some roots exposed--a potential for tree failure. 3. Trees that are a threat to power lines from growing below and into the lines, or leaning trees near power lines or other structures that may have grown too tall for the diameter that supports them.

The Cedar Valley Project (approximately 915 acres of commercial thinning) is nearing the end of the implementation phase. It was determined that the Cedar Valley Project may result in a short-term reduction of denning habitat quality on approximately 628 acres. However, this habitat will remain suitable as foraging habitat, and is expected to recover within 10-15 years to higher quality fisher habitat. The Cedar Valley Project will not impede movement or dispersal to other currently connected suitable habitat areas.

There is also one reasonably foreseeable project; Grey's Mountain, (with approximately 2,000 acres of treatments). The proposed Grey's Mountain ecological restoration project is in the initial planning stages, and would include provisions similar to those proposed for Fish Camp and Sugar Pine for fisher conservation. This project and all future projects will would be fully analyzed through the NEPA process to help ensure management effects are addressed.

Table 12: Analysis of Effects to female fisher habitat 4 mile radius around Fish Camp Project

Female Fisher	95% Use Kernal Home Range acreage	Percentage of female home range in BLRD Past, Present, and Reasonably Foreseeable Vegetation Management treatment units	Acres of female home range in project treatment units	Post treatment percentage of total home range habitat retained at current CWHR
F01	7026	16%	Sugar Pine Project 516 acres Cedar Valley Project 586 acres	91.85%
F03	9217	17%	Sugar Pine Project 911 acres	92.88%
F04	7026	9%	Fish Camp Project/8 acres Sugar Pine Project /27 acres Rush Creek Project/ 95 acres Sonny Meadows North/ 460 acres Oliver/Silver Road Hazard Project/ 48 acre	99.0%
F05	5872	13%	Rush Creek Project 185/acres	100%

			Sonny Meadows North/ 597 acres	
F08	7753	Unknown 10%	Grey's Mountain Project Graham Mountain Project/ 346 acres Beasore Hazard tree Project/ 393 acres	Unknown 96%
F12	7439	7%	Fish Camp Project/ 326 acres Sugar Pine Project/ 180 acres	99.23%
F13	6889	21%	Sonny Meadows South/ 800 acres Oliver/Silver Road Hazard project/ 670 acres	95%
F14	6575	12%	Sugar Pine Project 182/ acres Sonny Meadows North 60 acres Oliver/Silver Road Hazard project/527	96%

			acres	
F15	6643	2%	Fish Camp Project /56 acres Cedar Valley Project 53 acres	99%
F17	6159	16%	Fish Camp Project /252 acres Sugar Pine Project 723 acres	99.42%
F18	5929	16%	Fish Camp Project/ 118 acres Sugar Pine Project 881 acres	99.36%
F25	5171	18%	Fish Camp Project/ 267 acres Sugar Pine Project/ 577 acres Oliver/Silver Road Hazard project/89 acres	98.66%
F26	4804	17%	Fish Camp Project 20 acres Sugar Pine Project/ 637 acres Oliver/Silver Road Hazard project/148 acres	97.68%

Of the 13 female fisher home ranges provided by SNAMP (December 2009; Sweitzer unpublished data) the percentage of female fisher home range kernel within vegetation management treatment units ranges from 2% to 16%. The percentage of CWHR habitat retained ranges from 91.85-100%. No more than 8% of any female fisher home range is projected to be reduced in habitat quality, and habitat that is effected will not be reduced below CWHR 4M. Table 12 shows the past, present, and reasonably foreseeable actions on the Bass Lake Ranger District. Approximately 14% of the fisher habitat within a 4 mile buffer of the Fish Camp Project is within a present vegetation management Project boundary. Since habitat within each female fisher home range is being retained close to current levels, and no more than 16% of any female fisher home range is being treated by current vegetation management projects, it is unlikely that an individual fisher would be cumulatively affected by vegetation management activities surrounding the Fish Camp Project.

Timing of Vegetation Management Projects on the Bass Lake RD: It is expected that implementation of the Sugar Pine Project will be completed before any ground operations occur on the Fish Camp Project. This is due to the fact that the Sugar Pine project is part of the SNAMP, and is therefore restricted by the time limitations of research being conducted as a part of the on-going research for SNAMP. Treatments for the Sugar Pine Project are expected to commence in the summer of 2011 and will be completed under a service contract that will last approximately 2 years. A LOP from March 1 through June 30 is being implemented for all suitable Pacific fisher denning habitat within the Sugar Pine Project.

Commercial thinning treatments in Graham Mountain, Sonny Meadows North and South, and Rush Creek have been completed. Some follow-up mastication and prescribed burning remains to be conducted over the next few years within these Project areas. Commercial thinning treatments in Cedar Valley are nearing completion, and are projected to be completed before Fish Camp implementation begins. Some follow up mastication and prescribed burning activities will occur over the next few years throughout the Cedar Valley units. The few remaining Cedar Valley commercial thinning treatment areas are likely to be conducted concurrently with the Sugar Pine treatments. Since treatment units occur throughout a total of 25-35% of the Project boundary area for all vegetation management projects on the BLRD, and few of these projects are occurring simultaneously, fishers should retain movement capabilities throughout all suitable habitat areas. The Fish Camp Terrestrial Wildlife BE/BA (Otto 2010) shows the past, present, and reasonably foreseeable actions on the BLRD. District-wide, less than 4% of fisher habitat is within a present vegetation management Project boundary.

Provided the vegetation management projects on the BLRD have habitat management goals which include retention and promotion of large trees and oaks, as well as project design criteria promoting stand heterogeneity as well as retention of snags, large tree groups, decadent/cavitary trees, down woody debris, and understory trees/shrubs, it is unlikely that the cumulative effects of the vegetation management projects, considered with all past, present, ongoing, and reasonably foreseeable activities on the BLRD will have an effect on the North population of Pacific fishers within the Southern Sierra.

Additional Vegetation Management Projects within the SSFCA

High Sierra Ranger District, Sierra NF: The effects of implementing the Kings River Experimental Watersheds (KREW) Project on fisher were evaluated in the 2008 Kings River Project Biological Evaluation/Assessment for the Pacific Fisher (USDA Forest Service 2008b). The effects of the Dinkey North project on fisher were evaluated concurrently with the Dinkey South Project. The KREW Project – Providence unit is just northeast of the boundary of the Dinkey South Project area and is projected to result in no more than a 6% loss of fisher habitat within its boundaries immediately after project implementation. The KREW Project – Bull unit is approximately 6 miles southeast of the Dinkey South Project area and is projected to result in less than a 1% loss in suitable fisher habitat within its boundaries immediately after that project is implemented. The Dinkey North Project borders the Dinkey South Project area to the north and is projected to result in a 1% loss in suitable fisher habitat within its boundaries immediately after project implementation. There are two additional projects on the High Sierra Ranger District which are part of the Dinkey Landscape Restoration Project Collaborative: Eastfork and Soaproot. These two projects are in the planning stages within the Kings River area. All of the previously mentioned projects are predicted to ultimately result in an increase of the quality and amount of fisher habitat within project boundaries over the long term.

Stanislaus and Sequoia National Forests: Projects on the Stanislaus National Forest are not expected to result in a change in CWHR size class and cover type, though there would be a 15% reduction in canopy. The predicted habitat value for fisher would remain at 4M on these projects. Projects on the Sequoia National Forest are also not expected to result in a change in CWHR size class and cover type though would result in a loss of habitat. The current projections are that there would be a 10 to 20% reduction in suitable fisher habitat for these projects combined. Currently there is approximately 2,344 acres of suitable fisher habitat identified within in these Project areas, so the reductions would be between 234 and 469 acres.

While present and reasonably foreseeable vegetation treatments occurring or proposed on the Sierra, Stanislaus, and Sequoia National Forests will result in temporary reductions to fisher habitat suitability, these effects are relatively small, with changes calculated to occur across approximately 3% of the SSFCA.

Suitable fisher habitat on the SNF has increased slightly from 422,000 acres about ten years ago to 449,000 acres in recent years (USDA Forest Service 2006b). Rick Truex, a USDA Forest Service fisher scientist believes fishers may have increased their spatial distribution on the SNF since the mid-1990s, and that the annual occupancy rate within SNF seems to be consistent, though the spatial pattern of detections appears more variable among years than on the Sequoia National Forest (Truex pers. comm.). The combination of a stable or slightly increasing amount of suitable fisher habitat on the SNF over the last ten years and perhaps an increasing spatial distribution of fishers make it reasonable to conclude the cumulative effects of vegetation management activities on the SNF have not reduced overall habitat suitability for fishers on the Forest.

Additionally, recent scientific information presented in 2011 at The Western Section of the Wildlife Society meeting indicates that the fisher population on the Sierra National Forest is stable to increasing. Values of lambda (λ) greater than 1 indicate that a population is increasing, while λ values less than 1 indicate that a population is decreasing. Calculated values for λ were presented for fisher populations within the SNAMP study area (λ 1.04) on the Bass Lake Ranger District, and the Kings River Fisher Project area (λ 1.2) on the High Sierra Ranger District (Sweitzer et al. 2011). Based on this data, fisher populations on both districts of the Sierra National forest are increasing, although the population growth rate is slightly lower within the SNAMP study area as compared to the Kings River area. This is likely due to the bisection of the SNAMP study area by Highway 41, a major travel corridor through Sierra National Forest and Yosemite National Park. Over 21% of the SNAMP recorded fisher mortalities are road kill events on Highway 41 (3 on SNF and 5 in YNP). The Kings River fisher study has only recorded 1 road related fisher fatality out of 27 total mortalities (4%).

The information listed above is in alignment with the findings from the United States Fish and Wildlife Service (USFWS). Their annual review of native species that are candidates for listing as endangered or threatened (Federal Register: Vol. 72: 69034-69105), reemphasized that the three remaining areas containing fisher populations, including the southern Sierra Nevada, "appear to be stable or not rapidly declining based on recent survey and monitoring efforts".

In addition, the California Department of Fish and Game (CDFG) in their Evaluation of Petition: Request of the Center for Biological Diversity to list the Pacific fisher (CDFG 2008) found that the information provided, and was evaluated by the CDFG did not indicate an immediate or substantial change in either population or distribution of fishers since the selected benchmark analysis period beginning with the assessment provided by Grinnell et al. (1937). Based on this information, the Department finds that the fisher has sustained itself since the Grinnell period, with no evidence of recent, immediate, or significant change in population or distribution, despite a decline in late successional forest. Available information suggests this may be the case for a number of reasons. Recent studies of fisher habitat use, occurrence, and movement patterns indicate fishers also use managed forest habitats of mixed tree age structure and canopy closure, which have essential attributes such as snag/large tree attributes remaining for resting/denning. Fishers are no longer subject to the significant mortality factors of trapping and poisoning of prey that were common in past decades. Forest management in California has been trending toward more retention of late successional stands and this change in management activity likely has been, and will be, beneficial to species such as the fisher in the future.

Based on the above analysis of potential impacts within the Project area and in consideration of other past, present, ongoing and reasonably foreseeable actions from within the range of the Southern Sierra fisher population, it was determined that implementing either the Proposed Action (Alternative 2) or Alternative 3 of the Fish Camp Project would not contribute to significant cumulative effects to Pacific fisher or their habitat. This determination is supported by recent findings published by both the USFWS and the State of California with regard to fisher population viability and habitat sustainability.

California Spotted Owl

The California spotted owl has a continuous distribution throughout the Sierra Nevada with a network of 234 managed HRCAs (600 acres each) on the SNF. Given the scope and scale of the Fish Camp Project relative to the size of the SNF and the Sierra Nevada; the area considered in determining the cumulative effects of past, present, and reasonably foreseeable activities on the California spotted owl will focus on the SNF. A determination of viability for the California spotted owl will be made based on the following analysis.

Since about the mid 1960s, past activities have included clearcutting and salvage logging (1960s to 1972), sanitation and salvage harvests (1972 through 1978), clearcutting, shelterwood cutting, and salvage harvests (1978 through 1992), and commercial thinning from below and salvage in recent times. The only fires to burn substantial amounts of timber were the Rock Fire in 1981, the Big Creek Fire in 1995 and the North Fork Fire in 2001, with each fire burning about 3000 acres of forest. Clearcuts or burned areas that took place prior to 1972 are typically successful plantations today, exhibiting size class 3 (pole sized, 6-10.9" dbh) and density class M (moderate cover, 40-59%) stands. Other, more recent disturbances, while they may be reforested have probably not yet reached size class 3.

In its 12-month finding in which it decided to not list the California spotted owl as Threatened or Endangered, the USFWS concluded that the scale, magnitude, or intensity of effects on the California spotted owl resulting from fire, fuels treatments, timber harvest, and other activities did not rise above the threshold necessitating protection of the species under the Endangered Species Act (ESA) (USDI, 2006). The USFWS reached this conclusion after considering the impacts of the Forest Service's implementation of the SNFPA ROD (USDA 2004). The USFWS' (USDI, 2006) conclusion is supported by:

- Data which indicate that California spotted owl populations in the Sierra Nevada are stable and comprise 81% of the species' known territories
- The anticipation that current and planned fuels-reduction activities throughout the range of the species will have a long-term benefit by reducing the risk of stand replacing wildfire; these activities embrace those described by the SNFPA ROD.
- Protection measures are being implemented for the California spotted owl on private lands, including the largest private landholders within the range of the species.

At a forest-wide scale, there currently are 344 designated HRCAs and 245 PACs which encompass 146,760 acres. Approximately 468,861 acres of suitable habitat currently exist on the Forest. Considering the proposed treatment activities of the Fish Camp Project, along with other ongoing actions, and reasonably foreseeable activities, less than one percent of suitable habitat on the SNF would be affected.

Because the alternatives put forth in this project will increase forest stand structure and heterogeneity, and retain high canopy cover, along with the Project's goal of increasing large diameter trees would result in long-term increases in California spotted owl suitable habitat over time; along with the relatively stable geographic distribution and population levels of spotted owls in the area, the cumulative effects of vegetation management activities in the Fish Camp and Sugar Pine treatment units taken together with all other past, present, and reasonably foreseeable activities on the Forest will not result in a loss of viability for the California spotted owl.

All action alternatives also may result in long-term positive effects to the California spotted owl by: 1) reducing the potential for Un-characteristically severe,, stand eliminating wildfires; and 2) promoting the growth and re-growth of understory vegetation, which provides forage for prey species, as well as hiding and thermal cover. The horizontal and vertical diversity of forest vegetation structure and species also may be improved in some sites as a result of partially opening the forest overstory, particularly with Alternative 2. This in-turn would bring greater biodiversity into the stands, promoting greater prey species abundance and diversity, including promoting the establishment and improved growing conditions of black oaks, which are important components of California spotted owl habitat. These factors, combined with the project design criteria implemented to sustaining spotted owls, outweigh the short-term negative effects of treatments (due to immediate partial loss of forest biomass and disturbance), especially considering that a more severe fire regime is predicted for the future, and without fuels reduction, large scale, stand replacing wildfires would most likely cause serious and significant impacts to the population.

Implementing the action alternatives (Alternatives 2 or 3), combined with other past, present, and foreseeable land management projects on the SNF, would not have significant, long-term, detrimental impacts to the California spotted owl population, and they are not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl.

Great Gray Owl

While this species may move through the Project area during winter movements, as there is no suitable breeding habitat within the Project area, there are no expected direct or indirect negative effects to great gray owl from the project; therefore, there are no expected cumulative effects from the proposed project alternatives.

Northern Goshawk

The northern goshawk has a continuous distribution throughout the Sierra Nevada with a network of 57 managed territories on the SNF. Habitat for the northern goshawk has increased over the past decade from 382,000 acres in 1995 to 405,000 acres in 2005. Currently there are 405,000 acres of suitable northern goshawk habitat in the 4,000 to 8,000' elevation range on the SNF, with less than 1% of the suitable habitat occurring in the Fish Camp Project boundary. Given the scope and scale of the Fish Camp Project relative to the size of the Sierra Nevada and the goshawk's overall North American distribution, the area considered in determining the cumulative effects of past, present, and reasonably foreseeable activities on the northern goshawk will focus on the SNF. A determination of viability for the northern goshawk was made based on the following analysis.

All goshawk nest sites within the Project area will be protected by an LOP. Outside of the LOP, portions of the three goshawk PACs will be thinned to the degree allowed under the SNFPA ROD (USDA 2004b). The PAC will not be reduced to less than 60% canopy cover, where available; therefore, will not be diminished to less than nesting habitat. All snags will be retained during project implementation except in those cases where they pose a hazard.

BEs for many of the past projects in the SNF were reviewed to help inform the present analysis. Review of these documents revealed the following basic information about effects to northern goshawks from these activities:

- Twenty-six (26) total project BEs were reviewed, dating back to 1993 on the SNF.
- Determinations reached were:
  - No effect – 4 BEs
  - May affect individual goshawks, but not likely to lead to a trend toward federal listing or loss of viability – 20 BEs
  - May affect individual goshawks, and likely to lead to a trend toward federal listing or loss of viability – 0 BEs
  - Northern goshawk was not addressed in the document we reviewed due to lack of habitat or other reasons – 2 BEs
- Types of Projects: Fuels reduction, harvest, hazard tree removal, thinning, and underburning were the proposed activities that were most often represented in the sample of BEs in which the northern goshawk was analyzed.
- Relative to "May Affect" projects, the described impacts to northern goshawks most often fell in the following categories:
  - Noise disturbances
  - Loss of foraging area if underburn gets out of control
  - Loss of plucking trees
  - Habitat quality reduction

As with other species, the SNFPA (USDA-FS 2001) provided our analysis of northern goshawks with useful historical and habitat information. Evidence suggests the number of goshawk breeding territories (ranging from 12 reported in the SNFPA (USDA-FS 2001) to the 57 such territories known to exist today) has increased since some of the earliest data was reported in Grinnell and Miller (1944 – as cited in USDA-FS (2001)). This is evidenced by the fact that there has been no apparent change in the geographic distribution of northern goshawks in the Sierra Nevada since then. Thus, goshawk numbers in the SNF remain fairly stable. Reasons for this, as put forth by the SNFPA (USDA-FS 2001), include (1) vegetation management practices, (2) the fact that the SNF is near the southernmost edge of the goshawk's range, and (3) survey efforts for goshawks may be lower on the SNF.

The major risk factors identified by the SNFPA (USDA 2004) for goshawks are the effects of vegetation management and wildfires on the amount and distribution of quality habitat. Implementation of Alternative 2 would result in 31 acres of CWHR 4D converted to 4M. This density type change is spread across 11 treatment units and comprises just over 0.5% of the total goshawk habitat present in the Project boundary. This habitat is expected to recover with 10-15 years to higher quality habitat.

Because the alternatives put forth in this project will result in long-term increases in northern goshawk suitable habitat over time, along with the relatively stable geographic distribution and population levels of goshawks in the area, and the project's goal of increasing large diameter trees, the cumulative effects of vegetation management activities in the Fish Camp treatment areas taken together with past, present, and reasonably foreseeable activities on the Forest will not result in a loss of viability for the northern goshawk.

Pallid Bat

BEs for many of the past projects in the SNF were reviewed to help inform the present analysis. Our review of these documents revealed the following basic information about effects to pallid bats from these activities:

- Twenty-six (26) total project BEs were reviewed, dating back to 1993 on the SNF. The species was not listed as Forest Service Sensitive until the updated list from June 1998.

- Determinations reached were:
    - No effect – 4 BEs
    - May affect individual bats, but not likely to lead to a trend toward federal listing or loss of viability – 10 BEs
    - May affect individual bats, and likely to lead to a trend toward federal listing or loss of viability – 0 BEs
    - Pallid bat was not addressed in the document we reviewed due to lack of habitat or other reasons – 12 BEs

- Types of Projects: Fuels reduction, hazard tree removal, thinning, and underburning were the proposed activities that were most often represented in the sample of BEs in which the pallid bat was analyzed.

- Relative to "May Affect" projects, the described impacts to pallid bats most often fell in the following categories:
    - Loss of roosting trees/snags
    - Displacement because of smoke from underburning
    - Noise disturbance

Pallid bats occur most frequently below 6,000 feet and are especially sensitive to the removal of hardwoods (USDA-FS 2001). Except for 4D and 5D, CWHR rates all size classes and densities in blue oak woodlands as high for pallid bat, in terms of meeting its foraging needs. Montane hardwood conifer and montane hardwood habitats are rated low for pallid bat by CWHR (California Department of Fish and Game, 2005). Currently, there are 32,600 acres of blue oak woodlands and 251,000 acres of montane hardwoods and montane hardwood conifers below 8,000 ft on the SNF in CWHR size classes 2 and higher. The protection, maintenance, and enhancement of such westside foothill oaks and montane oaks are expected to benefit pallid bats by ensuring the continued availability of roosting sites. Indeed, all of the alternatives proposed in the SNFPA FEIS were determined to lead to an increase in oak species (USDA-FS 2001).

Cumulative effects discussed in the SNFPA FEIS stated that there have been no recent changes in the range or distribution of the pallid bat (USDA-FS 2001). For these reasons, and given the long-term objective for increasing the number of large trees across the landscape, the intention of reducing fuels to reduce the potential for large stand replacing wildfire, and the foregoing discussion of effects, the cumulative effects of vegetation management activities in the Fish Camp Project treatment areas taken together with past, present, and reasonably foreseeable activities on the Forest will not result in a loss of viability for the pallid bat.

Townsend's Big-Eared Bat and Western Red Bat

There are no expected direct or indirect negative effects to either of these species from the proposed project; therefore, there are no expected cumulative effects from the project.

Sierra Nevada red fox

The area considered in determining the cumulative effects of past, present, and reasonably foreseeable activities on Sierra Nevada red fox (SN red fox) encompasses the BLRD. This is an appropriate scale for cumulative effects for a wide-ranging species such as the Sierra Nevada red fox. Based on the following analysis, a determination of viability for the SN red fox will be made.

No large vegetation management projects on BLRD have occurred above 7,000' over the past decade as most recent projects are centered around the WUI areas of the district which generally occur below 6,000' in elevation. Additionally, most SN red fox habitat on the forest occurs in wilderness areas where few management activities occur.

Because the alternatives put forth in this project will result in long-term increases in suitable red fox habitat over time and the project's goal of increasing large diameter trees, the cumulative effects of vegetation management activities in the Fish Camp treatment units taken together with past, present, and reasonably foreseeable activities on the Forest will not result in a loss of viability for the Sierra Nevada red fox.

American Marten

The area considered in determining the cumulative effects of past, present, and reasonably foreseeable activities on marten encompasses the BLRD. This is an appropriate scale for cumulative effects for a wide-ranging species (such as the marten) that has also been selected as a Management Indicator Species (MIS) for the SNF. Based on the following analysis, a determination of viability for the marten will be made.

BEs for many of the past projects in the SNF were reviewed to help inform the present analysis. Our review of these documents revealed the following basic information about effects to marten from these activities:

Twenty-six (26) total project BEs were reviewed, dating back to 1993 on the Sierra NF.

Determinations reached were:
- No effect – 7 Bes
- May affect individual marten, but not likely to lead to a trend toward federal listing or loss of viability – 15 Bes
- May affect individual marten, and likely to lead to a trend toward federal listing or loss of viability – 0 Bes
- Marten were not addressed in the document we reviewed due to lack of habitat or other reasons – 4 BEs

Types of Projects: Fuels reduction, harvest, hazard tree removal, and thinning were the proposed activities that were most often represented in the sample of BEs in which the marten was analyzed. Relative to “May Affect” projects, the described impacts to marten most often fell in the following categories:

- Temporary disturbances
- Foraging area may be burned if underburning gets out of control
- Removed hazard trees could serve as resting or denning sites
- Habitat altered or removed
- Reduction of habitat quality (e.g., reduction in canopy cover)
- Habitat will be entered
- Noise disturbance (SNFPA FEIS 2001)

No large vegetation management projects on the BLRD have occurred above 7,000’ over the past decade as most recent projects are centered around the WUI areas of the district which generally occur below 6,000’ in elevation. Additionally, most marten habitat on the forest occurs in wilderness areas where few management activities occur.

Because the alternatives put forth in this project will result in long-term increases in marten suitable habitat over time and the project’s goal of increasing large diameter trees, the cumulative effects of vegetation management activities in the Fish Camp treatment units taken together with past, present, and reasonably foreseeable activities on the Forest will not result in a loss of viability for the American marten.

Aquatic Wildlife and Management Indicator Species

The direct, indirect and cumulative effects to the aquatic wildlife species and management indicator species habitat are summarized from the BE/BA (Strand, P. 2010) and the Aquatic Management Indicator Species Report (Strand, P. 2010a) for the Fish Camp Project.

Affected Environment

The Affected Environment describes existing condition based on data collected within the analysis area and any desired conditions that may have been established.

Existing Condition

Table 13 presents project SCI plots and stream channel surveys. The Project Hydrology Report (Stone 2010) indicates there is evidence that past activities have caused watershed degradation, but overall the channels and subdrainages in the Project area appear to be recovering and reaching a state of equilibrium. The current condition for most of the stream reaches is good or fair for channel stability using modified Pfankuch, after Rosgen (1996) and this has been corroborated with Stream Condition Inventory data. There are, however, several areas within the proposed Project boundary that are unstable and sensitive to disturbance. Specifically, Long Meadow in subwatershed 501.5005 has instabilities noted.

Table 13: Summary of subwatershed conditions (ND= No SCI data). mi = miles; mm= millimeters

Subwatershed	Acres	Channel Typing (mi)	D50 (mm)	Pfankuch stability (Rosgen modified)	Rosgen Sensitivity (mi)			Poor Stability (mi)
					Low	Moderate	High	
501.5002	587	0	ND	ND	ND	ND	ND	ND
501.5004	2436	5	ND	ND	2.45	0.1	2.45	0.1
501.5005	2229	4.94	51.8	Good	3.1	0.62	1.22	0.5
501.5006	638	2.67	92.9	Fair	0.84	1.48	0.35	1.5
501.5007	668	7.24	ND	ND	4.15	0.17	2.92	0.2
501.5008	2261	3.6	ND	ND	1.24	0.36	2	0.2
501.5053 lower	1817	4.8	45	Good	2.8	0.46	1.54	0
501.5053 upper			75.3	Fair				
501.5054	1480	4.71	ND	ND	4.54	0	0.17	0
501.7052	2891	0	85.4	Poor	ND	ND	ND	ND

Figure 6: Mean daily water temperatures through the summer of 2008. Table 4 displays miles of perennial streams, miles occuppied by resident trout, 2008 maximum (20-minute) summer water temperatures from the larger perennial streams, stream shading (% cover), and results from benthic macroinvertebrate sampling. Macroinvertebrate indices were calculated by the U.S. Department of the Interior Bureau of Land Management Aquatic Monitoring Center (Vinson 2008; Miller 2010) who report slight to moderate organic enrichment, with a community dominated by generally intolerant taxa.

Table 14: Perennial streams; resident trout occupancy, maximum water temperatures, % stream shading, and benthic macroinvertebrate index (Hilsenhoff Biotic Index (HBI)). HBI ratings between 0.0 – 3.5 considered Excellent; between 3.51 – 4.50 considered Very Good (Hilsenhoff 1987). (ND= No SCI data)

Subwatershed	Acres	Perennial (mi)	Fish (mi)	Stream Shading (% cover)	Max. Water Temp. (º C)	Hilsenhoff Biotic Index	Taxa Richness (# taxa)	Tolerant Taxa Richness (# taxa)
501.5002	587	0.5	0	ND	12.7	ND	ND	ND
501.5004	2436	4.9	3.6	ND	15	ND	ND	ND
501.5005	2229	3.9	2.7	31%	17.1	4.14	37	0
501.5006	638	1.6	1.1	67%	19.2	3.87	46	0
501.5007	668	0.4	0.3	ND	ND	ND	ND	ND
501.5008	2261	3.9	2.6	ND	ND	ND	ND	ND
501.5053	1817	4.6	4.3	46%	17.4	3.13	33	1
501.5054	1480	4.5	4.5	69%	19.4	4.13	40	0
501.7052	2891	3.4	0.9	77%	16.8	3.56	59	1

Streams in the Project analysis area are within the expected summer temperature range for the zoogeographic province described by Moyle (2002), which should be appropriate for native aquatic/riparian species. The Project Hydrology Report (Stone 2010) identifies that maintenance level 2 (“native surface”) roads throughout the Fish Camp Project area are in poor condition and many of these roads lack adequate drainage. This is increasing hydrologic connectivity in the project subdrainages, which is contributing to increased sediment input and overall watershed degradation resulting in CWE response in some areas.

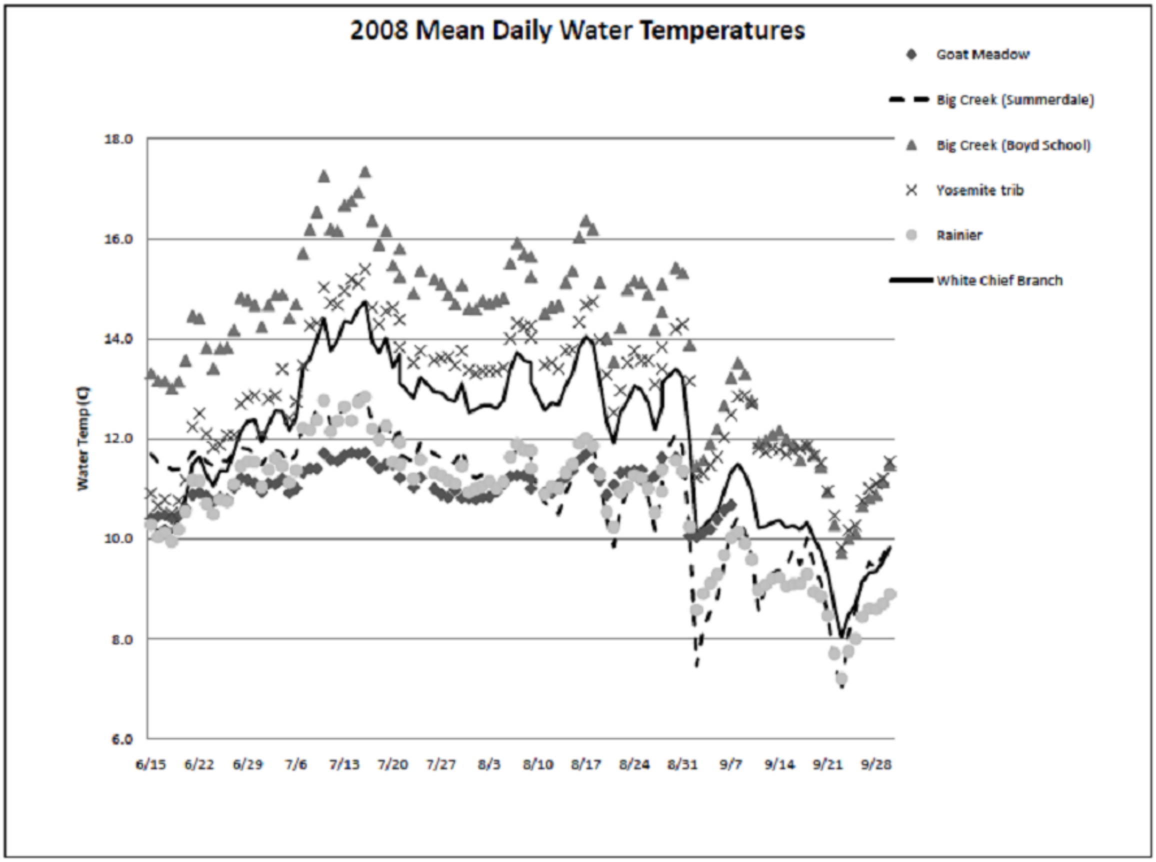

Figure 7: Expected summer temperature range

Species Accounts and Status

The following provides summarized information on aquatic/riparian threatened, endangered, candidate, and Forest Service sensitive (FSS) species that are either known to occur or have potential habitat within the analysis area, along with the system used to quantify and evaluate potential habitat. Complete descriptions are available in the project aquatic species biological assessment/ evaluation (Strand 2011). Species evaluated are based on the August 12, 2010 online database of federally threatened (T), endangered (E), proposed (P), and candidate (C) species for the Fish Camp Project area from the USFWS (USDI USFWS); (http://www.fws.gov/sacramento/is /spp_lists/NFActionPage.cfm). FSS are additionally considered. Species potentially affected by this project are the:

- Sierra Nevada yellow-legged frog (MYLF) (*R. sierrae*) (C/FSS)
- Yosemite toad (YT) , *Anaxyrus(=Bufo) canorus* (C/FSS)

Sierra Nevada yellow-legged frog (mountain yellow-legged frog)

Distribution: The Sierra Nevada yellow-legged frog (MYLF) occurs at high elevation (4,500-12,000 ft) only in the Sierra Nevada Mountains of California (CDFG 2005). DNA sequencing by Vredenburg et al. (2007) suggest two species within the historic range of MYLF. *R. muscosa* (Sierra Madre yellow-legged frog) would apply to populations south of the divide between the Middle and South Forks of the Kings River. Populations to the north (including the analysis area) would be considered *R. sierrae* (Sierra Nevada yellow-legged frog). The USFS sensitive species list and the USFWS continue to refer to the species as mountain yellow-legged frog (MYLF) and this evaluation includes that nomenclature.

Life History: The MYLF is diurnal and is seldom far from water. The species prefers well illuminated lakes and tarns, sloping banks of meadow streams, riverbanks, and isolated pools (Mullally and Cunningham 1956; Zeiner et al. 1988; Martin 1992). At high elevations, breeding occurs between May and August as soon as the meadows and lakes are free of snow and ice (CDFG 2005). In lower elevations breeding occurs between March and June once high water in streams subsides. Male frogs lack vocal sacks, but produce a call underwater to attract females (Vredenburg et al. 2005). Following amplexus the female deposits their 30-400 eggs in clusters submerged along stream banks or on vegetation (Zweifel 1955), and tadpoles develop after 2-3 weeks.

Tadpoles maintain a relatively high body temperature by selecting warmer microhabitats (margins of waterbodies) where they may congregate in the hundreds feeding on algae (Bradford 1984). Tadpoles may require up to three years before metamorphosis. Following metamorphosis, it can take up to four years for juveniles to reach sexual maturity. MYLF may move several hundred meters between breeding, feeding, and overwintering habitats (Pope and Matthews 2001). They tend to follow lake shores and streams, but will move short distances across dry land (Matthews and Pope 1999). Since the adults and tadpoles overwinter underwater, at high elevations they are restricted to relatively deep lakes (over five feet deep) which do not freeze solid in winter (Knapp 1996). Over-wintering of tadpoles in an aquatic habitat makes them more susceptible to fish predation and diseases.

Status: Vredenburg et al. (2007) report that MYLF no longer occur at more than 92% of its historic sites, in the Sierra Nevada, with even greater declines in the Tranverse Range and southern California. The USFWS (2003) found that listing was warranted as threatened or endangered for this species. However the listing was precluded at the time based on other higher priority issues (68 FR 2283). It is designated as a candidate species and is currently managed as sensitive by the USFS.

Species Occurrence in the Analysis Area: On the SNF there are 38 known locations currently occupied by MYLF. The majority of occupied sites are at high elevations within wilderness areas. The Museum of Vertebrate Zoology (Berkeley, California) indicates a foothill yellow-legged frog was collected at Big Creek in 1953. This site could be within the Project area boundary, although at the elevation (5100 feet) there is possibility the animal could be *Rana sierrae* (both species were classified as *Rana boylii* prior to Zwiefel's revision of taxonomy (1955)). There are no records from the California Academy of Sciences, California Natural Diversity Database, or Forest Service databases of MYLF within or adjacent to the Fish Camp Project area, and the species was not located during 2007 herpetofauna surveys. The nearest occupied site is approximately 0.25 mile beyond the aquatic analysis area boundary (Figure 3).

Potential Habitat: MYLF typically live along the edge of watercourses and rely heavily on an aquatic environment for foraging, shelter, breeding and protection from predators. The CWHR highly suitable habitats (CDFG 2005) for this species are lacustrine, montane riparian, riverine, and wet meadows with mostly submerged and flooded gravels, cobbles, and boulders with trees greater than one inch in diameter, short or tall herbaceous cover, and vegetation and canopy closures greater than 10%. Essential elements for habitat are identified as algae, invertebrates, terrestrial insects, and water.

Habitat for MYLF was evaluated as the perennial streams and lakes above 4,900 feet in elevation. Potential habitat was determined by GIS within the analysis area. There is approximately 29 miles of stream habitat, and 3 acres of pond and lake habitat. An estimated acreage of suitable habitat is derived from the total miles of stream with a 165-foot habitat on each bank (CDFG 2005) and total acres of lake/pond habitat with a 165-foot dispersal area for an approximate total of 1,020 acres of potential suitable habitat for this species (Figure 8, Table 15).

The CWHR habitat values for the acres of potential MYLF habitat for breeding, cover, and feeding are displayed in Table 15. The table also displays the % of habitat represented as low quality (<0.33); medium quality (>0.33 and <0.67); and high quality (>= 0.67). The table indicates that most the habitat in the analysis area is of medium or high quality for MYLF reproduction, cover, or feeding. As displayed in Figure 3, habitat connectivity is available via riparian corridors associated with the perennial stream system.

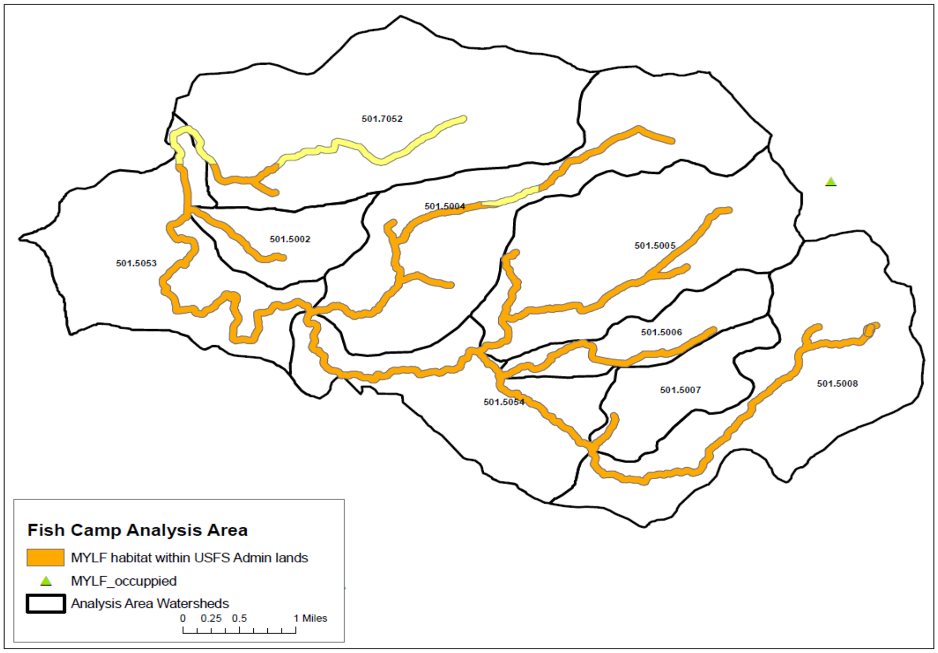

Figure 8: Potential habitat for MYLF in the analysis area (yellow are lands in Yosemite NP).

Table 15: Amount and value of MYLF habitat in the analysis area based on CW HR.

Habitat Quality	Repro (ac)	Repro (%)	Cover (ac)	Cover (%)	Feeding (ac)	Feeding (%)
None	59	0.06	59	0.06	59	0.06
Low	169	0.16	169	0.16	169	0.16
Medium	720	0.70	768	0.75	768	0.75
High	75	0.07	28	0.03	28	0.03

Yosemite toad

Distribution: The original range of the Yosemite toad (YT) extends from Ebbetts Pass in Alpine County to south of Kaiser Pass and Evolution Lake in Fresno County (Karlstrom 1962, CDFG

2005) above 6000 feet elevation. However, populations have been found as far south as Spanish Mountain on the SNF during Forest-wide inventories conducted between 2002 and 2004.

Life History: YT breed in shallow pools and small, slow moving, shallow streams usually in meadows (Martin 1992). Movement to and from breeding sites could be extensive, including travel over extensive snowfields from over-winter hibernation sites in forested areas (CDFG 2005). Males arrive at breeding pools several days before females (Kagarise Sherman 1980; Kagarise Sherman and Morton 1984). Breeding takes place from mid-May to mid-August (Kagarise Sherman 1980; Martin 1992). Males appear to outnumber females at breeding sites (Karlstrom 1962; USDI-USFWS 2002a), and females may only breed once in three years. Eggs are laid in single or double strands, typically in pools or streams not more than three inches deep with a loose silt substrate (Martin *ibid*; USDI-USFWS 2002a). A single female lays an estimated 1,500 to 2,000 eggs (Martin *ibid*). Individual males only stay at breeding ponds for a week or two, and females leave shortly after breeding (Kagarise Sherman and Morton 1984; USDI-USFWS 2002a). Eggs hatch in about 10-12 days, and tadpoles metamorphose seven to nine weeks after the eggs are laid (Kagarise Sherman and Morton *ibid*; USDI-USFWS 2002a).

After breeding both sexes were thought to remain in meadow areas to feed for two to three months before hibernating (Kagarise Sherman and Morton 1984), although recent studies indicate adults may move several hundred meters from meadows to upland foraging sites (Martin 2008; Liang per. comm. 2010). Seasonal variation in home range size is considerable. Mullally (1953) estimated home ranges of some toads to be about 20 ft, but suggested that individuals may travel long distances away from water (CDFG 2005). Martin (2008) estimated home range at approximately 8,460 m² (2.1 ac), while Liang (per. comm. 2010) estimated mean home range of 27,430 m² (6.8 ac), and noted female home range was more than 1-1/2 times larger than males. YT seek cover during non-breeding seasons (approximately August to March) in abandoned rodent burrows (Jennings and Hayes 1994) or by moving into adjacent forested areas (CDFG 2005).

In the late fall the toads are only active on warm days. Yosemite toads enter hibernation in late September or early October, and emerge in the spring. The toads utilize rodent burrows, crevices under rocks, or the base of willows for hibernation (Martin 1992; 2008). Males emerge from hibernation for breeding as soon as snow melts from meadows (Martin *ibid*). Females first breed at 4-6 years and males at 3-5 years of age (USDI-USFWS 2002a).

Status: Current estimates indicate disappearance of 47 to 69 percent from historical locations (USDI-USFWS 2002a). Remaining populations seem more scattered than they were historically and frequently appear to consist of small numbers of breeding adults. The USFWS (2002a) determined that listing was warranted as threatened or endangered for this species. However, the listing was precluded at the time based on other higher priority issues (67 FR 75834). The species is managed as sensitive by the USFS, which is preparing a Conservation Assessment for the species that is not available for direct attribution.

Occurrence in the Analysis Area: This species was inventoried for occurrence across the SNF between 2002 and 2004. No breeding meadows or individual YTwhere identified within the analysis area during Forest-wide or project level surveys. Two occupied meadows are located outside of the analysis area (Figure 4), but may have foraging habitat within the Fish Camp Project analysis area based on CWHR 900 meter dispersal for the species.

Potential Habitat: This species occurs above 6,000 feet in elevation in meadows, lake edges, and some stream habitats only in the central Sierra Nevada Mountains. The dispersal patterns are not totally understood, but similar high elevation toads in Colorado can disperse up to 0.6 miles (900 m)(CDFG 2005) to reach breeding or over-winter habitats. The CWHR highly suitable habitats (CDFG *ibid*) for this species are wet meadows that have short (< 12 inches) herbaceous plants with vegetation closures greater than 10%. Essential elements for habitat are identified as algae, invertebrates, water, and slow water.

YT also require terrestrial habitat. Metamorphs appear to overwinter their first year in the terrestrial meadow habitat adjacent to their rearing site and move to more distant terrestrial habitat during mid-summer of their second year (Kagarise Sherman and Morton 1993; USDI-USFWS 2002a). In meadows, metamorphs and yearlings appear to be associated with willows and long sedges and grasses. Moist upland areas such as seeps and springheads are important summer non-breeding areas for adults (USFWS 2002a).

Suitable breeding habitat for this analysis was considered all meadows above 6000 feet elevation. There are approximately 205 acres of meadow habitat above 6000 feet elevation within the analysis area. The CWHR model evaluates wet meadows as providing high quality habitat for YT reproduction, cover, and feeding. YT habitat was evaluated as 900 meters surrounding meadows above 6000 feet elevation (approx. 8140 acres). Figure 9 and Table 16 display information on habitat and occupancy.

The CWHR habitat values for the acres of occupied YT habitat for breeding, cover, and feeding are displayed in Table 16. The table also displays the % of habitat represented as low quality (<0.33); medium quality (>0.33 and <0.67); and high quality (>= 0.67). The table indicates that most the habitat in the analysis area is of low quality for YT reproduction, cover, or feeding. As displayed in Figure 4, habitat connectivity is provided via a network of meadows distributed across the landscape.

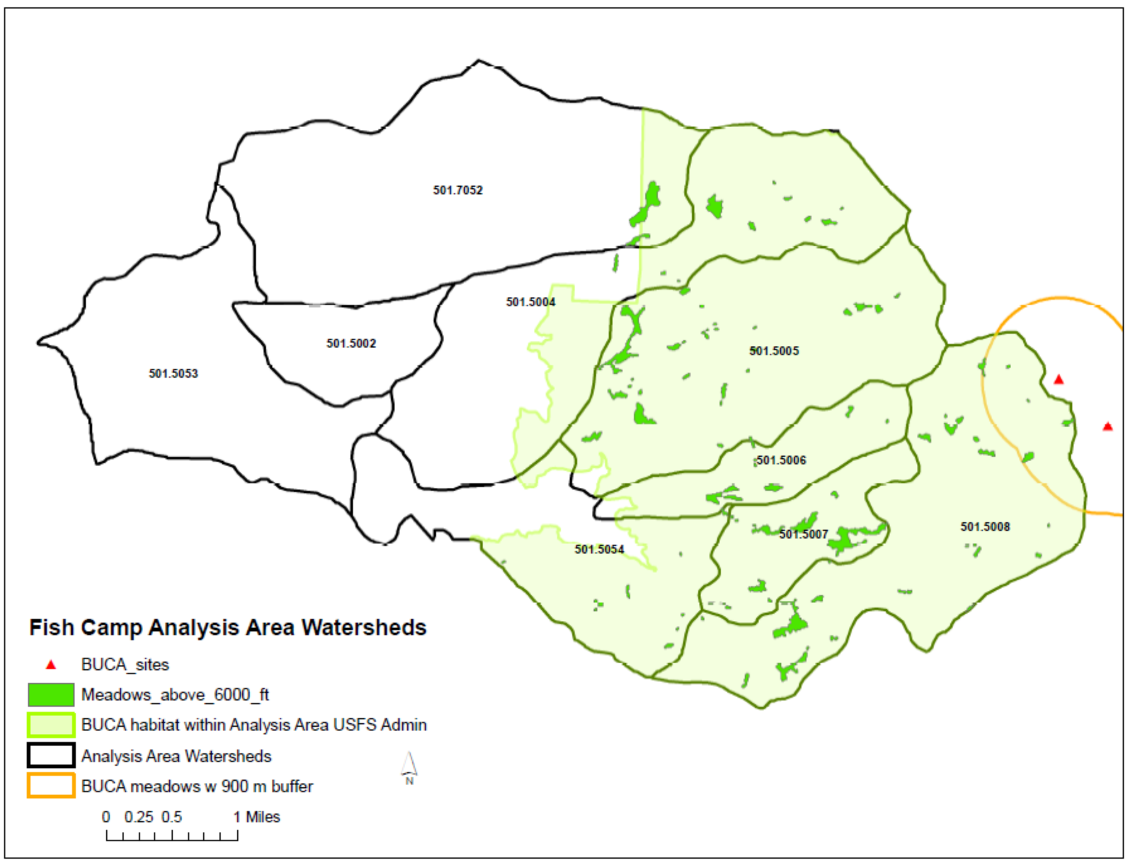

Figure 9: YT occupied habitat, potential habitat, and dispersal

Table 16: Amount and value of occupied YThabitat in the analysis area based on CWHR.

Habitat Quality	Repro (ac)	Repro (%)	Cover (ac)	Cover (%)	Feeding (ac)	Feeding (%)
None	818	0.10	818	0.10	818	0.10
Low	7187	0.88	7187	0.88	7187	0.88
Medium	5	0.00	5	0.00	5	0.00
High	132	0.02	132	0.02	132	0.02

Aquatic Management Indicator Species

Benthic macroinvertebrates and Pacific tree frog are aquatic/wet meadow associate Management Indicator Species (MIS) for the SNF, and analyzed in a separate report (Strand 2011a). Benthic Macroinvertebrates (BMI) 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. BMI are an important component of the foodweb, providing a food source for birds, mammals, amphibians, reptiles, and fish. The 29 miles of perennial streams within the Project area represent potential habitat for BMI.

The Pacific tree frog was selected as an MIS for wet meadow habitat in the Sierra Nevada. This broadly distributed species requires standing water for breeding; tadpoles require standing water for periods long enough to compete aquatic development, which can be as long as 3 or more months at high elevations in the Sierra Nevada (CDFG 2005). There are approximately 217 acres of wet meadow habitat within the Project analysis area.

Habitat Summary Table

Table 17 summarizes potential habitat within the Fish Camp aquatic analysis area for each the special interest herpetofauna and MIS habitats. The CWHR essential habitat elements for the species are:

- MYLT: algae, invertebrates (aquatic and terrestrial), water
- YT: algae, invertebrates, water, slow water

Table 17: Summary of potential habitat within Project area subwatersheds.

Species	Potential Habitat (ac/mi)
MYLT	1020 ac
YT	8140 ac
Lacustrine/riverine habitat	29 mi
Wet Meadows	217 ac

Desired Condition

Desired conditions for the Project area were described in the Fresno River Landscape Analysis (USDA - Forest Service 2005). The Fresno River is adjacent to the Project area and has similar vegetative conditions to Fish Camp. The watershed analysis established desired conditions for a number of resource areas. Canopy cover was a riparian vegetation indicator identified in the Landscape Analysis. While not identified in the Fresno River Landscape analysis, water temperature is also be used as an aquatic indicator. Desired conditions are:

- Stream shading of > 70-80% of the riparian zone as a desired condition. Data summarized in Table 14 indicates that some stream segments are currently less than the desired condition.
- Daily mean water temperatures < 21° C. A desired condition for water temperature was not identified in the Fresno River Landscape Analysis; however the CDFG discontinues trout stocking if water temperatures exceed 21° C (CDFG 2010). This temperature is also consistent with that described by Moyle (1976; 2002) within the rainbow trout assemblage. Water temperature data collected over the summer of 2008 (Figure 2) indicates that water temperatures are currently meeting the desired condition.

Environmental Consequences

This section analyzes the effects of the Fish Camp Project on aquatic/riparian species and their habitats. A list of past, present, and foreseeable projects for the Project area is located in Chapter 3, page XX Proposed management actions have the potential to directly alter stream shading (solar radiation); and indirectly or cumulatively alter water temperature; water quantity; water quality; sediment, nutrient, and litter inputs; woody debris; and channel structure. All of these elements can affect aquatic habitat and nutritional resources of aquatic organisms (Gregory et al. 1987; Chamberlin et al. 1991; Furniss et al. 1991; Dwire et al. 2006).

BMI are recognized for their importance in the aquatic/riparian systems within the Project area. Thus, if the project alters stream temperature, canopy cover, hydrologic regime, sediment inputs, seeps/springs/headwater areas, and nutrient cycling (LWD or litter inputs), it could affect aquatic/riparian species indirectly through affects to the invertebrate community. Various life stages of resident trout and herpetofauna utilize BMI as a food source.

Stream flow may increase as forest basal area (and evapotranspiration) declines, and peak flows can be indirectly affected by vegetation removal (Chamberlin et al. 1991; Kattleman 1996). Troendle (2006) indicated increased water yields following timber harvest, although treatments were primarily clearcuts rather than thinnings that are being proposed for the Fish Camp Project. Alteration of the hydrologic regime (timing, duration or magnitude of flows) from the combined effects of silviculture and underburning could affect spawning for fish, amphibian breeding, and MIS habitat (BMI and Pacific tree frog). Such an alteration could also result in channel downcutting, bank instabilities and degradation of aquatic habitat through additional accumulations of sediment in pool habitat and covering of spawning gravels. In snow-dominated areas, such as the Fish Camp drainage area, nearly all of the change in flows would occur during spring runoff, and spring runoff may occur slightly sooner if reductions in canopy allow faster melting of the snowpack.

Fire Effects

One of the objectives of the Fish Camp Project is to modify the intensity and spread of fire in the WUI near the communities of Fish Camp. This would be accomplished using a combination of thinning and fuels reduction. Nakamura et al. (2008) noted some success with reducing crown fire after thinning and burning for the Cone and Megram Fires. They also note that some fires are so large (McNally or Cedar Fires) that would likely continue to burn through or around treatment areas.

Little is known about fire history of riparian areas in the west, but it is expected to vary from those experienced in upland areas (Dwire and Kauffman 2003; Bisson et al. 2003). Riparian areas differ from upland areas in topography, microclimate, geomorphology, and vegetation. Further they are characterized as having cooler air temperatures, lower daily maximum air temperatures, and higher relative humidity. These characteristics may contribute to higher moisture content of live and dead fuels, and riparian soils, which presumably lowers the intensity, severity and frequency of fire (Dwire and Kauffman 2003).

Fire, both prescribed and wild, has potential to affect aquatic/riparian systems. Prescribed burning could indirectly affect streambank stability, aquatic foodwebs, stream temperature, and large wood dynamics (Dwire et al. 2006; Bêche et al. 2005). High intensity fires can severely disrupt aquatic ecosystems, and that these affects can be prolonged (up to 300 years for LWD). Specific influences may include decreased channel stability; greater and more variable stream discharge; altered woody debris delivery and storage; increased nutrient availability; higher sediment delivery and transport; and increased solar radiation and altered water temperature regime (Bisson et al. 2003; Dunham et al. 2003).

Impact of fire on the BMI community varies by burn intensity and extent; steam size and gradient; precipitation and amount of runoff; vegetative cover; geology; and topography. Some indicators of community health may return to pre-fire conditions within 1 to 2 years, but the overall community will probably vary for 5 to 10 years after the fire (Minshall 2003; Reardon et al. 2005).

The extent of fire effects on fish populations would be related to recovery of suitable water temperatures, suitable water quality, and connectivity to population refugia. Trout are noted as being resilient and adapted to disturbance (Rieman and Clayton 1997; Dunham et al. 2003; Rinne and Jacoby 2005), but recovery could take a decade or more. Sestrich (2005) reported that native trout populations recovered rapidly, with some sites exceeding pre-fire population levels within three years following fires in the Bitterroot River Basin (2000). Greswell (1999) considered the disturbance regime resulting from wildfire could facilitate invasion by nonnative fish species.

The ecological diversity of riparian corridors is maintained by natural disturbance regimes including fire and fire-related flooding, debris flows, and landslides (Dwire and Kauffman 2003). Many species have adapted life histories that are shaped by, and may depend on disturbance events (Dunham et al. 2003; Bisson et al. 2003; Rieman et al. 2005). There remains debate among Aquatic Ecologists regarding the need to treat riparian areas, and the types of treatments. Part of the controversy is related to the diverse and complex effects that fire can have on aquatic systems (Dunham et al. 2003). Researchers agree that aquatic systems have developed under a disturbance regime. Some aquatic biologists believe that wildfire poses additional risk to endangered species, while others feel affects from treatments are more likely to damage aquatic systems than fire (Erman 1996; Bisson et al. 2003). Analysis following the Angora Fire (USDA-FS 2007), identified fire spread was facilitated in part by corridors provided in the no-treatment Streamside Environmental Zones.

Canopy Cover

Canopy cover is the degree to which tree canopies obscure the sky or block the sun. Canopy cover was measured as the percentage of stream shading and varies by the width of the stream channel, which is generally a function of stream order. Stream shading is important in maintaining water temperature with the effect varying by the height of adjacent vegetation, proximity to the stream, topography, angle of the sun, and aspect (Beschta et al. 1987; USGS 1997, 2000; Moore et al. 2005). The Fresno River Landscape Analysis (USDA-FS 2005a) identifies stream shading of 70 to 80% within the riparian zone as a desired condition.

Large Woody Debris

LWD is of both physical and biological importance within stream channels and riparian zones (Bisson et al. 1987; Sedell et al. 1988). LWD provide sediment traps, affect stream channel morphology to create pool habitat, increase channel roughness to dissipate energy, provide complexity to habitat, provide structural cover, and provide nutrient inputs (Bisson et al. 1987). LWD provide cover for fish and animal species, are directly consumed by specialized macroinvertebrates. Factors influencing LWD in the Sierra Nevada mountain range may include geomorphology, decay resistance of local species, floods and past management (Ruediger and Ward 1996). The desired condition from the Fresno River Landscape Analysis is that project streams should average (over the watershed) between 3 to 15 LWD/100 m of the larger (stable) class.

Water Temperature

Water temperature has multiple effects on aquatic/riparian species and their behavior. Thermal effects relate to directing behavior (trigger migration or spawning); controlling factors (time of incubation and emergence); lethal (lead to breakdown of homeostatic system and increased susceptibility to disease); and growth (metabolic regulation; affected by food supply) (Beschta et al. 1987; Armour 1988; USGS 1997; 2000; Sauter et al. 2001). Elevation, aspect, stream width, channel roughness coefficient, riparian shading, solar radiation, air temperature, cloud cover, and stream discharge levels can affect water temperature. Of these elements, direct effects on riparian shading and indirect effects on stream discharge level could have the most effect on stream temperature (Beschta et al. 1987; Moore et al. 2005). A desired condition for water temperature was not identified in the Fresno River Landscape Analysis. The CDFG discontinues trout stocking if water temperatures exceed 21° C (CDFG 2009), thus the desired condition for this analysis is that water temperatures be less than 21° C. This temperature is also consistent with that described by Moyle (1976; 2002) within the rainbow trout assemblage.

Alternative 1 – No Action

Alternative 1 is the No Action alternative. Under the No Action alternative, current management plans would continue to guide management of the Project area. This includes all ongoing activities with existing decisions or permits that would not be changed if this alternative were selected including: plantation maintenance under separate document, cattle grazing, recreation, and recreation residences. The No Action alternative would not implement the Fish Camp Project to reduce fire ladder conditions (thinning); pile slash for burning; burn slash piles; masticate and/and or precommercially thin stands; plant trees; reduce fuel loading through controlled burning; or reconstruct and maintain roads. No treatments would be implemented in any subwatershed as displayed in Table 18, while projected acres potentially affected MIS habitat or habitat for frogs and toads is displayed in Table 19.

Table 18: Activities proposed under Alternative 1

HUC8 Subwatershed	501.5002	501.5004	501.5005	501.5006	501.5007	501.5008	501.5053	501.5054	501.7052	Total
Commercial or pre-commercial thinning or tractor piling	0	0	0	0	0	0	0	0	0	0
Mastication	0	0	0	0	0	0	0	0	0	0
Underburn	0	0	0	0	0	0	0	0	0	0
No Treatments	587	2436	2229	638	668	2261	1817	1480	2891	15007
Subwatershed Acres	587	2436	2229	638	668	2261	1817	1480	2891	15007

Table 19: Potential effects to habitat from Alternative 1 (acres are approximate)

Species	Potential Habitat (ac/mi)	Potential Habitat in Treatment Area (ac)
Sierra Nevada yellow-legged frog	1020 ac	0
Yosemite toad	8140 ac	0
Lacustrine/riverine habitat	29 mi	0
Wet Meadow	217 ac	0

Direct Effects

There would be no direct effects on threatened, endangered, or sensitive aquatic species or MIS habitat as a result of the implementation of Alternative 1 (No Action). No fuels ladder reduction or underburning would occur under this alternative. No direct effects to riparian canopy cover would be anticipated from Alternative 1. Water temperature would meet the desired condition, while canopy cover would be expected to remain near current levels through attrition at current and expected stocking levels.

Indirect Effects

There would be no anticipated indirect effects to special interest herpetofauna or MIS habitat as a result of the implementation of Alternative 1. Water temperature data collected from the Project area in 2008 indicates it currently meets the desired condition. However, Pilliod et al. (2003) suggest that no action may have consequences for amphibians due to overgrown forests changing the quality of amphibian habitat and increasing susceptibility for a high severity fire. Roads maintained by the U.S. Forest Service would continue to remain in poor condition and contribute sediment to aquatic systems.

Cumulative Effects

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Summary of Effects

Table 20 indicates that greatest potential effects to species habitat in the analysis area results from cattle grazing and the Sugar Pine Adaptive Management Project. As noted under occurrences in the species accounts, there are no known sites occupied by YT or MYLF within the aquatic analysis area. There would be no anticipated cumulative effects to aquatic MYLF or Yosemite YT as a result of the implementation of Alternative 1. Lacustrine/riverine and wet meadow habitats would be expected to remain stable.

Acres of habitat cumulatively affected under Alternative 1. (*lacustrine/riverine miles converted to acres assuming 10 ft wide stream)

Table 20: Acres of habitat cumulatively affected under Alternative 1. (*lacustrine/riverine miles converted to acres assuming 10 ft wide stream)

Species	Potential habitat (ac)	Grazing Primary Use (ac)	Rec/OHV Effected (ac)	Sugar Pine (ac)	Fish Camp (ac)	Fire (ac)	Roads (ac)	Cum. Effect (ac)	% Habitat Affected
Sierra Neveda yellow-legged frog	1020	141	27	7	0	0	10	186	18
Yosemite toad	8140	1196	6	449	0	26	20	1700	21
Lacustrine/riverine*	35	4	1	0	0	0	0.1	5	15
Wet meadow	217	217	0	0	0	0	2	217	100

Alternative 2 – Proposed Action

The Proposed Action would reduce fire ladder conditions through removing understory and intermediate trees (thinning); pile slash for burning; burn slash piles; masticate and/and or precommercially thin stands; reduce fuel loading through controlled burning; and reconstruct roads. Table 21 summarizes gross acres from proposed activities (net treatment acres would be less due to implementation of SMZs; Controlled Areas; portions of treatment units lacking access or not requiring treatment).

Table 21: Alternative 2 activities (acreages approximations generated by GIS). Acres represent gross area.

HUC8 Subwatershed	501.5002	501.5004	501.5005	501.5006	501.5007	501.5008	501.5053	501.5054	501.7052	Total
Commercial or pre-commercial thinning or tractor piling	134	331	280	0	1	0	52	81	85	964
Mastication	0	0	36	5	0	0	0	0	0	41
Underburn	32	55	0	0	0	0	0	0	104	192
Subwatershed Acres	587	2436	2229	638	668	2261	1817	1480	2891	15007
% Subwatershed treated	28%	16%	14%	1%	0%	0%	3%	5%	7%	8%

Table 22 displays habitat potentially directly affected by the Proposed Action. There are approximately 21 acres of proposed treatment adjacent (within 100 feet), but not within wet meadows. Similarly, there are approximately 3 miles of proposed treatments along perennial stream channels. It is expected that project design features would provide protection to both MIS habitat types.

Table 22: Overlap of Proposed Treatment Areas and Potential Habitat for species. (*lacustrine/riverine miles converted to acres assuming 10 ft wide stream)

Species	Potential Habitat (ac)	Habitat thinned (ac)	Habitat masticated (ac)	Habitat underburned (ac)	Total ac. Habitat Treated
Sierra Nevada yellow-legged frog	1020	12	0	27	39
Yosemite toad	8140	452	41	12	505
Lacustrine/riverine*	35	0	0	0	0
Wet Meadow	217	0	0	0	0

Direct Effects

There is overlap between proposed activities and potential effects on MYLF and YT. Approximately 40 acres of MYLF and 505 acres of YT habitat are within areas proposed for treatment under Alternative 2. Project design measures would be expected to protecting breeding and rearing sites from direct effects, thus sub-adult and adult life stages would potentially affected. Project design measures include the OFL corridors for Pacific fisher. These migration corridors extend 150 feet from both streambanks along the perennial streams within the Project area. There are no proposed treatments within the inner 50 feet from each streambank. The outer 50 feet would implement hand treatments to remove the understory ladder fuels. No heavy equipment would be allowed within 100 feet of the streambank within these corridors.

The potential for direct effects from crushing would be expected to be limited under the Proposed Action. The possibility of direct effects from crushing would be most likely during rainy periods when species may move beyond riparian areas. Operation of heavy equipment ceases during periods of prolonged precipitation to prevent compaction. Adult YT leave breeding meadows for foraging sites where they spend the majority of the summer, which makes them more susceptible to direct effects.

Introduced fire could directly affect herpetofauna. Some species may use slash piles for cover or for estivation. The possibility of direct effects on individual animals from burning piles within the OFL corridors would be reduced by implementing the project design measure to light piles on one side to allow an escape from the pile. Underburning may also represent a direct effect to herpetofauna. Underburning is proposed adjacent to perennial streams in units RX 3, 4, 5, and 22, potentially affecting MYLF. Prescribed burning would be expected to occur during the spring or fall. During spring, amphibians may be moving to breeding sites or dispersing after breeding. During the fall, herpetofauna may be moving to overwintering sites or estivating within areas to be burned. Allowing fire to creep into the SMZ (as opposed to active introduction) would provide opportunity for herpetofauna to move away from areas burning, but not eliminate the possibility of mortality.

Direct effects to listed herpetofauna would not be anticipated from implementing the Proposed Action due to Project Design Measures; non-detection of listed species during surveys; and nearest known occupied sites are not within species dispersal distance of project treatment areas. The nearest known occupied YT site is more than 1.5 miles from the nearest proposed treatment unit, while the nearest known MYLF population is 1.3 miles from the nearest treatment unit.

Indirect Effects

Alternative 2 has a risk of compacting soil (tractor thinning, mastication, and machine piling of slash), which could result in both short and long-term sediment delivery to riparian and aquatic habitats. Reduction in stand densities could affect canopy cover (indirectly affecting micro-climate and water temperatures), availability of LWD; macroinvertebrate community, and changes to water yield (indirectly affecting stream channel stability). Most of the potential indirect effects to herpetofauna would be related to habitat alteration. Thinnings are proposed within the red fir and Sierra mixed-conifer CWHR types. The primary changes may reduce size groups and reduce density for a 20-30 year period. CWHR habitat quality would remain unchanged for both species based on projected stands following thinning. Changes to microclimate (such as increased air temperatures, reduced soil moisture, and lower relative humidity) within treated areas may not be accounted for at the CWHR scale.

Compaction has the potential to increase erosion through overland flow; alteration to flow regime; and alteration of stream channel equilibrium. Increased sediment could decrease available pool habitat for herpetofauna. According to Reid (2006), the impacts of mechanical treatments on erosion and sediment yield are likely to result from direct soil disturbance where these activities affect swales and low-order stream channels. In this project, swales and Class V channels have no SMZs – mechanized access is not prohibited and could occur. Class IV channels have a 25-foot SMZ where equipment is excluded. Implementation of Best Management Practices (BMP) 1-19 mitigate the potential effects and include requiring that stream crossings on Class IV and V streams be agreed to by the sale administrator. Unscoured swales that are dry during operations receive no special protection. Activities that will be accomplished by hand, such as felling and leaving trees, hand piling, and planting, are assumed to have no effect on hydrology or water quality (Robichaud et al. 2006). Roads maintenance and reconstruction would reduce hydrologic connectivity and reduce sediment from that existing source.

<u>Stream Shading</u>: Naiman et al. (2000) note that riparian forests strongly influence stream microclimate; including air, soil, and surface temperatures; relative humidity; and solar radiation. Streamside shading affects the amount of solar radiation that filters to the surface of the water, and Matlack (1993) indicates that aspect also exerts influence on microclimate. Cushman (2006) identifies the importance in habitat connectivity for amphibian dispersal, suggesting juvenile dispersal as a possible limiting factor. Water temperature affects various life activities, such as breeding and rearing time for amphibians. If forest harvesting were to occur in streamside areas there could be an increase in solar radiation to the stream channel, affecting water temperature however project design criteria prevent streamside harvesting.

Perennial stream channels are included under the OFL (Riparian Migration Corridor). These corridors extend 150 feet from both streambanks along the perennial streams within the Project area. There are no proposed treatments within the inner 50 feet from each streambank. The outer 50 feet would implement hand treatments to remove the understory ladder fuels. No alteration of the existing stream shading is anticipated from the Proposed Action. There would be no indirect effects on water temperature anticipated from the Proposed Action. Changes to microclimate beyond the riparian corridors may affect habitat and dispersal of herpetofauna through changes to air temperature, wind speed, and relative humidity.

Additionally aquatic invertebrates serve as food source for various lifestages of herpetofauna. Kattelmann (1996) notes several studies have demonstrated that communities of aquatic invertebrates changed significantly in response to upstream logging, with some of these effects persisting for two decades. Much of the food base for stream ecosystems is derived from adjacent terrestrial ecosystems with litter fall from deciduous stands exceeding that of coniferous stands. Deciduous input (leaves) generally breaks down in less than half the time necessary for the breakdown of coniferous input (needles; Gregory et al. 1991). Buffer strips 30 meters (98.4 feet) wide are noted as protecting invertebrate communities from logging induced changes (Gregory et al. 1987; EPA 1991).

Dwire et al. (2006) suggest that prescribed fire may top-kill some riparian trees and shrubs. A study at Blodgett Forest in northern California introduced prescribed fire into the riparian zone and found that a 4.4% mortality rate resulted, occurring in trees 11 – 40 centimeters (4.5 - 15.7 inches) dbh (Bêche et al. 2005). Prescribed fire is not proposed for introduction into the perennial SMZs for this project, but it would be allowed to creep within the SMZ. Pilliod et al. (2003) suggest that prescribed burning could benefit amphibians by reducing forest canopy cover and providing breeding habitat, if reduced transpiration increased baseflow. However, habitat could be negatively affected if sediment was increased as a result of the burning.

<u>Water temperature:</u> Elevation, aspect, stream width, channel roughness coefficient, riparian shading, solar radiation, air temperature, cloud cover, and stream discharge levels can affect water temperature. Of these elements, solar radiation has the most effect on water temperature (Beschta 1987; USGS 1997, 2002). Shading effects from forest canopies are important during the summer months due to high levels of radiation (high sun angles, long days, clear skies) accompanied by low stream discharges (Beschta et al. 1987). Solar radiation through forest canopies depends on the heights of the crowns and density, along with the foliage (Moore et al. 2005). If forest harvesting occurred in streamside areas there could be a direct increase solar radiation (reduction in canopy cover) to the stream channel. However, in evaluating possible project direct effects to canopy cover it was noted that changes in overhead canopy from stands adjacent to perennial streams would not be anticipated. There would no harvesting under any prescription within the inner 50-feet of the Class I SMZ. In the outer 50-feet of treated SMZs there is a possible increase of open space within the understory and intermediate components of the treated stand. This provides an opportunity for increased angular solar radiation. It is anticipated that the majority of the trees would be retained and the inner 50-foot No-Treatment zone would intercept angular solar radiation and there would be no change to water temperatures. Wilkerson et al. (2006) found that a 23 m (75 feet) buffer resulted in no change to water temperature.

Of the remaining elements that may affect water temperature, only stream discharge level could be affected by the proposal. Changes to stream discharge would be an indirect effect from the proposal due to decreases as basal area (and evapo-transpiration) declines due to changes in stand density (Chamberlin et al. 1991; Kattelmann 1996). If more water were available as baseflow during the late summer, there would be a possible reduction in stream temperature. Potential increases in peak flows are related to changes in snow accumulation and snow melt. In the Rocky Mountains, any reduction in stand density will increase snowpack accumulation. This would apply mostly to the snow-dominated Fish Camp Project area. Troendle et al. (2006) state that the potential for thinning to have an effect on streamflow due to reduced evapotranspiration depends on the amount of precipitation. In wet summers, there may be surplus water to contribute to increased stream flow, while in dry years; it is likely that the residual stand will use all of the available water. In snow-dominated areas such as Fish Camp, nearly all of the change in flows would occur during spring runoff, and spring runoff may occur slightly sooner if reductions in canopy allow faster melting of the snowpack.

Late summer, when solar radiation potential is greatest, air temperatures are warmest, and stream flows are lowest, is the period when canopy cover is essential in moderating water temperatures. Typically only perennial channels flow during this period, thus concerns over water temperature focus on these stream channels. Forest thinning projects have the potential to affect water quantity through changes in interception of precipitation, changes in snow accumulation and snowmelt (important in snow-dominated areas but less so in rain-dominated and ‘warm snow’ zones such as the Project area), and changes in available soil moisture due to decreased evapotranspiration. The Project Hydrology Report (Stone 2010) notes that any changes in flow resulting from thinning would be unlikely to persist beyond 10 years.

Figure 2 displays daily mean water temperature collected across the analysis area. As measured during the summer of 2008, daily mean water temperatures in the analysis area were less than 21° C (Desired Condition). The period monitored represents that of highest air temperatures and lowest stream flow, thus most stressful on aquatic/riparian species. There would be no anticipated alterations to canopy cover or flow, thus there would be no effects on water temperature expected from the Proposed Action.

Cumulative Effects

Known activities occurring spatially and temporally within the analysis area are recreational use (both developed and undeveloped), vegetation and fuels projects, existing roads, cattle grazing, fish stocking, and fires. Table 20 summarizes overlap of potential habitat by other Actions. Habitat may also be altered by climate change, fire, and the alteration of the fire return interval.

Recreation: There are approximately 6.5 miles of inventoried Off-Highway Vehicle (OHV) routes within the analysis area, some which cross habitat for Forest Service sensitive herpetofauna. Slow moving species (such as reptiles and amphibians) are more susceptible to vehicle mortality because their life histories often involve migration between wetland and upland habitats (Trombulak and Frissell 2000). The SNF has completed a Travel Management Plan (USDA – Forest Service 2010a) that would eliminate cross-country travel by OHVs, designate routes approved for OHV use, and establish a season of use. Approved routes require improvements to protect resources. This analysis considers the currently inventoried routes (6 miles) within the analysis area, although no routes (0 miles) were approved under the Record of Decision for the Travel Management Plan.

Within the project analysis area there are 3 developed campgrounds and day use sites, and several other developed sites (snowplay, trailheads, etc). These facilities total approximately 80 acres. Some of the campgrounds and day use areas are located adjacent to water, thus are within habitat for amphibians (approximately 30 acres). Amphibians and reptile species adjacent to campgrounds may be subject to handling; collection; consumption; or translocation (Maxwell and Hokit 1999). Handling may harm animals or in some instances handlers. Increased mortality rates may result from pets accompanying recreationists, along with mortality associated with use areas from pets or predators (ravens, skunks, raccoons, coyotes or foxes) that may occur at greater frequency at these sites due to refuse. Ravens are noted as natural predators for a variety of herpetofauna (Kagrise-Sherman and Morton 1993; Jennings and Hayes 1994; Ashton et al. 1997; Maxell and Hokit 1999; and Boatman 2002). Ashton et al. (1997) note that areas of human influence can drive out larger predators. Thus, the numbers of small predators (such as ravens) may be supported at artificially high numbers near areas of increased human activities. Boatman (2002) identifies that increased forage opportunities for raven may be associated with road mortality and landfills. Rainbow trout are stocked by the California Department of Fish and Game at several sites along Big Creek.

Vegetation and Fuels Projects: Approximately 670 acres of the Sugar Pine Adaptive Management Project are within the analysis area. The project overlaps approximately 450 acres of YT and 7 acres of MYLF habitat. Activities within habitat could include felling, bucking (cutting into logs), skidding to the road, and piling of slash. Amphibians could be subject to direct effects from crushing related to felling of trees, or when skidding logs to the road. Skidding can also reduce ground cover, increase site compaction, and result in off-site erosion. Project design criteria, Forest S&G and Best Management Practices have been provided to reduce potential effects to species and habitat.

Use of heavy machinery can result in compaction and potentially stream channel disturbance. Application of SMZs and implementation of Best Management Practices reduces the risk of compaction, or project-associated erosion being transported to stream channels.

Roads: The existing National Forest Transportation System (approximately 63 miles in the analysis area) could result in mortality to aquatic/riparian species in a variety of ways including collisions. Roads overlaps approximately 20 acres of YT and 10 acres of MYLF habitat. Slow moving species (such as reptiles and amphibians) are more susceptible to road mortality because their life histories often involve migration between wetland and upland habitats (Trombulak and Frissell 2000). Literature suggests that highest road-kill rates are near wetlands and that amphibians represent the largest percent of species. Some frogs and toads disperse at night due to lower temperatures and increased relative humidity.

Cattle grazing: The aquatic analysis area includes portions of the Soquel and Iron Creek allotments. Cattle grazing also occurs on private property within the two allotments. There are approximately 1,520 acres of Primary Use within the analysis area, which represents available forage overlaps with YT and Pacific tree frog breeding habitat. Primary Use Areas were defined as meadows buffered by 250 feet.

Numerous effects on aquatic habitat and species have been attributed to prolonged use of riparian areas by cattle. Literature suggests potential effects from cattle grazing relating to channel function, water quantity, hydrologic alteration, and water quality. Cattle grazing has been identified as altering channel function, which reduces natural processes, habitat diversity and habitat complexity for aquatic or riparian animals (Elmore and Beschta 1987; Clary and Webster 1989; EPA 1991; Meehan et. al. 1991; Belsky et. al. 1999). Movement of cattle within riparian zones can lead to reductions in stream shading, compaction of stream banks, and trampling of stream banks (Meehan et. al. 1991; Armour et. al. 1994). All of these factors could result in negative effects to habitat for herpetofauna. However, quantifying effects related to continued cattle grazing and recovery from past effects has proved difficult to evaluate due to absence of reference sites that have never been grazed by livestock (Kattelmannn 1996). Some of the effects described in literature are noted as resulting from “heavy” or “overgrazing”.

Cattle grazing is administered under U.S. Forest Service permits, which include compliance with S&G from the SNF-LRMP (USDA – Forest Service 1992; 2001; 2004). It is expected that cattle grazing is locally resulting in exposed streambanks and erosion at some sites.

Climate Change: Climate change has been suggested as a contributing agent in the decline of amphibians (Pounds and Crump 1994; Steward 1995; Pounds et al. 1999). The Species Survival Commission (2008) notes that over 50% of the amphibians may be potentially susceptible to climate change. Reaser and Blaustein (in Lannoo 2005) summarize that site specific review of amphibian declines indicate possible global changes, and that regional warming, increasing ultraviolet radiation, and diseases are a potential result of global change. California anticipates warmer temperatures, accompanied by altered patterns of precipitation and runoff related to climate change (DWR 2007). Annual runoff in the San Joaquin River basin has declined by 19% over the past 100 years, and projected precipitation alterations could reduce the snowpack by 25% by the year 2050.

It is expected that air temperatures and precipitation patterns may change within the aquatic analysis area over time. The Fish Camp Project is within an elevational zone characterized as having warm/hot summers (varies by elevation) and cool winters. Most precipitation above 5500 feet falls in the form of snow from fall through spring. Change is expected to be reflected through an increase in daily maximum, minimums, and mean air temperatures, along with altered rainfall patterns. In a review of weather station data for sites within or adjacent to the SNF, Meyer and Safford (2010) note that mean annual temperature at Huntington Lake has increased by 1.8º F, with a mean minimum (nighttime) increase of 4º F since 1915. Information from Meyer and Safford (*ibid*) project an increase in annual precipitation of 2.1 inches at Huntington Lake over the 10-year period, but the projections at Grant Grove in Kings Canyon National Park project no change.

The Big Creek drainage in the Project area is influenced by snowmelt runoff. Spring runoff is occurring earlier in the year and fraction of runoff occurring in the spring is decreasing. With less snowfall expected to result from elevated air temperatures associated with climate change, it is likely that less water would be available during the late summer and that the water would be warmer than current conditions. An increasing snow level would reduce the amount of shallow pools during the springs which provide breeding habitat for YT and Pacific tree frog. A similar effect to shallow lakes would reduce the suitability of habitat for MYLF. The changing conditions of habitat would provide conditions more favorable for invasion by species currently occurring at lower elevational sites.

Alteration of the fire return interval: The USFWS (2003) identified that "*Fire suppression, and changes in fire frequency and hydrology, has probably contributed to the decline of Yosemite toads through habitat loss caused by conifer encroachment on meadows. Under natural conditions, conifers are excluded from meadows by fire and soils too saturated for their survival. But as conifers begin to encroach on a meadow, if they are not occasionally set back by fire, they transpire water out of the meadow, reducing the saturation of the soils, and facilitating further conifer encroachment. Therefore, some vegetation treatment may be needed to maintain or restore YThabitat.*"

In the event of a wildfire there could be varied response depending on size and severity. A large, high severity fire could disrupt flow regime and alter stream channel dynamics. Soil water storage; baseflow; streamflow regime; peak flow; water quality (sediment, temperature, pH, ash slurry); and chemical characteristics can be affected by wildfire (Neary et al. 2005). If a wildfire followed by a large precipitation event occurred, accelerated erosion and increased sedimentation will occur and sediment will be transported to the stream system via overland flow from burnt slopes and roads. Accumulations of sediment could reduce habitat for BMI. Vieira et al. (2004) also reported that a 100-year flood following the Dome wildfire (New Mexico) resulted in an almost total loss in density and taxon richness.

Meyer and Safford's (2010) review of fire literature indicates increases in fire frequency, size, total area burned and severity in the Sierra Nevada over the past 20-30 years. Since 2002 (year of Vegetation Typing), there has been not been any fire within the analysis area. There is an overlap of approximately 26 acres within potential habitat for YT, and 0 acres of potential habitat for MYLF that burned in 1990. Habitat has recovered since the fires. In an analysis of occupied YT sites on the Sierra NF, Liang et al. (2010) note that YT were less likely to occur in areas where the fire regime was significantly altered.

CWE Analysis: The Cumulative Watershed Effects Analysis (CWEA) prepared for this project (Gallegos 2010) includes consideration of actions on private lands in addition to Forest Service permitted actions. The baseline or existing condition of most of the subwatersheds is below the Lower Threshold of Concern (TOC)%, but subwatersheds 501.5006, 501.5007, 501.5053 are over their Lower TOC%. No adjustment to TOC would result from Alternative 1. The Project Hydrology report (Stone 2010) notes that, "*Essentially the only watershed considered to be at or near CWE prior to field investigations is a segment of 501.5005. Specifically, subwatershed 501.5005 has a sub-basin where CWE response is occurring, which includes Long Meadow*."

Cumulative Watershed Effects: The Project CWE Report (Gallegos 2010) notes that there is a low potential that a CWE would occur from proposed treatments in subwatersheds 501.5005 and 501.5006. Evidence of existing CWE in the Long Meadow Creek portion of subwatershed

501.5005 and planned mechanical treatments in the SMZ of Long Meadow make this subwatershed vulnerable to CWE. Planned treatments from the Sugar Pine Project in subwatershed 501.5006 will result in ERA approaching the upper TOC for CWE and make this subwatershed vulnerable to CWE.

Stream Shading**:** Current and foreseeable actions and Alternative 2 would include SMZs (including private land operating under Timber Harvest Plans). It is expected that riparian canopy cover would be maintained at current levels as described under Indirect Effects.

Water Temperature**:** Changes to flow would be similar to those described under Indirect Effects. Riparian canopy cover would be anticipated to remain at current levels based on use of Class I SMZs (minimum 100 ft) that include no action within the inner 50 ft, thus a cumulative effect to water temperature through implementation of Alternative 2 would not be anticipated.

Summary of Effects

Table 23 summarizes overlap of potential habitat by other Actions and the Fish Camp Project. Most of the Forest Service actions over the past decade, along with those proposed in the next decade, relate to cattle grazing, fuels reduction or forest thinning. These actions have BMP (USDA – Forest Service 1983, 2002), along with Forest standards and guidelines to restrict off-site erosion and activities within SMZ. BMPs have also been developed to reduce effects from livestock grazing and movement of cattle through riparian zones. Literature has shown BMPs to be effective in minimizing the erosion in treatment areas and at preventing sediment from reaching streams. In a study of sediment redistribution after harvesting, Wallbrink and Croke (2002) found that sediment derived from skid trails was deposited both within the treated area and the stream buffers (23-30 m). BMPs are expected to protect stream channels from sediment for treatments areas near streams. Monitoring of BMP on Forest Service lands in California has shown that, when implemented, timber management BMP are 95-98% effective (USDA- Forest Service 2004a) at protecting stream channels.

Table 23: Acres of habitat cumulatively affected under Alternative 2. (*lacustrine/riverine miles converted to acres assuming 10 ft wide stream)

Species	Potential habitat (ac)	Grazing Primary Use (ac)	Rec/OHV Effected (ac)	Sugar Pine (ac)	Fish Camp (ac)	Fire (ac)	Roads (ac)	Cum. Effect (ac)	% Habitat Affected
Sierra Nevada yellow-legged frog	1020	141	27	7	39	0	10	224	22
Yosemite toad	8140	1196	6	449	505	26	20	2205	27
Lacustrine/riverine*	35	4	1	0	0	0	0.1	5	14
Wet meadow	217	217	0	0	0	0	2	217	100

It is not expected that the Fish Camp Project (Alternative 2), in addition to other activities in the Project area subwatersheds, would contribute to cumulative effects to MYLF or Yosemite toad, nor to lacustrine/riverine or wet meadow habitats.

Alternative 3 (Lower and Limited Mid-Level Canopy Treatments, All Treatment Areas

In Alternative 3, treatment areas would remain the same as in Alternative 2, treatments within these areas would include only those needed to reduce the surface and ladder fuels (within the lower and limited mid-level canopy levels) needed to achieve fire and fuels objectives. Under

Alternative 3 there would be no additional treatments (i.e. additional thinning in the mid-level canopy) to fully address stand density and forest health objectives.

This alternative would receive treatment only to achieve fire and fuels objectives and limit treatments to mechanical clearing of ladder and surface fuels. As such, all design criteria and SNFPA ROD (USDA- Forest Service 2004) standards and guidelines associated with Pacific Fisher would be implemented with this alternative. Of the 5700 total acres within the Project boundary, approximately 1200 acres were analyzed as areas where some form(s) of treatment are proposed (so named as treatment areas). The remaining 4500 acres have no treatments proposed due to slopes greater than 35 percent, standard and guideline limitations on treatment and/or no treatment is needed to meet the purpose and need. Table 21 for Alternative 2 would also represent treatments by subwatershed. Table 22 from Alternative 2 also represent overlap of treatments and species habitat for Alternative 3.

Direct Effects

Similar to Alternative 2 there is an overlap between proposed activities and potential effects on MYLF and YT. Potential direct effects could occur from crushing of individual animals by tractor thinning, tractor piling, or mastication, or from burning of animals.

Introduced fire could directly affect herpetofauna similar to Alternative 2. Allowing fire to creep into the SMZ (as opposed to active introduction) would provide opportunity for herpetofauna to move away from areas burning, but not eliminate the possibility of mortality.

Similar to Alternative 2, it would be expected that direct effects to herpetofauna or habitat from Alternative 3 would be limited due to project design measures; non-detection of listed species during surveys; and nearest known occupied sites are not within species dispersal distance of project treatment areas. Buffers along wet meadows and perennial streams are anticipated to provide protection from direct and indirect effects. Any increases in soil moisture would be expected to be utilized by the remaining vegetation, so it would not likely be available for stream flow. No changes to direct or indirect effects on meadow hydrology are anticipated as a result of implementing Alternative 2.

Indirect Effects

Thinning to reduce ladder fuels, mastication, and underburning would occur on over the same acreage analyzed under Alternative 2. Table 22 in Alternative 2 identifies that treatment areas represent approximately 40 acres of Sierra Nevada yellow-legged frog; and 505 acres of BUCA habitat. Alternative 3 has a risk of compacting soil (tractor thinning, mastication, new road construction, and machine piling or slash), which could result in both short and long-term sediment delivery to riparian and aquatic habitats. Implementation of Best Management Practices (USDA – Forest Service 1983; 2002); streamside management zones; and project design criteria are expected to reduce the potential for sedimentation and protect aquatic habitat (Stone 2010).

As noted under Alternative 2, reduction in stand densities could affect canopy cover (indirectly affecting micro-climate and water temperatures), availability of LWD; macroinvertebrate community, and changes to water yield (indirectly affecting stream channel stability). Most of the indirect effects to herpetofauna would be related to habitat alteration. Thinnings are proposed within the red fir and Sierra mixed-conifer CWHR types. The primary changes may reduce size groups and reduce density for a 20-30 year period. CWHR habitat quality would remain unchanged for both species based on projected stands following thinning. Changes to microclimate (such as increased air temperatures, reduced soil moisture, and lower relative humidity) within treated areas may not be accounted for at the CWHR scale, but the reduction in mid-canopy tree removal under Alternative 3 may represent reduced effects to microclimate.

Stream Shading: Similar to Alternative 2, there would be no alteration to current stream shading.

Water temperature: Similar to Alternative 2, there would be no anticipated alterations to canopy cover, thus there would be no direct effects on water temperature expected from Alternative 3.

Cumulative Effects

Past, present, and reasonably foreseeable actions within the Project areas would be as displayed under Alternative 2. Acres of habitat potentially affected would be similar to Table 23 under Alternative 2. Effects to Stream Shading, Water Temperature and CWE would be similar to Alternative 2.

Summary of Effects

Table 23 under Alternative 2 summarizes overlap of potential habitat by other Actions and Fish Camp. Most of the Forest Service actions over the past decade, along with those proposed in the next decade, relate to cattle grazing, fuels reduction or forest thinning. These actions have Best Management Practices (USDA – Forest Service 1983,2002), along with Forest standards and guidelines to restrict off-site erosion and activities within Streamside Management Zones. BMPs have also been developed to reduce effects from livestock grazing and movement of cattle through riparian zones. Literature has shown BMPs to be effective in minimizing the erosion in treatment areas and at preventing sediment from reaching streams. In a study of sediment redistribution after harvesting, Wallbrink and Croke (2002) found that sediment derived from skid trails was deposited both within the treated area and the stream buffers (23-30 m). BMPs are expected to protect stream channels from sediment for treatments areas near streams. Monitoring of BMP on Forest Service lands in California has shown that, when implemented, timber

It is not expected that Alternative 3, in addition to other activities in the Project area subwatersheds, would contribute to cumulative effects MYLF frog or YT, nor to lacustrine/riverine or wet meadow habitats.

Other Relevant Mandatory Disclosures

Tables 24 and 25 display determination of effects on threatened, endangered, and sensitive herpetofauna based on known information on species, habitat available, literature review, and anticipated effects. Lacustrine/riverine and wet meadow habitats would be anticipated to remain stable under any of the alternatives.

Table 24: Effects from Alternative 1 on aquatic threatened, endangered, and sensitive species.

Species	Determination	Rationale for the Determinations for Proposed Action
MYLF	***No effect***	No anticipated impacts to species or habitat
YT	***No effect***	No anticipated impacts to species or habitat

Table 25: Effects from Alternatives 2 and 3 on aquatic threatened, endangered, and sensitive species.

Species	Determination	Rationale for the Determinations for Proposed Action
MYLF	***May affect individuals, but is not likely to lead to federal listing or loss of viability.***	• Not detected within the Project area during surveys • Proposed treatments not anticipated to reduce quality of CWHR habitat. • Nearest known occupied site is 1.3 miles from any treatment area, which is beyond dispersal range of species.
YT	***May affect individuals, but is not likely to lead to federal listing or loss of viability.***	• Species was not located during Forest-wide surveys between 2002-2004, or during project surveys. • No occupied meadows are occupied within Project area subwatersheds • Nearest occupied meadows are beyond (> 1.5 miles) CWHR dispersal distance of species (0.6 mi) from any proposed treatment unit. • Proposed treatments not anticipated to reduce quality of CWHR habitat.

Terrestrial Management Indicator Species

The purpose of the terrestrial MIS report is to evaluate and disclose the impacts of the Fish Camp Project on the habitat of terrestrial Management Indicator Species (MIS) identified in the SNF LRMP (USDA-FS 1992) as amended by the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (USDA-FS 2007a). The MIS report documents the effects of the Proposed Action and alternatives on the habitat of selected project-level MIS. The direct, indirect and cumulative effects to the terrestrial management indicator species are summarized from the Terrestrial Management Indicator Species Report for the Fish Camp Project (Otto 2010).

MIS are animal species identified in the SNF MIS Amendment Record of Decision (ROD) signed December 14, 2007, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). The current rule applicable to project decisions is the 2004 Interpretive Rule, which states "Projects implementing land management plans…must be developed considering the best available science in accordance with §219.36(a)…and must be consistent with the provisions of the governing plan." (Appendix B to §219.35). Guidance regarding MIS set forth in the Sierra NF LRMP (USDA-FS 1992) as amended by the 2007 SNF MIS Amendment ROD 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 Sierra NF LRMP (USDA-FS 1992) as amended.

Affected Environment

MIS Habitat Status and Trend

All habitat monitoring data are collected and/or compiled at the bioregional scale, consistent with the SNF LRMP (USDA-FS 1992) as amended by the 2007 Sierra NF MIS Amendment ROD (USDA Forest Service 2007a).

Habitats are the vegetation types (for example, early seral coniferous forest) or ecosystem components (for example, 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-FS 2007a and project record). 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 (ibid). Tables explaining the acronyms used for available habitat stages in the CWHR system is described in detail in the Sierra NF Bioregional MIS Report (USDA-FS 2008).

Habitat status is the current amount of habitat on the Sierra Nevada Forests. 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 Sierra NF Bioregional MIS Report (USDA-FS 2008).

MIS 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 Sierra NF MIS Amendment ROD (USDA-FS 2007a). The information is presented in detail in the 2008 Sierra NF Bioregional MIS Report (USDA-FS 2008).

Population monitoring strategies for MIS of the Sierra NF are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment ROD (USDA-FS 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-FS 2001, 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-FS 2007a). Distribution population monitoring consists of collecting presence data for the MIS across a number of sample locations over time. Presence 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 assessed to track changes in distribution over time vary by species and the type of presence data collected, as described in the Sierra NF Bioregional MIS Report (USDA-FS 2008).

Methodology for Analysis

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 analysis area.

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 Sierra NF LRMP as amended by the SNF MIS Amendment ROD identifies distribution population monitoring for an MIS, the project-level habitat 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 Sierra NF LRMP, as amended, for MIS analyzed for the Fish Camp Project is summarized in Section 3 of the Terrestrial MIS report.

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 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 draft document “MIS Analysis and Documentation in Project-Level NEPA, R5 Environmental Coordination” (May 25, 2006). This Management Indicator Species (MIS) Report documents application of the above steps to select project-level MIS and analyze project effects on MIS habitat for the Fish Camp Project.

Mitigation and Monitoring

Special project design measures for the Fish Camp Project were developed in concert with the BLRD interdisciplinary team, PSW Research scientists, and concerned public participation groups. These design measures would be implemented under either of the two action alternatives. Within this Project area special considerations have been given to maintaining higher levels of biodiversity through actions such as delineating Old Forest Linkages (OFLs) surrounding perennial streams (see Terrestrial Wildlife BE/BA Otto 2010 for a description of OFLs). Higher levels of biodiversity have also been planned for by marking retention groups of large diameter trees. 473 such tree groups were identified in the Fish Camp Project area. Ideally, when available on the landscape these groups also contain “defect” trees: those that have cavity and platform creating defects such as mistletoe, rot, forked tops, broken limbs, and broken tops. No trees greater than 20” dbh would be cut within these groups. These large tree groups would have a residual basal area of 240 ft^2 or more for mixed conifer and 210 ft^2 or more for pine and in many instances may reach 300 to 400 ft^2 per acre.

Another project design measure which would maintain biodiversity is the identification of retention areas around large oaks within treatment units. Two to three large oaks per acre were identified and marked with paint. These oaks would retain a zone of no activity around them measuring 35 feet, or dripline circumference around the oak (whichever is greater). The delineation of OFLs, retention of large tree groups, and oak no treatment zones would ensure a heterogeneous post treatment landscape resulting in the continued accessibility of both hiding cover and prey availability within these areas of biodiversity (USDA-FS 2010).

The project is designed to improve habitat conditions through the acceleration of late-successional habitat characteristics, while still maintaining current functional habitat. Specific project design criteria include: canopy cover would be maintained at 50 to 60% or greater where available; ground disturbance would be limited to those guidelines with the LRMP as amended; vegetation species diversity and composition would be maintained; management activities would be limited in designated riparian management areas; and retention of snags and downed logs would be retained at levels defined in the Design Criteria Common to All Action Alternatives. All riparian management areas within the project have been identified and buffers established. In addition, no operations would occur during the wet weather season. (USDA-FS 2010)

Table 26: Selection of MIS for Project-Level Habitat Analysis for the Fish Camp Project.

Habitat or Ecosystem Component	**CWHR Type(s) defining the habitat or ecosystem component[1]**	**Sierra Nevada Forests Management Indicator Species** ***Scientific Name***	**Category for Project Analysis [2]**
Riverine & Lacustrine[†]	lacustrine (LAC) and riverine (RIV)	aquatic macroinvertebrates	N/A
Shrubland (west-slope chaparral types)	montane chaparral (MCP), mixed chaparral (MCH), chamise-redshank chaparral (CRC)	fox sparrow *Passerella iliaca*	Cat. 3
Sagebrush	Sagebrush (SGB)	greater sage-grouse *Centrocercus urophasianus*	Cat. 1
Oak-associated Hardwood & Hardwood/conifer	montane hardwood (MHW), montane hardwood-conifer (MHC)	mule deer *Odocoileus hemionus*	Cat. 2

Riparian	montane riparian (MRI), valley foothill riparian (VRI)	yellow warbler *Dendroica petechia*	Cat. 2
Wet Meadow[†]	Wet meadow (WTM), freshwater emergent wetland (FEW)	Pacific tree frog *Pseudacris regilla*	N/A
Early Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, and 3, all canopy closures	Mountain quail *Oreortyx pictus*	Cat. 3
Mid Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures	Mountain quail *Oreortyx pictus*	Cat. 3
Habitat or Ecosystem Component	**CWHR Type(s) defining the habitat or ecosystem component[1]**	**Sierra Nevada Forests** **Management Indicator Species** ***Scientific Name***	**Category for** **Project Analysis [2]**
Late Seral Open Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P	Sooty (blue) grouse *Dendragapus obscurus*	Cat. 2
Late Seral Closed Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D), and tree size 6.	California spotted owl *Strix occidentalis occidentalis* American marten *Martes americana* northern flying squirrel *Glaucomys sabrinus*	Cat. 2
Snags in Green Forest	Medium and large snags in green forest	hairy woodpecker *Picoides villosus*	Cat. 3

Snags in Burned Forest	Medium and large snags in burned forest (stand-replacing fire)	black-backed woodpecker *Picoides arcticus*	Cat. 1

[1] All CWHR size classes and canopy closures are included unless otherwise specified; **dbh** = diameter at breast height; **Canopy Closure classifications:** S=Sparse Cover (10-24% canopy closure); P= Open cover (25-39% canopy closure); M= Moderate cover (40-59% canopy closure); D= Dense cover (60-100% canopy closure); **Tree size classes:** 1 (Seedling)(<1" dbh); 2 (Sapling)(1"-5.9" dbh); 3 (Pole)(6"-10.9" dbh); 4 (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)(≥24" dbh); 6 (Multi-layered Tree) [In PPN and SMC] (Mayer and Laudenslayer 1988).

[2] **Category 1:** MIS whose habitat is not in or adjacent to the Project area and would not be affected by the project.

Category 2: MIS whose habitat is in or adjacent to Project area, but would not be either directly or indirectly affected by the project.

Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

[†] Species in these categories will be analyzed separately under the aquatic species MIS report for the Fish Camp Project

Category 1 MIS

Species that will not be discussed further in this document include Category 1 and Category 2 MIS. Category 1 defines MIS whose habitat does not occur in or adjacent to the Project area. For the Fish Camp, Project Category 1 MIS include the greater sage-grouse and the black-backed woodpecker. No sagebrush (SGB) or burned forest habitat is currently present in or adjacent to the Project area.

Category 2 MIS

Category 2 defines MIS whose habitat is in or adjacent to the Project area, but whose habitat would not be directly or indirectly affected by the project. For the Fish Camp Project, Category 2 MIS include: yellow warbler, sooty grouse, mule deer, California spotted owl, American marten, and northern flying squirrel. Though habitat for these species occurs within or adjacent to the Project area, that habitat will not be directly or indirectly affected by the project. The primary reasons for this appraisal are the Fish Camp Project design features which limit the activities reducing canopy closure. These design features, as well as applicable Forest Service standards and guidelines protecting species habitats, are discussed further in the following sections of this document for each Category 2 MIS.

Category 3 MIS

The MIS whose habitat would be either directly or indirectly affected by the Fish Camp Project, identified as Category 3, are carried forward in this analysis, which will evaluate the direct, indirect, and cumulative effects of the Proposed Action and alternatives on the habitat of these MIS. The MIS selected for project-level MIS analysis for the Fish Camp Project are: fox sparrow, mountain quail, and hairy woodpecker.

Table 27: Summary of Treatments with pre- and post-treatment CWHR type acres for Alternatives 1 and 3

CWHR Forest Structure Class	Alternative 1 Current Structural Class Acres Project boundary	Structural Class Acres within Commercial Thinning Treatment Units	Structural Class Acres within Mastication and Prescribed Burn Treatment Units	Percent of Structural Class Acres in Project boundary within Proposed Treatment Units	Alternative 2 Post-Treatment Projected changes to CWHR Structural class acres	Alternative 2 Post-Treatment CWHR structural class acres Project boundary	Alternative 3 Post-Treatment CWHR structural class acres Project boundary*
BAR	38	0	5	12%	0	38	38
JPN2S	170	1	33	20%	0	170	170
JPN3M	55	2	0	4%	0	55	55
JPN3P	42	8	0	19%	0	42	42
JPN3S	18	0	0	0%	0	18	18
JPN4D	40	7	0	0%	0	40	40
JPN4M	466	262	0	56%	0	466	466
JPN4P	29	4	0	14%	0	29	29
JPN4S	53	4	0	8%	0	53	53
LAC	15	0	0	0%	0	15	15
MCH	4	0	0	0%	0	4	4
MCP	189	13	0	7%	0	189	189
MHC4M	1	0	0	0%	0	1	1
MHW3D	13	1	0	8%	0	13	13
MRI	6	0	0	0%	0	6	6
PPN2S	80	3	0	4%	0	80	80
PPN3D	7	0	0	0%	0	7	7
PPN3P	48	5	37	88%	0	48	48
PPN4D	**54**	**41**	**0**	**80%**	**-9**	**45**	**54**
PPN4M	**83**	**25**	**5**	**36%**	**+9**	**92**	**83**
PPN4P	58	18	0	31%	0	58	58
PPN4S	6	1	0	17%	0	6	6
RDWD4D	4	2	0	50%	0	4	4
RFR2D	8	0	4	50%	0	8	8
RFR3D	7	0	0	0%	0	7	7
RFR3M	25	0	0	0%	0	25	25
RFR4D	63	0	1	2%	0	63	63
RFR4M	27	0	0	0%	0	27	27
RFR4P	32	0	0	0%	0	32	32
RFR4S	66	0	0	0%	0	66	66
RFR5M	10	0	0	0%	0	10	10

RFR5D	229	0	0	0%	0	229	229
RFR5P	2	0	0	0%	0	2	2
RFR5S	5	0	0	0%	0	5	5
SMC2D	8	1	0	13%	0	8	8
SMC2M	20	1	0	5%	0	20	20
SMC2P	9	0	1	11%	0	9	9
SMC2S	25	0	0	0%	0	25	25
SMC3D	16	0	0	0%	0	16	16
SMC3M	24	0	0	0%	0	24	24
SMC3P	40	0	0	0%	0	40	40
SMC3S	5	0	0	0%	0	5	5
SMC4D	**1708**	**331**	**110**	**26%**	**-22**	**1686**	**1708**
SMC4M	**914**	**196**	**7**	**22%**	**+22**	**936**	**914**
SMC4P	120	15	0	13%	0	120	120
SMC4S	174	17	32	28%	0	174	174
SMC5D	232	2	0	1%	0	232	232
SMC5M	71	0	0	0%	0	71	71
SMC5P	3	0	0	0%	0	3	3
WFR5D	31	0	0	0%	0	31	31
WTM	87	0	0	0%	0	87	87
Total Analysis Area Acres	**5440**	**960**	**235**		**CWHR Density change 31acres D to M**	**5440**	**5440**

MIS Project-level Effects Analysis for Category 3 MIS

1. Shrubland (West-Slope Chaparral) Habitat (Fox Sparrow)

Current Condition of the Habitat Factor(s) in the Project area: There are a total of 193 acres of shrub-land (chaparral) habitat within the Project boundary. 189 acres are classified as montane chaparral (MCP) and the remaining 4 acres are classified as mixed chaparral (MCH). Of the 193 acres of chaparral within the Project boundary, only 7%, or 13 acres occur within proposed treatment units. Please refer to (Fish Camp CWHR Data Table, Project area, Present Compared to Alternative 2 Proposal) for a full breakdown of all CWHR habitat types within the Project boundary pre- and post-treatment.

Alternative 1 – No Action

Alternative 1 is the No Action alternative. Under the No Action alternative, current management plans would continue to guide management of the Project area. This includes all ongoing activities with existing decisions or permits that would not be changed if this alternative were selected including: plantation maintenance under separate document, cattle grazing, recreation, and recreation residences. The No Action Alternative would not implement the Fish Camp Project to reduce fire ladder conditions (thinning); pile slash for burning; burn slash piles; masticate and/and or precommercially thin stands; plant trees; reduce fuel loading through controlled burning; construct handline around jackpot burn areas; or reconstruct roads.

Direct and Indirect Effects to Habitat: There are no direct effects to shrubland habitat under this alternative as it does not propose any actions. There is a potential for indirect effects under the No Action alternative as the continued immediate threat of wildfire would remain unabated. In failing to make an attempt at density management of the stands, the eventual changes through drought stress and subsequent insect and disease mortality acceleration would exacerbate the threat of stand replacing fire. Additionally, the high probability of a drying climate change throughout the Western United States would have the potential to further compound these effects (USDA-FS 2009a, Stalter 2008, Smith 2008).

Cumulative Effects to Habitat in the Analysis Area: As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Alternative 2 – Proposed Action

Direct and Indirect Effects to Habitat: Under Alternative 2 direct effects to 13 acres of shrubland habitat are proposed through mastication and prescribed burning treatments. These 13 acres would be treated to maintain the growth and vigor of existing trees, or to create conditions suitable for the establishment of planted trees. The change in seral stage of 13 acres of chaparral out of 189 acres within the Project boundary is a treatment of 7% of the total chaparral available within the Fish Camp Project boundary. There are an additional 180 acres of shrubland habitat identified within the Project boundary that are not proposed for treatment under the Proposed Action alternatives and would continue to provide suitable habitat for fox sparrow during implementation of mastication and burning activities.

Cumulative Effects to Habitat in the Analysis Area: A table of current and future projects within the analysis area for the Fish Camp Project can be found in the Fish Camp DEIS Chapter

3. This project proposes to treat 7% of the existing shrubland within the Project boundary. Further activities taking place within the cumulative effects boundary that may alter shrubland habitat include road brushing and plantation maintenance. These activities may alter a very small percentage of the available shrubland habitat through removal of aging chapparal bordering roads and inside plantations, resulting in natural regeneration of early seral stage chaparral habitat.

Alternative 3

Direct, Indirect, and Cumulative Effects to Habitat and Conclusion: The proposed treatments for the shrubland habitat within Alternative 3 are the same as for Alternative 2, therefore the direct, indirect, and cumulative effects for Alternative 3 would be the same as those discussed under the Proposed Action.

Summary of Fox Sparrow Status and Trend at the Bioregional Scale

The Sierra NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the fox sparrow; hence, the shrubland effects analysis for the Fish Camp 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 Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Habitat Status and Trend: There are currently 922,000 acres of west-slope chaparral shrubland habitat on National Forest System lands in the Sierra Nevada. Within the last decade, the trend is stable.

Population Status and Trend: The fox sparrow has been monitored in the Sierra Nevada at various sample locations by avian point counts and breeding bird survey protocols, including: 1997 to present – Lassen National Forest (Burnett and Humple 2003, Burnett et al. 2005); 2002 to present - Plumas and Lassen National Forests (Sierra Nevada Research Center 2007); on-going monitoring through California Partners in Flight Monitoring Sites (CPIF 2002); 1992 to 2005 – Sierra Nevada Monitoring Avian Productivity and Survivorship (MAPS) stations (Siegel and Kaschube 2007); and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that fox sparrows continue to be present at these sample sites, and current data at the rangewide, 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 193 acres of shrubland habitat that exists within the Project boundary account for less than 0.02% of the 922,000 acres that exists at the bioregional scale, and only 13 of these acres are proposed for treatment. Therefore, cumulative impacts within the CE boundary would not alter the existing bioregional trends in this habitat, nor would they lead to a change in the distribution of fox sparrows across the Sierra Nevada bioregion.

2. Early and Mid Seral Coniferous Forest Habitat (Mountain quail)

Current Condition of the Habitat Factor(s) in the Project area: There are currently 3,627 acres of early and mid seral coniferous forest habitat within the Fish Camp Project boundary. Of these, 658 acres (18%) are within proposed treatment units. Refer to (Fish Camp CWHR Data Table, Project area, Present Compared to Alternative 2 Proposal) of this report for a full breakdown of all CWHR habitat types within the Project boundary pre- and post-treatment.

Alternative 1 – No Action

Direct and Indirect Effects to Habitat: There would be no direct effects to early and mid seral coniferous habitat under this alternative. There is a potential for indirect effects under the No Action alternative as the continued immediate threat of wildfire would remain unabated. In failing to make an attempt at density management of the stands, the eventual changes through drought stress and subsequent insect and disease mortality acceleration would exacerbate the threat of stand replacing fire. Additionally, the high probability of a drying climate change throughout the Western United States would have the potential to further compound these effects (USDA-FS 2011, Stalter 2008, Smith 2008).

Cumulative Effects to Habitat in the Analysis Area and Conclusion:

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Alternative 2 – Proposed Action

Direct and Indirect Effects to Habitat: Under Alternative 2, minimal changes in CWHR composition of early and mid seral coniferous habitat are proposed for less than 1% of the 3,627 acres of habitat within the Project boundary. These changes are projected to occur on 31 acres spread across 11 treatment units. 9 acres of PPN4D would be converted to PPN4M and 22 acres of SMC4D would be converted to SMC4M through proposed mechanical thinning treatments. The remaining 3,596 acres of early and mid seral coniferous habitat within the treatment analysis acres will not experience a change in CWHR habitat type, size, or density under the Alternative 2 proposal. Due to the thinning prescriptions proposed, additional seral stage changes beyond those described will not change. Stands will merely reflect less density. Where stand density is at 60% or greater, it will not be brought below this level. It is expected that those stands treated will experience better health, vigor, and growth and will be less susceptible to wildfires.

Cumulative Effects to Habitat in the Analysis Area and Conclusion: Many of the ongoing management activities within the cumulative effects boundary will not contribute to significant cumulative impacts upon early and/or mid seral coniferous forest habitat. Of the cumulative effects actions elevated within the analysis area private land residential development, roadside hazard tree removal, on-going plantation maintenance, and past and future timber sale activity have the greatest potential to alter early and mid seral coniferous habitat. Additional effects through Alternative 2 proposed canopy cover changes of 0.5% of the total habitat in the cumulative effects boundary are insignificant, especially when one considers the vast amount of available early and mid seral coniferous habitat present within the cumulative effects boundary.

Alternative 3

Direct, Indirect, and Cumulative Effects to Habitat and Conclusion: The proposed treatments for the early and mid seral stage coniferous habitat within Alternative 3 are very limited in scope and will not change any CWRH habitat type, size, or density, therefore no direct effects to early and mid seral coniferous habitat would be expected to occur with implementation of Alternative 3.

Indirect effects can be expected by failing to make an attempt at density management of the stands, the eventual changes through drought stress and subsequent insect and disease mortality acceleration would exacerbate the threat of stand replacing fire. Additionally, the high probability of a drying climate change throughout the Western United States would have the potential to further compound these effects. (USDA Forest Service 2011, 2010c, 2010d).

Summary of Mountain Quail Status and Trend at the Bioregional Scale

The Sierra NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the mountain quail; hence, the early and mid seral coniferous forest effects analysis for the Fish Camp 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 mountain quail. This information is drawn from the detailed information on habitat and population trends in the SNF Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 546,000 acres of early seral and 2,766,000 acres of mid seral coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat on National Forest System lands in the Sierra Nevada. Within the last decade, the trend for early seral is slightly decreasing (from 9% to 5% of the acres on National Forest System lands) and the trend for mid seral is slightly increasing (from 21% to 25% of the acres on National Forest System lands).

Population Status and Trend. The mountain quail has been monitored in the Sierra Nevada at various sample locations by hunter survey, modeling, and breeding bird survey protocols, including California Department of Fish and Game hunter survey, modeling, and hunting regulations assessment (CDFG 2004a, CDFG 2004b) and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that mountain quail continue to be present across the Sierra Nevada, and current data at the rangewide, 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 3,627 acres of early and mid seral coniferous habitat that exists within the Project boundary account for less than 0.1% of the 2,766,000 acres that exists at the bioregional scale. The change in canopy closure of 31 acres out of 2,766,000 acres of early and mid seral coniferous habitat in the Sierra Nevada bioregion 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.

3. Snags in Green Forest Ecosystem Component (Hairy woodpecker)

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. The hairy woodpecker uses 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

Current Condition of the Habitat Factor(s) in the Project area:

Prior to 2004, the forest implemented standards and guidelines (S&Gs) from the Sierra NF Land and Resource Management Plan (LRMP) (1991) which called for maintaining an average of 1.5 snags per acre in sizes 15-24" dbh and an average of 0.5 snags per acre in sizes 25" dbh or greater. All countable snags had to be 20' or greater height (S&G #64, p. 4-16). Additionally, a sufficient number of live trees had to be left in appropriate sizes to serve as replacement snags. The Sierra Nevada Forest Plan Amendment (SNFPA) (2004), modified the SNF LRMP with the followings guidelines: (1) in westside mixed conifer and ponderosa pine types, Forests should maintain 4 of the largest snags per acre, (2) in red fir forest type, they should maintain 6 of the largest snags per acre, (3) in eastside pine and mixed conifer forest types, they should maintain 3 of the largest snags per acre, and (4) in westside hardwood ecosystems, they should maintain 4 of the largest snags (hardwood or conifer) per acre, or if standing live hardwood trees lack dead branches, they should maintain 6 of the largest snags per acre (S&G #11, p. 51).

Current conditions within the Project boundary meet and in many areas exceed the snag and down woody material retention guidelines laid forth in the 2004 SNFPA. The following standards and guidelines for Snags and Down Woody Material apply to this project (SNFPA FSEIS ROD Pg. 51-52):

> Down Woody Material: "Determine down woody material 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. Consider the effects of follow-up prescribed fire in achieving desired down woody material retention levels." Typically 10-20 tons of down woody material per acre is acceptable from a fuel loading standpoint, and will retain sufficient material to provide for post-treatment habitat for down woody utilizing species, based on extrapolation of pre-European stand conditions.
>
> Snag Retention: "Design projects to implement and sustain a generally continuous supply of snags and live decadent trees suitable for cavity nesting wildlife across a landscape. Retain some mid- and large-diameter live trees that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure. When determining snag retention levels and locations, consider land allocation, desired condition, landscape position, potential prescribed burning and fire suppression line locations, and site conditions (such as riparian areas and ridge tops), avoiding uniformity across large areas.
>
> The general guidelines for large-snag retention are as follows:
>
> Westside mixed conifer and ponderosa pine types – four of the largest snags per acre.
>
> Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units. Consider leaving fewer snags strategically located in treatment areas within the WUI. When some snags are expected to be lost due to hazard removal or the effects of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels."

No snags are proposed to be removed in the Fish Camp project unless they meet the definition of a danger tree and are felled for safety (US Forest Service 2011).

Additional Design criteria common to all Action alternatives includes:

- Maintain highest canopy cover possible to meet the prescription within stands, aim for 50-60% immediately post-harvest.
- Thinning will not remove any trees larger than 30”dbh.
- Retain groups of larger trees (greater than 30”) at the rate of approximately one group per 2.5-3.5 acres. Ideally these groups would contain “defect” trees, those that have cavity and platform creating defects (mistletoe, rot, fork topped, broken limbs and tops) for den and rest sites.
- Retain largest snags and logs. Do not remove snags unless it is safety concern (project does not propose to remove snags). Retain largest logs to maximum allowed by fuel loading standards.

Alternative 1 (No Action)

Direct and Indirect Effects to Habitat. There is a potential for indirect effects under the No Action alternative as the continued immediate threat of wildfire would remain unabated. In failing to make an attempt at density management of the stands, the eventual changes through drought stress and subsequent insect and disease mortality acceleration would exacerbate the threat of stand replacing fire. Such a wildfire would convert current snags in green forest habitat to snags in burned forest habitat. Additionally, the high probability of a drying climate change throughout the Western United States would have the potential to further compound these effects (USDA Forest Service 2011, 2010c, 2010d). Other potential effects is snag development as there is a higher probability of insect and density related tree mortality over the life of the project.

Cumulative Effects to Habitat in the Analysis Area and Conclusion.
As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Alternative 2 (Proposed Action)

Direct, Indirect, and Cumulative Effects to Habitat and Conclusion. There would be minimal direct effects to snags under the Alternative 2 Proposed Action. Currently across the treatment units there are an average of 9 standing conifer snags per acre that are ≥11” dbh and 5 standing conifer snags per acre that are ≥18” dbh. No snags are proposed for removal by any of the action alternatives in the Fish Camp Project, except for in rare cases where they constitute a safety concern. Current conditions within the Project boundary meet and in many areas exceed the snag and down woody material retention guidelines laid forth in the 2004 SNFPA. It is reasonable to assume that a few stage 4 through 7 snags may be lost in prescribed fire treatment areas, however this treatment is also likely to produce stage 2 and 3 snags. It is not expected that removal of snags that pose a safety concern along roadways or in treatment units will alter the available snag levels below the current standards set forth in the ROD.

Alternative 3

Direct, Indirect, and Cumulative Effects to Habitat and Conclusion.

The proposed treatments for forest snags within Alternative 3 are the same as for Alternative 2, therefore the direct, indirect, and cumulative effects for Alternative 3 would be the same as those discussed under the Proposed Action.

Summary of Hairy Woodpecker Status and Trend at the Bioregional Scale
The Sierra NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the hairy woodpecker; hence, the snag effects analysis for the Fish Camp 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 SNF Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Ecosystem Component Status and Trend. The current (based on 2001-2004 inventory sources) 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 1.4 per acre in eastside pine to 8.3 per acre in white fir. Detailed information by forest type, snag size, and snag decay class can be found in the SNF Bioregional MIS Report (USDA Forest Service 2008).

Data from the mid-to-late 1990s 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 (+0.80), white fir (+1.98), and red fir (+0.68) and decreased within ponderosa pine (-0.17), productive hardwoods (-0.17), and eastside pine (-0.16).

Population Status and Trend. The hairy woodpecker has been monitored in the Sierra Nevada at various sample locations by avian point counts and breeding bird survey protocols, including 1997 to present – Lassen National Forest (Burnett and Humple 2003, Burnett et al. 2005); 2002 to present - Plumas and Lassen National Forests (Sierra Nevada Research Center 2007); 1992 to 2005 – Sierra Nevada Monitoring Avian Productivity and Survivorship (MAPS) stations (Siegel and Kaschube 2007); and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that the hairy woodpecker continues to be present at these sample sites, and current data at the rangewide, 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 5,440 acres of mid and late seral forest habitat that provides the green forest snag component within the Project boundary account for less than 0.1% of the 3,835,000 acres of mid and late seral coniferous forest habitat within the Sierra Nevada bioregion. Therefore, none of the alternatives would alter the bioregional trend in the snag component of the coniferous forest habitat, nor would they lead to a change in the distribution of the hairy woodpecker across the Sierra Nevada bioregion.

Hydrology/Water Quality

The direct, indirect and cumulative effects to the hydrologic resource and water quality are summarized from the Hydrology Report (Stone, A. 12/15/2010) and Cumulative Watershed Effects Analysis (Gallegos, A. 12/16/2010) for the Fish Camp Project.

Affected Environment

The Fish Camp Project is located in the South Fork Merced River 5th-field HUC Watershed. Big Creek, the principal drainage in the Project area, is tributary to the South Fork of the Merced River. The South Fork of the Merced is tributary to the Merced River, which flows to the San Joaquin River in the Central Valley of California. All of the discharge from Big Sandy Watershed, White Chief Branch and the headwaters of Big Creek at one time flowed into Big Creek but are now diverted by a flume into Lewis Fork, a tributary to the Fresno River. Up to 6000 acre-feet of water is diverted from Big Creek between December 1st and July 15th into the Lewis Fork. This diversion has occurred since the 1870s. Although severe degradation to tributary channels feeding Lewis Fork has occurred, the channel conditions have adjusted since the time of diversion to reach equilibrium. Table 28 provides a summary of the affected drainages and associated water bodies in the Project area. Figure 5 displays the location of perennial streams and watersheds associated with the project.

Table 28: Subdrainage Summaries.

Main Stream System(s)	Watershed (HUC 5)	Subdrainages (HUC 8)	Stream miles			
			Perennial	Intermittent/Ephemeral	Ephemeral	Total
Big Creek	SF Merced (1804000803)	501.5002 501.5004 501.5005 501.5006 501.5007 501.5008 501.5053 501.5054 501.7052	29	18	141	188

Summary of Existing Conditions

Although there is evidence that past activities that have caused watershed degradation, overall the channels and subdrainages appear to be recovering and reaching a state of equilibrium. The current condition for most of the stream reaches is good or fair for channel stability using modified Pfankuch, after Rosgen (2004) and this has been corroborated with Stream Condition Inventory data. There are, however, several areas within the proposed Project boundary that are unstable and sensitive to disturbance. Specifically, subdrainage 501.5005 has a sub-basin where CWE response is occurring, which includes Long Meadow. Ground disturbance from mechanized equipment should be minimized or avoided in this area, especially in designated SMZ’s. If the use of mechanized equipment will be essential to fulfilling the purpose and need, then consultation with the district hydrologist will be necessary for any work in the CWE response area (Figure 7).

Maintenance level 2 (“native surface”) roads throughout the Fish Camp Project area are in poor condition and many of these roads lack adequate drainage. This is increasing hydrologic connectivity in the project subdrainages, which is contributing to increased sediment input and overall watershed degradation resulting in CWE response in some areas.

The baseline or existing condition of most of the subdrainages is below the Lower TOC%, but subdrainages 501.5006, 501.5007, 501.5053 are over their Lower TOC%. When adding in the Proposed Action or Alternative 3, none exceeded the Upper TOC of 14%. All of the subdrainages have been inspected for CWE response in the field by an IDT or surveyed using various methods (e.g., SCI, Pfankuch). Overall, the project subdrainages did not appear to be experiencing a CWE response except a sub-basin within 501.5005 (Figure 7).

Water quality in the Project area is managed under the Central Valley Basin Plan for the San Joaquin and Sacramento River Basins (CVRWQCB, 2007). A water body or segment of a water body that does not meet (or is not expected to meet) water quality standards may be considered a “Water Quality Limited Segment” (WQLS). These WQLS’s are added biennially by the CVRWQCB to the Clean Water Act Section 303(d) list of impaired waters. As of this writing, none of the perennial drainages within the Project area are listed for impairment on the State’s 303(d) listing.

Cumulative Effects of no action would be displayed under the pre project condition of the CWE analysis. (Also see Cumulative Watershed Effects Report, Gallegos, 2010). Essentially the only watershed considered being at or near CWE prior to field investigations is a segment of 501.5005. Specifically, subdrainage 501.5005 has a sub-basin where CWE response is occurring, which includes Long Meadow. Ground disturbance from mechanized equipment should be minimized or avoided in this area, especially in designated SMZ’s. If the use of mechanized equipment will be essential to fulfilling the purpose and need, then consultation with the district hydrologist will be necessary for any work in the CWE response area (FLRMP, 2509.22 Supplement No. 1).

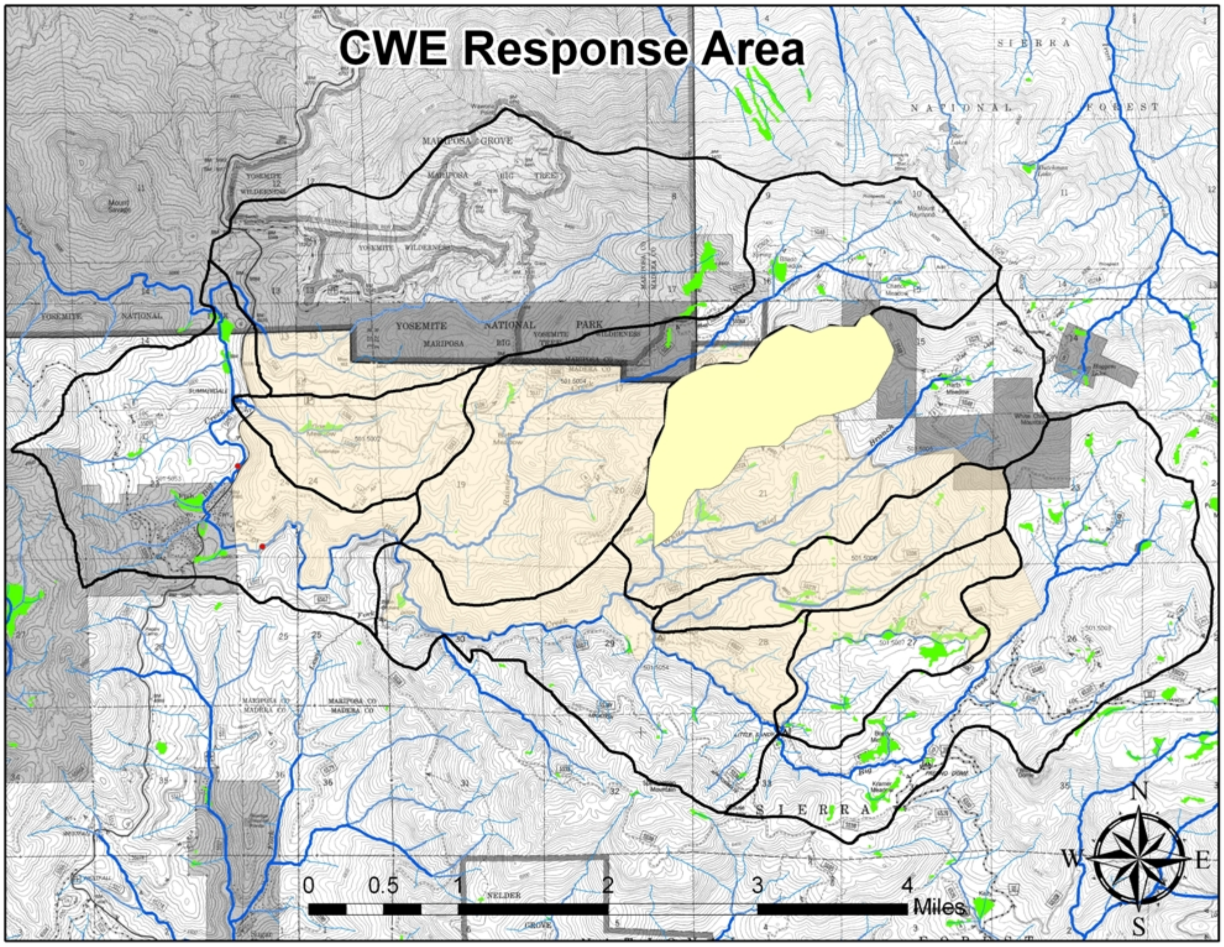

Figure 10: Subdrainages; Map showing the Fish Camp Project area with subdrainages, perennial streams, and meadows. The solid yellow polygon in subdrainage 501.5005 (see figure 5 for a subdrainage map) is the sub-drainage showing a CWE response.

Alternative 1 – No Action

Direct effects associated with not treating fuels in the Project area would result in a lost opportunity to reduce potential for catastrophic fire. This lost opportunity has the potential to affect not only the communities at risk; it also affects the riparian habitat and water quality in the Project area. As described in the affected environment, riparian areas have large amounts of organic material throughout the drainages. This material is not lying on the forest floor; it is intermingled with standing material. In the event of a catastrophic wildfire, riparian habitat, channel characteristics and riparian vegetation would be adversely affected.

Direct Effects

Direct effects of the No Action alternative would be continued increase of fuels in stream courses and continued watershed impacts from water and silt runoff of highly degraded road system.

Indirect Effects

Indirect effects of No Action alternative would be basin-wide increases of fuels in stream courses and continued watershed impacts from a highly degraded road system.

Cumulative Effects

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Table 29: Existing (Baseline) CWE Conditions.

Summary of Existing Disturbance Data for the Fishcamp Project area									
Subdrainage ID	**Subdrainage Acres**	**Sensitivity**	**Lower TOC**	**Allotment ERA**	**Roads ERA**	**Harvest ERA**	**Total ERA**	**Potential CWE**
501.5002	587.00	Moderate	5.0%	0.69	1.06	0.50	2.26	unlikely
501.5004	2,435.00	Moderate	5.0%	0.69	0.91	0.24	1.84	Unlikely
501.5005	2,228.00	Moderate	5.0%	0.89	0.86	0.75	2.50	Unlikely
501.5006	**638.00**	**Moderate**	**5.0%**	**0.95**	**0.71**	**10.74**	**12.40**	**Low**
501.5007	**668.00**	**Moderate**	**5.0%**	**1.23**	**0.56**	**6.28**	**8.07**	**Low**
501.5053	**1,816.00**	**Moderate**	**5.0%**	**0.78**	**1.45**	**4.57**	**6.80**	**Low**
501.5054	1,479.00	Moderate	5.0%	0.87	0.87	0.50	2.25	Unlikely
501.7052	2,892	Moderate	5.0%	0.06	1.38	0.46	1.91	Unlikely

Alternative 2 – Proposed Action

CWE response

Table 30: Activities proposed within Project area subdrainages u
(*approximate* maximum acres generated by GIS)

Subdrainage	**501.5002**	**501.5004**	**501.5005**	**501.5006**	**501.5007**	**501.5008**	**501.5053**	**501.5054**	**501.7052**	**Total**
Commercial or pre-commercial thinning or tractor piling	134	331	269	0	0	0	52	83	86	955
Mastication	0	0	35	5	0	12	0	0	0	52
Underburn	32	55	0	0	0	0	0	0	105	192
Subdrainage Acres	588	2436	2229	638	668	2261	1817	1480	2880	
% Subdrainage	28%	16%	14%	0.7%	0%	0.5%	3%	6%	7%	

Limited or no direct treatment would occur in SMZ's with the one exception being over stocked plantations adjacent to the Long Meadow complex (Figure 1). In general, all vegetation and fuel treatments conducted in RCA's would focus on improving forest health, enhancing or maintaining hydrologic function and maintaining or enhancing the key attributes of riparian habitats. Attributes comprise cool, moist soil conditions; high water quality; retention of large snags and down logs in sufficient quantities to provide habitat and woody debris recruitment in stream channels; and retention of woody material to provide stability to riparian and aquatic habitats. Well functioning channels have good riparian vegetation, good sediment transport, and stable streambanks. These characteristics work together to maintain channel function and stability.

A wide range of activity-specific BMP's are designed to minimize detrimental soil disturbance, protect water quality, maintain physical stability, and hydrologic connectivity of riparian and aquatic habitats. There is little potential for the Proposed Action to adversely affect the geomorphic, hydrologic, or riparian characteristics and aquatic habitats in affected subdrainages because of the low-impact characteristics of the proposed stand treatments, the limitations that would be imposed on operations within RCA's and SMZ's, and the use of activity-specific BMP's.

The greatest potential for the Proposed Action to affect the hydrologic connectivity of streams and aquatic habitat exists at stream crossings. To minimize the potential for project-related effects on hydrologic connectivity, existing crossings would be used whenever possible. In the event that it is necessary to construct a temporary crossing, the methods used for construction would be selected to avoid or minimize detrimental soil and vegetation disturbance and to maintain hydrologic connectivity between upstream and downstream features (Appendix 2 of the hydrology specialist report). All temporary crossings would be removed following the completion of project-related activities and would be treated as necessary to restore to pre-project conditions. Implementation of the activity-specific BMP's would further ensure that hydrologic connectivity in streams and special aquatic features are not adversely affected by the Proposed Action.

Common to All Subdrainages

No new roads are proposed to be constructed as part of the Fish Camp project because there are sufficient numbers to provide the necessary access to each of the treatment units. The existing road system, however, is currently in poor condition and in need of maintenance. In their current state of disrepair, the roads in the Project area are increasing hydrologic connectivity, contributing to increased sediment input and causing overall watershed degradation. This is contributing to CWE response in some areas. As part of the Timber Sale contract, all the roads to be used for project activities will be brought up to a maintenance level 3 standard (BMP 2-22). This includes maintaining roads in a manner that provides for water quality protection by minimizing rutting, failures, sidecasting, and blockage of drainage facilities, all of which can cause erosion, sedimentation, and deteriorating watershed conditions. Roads needed for project activities will be brought to current engineering standards of alignment, drainage, and grade before use, and will be maintained through the life of the project. Roads will be inspected at least annually to determine what work, if any, is needed to keep ditches, culverts, and other drainage facilities functional and the road stable.

Direct Effects

Direct effects are those occurring at the same time and place as the triggering action. The Proposed Action (Alternative 2) could directly affect hydrologic resources, primarily as a result of vegetation removal, temporary road construction, slash piling, and prescribed fire immediately following treatment; such activities could lead to soil disturbance and its associated effects on water quality and therefore aquatic habitats (e.g., accelerated erosion and sedimentation). Any soil displacement, compaction, or change in ground cover would cause a direct effect on watershed condition. Most treatment units have avoided crossing stream channels. The exception is Class V ephemeral draws. Fuels treatments have been laid out to utilize designated and/or existing crossings. Figure ?displays SMZ's assigned to streams in the Fish Camp Project area. Streamcourses are to be protected under on project design criteria. Any additional streams identified during operations would receive protection appropriate for the stream and the treatment.

Subdrainage 501.5005

14% of this 2,229 acre subdrainage is planned for treatment (Table 30). Of all project subdrainages, the most acute changes in ERA% with the Proposed Action occurred in subdrainages 501.5005 and 501.5004. An IDT evaluation for CWE response found that a sub-basin within subdrainage 501.5005 was contributing excess sediment into Long Meadow creek and portions of White Chief Branch creek (Figure 5). The condition of Long Meadow is highly degraded as are the existing roads around the meadow. Approximately 270 acres of mechanical treatments are planned, which could further exacerbate the unstable watershed conditions around Long Meadow. Treatments throughout this subdrainage (in particular, units T-17c,d, T-19a,b, T-22b,c, T-28a,b,f) will use a "light-on-the-land" approach and avoid, any mechanical treatments within 100 feet of Long Meadow unless the purpose and need for forest health is not being met.

Under the current sale layout, some of the timber being removed from unit T-28b would require skidding up an adverse slope of more than 25% to FS road 5S22X A-spur or FS road 5S48. This could require more mitigation for winter-time closure than would be desirable, and as such, alternate egress from unit T-28b is being considered. The optimum route is to skid logs to FS road 5S22X C-spur. This would require skidding across the upper reaches of Long Meadow Creek (Figure 8). This segment of Long Meadow Creek is a class II/III (perennial/intermittent), and was observed to be in stable to moderately stable condition based on professional judgment (i.e., no SCI or Pfankuch surveys were conducted). Figure 10 shows three potential crossing locations (it is important to note that only one of these locations would be selected if used). Currently, there are unresolved archeological concerns in this area, which may preclude any skidding through this part of the unit; however, should a temporary stream crossing be allowed, it would strictly follow the design measures outlined in Appendix B be supervised by the district hydrologist, forest hydrologist, or forest fisheries biologist.

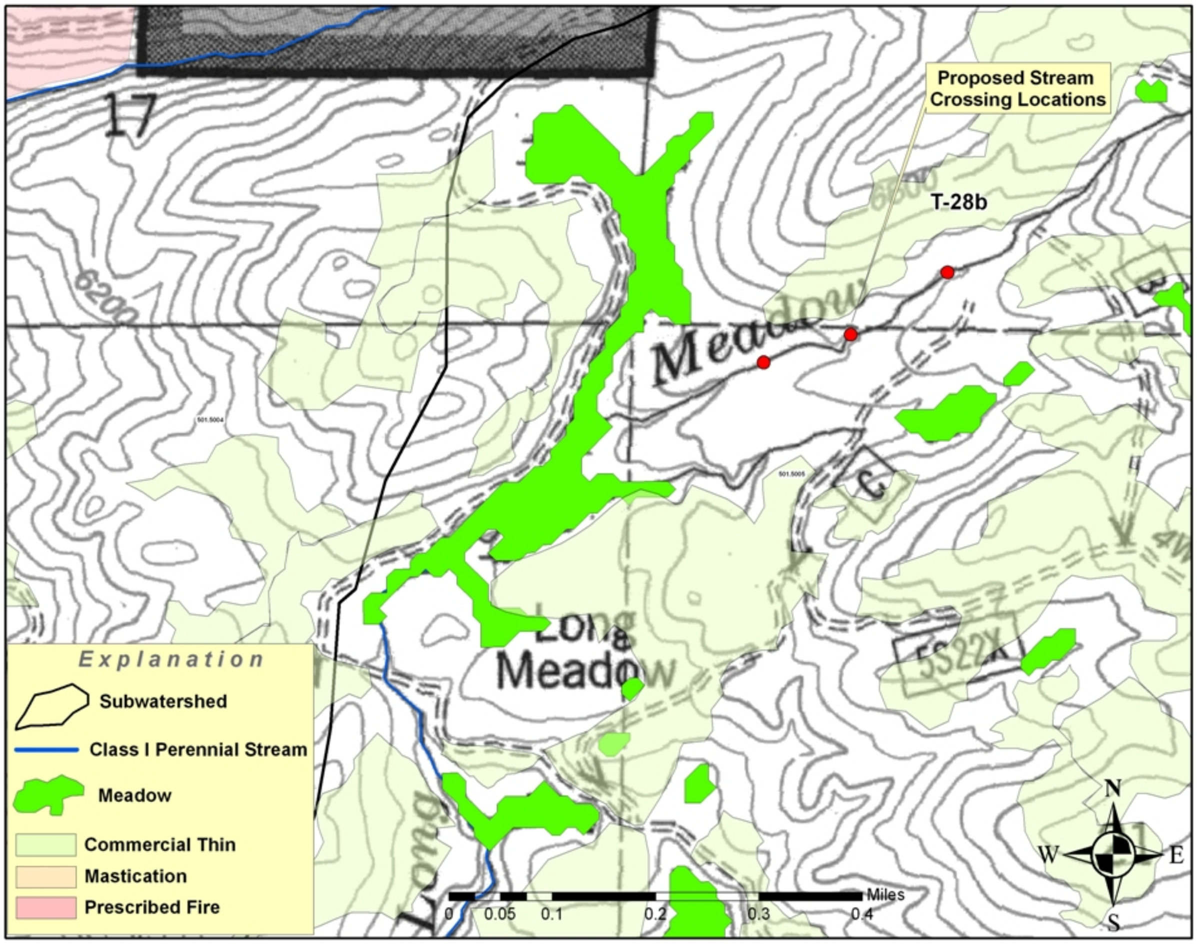

Figure 10: Three potential crossing locations for skidding logs out of Unit T-28b. Only one of the three locations would be used. A temporary crossing would be constructed following the design measure outlined in Appendix 2 of the hydrology specialist report.

Indirect Effects

Indirect effects are those that occur at a later time or at a distance from the triggering action. Indirect effects are expected to be minor. Design features incorporated into the project would be implemented to control erosion and sedimentation. The implementation of BMPs would avoid or minimize potential increases in sediment loads to streams during project implementation such that prescribed fires are not expected to affect water quality. Over the longer term, potential adverse effects on water and soils from implementing the Proposed Action are expected to be minor, and substantially less than if an uncontrolled wildfire were to occur.

Cumulative Effects

Table 31 shows the CWE results for the Fish Camp project. All of the subdrainages are considered moderately sensitive to disturbance (i.e., 5% Lower TOC). The baseline or existing condition of most of the subdrainages is below the Lower TOC%, but subdrainages 501.5006, 501.5007, 501.5053 are over their Lower TOC%. When adding in the Proposed Action, none exceeded the Upper TOC of 14%. All of the subdrainages have been inspected for CWE response in the field by an IDT or surveyed using various methods (e.g., SCI, Pfankuch). Descriptions of each subdrainage can be found in the Hydrology Specialist Report (Stone, 2010) or in the Cumulative Watershed Effects report (Gallegos, 2010.

An IDT evaluation for CWE response found that a sub-basin within subdrainage 501.5005 was contributing excess sediment into Long Meadow creek and portions of White Chief Branch creek (Figure 7). The condition of Long Meadow is highly degraded as are the existing roads around the meadow. Treatments throughout this subdrainage (i.e., T-17c,d, T-19b, T-22b,c, T-28f) should use a "light-on-the-land" approach and avoid any mechanical treatments within 100 feet of Long Meadow unless the purpose and need for forest health is not being met (see design measures section for a description of light-on-the-land equipment). Any activity proposed within the SMZ (i.e., the plantation adjacent to Long Meadow), would require a modified operation plan (FSH 2509.22, 3c, 14.17-4), which is outlined under the Design Measures section of this document.

None of the subdrainages exceeded the Upper TOC of 14% (Table 27). All of the subdrainages have been inspected for CWE response in the field by an IDT or surveyed using various methods (e.g., SCI, Pfankuch); Baseline and project CWE data and IDT observations suggest that there is a low potential for CWE response from the Proposed Action throughout the greater subdrainage 501.5005, but a localized CWE response is occurring in the Long Meadow sub-basin (Figure 7).

Table 31: Alternatives 2 and 3 CWE Conditions.

Summary of Disturbance Data with the Fishcamp Project								
Subdrainage ID	**Subdrainage Acres**	**Lower TOC**	**Allotment ERA**	**Roads ERA**	**Harvest ERA**	**Total Existing ERA**	**Total Proposed ERA**	**Potential CWE**
501.5002	587	5.0%	0.69	1.06	2.79	2.26	4.55	Unlikely
501.5004	2,435	5.0%	0.69	0.91	4.07	1.84	5.67	Unlikely
501.5005	**2,228**	**5.0%**	**0.89**	**0.86**	**5.01**	**2.50**	**6.76**	**Low**
501.5006	**638**	**5.0%**	**0.95**	**0.71**	**10.77**	**12.40**	**12.44**	**Low**
501.5007	668	5.0%	1.23	0.56	6.31	8.07	8.10	Low
501.5053	1,816	5.0%	0.78	1.45	4.99	6.80	7.22	Low
501.5054	1,479	5.0%	0.87	0.87	2.42	2.25	4.17	Unlikely
501.7052	2,892	5.0%	0.06	1.38	.88	1.91	2.32	Unlikely

Alternative 3

In Alternative 3, treatment areas would remain the same as in Alternative 2, treatments within these areas would include only those needed to reduce the surface and ladder fuels (within the lower and limited mid-level canopy levels) needed to achieve fire and fuels objectives. Under Alternative 3 there would be no additional treatments (i.e. additional thinning in the mid-level canopy) to fully address stand density and forest health objectives.

This alternative would receive treatment only to achieve fire and fuels objectives and limit treatments to mechanical clearing of ladder and surface fuels. As such, all design criteria and SNFPA ROD (2004) standards and guidelines associated with Pacific Fisher would be implemented with this alternative.

Of the 5700 total acres within the Project boundary, approximately 1200 acres were analyzed as areas where some form(s) of treatment are proposed (so named as treatment areas). The remaining 4500 acres have no treatments proposed due to slopes greater than 35 percent, standard and guideline limitations on treatment and/or no treatment is needed to meet the purpose and need.

Though a total of 1200 acres are analyzed for treatments listed above, design criteria common to all alternatives and standards and guidelines from SNFPA ROD (USDA-FS 2004b) dictate areas where treatment cannot occur to reduce and/or eliminate adverse effects on particular resources. These can include, but are not limited to heritage resources areas, botanical species areas, wildlife habitat areas, and aquatic species areas.

Direct Effects

Direct effects are those occurring at the same time and place as the triggering action. The direct effects would be less than those described under Alternative 2, in that there would be less impact because the thinning methodology would only concentrate on ladder and surface fuels within the lower and mid-canopy levels, and not include commercial thinning.

Indirect Effects

Indirect effects are those that occur at a later time or at a distance from the triggering action. Like Alternative 2, indirect effects are expected to be minor. Conservation measures incorporated into the project would be implemented to control erosion and sedimentation. The implementation of BMP's would avoid or minimize potential increases in sediment loads to streams during project implementation such that impacts to aquatic habitats are not expected. Over the longer term, potential adverse effects on water and soils from implementing the Alternative 3 are expected to be minor, and substantially less than if an uncontrolled wildfire were to occur.

Cumulative Effects

Table 31 shows the CWE results for the Fish Camp project. All of the subdrainages are considered moderately sensitive to disturbance (i.e., 5% Lower TOC). The baseline or existing condition of most of the subdrainages is below the Lower TOC%, but subdrainages 501.5006, 501.5007, 501.5053 are over their Lower TOC%. When adding in the Proposed Action, none exceeded the Upper TOC of 14%. All of the subdrainages have been inspected for CWE response in the field by an IDT or surveyed using various methods (e.g., SCI, Pfankuch). Descriptions of each subdrainage can be found in the Hydrology Specialist Report (Stone, 2010) or in the Cumulative Watershed Effects report (Gallegos, 2010).

An IDT evaluation for CWE response found that a sub-basin within subdrainage 501.5005 was contributing excess sediment into Long Meadow creek and portions of White Chief Branch creek (Figure 7). The condition of Long Meadow is highly degraded as are the existing roads around the meadow. Treatments throughout this subdrainage (i.e., T-17c,d, T-19b, T-22b,c, T-28f) should use a "light-on-the-land" approach and avoid any mechanical treatments within 100 feet of Long Meadow unless the purpose and need for forest health is not being met (see design measures section for a description of light-on-the-land equipment). Any activity proposed within the SMZ (i.e., the plantation adjacent to Long Meadow), would require a modified operation plan (FSH 2509.22, 3c, 14.17-4), which is outlined under the Design Measures section of this document.

All of the subdrainages calculated above their Lower TOC% when adding in the Proposed Action, but none exceeded the Upper TOC of 14% (Table 29). Since the treatment acreages would not change under Alternative 3, the %ERA calculation would be the same as in Alternative 2 resulting in the same conclusion, that is, none of the subdrainages exceeded the Upper TOC of

14%. Baseline and project CWE data and IDT observations suggest that there is a low potential for CWE response from Alternative 3 throughout the greater subdrainage 501.5005, but a localized CWE response is occurring in the Long Meadow sub-basin (Figure 7).

Forest Vegetation/Silviculture

The direct, indirect and cumulative effects to forest vegetation are summarized from the Silvicultural Report for the Fish Camp Project (Smith, D. 2011).

Affected Environment

The Fish Camp Project area has a history of heavy railroad logging activities. Between 1919 and 1923 heavy railroad clearcut logging was carried out by the Madera Sugar Pine Co. through much of the Project area. Logs from railroad logged stands were transported to the mill at Sugar Pine over its 140 miles of track. The mill operated for 32 years averaging a 40 million board foot cut each year. Seven locomotives and 100 log hauling cars were in use during its peak. In 1900, when the Madera Sugar Pine Co. first began logging, it owned 21,616 acres of timberland in Madera and Mariposa Counties including land near Wawona, now a part of Yosemite National Park. In subsequent years it purchased additional timberlands as well as Forest Service timber. Lands within the Fish Camp Project area were private timber holdings at the time they were railroad logged.

During the railroad logging at the beginning of the last century, logs were yarded by a system of cable settings. Deep gouging occurred in a number of places where logs dug into the soil as they were yarded to landings. As logs approached landings, more soil was generally displaced. In many cases, this reduced soil depths to almost bare rock. Settings can often be distinguished by a lack of conifer reproduction and an abundance of brush still today. However, between cableways, existing reproduction was often protected from damage. Logging slash was not treated following harvest. Today, much of this early reproduction remains as stands of generally 90 to 110 year old 6 to 24 inch dbh incense cedar, sugar pine, ponderosa/Jeffrey pine, and white fir.

During the 1960s, a significant effort was made throughout California to reforest previously forested areas that were understocked. Two major blocks of plantations created during this time period lie within the Project area; one, a ponderosa pine plantation area, near Buffin Meadow and the other, larger one, a mostly Jeffrey pine plantation area, near Long Meadow. Over 950 acres of railroad logged ground were planted within the proposed project boundaries during this time. Approximately 300 additional acres of plantations were created in the early 1990s.

Over the past several years, 180 acres of these 1990s plantations were released and thinned by mastication. Stand Rx55 overlies 38 acres of these recently masticated plantations. The Sugar Pine Adaptive Management Project Big Creek hydrology study treatment units (251 acres), recently put under contract, comprise a portion of the 5440 acres within the total project boundaries.

Many of these 40 to 50 year old plantations were precommercially thinned in past years. Some of the plantations were hand thinned, slash tractor piled, and piles burned while others were thinned with mastication machines where material was shredded and left on the ground as mulch. The majority of the trees within these previously thinned areas are presently 10 inches and larger in diameter at breast height (dbh). Stocking, tree height and diameter, vigor and stand density varies considerably within the larger plantations where precommercial thinning has not taken place previously. Rocky outcrops and other lower site areas scattered throughout are generally vegetated with oaks and brush and more scattered conifer stocking. As a result, some stand heterogeneity is present within these larger plantations. Basal area stocking in these lower site areas runs from 40 ft2 to 100 ft2 per acre. Stocking in the more densely stocked stands varies from 120 ft2 to 320ft2 per acre. Conifer canopy cover varies from very light in the low site areas to dense (80-100%) in overstocked areas.

Although pockets of older trees can be found scattered through the proposed Project area, past railroad and other logging as well as stand replacing fires have resulted in little of the area being vegetated with trees older than 130 years. The natural stands proposed for thinning within the Project area generally consist of approximately 90 to 110 year old trees that were young, shade tolerant saplings growing beneath the overstory trees during the railroad logging era. The majority of wild stands present are considered to be mixed conifer types. These stands, once heavy to more fire resistant, shade intolerant, ponderosa and sugar pine, have become very heavy to less fire resistant fir and incense cedar. Plot data indicates that in many areas white fir and incense cedar comprise 40 to 80 percent of the basal area sampled. Mixed conifer aggregations and stands occupy areas near cooler, damper draws and at the mid elevations within the Project area. Red fir stands are present at the higher reaches of the Project area. Pine, mixed conifer and white fir stand basal area stocking varies from 120 ft2 per acre in more open areas to oak pockets to densely stocked pockets of 350-400 ft2 per acre or more. Conifer canopy cover varies substantially across the Project area. Conifer canopy cover ranges from quite dense (80-100%) in overstocked areas to clumpy dense patches in less uniformly stocked areas to more moderate (50-70%) to fairly light in other locations. Some scattered brushfields, resulting from previous fires and early 1900's logging, are found within the Project area.

Exclusion of fire from the vast majority of the area has resulted in the development of multi-layered stands. The understory layers consist of fir and incense cedar beneath young growth stands of ponderosa/Jeffrey pine, sugar pine, incense cedar, and white fir with, in some cases, an additional layer of brush beneath or adjacent. In pine plantations, incense cedar and white fir and /or brush have seeded in thus creating significant fuel ladders.

Weather Changes

Tree ring studies have established that compared to the previous two centuries weather during the 20^{th} Century was relatively moist without the decades-long droughts that occurred earlier (Ferrell, 1996). Beginning in the 1970's temperatures began to warm noticeably. This warming resulted in a greater fraction of the Sierra Nevada precipitation falling as rain rather than snow, earlier snowmelt and earlier streamflow peaks (-van Mantgem, 2009)(Knowles, et al, 2006)(Stewart, et al, 2005). This shift appears to be the result from still longer term climate shifts (Knowles, et al. 2006).The combination of reduced stand vigor and excessive stocking combined with increasing temperatures and decreasing soil moisture availability is greatly increasing the threat of loss due to mortality from insect attack, diseases, competition, or fire.

The wetter than normal 20^{th} Century coupled with the exclusion of fire has set the stage for stands to become overcrowded with competing conifers, oaks and other vegetation. Wide swings in weather conditions over the past thirty years have placed stress on many of these stands. Inter tree competition, drought, rising temperatures, and insect attacks are beginning to take a toll on both plantation and wild stand trees. White pine blister rust has also been killing a number of sugar pine over the past ten to fifteen years. Dead and down fuel loadings have been on the rise.

These conditions are not unique to the Fish Camp area. More extreme examples can be found in the Lake Tahoe Basin, San Bernardino National Forest and in Arizona and New Mexico where entire stands of trees are dieing. In southern California the amount of ponderosa pine mortality associated with western pine beetle, D. brevicomis Le Conte, infestations reached unprecedented levels after years of extended drought (Fettig, 2007).

Recurrent droughts are characteristic of the Sierra Nevada climate. Summers are usually hot and dry, with the bulk of the precipitation occurring in winter, much of it as snow. But in addition to the dry summers, there have been droughts of one or more years' duration in every decade of this century. Increased mortality usually occurs first at the lower and middle elevations on both western and eastern slopes of the range and spreads to the upper elevations only if the drought is protracted. During droughts, lack of spring precipitation has a particularly large influence, not only by increasing the susceptibility of the trees, as indicated by their rates of growth and beetle-caused mortality, but also probably aiding dispersal of and host selection by the flying beetles. In the ponderosa pine type because of the relatively low elevation, water availability, not temperature, is the strongest factor limiting forest growth (Ferrell, 1996).

As stated previously, beginning in the 1970s temperatures began to warm noticeably. Seasonal snowmelt and streamflow is projected to occur a month earlier during the current century. By the end of the 21st Century, 30 percent less water is anticipated to arrive in reservoirs between April and July. Soil moistures will dry out earlier and by summer be more severely depleted. Substantial changes in extreme temperature episodes (fewer frosts, more heat waves) are anticipated (Dettinger, et al, 2004). Over the past 17 to 29 years noncatastrophic mortality rates were found to have doubled over a series of 76 western forest plots which sampled undisturbed, 200 year and older stands. Increasing mortality rates could result in substantial changes in forest structure, composition, and function. –A persistent doubling of background mortality -would cause a >50% reduction in average tree age in a forest, and a potential reduction in average tree size (van Mantgem, 2009). Current projections of warming climates provide a greater opportunity for fire ignitions due to longer fire seasons. A higher probability of fire starts coupled with the changes in forest fuel conditions that occurred over the past century lead many to predict that large, generally more intense fires will become more likely than occurred historically (Skinner and Stephens, 2004).

Desired Condition

The Sierra Nevada Forest Plan Amendment Record of Decision, 2004 (SNFPA ROD, 2004) addressed the desired condition, management intent and management objectives for individual land allocations. These were brought forward in the Fresno River Landscape Analysis (July 2005) written for the area immediately south of this project.

The Fish Camp Project boundary encompasses many different land allocations, some with specific desired conditions, i.e. spotted owl/goshawk/pacific fisher habitat and some with generalized desired conditions. In effect, all center on the need to restore both the structure and processes of old forest habitat ecosystems as a long-term strategy and with short-term goals of reducing the adverse effect of wildfire and reducing stand susceptibility to insects/pathogens, competition and drought-related tree mortality.

Density Management Measures

Basal Area Stocking Levels

"Normal" basal area stocking is considered to be that level at which mortality begins as additional growth takes place. Normal is generally described as basal area per acre and is the maximum amount of vegetation an acre can adequately sustain over time. For a short period of time, basal areas in excess of "normal" can be maintained in some areas. A normal stand—or fully stocked stand—is a stand that, so far as any practical consideration is involved, utilizes its site completely. Maximum stocking is not implied; it practically never exists over a continuous area of more than a few acres (Meyer, 1938). These "normal" stocking levels were calculated during the abnormally wet 20th Century and are most likely too dense to be maintained during the drier periods that are more likely the norm. Fairly recent studies have indicated that the exclusion of fire may have also resulted in normal basal area densities in excess of what would have been found during previous centuries.

Four different yield tables are being used to determine normal stocking within the Project area:

- Yield of Even-aged Stands of Ponderosa Pine, Technical Bulletin No 630, Meyer, 1938.

- Preliminary Yield Table for Second-growth Stands in the California Pine Region, Technical Bulletin 354, Dunning and Reineke, 1933 (Mixed Conifer).

- Yield, Stand, and Volume Tables for White Fir in the California Pine Region, Bulletin 407, Schumacher, 1926.

- Growth Models for Ponderosa Pine: I. Yield of unthinned plantations in northern California, Research Paper, PSW-133, Oliver and Powers, 1978.

As stands approach 80 to 90 percent of normal stocking, growth rates begin to decline significantly, stand vigor begins to suffer, and susceptibility to insect and disease attacks and drought stress increases. To reduce growth losses, maintain more viable stands, and retain canopy covers less susceptible to crown fires, this entry would thin stands to stocking levels that with growth will result in reaching 80 percent of normal in 15 to 20 years when the next thinning entry would need to take place. Utilizing basal area to describe desired stocking automatically takes into account varying diameters of trees within stands. For a given basal area, more trees per acre are retained in the residual stand in areas with smaller diameter trees than in areas of larger trees. The silvicultural prescriptions for ponderosa pine, mixed conifer and fir will be described utilizing basal area per acre.

The desired condition for stocking levels and the measure used for comparison of alternatives is:

- Average basal area in pine, mixed conifer, and white fir grouped by lightly and heavily stocked aggregations
- Average potential basal area growth
- Basal area following thinning—ponderosa pine—135 ft2 per acre (45% normal)
- Basal area following thinning—mixed conifer—210 ft2 per acre (60% normal)
- Basal area following thinning—white fir—240 ft2 per acre (60% normal)

Stand Density

Another approach to stocking density management is Stand Density Index (SDI). This method compares stocking density to the maximum number of stems found by species which is substantially greater than that utilized for normal yield. Mortality studies completed in pine stands have been described using this density management approach rather than normal yield tables. Since SDI was used as a frame of reference for ponderosa pine in these studies, it will be used as well as basal area to describe the silvicultural prescriptions for pine stands. SDI studies have determined that the onset of competition between trees begins when stands reach 25 percent of SDI max. At 35 percent of SDI max the lower limit of full site occupancy and susceptibility to bark beetle attack begins, and at 60 percent SDI max is where the lower limit of self-thinning begins (normal stocking). Stands that approach SDI 365 usually suffer large losses from bark beetle epidemics—losses that equal or exceed periodic growth. The limiting SDI for ponderosa pine stands in northern California as defined by Dendroctonus bark beetles is 365 (45 percent of SDI max—approximately 200 ft^2 basal area). Studies have shown that the vigor of trees in a stand is related to their ability to quickly respond to thinning and their susceptibility to various pests. A live crown ratio of at least 40 percent has been cited for a number of conifers as representing a generally acceptable level of individual tree vigor. For several coniferous species, a live crown ratio of 40 percent seems to correspond with an SDI of about 50 percent of the maximum SDI for the species. 'Catastrophic' (extremely high) tree mortality from bark beetles can be prevented by reducing stand density below 150 ft2 per acre in basal area (33 percent of SDI max) (Long, 1985). To ensure prompt response to thinning and minimize mortality, pine stands should be maintained between 30 and a high of 50 percent of SDI max.

For this proposed project, forested stands would meet stocking (as measured by percent of "normal" for the given site) and the associated density levels (as measured by basal area for a given site) that would maintain or improve growth rates, would increase resistance to mortality agents (insects/pathogens/fire) and would provide the potential to begin the perpetuation of both the structure and processes of old forest habitat ecosystems. This desired condition incorporates both short and long-term goals, but is focused on the need for continued maintenance of stands that are healthy and sustainable.

The desired condition for Stand Density Index and the measure used for comparison of alternatives is:

- SDI—ponderosa pine 30 percent of SDI max (135 ft2/acre)

Methodology for Analysis

In determining the existing condition and analyzing the effects of the alternatives associated with the Fish Camp Project, many sources of information were utilized. These included aerial photography interpretation, field verification of stand conditions, cruise plot data validation, evaluation and summarization, California Wildlife Habitat Relationship site-specific vegetation type correction and verification, and experience in the implementation of similarly designed past projects. Scientific and research documentation was utilized to evaluate the potential effects of all alternatives and in determining the measures to be evaluated for meeting the purpose and need with regards to forest health.

The SNFPA 2004 describes the use of thinning from below as the primary silvicultural prescription to utilize in managing stand densities to provide resiliency and sustainability during drought conditions and climate variations. Stand density index and basal area (ft2/acre) are used as common measures in determining the effects of management actions on coniferous stands. For retention of maximum growth and vigor, thinning entries should be timed to occur before growth rates in potential leave trees begin to slow. At this point, leave trees are still retaining substantial crown ratios and have the greatest potential for maximum growth. Thinning should be undertaken before crown ratios drop below 40 percent (Emmingham, 1983) (Long, 1985). As competition between trees increases, crown vigor decreases. A stand's ability to respond to thinning progressively declines the longer it remains in competition. Some stands proposed for treatment are currently at this maximum potential response level while others are beginning to decline and should have already been treated.

For this project stand density (number of stems per acre) as well as basal area (ft2/acre) are used to determine which stands/aggregations are considered overcrowded and in need of thinning (treatment area designation), at what stocking level the stand/aggregation needs to be (desired condition), the silvicultural prescription for each alternative and the associated short (immediate) and long-term (length of effectiveness of treatment) effects of design criteria (specifically those associated with old forest habitat dependent species), and the effects the standards and guidelines and land allocations have on meeting the purpose and need for forest health.

Alternative 1 – No Action

Direct Effects

With this alternative, no commercial or precommercial thinning would be accomplished. Understory incense cedar, white fir and brush cover would continue to increase in size and density. Fuel ladders and competition between trees would increase. Growth rates and vigor would continue to decline as stands, or portions of stands, continue to approach or exceed normal stocking. Plantations would become highly susceptible to insect and drought induced mortality. Shade intolerant pine and oaks would become less vigorous and continue to drop out of the stands. Understocked plantations would not be replanted.

Indirect/Cumulative Effects

Wide swings in weather conditions as has been experienced over the past thirty years would continue to place increased stress on these untreated stands. Trees in overstocked and/or brush choked plantations would continue to experience increased competition. Mixed conifer and fir aggregations and stands with stocking levels approaching or exceeding normal would become increasingly susceptible to mortality. Excessive stand/aggregation densities in ponderosa pine stands and ponderosa and Jeffrey pine plantations would result in the likelihood of heavy mortality. Drought and insect induced mortality would escalate. Snags and jack-strawed down material would increase. Basal area tree growth of only 15 to 20 ft^2 per acre would occur over a 15 to 20 year period (if excessive mortality does not occur) in more densely stocked aggregations. Forest health in the area would decline and elevate the risk of loss due to wildfire. Not only would the potential for loss of these stands to insect attack and drought increase, but their ability to respond to future thinning would continue to decline as crown vigor deteriorated as treatment was postponed. Experience has shown that even a course of no action is not without consequence (Fettig, 2007). Taking no action would result in that the Project area continuing to deteriorate over time because wildfire today no longer operates in its historical fashion, that of frequent low-intensity surface fires (Fitzgerald, 2005).

Fuel continuity would not be broken up. Brushfields and over stocked precommercial size conifer pockets would not be treated. The threat of fire moving into or out of population centers within the Wildland Urban Intermix (WUI) would increase, not decrease. The threat of loss of wildlife habitat designated as Protected Activity Centers (PACs), Home Range Core Areas (HRCAs) and fisher conservation areas would increase. Agee, 2005, concludes in his report that the "No action" alternative is not a risk-free option, as dry climates regularly predispose forests to burn in a typical dry summer. He further states that the impacts of "no action" in dry forest ecosystems must recognize the likelihood of stand-replacing, intense fire where stand density has increased and dead fuel accumulated in excess of historical levels.

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Alternative 2 – Proposed Action

Under Alternative 2, the development of Strategically Placed Area Treatments (SPLAT's) would occur. Additional areas would be treated to provide a defensible fuels profile near key transportation corridors and adjacent to Yosemite National Park. In addition to those treatments needed to meet fire and fuels objectives, treatments would be undertaken to reduce stand densities (basal area and/or precommercially thin) to a level that maintains or improves the growth and vigor of remaining trees. Treatments included in this alternative are: thinning from below in conifer stands (either precommercially or commercially), and/or masticating excess vegetation (conifers and brush) to reduce lower, mid- level (intermediates and codominants) canopy stand densities; masticating brush and shrub patches; prescribed burning, both understory and piles; manually reducing and/or prescribed burning noxious weed infestations; and site preparing, planting and subsequently hand releasing failed conifer plantations.

As part of the Proposed Action, design measures common to all alternatives have been incorporated and are part of the Proposed Action. As such, analysis of the direct, indirect and cumulative effects of the action alternative addresses not only the Proposed Action, but the effects of these design measures as they relate to vegetation and silvicultural management in the Project area.

Direct Effects

Commercial thinning needs to be undertaken in portions of the approximately 90-110 year old young growth stands and 40 to 50 year old plantations to reduce competition and provide room for crown expansion by removing poorly growing trees, excess trees, and fuel ladders from these stands before competition results in much additional reduction in growth or competition, insect, disease or fire related mortality increases.

Studies have shown that active management through thinning is critical to maintaining healthy trees that are less susceptible to mountain pine beetle attack**.** A 1998 study assessed the effects of thinning from below (alone and in combination with prescribed burning) on tree growth, leaf physiology and several environmental factors in ponderosa pine on the Gus Pearson Natural Area in Arizona. Soil water content was greater in thinned treatments than in the unthinned control. Similar findings have been reported in northern Arizona and western Montana, and can be attributed to increased water availability resulting from decreased tree competition. Trees in thinned treatments had greater foliar nitrogen content, needle toughness and basal area increment. The results suggest that restoration treatments improved tree vigor, growth and decreased the likelihood of bark beetle attacks on individual trees. A similar study compared measures of tree susceptibility to bark beetle attack in thinned ponderosa pine plots in northern Arizona. Phloem thickness significantly increased with decreasing stand density. Duration of resin flow and 24 hr resin flow were significantly higher in thinned plots. Increases in these variables suggest improved host vigor and reduced likelihood of bark beetle attack. An increase in predawn xylem water potential, net photosynthetic rate, foliar nitrogen concentration and bud and needle size resulting in increasing foliar growth and uptake of water and nutrients was reported in similar stands. It has been noted that phloem thickness and basal area increment were lower in unmanaged stands than in managed. Studies have shown that thinning significantly reduced the amount of ponderosa pine mortality caused by mountain pine beetle in northeastern California (Fettig, 2007) (Egan, 2010). The largest increase in photosynthetic rate and predawn water potential increases due to thinning was found to be during periods of drought (Feeney, 1998). Several studies have shown that thinning from below not only reduces ladder fuels and the risk of torching, but by reducing stand density tree vigor is improved and risk to bark beetle attack reduced (Fitzgerald, 2005). By reducing competition through thinning, mistletoe infected residual trees will experience increased height growth thus slowing the upwards spread of mistletoe into tree crowns (Ferrell, 1996). By increasing tree vigor, diseased trees will be better able to withstand the effects of drought or insect attack. Based on these scientific studies, reducing stand density as part of Alternative 2 treatments would increase tree vigor and reduce the risk of bark beetle attack in the Fish Camp Project area.

This entry would commercially thin wild stands on slopes generally less than 35% outside of PACs, and Old Forest Linkages to stocking levels that, with current growth, would result in returning stands to 80 percent of normal basal area stocking 15 to 20 years following harvesting. Maintaining a stocking level that remains at 80 percent or less of full (normal) stocking will ensure a healthy rate of growth while retaining a level of stocking that will be better able to survive the lower levels of yearly precipitation that were common prior to the past century. Black oaks will be retained in treated stands longer by reducing competition and overtopping by nearby conifers. Treated stands would also be less susceptible to weather fluctuations and longer summer dry spells which appears to be becoming more and more prevalent. Reentry in 15 to 20 years was chosen for several reasons: (1) reduce the number of entries into the stand, (2) increase the volume removed to make the entry more economically viable, (3) open the stand sufficiently to permit harvest operations with a minimum of damage to the residual stand, (4) treat the stand to a level where for a period of at least 10 years fires, except under the most extreme conditions, would remain as ground fires and not become crown fires as directed by the National Fire Plan, (5) retain canopy covers that meet or exceed those directed under the SNFPA 2004 while opening the canopy to maintain or improve growth and vigor over 15 to 20 years.

To obtain some benefits from thinning, while retaining species specific canopy cover levels following harvest, thinning in wild pine stands is proposed to generally reduce stocking to leave basal areas of around 150 to180 ft^2 per acre depending on age, site, and existing crown condition (55-60 percent of normal—32 to 40 percent SDI max). This entry would still result in the retention of basal areas substantially above the SDI recommendations for thinning. (150 ft^2 should be achieved in locations where leave trees have full crowns. 180 ft^2 per acre should be achieved in areas with poorer crown leave trees, higher growing sites, older trees and in HRCAs.) (Normal stocking for this site and age is 270 to 290 ft^2 per acre.) Portions of stands with larger diameter trees present will generally have fewer residual trees per acre than those with smaller diameter trees. Because this entry would retain a higher basal area than the desired condition, to maintain stand resiliency, the next thinning entry may need to take place at 10 to 15 years in these pine stands rather than the planned 15 to 20 as the more limited growing space becomes reoccupied.

The portions of the 40 to 50 year old pine plantations that are planned for thinning would be thinned to basal areas of around 120 to 140 ft^2 per acre depending on existing crown condition and adjacent openings (40-45 percent of normal--26 to 30 percent SDImax). As previously discussed, the onset of competition between trees begins when pine stands reach 25 percent SDImax. Thinning to 26 to 30 percent SDImax would permit these thinned portions of the pine plantations to continue vigorous growth for a period of 10 or more years at a rate that can generally withstand insect attack and the stresses of drought. As these plantations approach the planned next thinning entry in15 to 20 years, the limiting SDI 365 would be reached or exceeded; they would become more at risk of loss due to insect attack or stress due to competition or drought conditions.

Where diameter restrictions permit, young growth, approximately 90-110 year old, mixed conifer and white fir stands would be thinned to around 55 to 65 percent of normal. Leave basal areas, depending on site index and age, would be around 210 ft^2 per acre (Mix Confir) and 240 ft^2 (White Fir). (Normal basal area stocking for 90 to 110 year old mixed conifer stands on similar sites ranges from 330 to 360 ft^2 per acre. Normal for white fir ranges from 420 to 445 ft^2 per acre). Canopy covers that meet or exceed those directed under the Sierra Nevada Framework would be retained following treatment. To obtain maximum growth and reduce fuel ladders, trees less than 10 inches dbh trees not needed for stocking or cover for wildlife are planned to be removed with this entry within the treatment areas not designated as mastication or prescribed fire. Except for mastication equipment, equipment use on slopes greater than 35 percent would be avoided.

Thinning to these target basal areas in these approximately 90-110 year old young growth stands would result in basal area increases of 70 to 80 ft^2 per acre over 15 to 20 years. If thinning did not occur, this increase in growth over the same time period would be 15 to 20 ft^2 per acre within the more heavily stocked aggregations if mortality does not occur.

As previously discussed, desired leave basal areas would vary by an aggregation species composition. Pine aggregations would have a lower leave basal area than mixed conifer. Fir would retain the highest. By recognizing the variation in species composition within treatment units and treating accordingly, stand heterogeneity would be maintained as varying stocking levels are retained across the stand. The North, et al, 2009 paper proposes leaving the highest density stocking near the bottom of the slope and the least near the ridgetops. Since fir and mixed conifer stands more readily occupy the lower, cooler, damper, locations on the slope, the proposed retention basal areas will generally result in heavier stocking on the lower slopes and lighter stocking as ridgetops are reached. Wild stand pine aggregations and pine plantations would retain the least basal area stocking.

Except where retained for wildlife purposes (see wildlife design criteria for descriptions), suppressed, intermediate, damaged and diseased then finally codominant trees, in order of removal, would be harvested until the prescribed stocking level has been reached. This is known as thinning from below as directed in the 2004 ROD and recommended in the North, et al, 2009 paper. The poorest quality trees are generally removed first, leaving, for the most part, the best trees in the stand. Thinning from below retains the majority of the crown cover and generally the largest trees. Many small, poor crowned trees are removed during the operation. Some poorer crowned codominant trees are removed, as needed, to create openings on one or more sides of other codominant and dominant trees. These openings provide room for crown expansion of the residual trees. Without room for expansion, remaining tree crowns would become less vigorous resulting in reduced photosynthesis and declining growth. Removal of only intermediate and suppressed trees results in removal of "little more than the salvage of trees which will inevitably die" (Smith,1962). Removal of some of the trees that compete for the limited water and soil nutrients would make more water and nutrients available for the remaining trees. Thinning also opens the stand's crown canopy, making more light available for the remaining trees. The increased water, nutrients, and light that result from thinning increase photosynthesis in the remaining trees. More food is produced making more carbohydrate available for new cell formation and growth. After competition begins and the stand develops all crown classes, removing only intermediate and suppressed trees may not significantly reduce the competition faced by the larger dominant and codominant trees. Suppressed trees, in particular do not compete significantly with larger trees. Intolerant species (pines) require nearly full sunlight to thrive and grow. A successful low thinning removes all suppressed, most intermediates, many codominants, and even some dominant trees (Emmingham, 1983).

The effects of fuel treatments on tree based carbon storage are currently being studied. Healthy forests play an important role in carbon sequesterization. Studies indicate that "in wildfire-prone forests, tree-based C [carbon] stocks were best protected by fuel treatments that produced a low-density stand structure dominated by large fire resistant pines" (Hurteau, 2009). Average stand diameters increase significantly following thinning as smaller diameter trees are removed in favor of retaining larger trees. Concentrating removal on the smaller diameter trees also reduces fuel ladders and susceptibility to fire loss as average residual diameters and fire resistance increases. Follow-up treatments to remove submerchantable trees and brush would further reduce stress on the remaining stand. In the majority of the stands present, stocking is very heavy to white fir (over 60 percent), with incense cedar comprising around 20 percent, sugar pine around 13 percent and ponderosa/Jeffrey pine around 7 percent. Where choices exist, more fire resistant pines would be favored over fir and incense cedar as leave trees. In most areas, stand composition following treatment would consist of a greater percentage of more fire and drought resistant ponderosa and sugar pine as recommended in the North paper (2009). 30 inch harvest tree diameter limitations dictated by the SNFPA 2004 ROD would, in many areas, result in basal area retention levels in excess of proposed residual basal areas. In some cases in pockets of larger trees, no trees would be harvested. In these types of thinnings, the smaller size of the product to be removed makes harvest operations much more expensive than those where larger trees are removed.

Thinning to the proposed basal areas would result in increased diameter growth and crown expansion on the remaining trees as the residual trees respond to reduced competition. Since increased diameter growth would occur over fewer stems per acre, substantial increases in diameter would result. Thinning would result in larger diameter, taller, healthier crowned trees over much shorter time frames than in unthinned stands. Shade intolerant pines and oaks would be retained in a more vigorous condition as a result of more available sunlight due to reduced competition. To assist in the retention of oaks within plantation treatment units, an average of one black oak, 4-12 inches dbh, for every five acres would receive additional clearing on the south side of the tree to reduce competition (as described in wildlife design criteria section). As the diameters of the residual trees become larger and bark becomes thicker, they would become better able to survive a fire should one occur Thinning is an effective technique for creating stands that more closely represent those present prior to railroad and other extensive logging and the exclusion of fires during the 20th Century which is the desired condition.

Hand and mastication thinning and release of natural stands/aggregations of conifers and plantation trees generally less than 10 inches dbh would be undertaken within treatment units as part of this proposal. These thinned aggregations would occupy large and small openings surrounded by larger trees as described in the North paper (2009). Depending on tree size these stands would be thinned to around 150 to 200 leave trees per acre. Hand thinning slash concentrations would generally be tractor piled and piles burned. Slash concentrations on steeper slopes would generally be hand piled and burned. Areas of only light slash (10-20 tons per acre) would be lop and scattered to 18 inches. Stand heterogeneity would be maintained through retention of these precommercially thinned clumps as well as untreated clumps on steeper slopes, the more dense clumps of larger diameter trees, SMZ's, archaeological sites, and the two to three untreated larger oaks per acre. In addition, shrub and understory diversity would be retained throughout the Project area during follow-up treatments through the retention of 15-20 percent of the total understory growth in approximately 1/10th acre pockets within plantation treatment units and ¼ acre pockets within wild stand treatment units.

Indirect Effects and Cumulative Effects

Of the 5440 acres within the proposed project boundaries, approximately 1200 acres, comprised of a number of smaller treatment areas, are being analyzed for treatment as a part of this EIS, the remainder of the Project area is not proposed for treatments and will retain its present CWHR classifications. An additional 142 acres of 17 to 20 year old plantations have been recently released and pre-commercially thinned by mastication under a existing document. Within HRCAs (Home Range Core Areas) and Old Forest Linkages the aim as stated in the SNFPA 2004 is to retain 60 percent or greater canopy cover, where available. (The intent of the Fish Camp project is to retain canopy cover of 60 percent or greater in CWHR 4 and 5 size classes where it presently exists.) Within those portions of Spotted Owl and Goshawk PACs (Protected Activity Centers) where thinning is proposed, the aim is to retain 70 percent or greater canopy cover, where available. The vast majority of the Project area would not be treated as a result of these past or proposed treatments. Under this alternative, vegetation present in these untreated areas would remain the same as presently found and therefore there would be no effect to vegetation in the untreated acres.

In addition to the denser canopy cover proposed for Old Forest Linkages, groups or patches of five or more larger trees, generally 30 inches and larger, are planned to be retained through the Project area. These small groups would have residual basal areas of 240 ft^2 or more for mixed conifer and 210 ft^2 or more for pine and in many instances may reach 300 to 400 ft^2 per acre. No fuel ladder or precommercial thinning treatments would occur within these pockets. Approximately two to three black oaks 20 inches dbh and larger per acre would also have a 35 foot buffer, measured from the bole, around them where no fuels treatment would occur.

Retention of these higher basal areas to provide denser canopy cover for wildlife would result in not fully meeting the silvicultural objectives for maintaining or improving forest health. The impact would not be as great in mixed conifer and fir stands as it would be in pine. Retaining 60 percent or greater basal area in pine stands leaves them at a level where SDI studies have shown them to be susceptible to insect attack. Pine stands left at 70 percent or greater would remain at SDI max levels of 50 percent or greater (SDI 400 or more) and will be highly susceptible to insect attack. Oliver, 1995, stated that a SDI 365 (200 ft2/acre), defines the threshold for a zone of imminent bark beetle mortality where pine stands suffer large losses from bark beetle epidemics. These losses can equal or exceed periodic growth. This said, there is a potential for greater snag creation within these pockets to serve as future wildlife habitat while also maintaining structural diversity and heterogeneity throughout the treatment units.

Subsequent growth of these stands would add further to the problem. Sufficient thinning would occur in some of the proposed scattered clumps to provide a short term benefit to stand vigor while in other clumps little, if any, thinning would occur resulting in a continued decline in clump vigor. Pine clumps left at these higher basal area retention levels would continue to be at a very high risk of loss due to insect, disease, competition, and/or drought induced mortality. A 2004 report found that plots infested by mountain pine beetle had significantly higher total basal area, ponderosa pine basal area, stem density and stand density index (Fettig, 2007). Heavily stocked pine clumps attacked by insects have the potential to serve as infection centers for increased mortality in the surrounding pine stands as insect populations build and move into adjacent stands. To maintain more vigorous, drought and insect resistant stands, a shorter reentry period would be needed. The reentry time frame within HRCA, PAC, and Old Forest Linkage pine stands and these more heavily stocked clumps would likely be reduced by five or more years.

Since the vast majority of the crown covers and ground cover would remain in place following thinning operations, properly conducted thinning has only a minor short term affect on tree growth. Leave trees would continue to contribute needles as well as small branches to the forest floor. Long term effects would be to maintain or increase growth and vigor of treated stands, accelerate development of old forest characteristics in plantations, and improve the protection of human communities from wildland fires as well as minimize the spread of fires that might originate in urban areas. Over the past eighteen years, the district has planned and completed several projects, treating several thousand acres, similar to the Proposed Action. Observations after these treatments has shown canopy cover retention following harvest has met or exceeded expectations. Residual crowns have rapidly filled in openings created by harvest treatments.

In addition to the benefits obtained through density management several other benefits have been noted in treated stands. Several studies have shown that in addition to increasing residual tree vigor, increasing temperatures and windspeeds are common in recently thinned stands. This may accelerate development of certain bark beetle species and force them to overwinter in stages that are more susceptible to freezing or cause turbulences that disrupt pheromone plumes used for recruiting conspecifics during initial phases of host tree colonization (Fettig, 2008). Moderate thinnings may result in less potential extreme fire behavior compared to unmanaged stands. Greater fuel depths, mid–flame wind speeds and lower fuel moistures in heavily treated stands (>60 percent basal area reduction) might increase potential fire behavior compared to unmanaged stands. Thinning followed by sufficient treatment of surface fuels usually outweighs changes in fire weather factors (wind speed and fuel moisture) resulting in an overall reduction in expected fire behavior (Jenkins, et al, 2008). Thinning followed by tractor piling and burning or whole tree yarding have been shown to be effective in reducing fire severity under severe fire weather conditions. Thinning from below where the largest trees are retained within the stand contributed to increased fire resistance (Stephens, 2009). Thinning makes fire suppression more efficient. Once heavy fuels are removed, the residence time (duration) of the fire is reduced, often resulting in a non-lethal surface fire (Fitzgerald, 2005). The thinning proposed within the Fish Camp project is designed to reduce existing basal area by generally 30 percent or less. Follow-up treatments are designed to remove fuel ladders as well as slash concentrations. This relatively light level of thinning should both realize the benefits of thinning stands to reduce the adverse effect of bark beetles and competition while reducing expected potential fire behavior.

Alternative 3

This alternative proposes to only remove submerchantable fuel ladders/fuels and precommerically thin throughout the wild stand treatment areas. Plantations would be commercially and precommercially thinned to only 20 inches dbh and fuels treated.

Direct Effects

No density management would be accomplished with this alternative in wild stands. In wild stands, fuel ladder removal would occur on suppressed and a very few intermediate trees only. No codominant trees would be removed. 95 to 100 percent of the existing basal area 10 inches dbh and larger would remain. The percentage of less drought resistant, more fire prone incense cedar and fir would remain the same as the existing condition. The average stand diameter would not change. Shade intolerant pine and oaks would become less vigorous and continue to drop out of the stands. Post treatment stocking levels would be too dense to withstand the stresses of drought and weather variances.

Plantations would be thinned to a maximum of 20 inches dbh. In some areas of smaller diameter trees, thinning to 20 inches would remove most of the competing conifers. In others, aggregations would remain densely overstocked since the smaller diameter trees needing removal to meet residual density objectives exceed 20 inches dbh. These areas of excessive stocking would be highly susceptible to insect or drought induced mortality. Once successfully attacked by bark beetles, they would serve as dispersal points for additional mortality occurring in the adjoining stand, potentially resulting in large portions of these pine plantations suffering insect attack and subsequent mortality.

As stated previously, Smith, 1962, stated that removal of only intermediate and suppressed trees results in removal of "little more than the salvage of trees which will inevitably die". Emmingham, 1983, stated that a successful thinning from below requires the removal of many codominants as well as most intermediates and suppressed trees. Under this alternative, fuel ladder reduction only dealing with precommerical trees would not remove any significant levels of competition to meet density management objectives. Removal of only some suppressed trees and little to no intermediates would not provide any significant increase in nutrient or water availability to the residual stand. Not only would there not be a significant increase in available nutrients or water, failure to remove some of the codominants and intermediates growing into the bottom portion of the codominant layer of the stand will not create openings in the canopy to provide room for crown expansion of the residual trees. Shade intolerant oaks and pines will not be able to benefit from increased light and rates of photosynthesis as well as reduced competition provided by openings created in the canopy cover. This alternative does not meet the purpose and need for density management emphasized in the SNFPA, 2004 decision and being examined as a part of this project.

Indirect and Cumulative Effects

Wide swings in weather conditions as has been experienced over the past thirty years would continue to place increased stress on these untreated wild stands and dense aggregations in plantations. Mixed conifer and fir aggregations and stands with stocking levels approaching or exceeding normal would become increasingly susceptible to mortality. Excessive stand/aggregation densities in ponderosa pine stands and ponderosa and Jeffrey pine plantation aggregations of larger trees would result in the likelihood of heavy mortality. Drought and insect induced mortality would escalate. Snags and jack-strawed down material would increase. Basal area tree growth of only 15 to 20 ft^2 per acre would occur over a 15 to 20 year period (if excessive mortality does not occur) in more densely stocked aggregations. Forest health in the area would decline and elevate the risk of loss due to wildfire. Not only would the potential for loss of these stands to insect attack and drought increase, but their ability to respond to future thinning would continue to decline as crown vigor deteriorated as treatment was postponed. Experience has shown that even a course of no action is not without consequence (Fettig, 2007). Doing little to nothing to reduce stand density would result in forests that continue to deteriorate over time.

Fire/Fuels

The direct, indirect and cumulative effects to wildland fire and fuels are summarized from the Fire/Fuels Report for the Fish Camp Project (Smith,GB. 2010).

Introduction

Presettlement fire strongly influenced the structure, composition and dynamics of most Sierra Nevada ecosystems. In many areas frequent surface fires are thought to have minimized fuel accumulation, keeping understories relatively free of trees and other vegetation that could form fuel ladders to carry fire into the main canopy (Sierra Nevada Ecosystem Project [SNEP], 1996).

Forest structure and species composition in many western U.S. coniferous forests have been altered through fire exclusion, past and on-going harvesting practices, and livestock grazing. The effects of these activities have been most pronounced in seasonally dry, low and mid-elevation, coniferous forests that once experienced frequent, low to moderate intensity fire regimes. Increased stand density, decreased overall tree size, and increased surface fuel loads are well documented for many forests of this type (Stephens, S. et.al., 2009). These changes concern fire managers because the increased fuel loads and altered forest structure have made forest vulnerable to fire intensities and severities outside of the desired conditions and outside of historic fire regimes for these ecosystems. Changing climates in the next several decades may further complicate fire management by increasing temperatures and fire season length (Stephens, S. et.al., 2009). Fires now occur less frequently and cover much less area, but are likely to be large and severe when they do occur (SNEP, 1996).

Fire represents both one of the greatest threats and one of the strongest allies in efforts to protect and sustain human and natural resources in the Sierra Nevada. Residents and visitors alike are well aware of the threats posed by summer wildfires. A growing density of homes and other structures coupled with the increased amount and continuity of fuels resulting from twentieth-century fire suppression have heightened concern about threats to life and property, as well as the health and long-term sustainability of forests, watersheds, and other natural resources. Yet fire has been an integral part of the Sierra Nevada for millennia, influencing the characteristics of ecosystems and landscapes. Today, state, federal and local agencies put enormous resources into efforts to reduce fire occurrence while at the same time advocating the need to use fire to promote healthy ecosystems. The challenge faced is how to restore some aspects of a more natural fire regime while at the same time minimizing the threat wildfire poses to human and natural resources and values (SNEP, 1996).

The Fish Camp Project objectives are to: (1) reduce fuel ladders and excessive ground fuels that pose a potential for the propagation and sustainability of a crown fire, (2) minimize the effects of wildland fire in high risk (probability of ignition occurring), high hazard (availability of fuels to sustain a fire) wildland urban intermix area, (3) increase the vigor and health of mixed conifer stands and plantations, and (4) prevent and control the spread of noxious weeds.

This analysis evaluates the direct, indirect and cumulative effects of proposed Alternative 2 and 3 to meet the purpose and need of the Fish Camp Project as well as the No Action Alternative l, as they relate to fire and fuels. Indicators are presented to evaluate and compare alternatives and the resultant fire behavior/fire effects associated with their implementation.

Overview of Issues Addressed

Issues relevant to Fire/Fuels

Presettlement fire strongly influenced the structure, composition and dynamics of most Sierra Nevada ecosystems. Fire not only interacts with the physical, but the living components of the ecosystem (Sugihara, N., et. al., 2006). The only portion of the fire behavior "triangle" that can be intervened with is fuels by managing vegetation (Sugihara, N., et. al., 2006). But how can fire be placed back into the ecosystem, if the potential resultant fire (whether management ignited as prescribed fire or natural-caused) is of higher intensity and severity than it was historically because of the unnatural accumulations of fuels? Although there is relatively little understanding of the ecological effects of fuel treatments, in particular the extent to which mechanical treatments might emulate natural ecological processes such as fire (Stephens, S., 2009), they can be effective tools to modify stand structure and influence subsequent fire severity and extent. These mechanical treatments are often a required first treatment in forests containing excessive fuels loads (North, M., 2009).

This Fish Camp Project analyses the effect of treatment within the units. This analysis measures the combination and balance of the alternatives designed to meet the purpose and need of the project. The analysis measures if fuel loadings are reduced to where wildfire effects are moderated and where there is an ability for low intensity fire (by prescribed fire in the short term) to be re-introduced into a fire dependent ecosystem. Also considered in this analysis is whether the alternatives and the treatment intensities proposed allow for forest resiliency while providing for the forest structure diversity needed for wildlife habitat.

Creating Fire Resistant Forests

Fire resistant forests combine fire resistant tree species suitable to a site in a spatial arrangement that discourages surface fires from moving to the crowns. Crowns are made more resistant to fire by reducing surface and ladder fuels as well as increasing the height of the base of the canopy.

Canopy Base Height (CBH) –

- Is the lowest height above the ground at which there is sufficient canopy fuel to propagate fire (Van Wagner, 1993);
- Is the average crown base height for the stand;
- Is the lowest 20th percentile of all crown base heights in the stand (Hoffman 2005, Fulé et al. 2001, 2002);
- The height at which a minimum bulk density of fine fuel (30 lb/acre/ft, 0.011 kg/m3) is found (Reinhardt and Crookston, 2003);
- CBH is the lowest height above the ground at which there is sufficient canopy fuels to propagate fire vertically through the canopy (Scott and Reinhardt, 2001).

Also decreasing the crown density and removing smaller trees while retaining larger more fire resistant trees reduces the risk of crown fire. Table 38 below displays recommendations for

Table 32: Principles of Fire Resistant Forests. Adopted from Agee 2002 by Graham et. al. 2004

Recommendation	Physical Effects	Fire Advantage	Concerns
Reduce surface and ladder fuel	Reduces potential flame length	Fire control easier, less torching	Surface disturbance less with fire than other techniques

Recommendation	Physical Effects	Fire Advantage	Concerns
Increase canopy base height	Requires longer flame length to ignite tree crowns	Less torching	Opens under story, may allow surface wind to increase
Decrease crown density	Makes independent crown fire less probable	Reduces crown fire propagation	Surface wind may increase, surface fuel may be drier
Retain larger trees	Thicker bark and taller crowns	Increases survivability of trees	Removing only smaller trees is economically less feasible
Retain fire resistant tree species	Promotes trees most likely to survive fires	Reduces mortality from future fires	Repeated treatments may be necessary to promote desired trees

The table above is displayed in this report to assist in demonstrating the types of treatments proposed to achieve the purpose and need of the Fish Project, the physical effects, fire advantage and concerns associated with each recommended means to affect fire behavior. The following associates the predicted fire behavior results of each level of treatment proposed by this and all action alternatives.

Fire Behavior Indicators

Analysis Indicators Measured - The SFNPA ROD, 2004 includes specific characteristics (indicators) of fire behavior as desired conditions for fuels treatments. These are used as the "indicators" in this analysis. These include:

Fire Behavior Characteristics Indicators:

- Existing and Resultant Fuel Model
- Existing and Resultant Average Rate of Spread
- Existing and Resultant Average Flame Length
- Existing and Resultant Average Fireline Intensity
- Existing and Resultant Crown Fire Potential
- Existing and Resultant Resistance to Control
- Existing and Resultant Average Tons per Acre of Surface Fuels
- Existing and Resultant Average Mortality in Ponderosa Pine red and white fir conifers (average size existing 10" dbh; post treatment 30" dbh)

Affected Environment

Existing Condition

The Fish Camp Project area encompasses 5 distinctive vegetation complexes. These include: (1) conifer plantations, (2) mixed conifer stands, (4) true fir conifer stands and/or (5) a combination of these. These vegetative complexes are results of various processes including wild fires, effective fire suppression efforts, turn of the century timber harvesting and reforestation efforts.

Fire Behavior in Current Fuel Loading - The Fish Camp Project area has three dominant arrangements of fuels that influence fire behavior. These are: ground, surface and crown fuels. Ground and surface fuels can be described utilizing Rocky Mountain Research Station Fuel Models (Scott and Burgan, 2005) for estimating fire behavior. This is used to aid in describing the type and average amount of fuel given a particular fuel type and the prediction of the type of fire behavior expected under certain weather and topographic conditions. Crown fuels are generally described in relationship to the density of crowns (canopy bulk density) and their height above the surface fuels (canopy base height).

***Surface Fuels*:** Ground and surface fuels within the Fish Camp project vary throughout the project. The ground and surface fuels within plantations or where poor regeneration has occurred and areas consisting of mixed conifer stands located on the south and southwest facing slopes of the lower reaches of the Project area can be best described using a Fuel Model SH2. A Fuel model SH2 is described as dry climate woody shrubs' and shrub litter with moderate fuel load.

The ground and surface fuels within the mixed conifer and true fir stands that do not have brush as the main understory component fall into four Fuel Models TL8 (long needle pine litter), and TL3 (conifer needle litter), TU5 (conifer litter with shrub understory), and SB2 (activity fuels and scattered blowdown from wind damage with many trees still standing). The difference between these four fuel models comes from the increasing amounts of ground and surface fuels.

Fuel Model TL3 is described as the lighter amount of ground and surface fuels associated with it and is used to describe the true fire stands in the higher elevations of the Fish Project that have not started to deteriorate from drought stress and/or overcrowding and the trees have not begun to fall on their own. Estimated surface fuel loadings average is between 3 and 8 tons per acre.

Fuel models TL8 describes where there are areas where there is a moderate fuel load small saplings and suppressed trees have begun to fill in the understory of larger trees. Estimated surface fuel loadings average is between 5 and 10 tons per acre.

Fuel Model TU5 and SB2 are used to describe conifer stands where natural fuel and activity generated accumulations of ground and surface fuels are beginning to increase. These surface fuels are of larger size, mostly 3+" in size and can increase the intensity of surface fires within the area. These fuels include not only the branches and needles of fallen trees, but also include the boles, increasing the tons/acres of natural fuels on the ground rapidly. Surface fuel loadings in the Fish Camp Project area that are representative of Fuel Model TU5 average between 12 and 25 tons per acre. Surface fuel loadings that are representative of Fuel Model SB2 average between 15 and 30 tons per acre.

Crown Fuels: The crown fuels in the Fish Camp Project area can be described in two ways, crown fuels that can lead to the propagation of a crown fire and the crown fuels available to sustain a crown fire. There are two elements that need to fall into place for a crown fire to start and for it to sustain itself, fuel ladders (vegetation that "stair-steps" up in height and can allow a fire to reach the crowns of trees) and canopy density (in simple terms, how close together individual tree crowns are, usually given as a percentage of space taken up by the tops of trees).

In the Fish Camp Project area, fuel ladders are heavy and continuous, consisting of regeneration of conifers and brush in plantations and of natural regeneration of conifers (mainly white fir and incense cedar). These fuel ladders start at the surface layer and have grown to the point of having a continuous "stair-step" of available fuels into the bases of the canopy trees.

The canopy fuels in the Fish Camp Project area are varied from open to heavily closed (approximately 100% canopy closure). Areas where there is a combination of heavy, continuous fuel ladders and canopy closure is closed (interlocking of crowns in the canopy) the potential for initiation and sustainability of a crown fire is the greatest.

Wildland Urban Intermix (WUI): Communities (wildland urban intermix zones) surrounding the Project area have been rapidly developing over the last several years. Adjacent the Southeast border of the Fish Project is the community of Fish Camp with scattered residences and businesses along the Highway 41 corridor. Fish Camp also includes the Teneya Lodge (a popular visitor destination outside of Yosemite National Park). To the Northeast is Yosemite West a residential area and Wawona in Yosemite National Park. To the north and Northeast is the South entrance to the Yosemite National Park wilderness and Mariposa Grove (a high interest attraction for Yosemite Park visitors.) To the northeast and east is private property. To the South and Southeast of the Fish Project area lie the communities of Sugar Pine and Cedar Valley and Nelder Grove Historical Area of giant sequoia.

With the continuity of the fuels within the Fish Project area, a wildland fire originating from along Highway 41or Forest Service designated roads, under the right conditions, has the potential to spread northward or eastward to the community of Fish Camp, Yosemite National Park and/or Mariposa Grove.

Desired Condition

The Sierra National Forest LRMP identifies two related broad goals of the old forest and associated species conservation strategy, which are to: a) protect, increase, and perpetuate desired conditions of old forest ecosystems and conserve species associated with these ecosystems while meeting people's need for commodities and outdoor recreation activities; b) increase the frequency of large trees, increase structural diversity of vegetation, and improve the continuity and distribution of old forests across the landscape. A key element in this strategy includes: a proactive approach for improving stand health and vigor with management objectives to reduce susceptibility of forest stands to insect and drought related tree mortality by managing stand density levels. The forest-wide standard and guidelines state that "vegetation within treatment areas should be modified to meet desired surface and ladder, and crown fuel conditions as well as stand densities necessary for healthy forests during drought conditions".

The SNFPA ROD, 2004 establishes a desired condition for each land allocation. In particular, the desired condition for each land allocation incorporates how and what type of vegetation complexes are desired for each. These are referenced in short and long term conditions and are influenced by the temporal and spatial influences of fire. The land allocations and their specific desired conditions used in this report include:

General Forest: (SNFPA ROD, 2004; page 48)
Desired conditions for the general forest allocations are identical as those described for the old forest emphasis areas.

- Forest structure and function generally resemble presettlement conditions.
- Multi-tiered canopies particularly in older forest provide vertical heterogeneity.
- Where possible, areas treated for fuels provide for the successful establishment of early seral stage vegetation.

Wildland Urban Interface:

Defense Zone (SNFPA ROD, 2004; page 45)

- Stands are fairly open and dominated primarily by larger, fire tolerant trees.
- Surface and ladder fuel conditions are such that crown fire ignition is highly unlikely.
- The openness and discontinuity of crown fuels, both horizontally and vertically, result in very low probability of sustained crown fire.

Threat Zone (SNFPA ROD, 2004; page 46)
Under high fire weather conditions, wildland fire behavior in treated areas is characterized as follows:

- flame lengths at the head of the fire are less than four feet;
- the rate of spread at the head of the fire is reduced to at least 50 percent of pre-treatment levels;
- hazards to firefighters are reduced by managing snag levels in locations likely to be used for control prescribed fire and fire suppression consistent with safe practices guidelines;
- production rates for fireline construction are doubled from pre-treatment levels; and
- tree density has been reduced to a level consistent with the site's ability to sustain forest health during drought conditions.

Fuels treatments outside of the WUI and within other land allocations are to establish and maintain a pattern of area treatments that is effective in modifying wildfire behavior (SNFPA ROD, 2004; page 35). There are specific means and conditions by which treatments can be conducted within some land allocations because of maintaining habitat needs as well as perpetuating such conditions (i.e. old forest emphasis areas).

The Forest Service's primary responsibility and objective for structure fire protection is to suppress wildfire before it reaches structure. (Forest Service Manual, 5137.02). The spatial arrangement of stands and homes is crucial to the success of fuel management activities in changing the effects of large fires either at the local or landscape scale. (Finney and Cohen, 2003). Thinning trees to produce gaps in the flame front significantly reduces radiant exposure, and that a firefighter' s maximum radiant exposure is well below exposures necessary for piloted wood ignitions. The defensible space requires more vegetation fuel hazard reduction than fuels reductions required for preventing piloted wood ignitions. (Cohen and Butler, 1996). Agency WUI fuel treatment largely do not address home ignitability but rather areas outside the home ignition zone. Fuel treatment in the vicinity is expected to protect homes by creating conditions that enable successful fire suppression if a wildfire would to occur. Preventing WUI fire disasters require the problem be framed of home ignition potential. Because this principally involves the home ignition zone, the home ignition zone primarily falls within private ownership, the responsibility for preventing home ignition largely falls within the authority of the property owner (Cohen, 2008).

Environmental Consequences

Methodology

Assessment of Fuel and Stand Structure - Aerial photography (2007) of the Fish Camp Project area was initially used to determine fuel type (shrub, brush, timber litter, and slash/windblown) within the Project area. Due to the variability of conditions throughout the Project area, The Rocky Mountain Research Station Fuel Models (Scott and Burgan, 2005) was used to determine which stratum of surface fuel was most likely to carry the spreading fire. These fuel models were used to represent the average conditions within in each fuel type represented in the area. Because these fuel models have associated fuel loading for each time lag fuel category (1, 10, 100-hour fuels) and live fuel loadings, field ocular verification and timber cruise plot data, that included recording of ground and surface fuels utilizing the Photo Series for Quantifying Forest Residues in the Sierra Mixed Conifer Type and Sierra True Fir Type (General Technical Report PNW-95, October 1997), was used to adjust and/or include additional fuel models to represent the average fuel loading conditions existing within the Project area.

Predicted Fuel Model Conversion - In assessing the effects of future conditions in the no action alternative and the action alternatives, fuel models were chosen to represent the predicted fuel group and average post treatment conditions by fuel group being treated. It was assumed that treatments would move existing conditions from one fuel model to another, but remain within the same fuel group (i.e. a Fuel Model TU1, Timber Group would post treatment convert to a Fuel Model within the Timber Group). For the shrub group, dependent on the type of treatment, it may be converted from the shrub group into any of the fuel groups. Studies within the Sierra Nevada range and similar to those existing and resulting from the Fish Camp treatments proposed (Kaufman, 2002; Stephens, S., 2009; USDA Forest Service, PSW, 2001) were used to determine and verify the fuel models chosen as well as field verification in areas on the district where similar treatment prescriptions have been implemented

Crown Fire Prediction - In order to determine the potential for crown fire initiation and/or the type of crown fire (if initiated), average canopy bulk density as well as average canopy base height were needed for stands within the Project area. Tree list were developed utilizing timber cruise sample plot data collected within the Project area and processed through the Forest Vegetation Simulator program for verification. The collected data was for trees over 10 inches in diameter (dbh) only. Utilizing studies conducted within the Sierra Nevada Range and in similar conditions as that within the Project area (Kaufman, 2002; Stephens, S., 2009; USDA Forest Service, PSW, 2001) average existing and post treatment canopy characteristics were determined. Average canopy base heights were based on measured tree heights, stand position and field verification for both existing and post treatment condition.

Modeling For Potential Fire Behavior and Fire Effects -Modeling of potential fire behavior and the resultant intensity and severity of such fire behavior requires several inputs for calculation. These include, but are not limited to fuel, weather and topography conditions of the area being analyzed. These conditions can change slowly over time and space or can change rapidly. For this analysis, conditions (except for fuel model) were held constant and were based on what are considered 90th percentile weather conditions for the Project area. Ninetieth percentile conditions, as used here, is representative of the high fire weather conditions under which wildfire behavior in treated areas is to be characterized for desired conditions (SNFPA ROD, 2004; page 46).

Fire Family Plus (a program used for analyzing historic weather and fire danger rating records) was used to determine what 90th percentile weather conditions are from representative Remote Automated Weather Station (RAWS) historic weather records. Twenty years of recorded weather data (1990-2010) from the Batterson and Minarets RAWS were analyzed. Conditions analyzed and used were: 1-hour, 10-hour and 100-hour dead fuel moistures, live fuel moistures, air temperature, and windspeed. Because treatments are proposed on slopes generally less than 35 percent, an average slope of 20 percent was used for fire behavior modeling. It is assumed that with an increase in slope percentage, fire spread and intensity would increase.

Fire behavior was modeled, for existing, short term conversions and post activity treatments, using BEHAVE Plus 5 and Nexus. BEHAVE Plus 5 was used to model surface fire behavior for the initial fuel models selected for existing, short term conversions and post activity treatment conditions as well as the predicted mortality of conifers within the stands given the constant weather conditions and the representative fuel bed. Nexus was used to model both surface and crown fire. The modeled results were compared to observations made of past wildfires burning under the same conditions and same fuel models to determine if modeled results were representative and/or realistic

The inputs utilized for this analysis are;

Fuel Models: SH2, TL3, TL8, TU5, and SB2 (for existing conditions)

1-hour Fuel Moisture (%):	3
10-Hour Fuel Moisture (%):	4
100-Hour Fuel Moisture (%):	6
Live Woody Fuel Moisture (%):	80
Foliar Moisture (%):	80
Air Temperature (%):	80
20 foot Windspeed (mph):	15
Wind Reduction Factor:	0.3
Canopy Bulk Density (lb/ft3):	0.0119 and 0.0874
Canopy Base Height (feet):	10 and 20 For timber 0.1 and 5 For brush
Slope (%):	20

Analysis Indicators Measured - When interpreting fire behavior and predictions, guidelines or "trigger-points" have been established to determine the most effective means or resources that should be used on fires based on rates of spread, flame length and fireline intensity that are observed or predicted for given conditions. Intuitively, a resource(s) used to suppress a fire must have line building capability faster than the rate of spread to be effective in stopping the fire's spread. Rate of Spread, flame length and fireline intensity determine which type of resources and how "close" to the fire they can attack it. These effects result to the resistance to control or the difficulty to control a fire. Resistance to control relates the difficulty of constructing and holding a control line as affected by resistance to line construction and by fire behavior. Because every fire is different these are used as general guidelines in assisting fire managers in determining appropriate tactical decisions. The tables below displays trigger points for

Table 33: Adapted from How to Predict the Spread and Intensity of Forest and Range Fires. Richard C. Rothermel, 1983 and Rocky Mountain Research Station Fuel Models, Scott and Burgan, 2005

ROS (Ch/h)	Flame Length (Feet)	Fireline Intensity (Btu/ft/s)	Interpretations

ROS (Ch/h)	Flame Length (Feet)	Fireline Intensity (Btu/ft/s)	Interpretations
0 - 5	<4	<100	Fire generally can be attacked directly at the head or flanks by using hand tools. Use of hand crews with tools is effective. Hand line should hold fire.
5-20	4-8	100-500	Fires are too intense for direct attack at the head of the fire by persons using hand tools. Hand line cannot be relied on to hold fire. Equipment such as fire engines, dozers, and aerially delivered fire retardant can be effective in control efforts on the fire.
20-50	8-11	500-1,000	Fires may present serious control problems as the following can be expected in forests: torching of trees, initiation and spread via a crown fire, and the occurrence of spot fires up in front of the main fire. Control efforts at the head of the fire will probably be ineffective.
50-150	>11	>1,000	Crowning, spotting, and major fire runs are probable. Fire usually spreads via rapid runs in surface fuels and crown fires in timber stands. Major fire spread and spotting 1 to 2 miles in front of the main fire is expected. Control efforts at the head of the fire are ineffective.

To measure the degree of change between existing and resultant conditions between alternatives, the table above and an adjective class guide below was used as a guide to quantify the spread rates, flame length, fireline intensity and resistance of control. These guides rates the rates of spread, and flame lengths for predicted fire behavior and are referred as being very low, low, moderate, high, very high, and extreme. Because every fire responds differently to various environmental conditions and topography actual predictions may be slightly high or lower.

Table 34: Rocky Mountain Research Station Fuel Models, Scott and Burgan, 2005

Adjective Class	ROS (Ch/h)	FL (Ft)
Very Low	0-2	0-1
Low	2-5	1-4
Moderat*e*	*5-20*	*4-8*
High	20-50	8-12

Adjective Class	ROS (Ch/h)	FL (Ft)
Very High	50-150	12-25
Extreme	>150	>25

Incomplete and Unavailable Information

Assumptions
Locations of cruise plots were done randomly and not all trees were cruised therefore leaving insufficient data during the collection of plot surveying.

Fire Behavior Prediction and Fuel Modeling System BEHAVE Plus 5 Fire Modeling System, Version 4 (Patricia LAndrews,.Collins D. Bevins, Robert C. Seli, USDA Forest Service General Technical Report RMRS-GTR-106WWW Revised, Jul, 2008.) computer model was used as a baseline to analyze the environmental effects of the alternatives. Through mathematical equations this modeling program uses inputs from fuel, topography, and weather in which produce predicted fire behavior outputs. Because fuel, fuel moisture, wind, and slope are assumed constant and can only be applied to fires spreading through surface fuels this modeling program estimates basic fire behavior.

The rate of spread and flame length adjective class guide table (Table 34) assumes live herbaceous fuels are two-thirds cured, dry dead fuels (1 hour/six percent, 10 hours/seven percent, 100 hours/eight percent), midflame wind speed of 5 mil/h, and zero slope.

Connected Actions, Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

Fire plays a pivotal role in reshaping and maintaining mixed-conifer ecosystems (North, M. et. al., 2009). The role fire plays in an ecosystem is characterized by the fire regime attributes that describe the pattern of fire occurrence, behavior, and effects. Temporal attributes include seasonality and fire return interval. Spatial attributes are fire size and spatial complexity of the burns. Magnitude attributes are fire intensity, fire severity, and fire type. Many species and most communities show clear evidence of adaptation to recurrent fire, further demonstrating that fire has long been a regular and frequent occurrence. This is particularly true in the chaparral and mixed conifer communities, where many plant species take advantage of or depend on fire for their reproduction or as a means of competing with other biota. In many areas frequent surface fires are thought to have minimized fuel accumulation, keeping understories relatively free of trees and other vegetation that could form fuel ladders to carry fire into the main canopy (Sierra Nevada Ecosystem Project [SNEP], 1996).

Past Activities:

- ***Fire History*** **-** The Fish Camp Project lies within the Big Creek watershed, where during the period before significant Euro-American influence, natural fires occurred frequently and were low intensity with return intervals ranging from 5 to 10 years. During the past century, fire history maps indicate that wildland fires have played a role around the Fish Camp and the Southern Yosemite National Park area. Between 1911 and 2008 there have been 8 fires within 3 miles of Fish Camp area. The majority of the fires occurred between 1911 and 1934 and ranged in size from 106 to 3930 acres. These fires were mostly to the south and west of Fish Camp. Although there is no documented history of large fire occurrence in the Project area, numerous residual trees and cut stumps show witness to fire. In 1990, a 26 acre fire started in or near two adjacent plantations, causing severe damage to the plantations. In 1924, an 800 acre fire to the south west of Fish Camp was stopped within a tenth of mile of the community.

Though this area has had a small fire occurrence, given the proper burning conditions as documented fire history around the Project area shows a fire could have the potential to burn with such severity that could result in resource damage that would be greater than the ecosystem could sustain. It also can easily threaten and has burned into the Yosemite National Park, the community of Fish Camp and Yosemite West residential area.

Tables 35 and 36 show the Fire History Records (fires >100 Acres) within and outside of the Fish Camp Project area. Map 1 in the appendix of this document shows the approximate perimeters of these fires and their proximity to the community of Fish Camp and the Project area.

Table 35: Fire History within the Project boundary

Year	Size/Acres	General Location
1990	26	½ mile north of Little Sandy Campground

Table 36: Fire History Outside of the Project boundary (within a 4 mile radius)

Year	Size/Acres		Year	Size/Acres
1911	162		1924	106
1917	2,236		1926	540
1920	508		1930	701
1920	99		1934	3,930
1924	800		2008	102
1924	160		2008	235

- ***Logging*** - The areas east of Fish Camp received extensive logging between 1918 and 1925 which resulted in slow natural regeneration of conifer species. Railroad and ground-based logging activities as well as stand replacing fires have resulted in little of the area with trees over 100 years of age. The natural stands proposed for thinning generally consist of approximately 85 to 100 year old shade tolerant trees. A large number of the resulting brush fields were prepared and planted in the late fifties and early sixties. Fire exclusion from the vast majority of the area since the 1920's, has resulted in development of dense fuel ladders in the natural regeneration areas along with areas that escaped early day logging.

  Hundreds of small trees per acre are common beneath these stands of white fir, sugar pine, incense cedar, and ponderosa/Jeffrey pine in the lower elevations and red fir in the higher elevations. These stems consist of mostly shade tolerant incense cedar and white fir. Ponderosa pine and incense cedar have naturally reseeded into small portions of fire impacted areas where they are severely overstocked, creating significant fuel ladders. Due to drought and beetle infestation in the late eighties and nineties logging was used to salvage dead and dying trees. Activity fuels were treated with machine piling and pile burning.

Present Activities -The community of Fish Camp borders the west side of the Project area. This project also affects three Forest Service campgrounds, a State Snow Play area and a county refuge transfer site. Also within the project is a 244 room hotel situated on 35 acres with numerous out buildings and guest cottages. There is also a special use permit for a wilderness pack station and horseback riding. Most of the homes in the Fish Camp area do not have adequate clearance to protect them if a fast moving wildland fire were to move into the subdivision. Compounding this problem is poor access in the subdivision, with narrow winding roads and only one main road as access in the event of a wildfire.

Foreseeable Activities - Fish Camp sets at the southern entrance to Yosemite National Park and as the tourism increases recreation activities spills into the National Forest and the Project area. With high concentrations of recreation visitors during the height of the summer season, evacuations would be difficult if a fast moving fire started. Natural and/or human caused fires starting to the south of the project or near Fish Camp would have the greatest potential for threat.

Other issues beginning to appear are pockets of insect and drought induced mortality within conifer plantations and mixed conifer stands along with accumulations of heavy dead and downed material as a result of fire exclusion and past harvest operations.

Alternative 1 – No Action

Under Alternative1, current management plans would continue to guide activities in the Project area. No thinning of commercial and/or pre-commercial operations of mixed conifer and pine stands, mastication of brush/shrub patches, prescribed burning to reduce natural fuel accumulations and/or treatment of infestations of noxious weeds and replanting of conifers in failed conifer plantations would be implemented to accomplish the purpose and need.

Direct Effects

Natural fuel accumulations would continue to increase as more trees begin to succumb to overcrowding, drought, insect and pathogens. This would increase the amount of ground and surface fuels within the area. This increase in ground and surface fuels would gradually begin to shift the potential fire behavior in the area, to a more severe stature if a wildfire were to start. This increase would be to a more severe surface fire as the type of fuels changed from branches and needles (0-1" material) to the larger size material (3+"). This change is best represented by fuel model changes or conversions mixed conifer areas that begin as Fuel Model TL8 would convert to Fuel Model TU5. As accumulated natural surface fuel loadings increased, a further conversion from Fuel Model TU5 to Fuel Model SB2, similar to that of a moderate slash fuel loading could occur in some areas.

Fuel Model SH2 is used to present the surface fuel conditions in existing in some conifer plantation. Under Alternative 1, this would not change, but additional accumulations of larger diameter branch wood, twigs and perhaps boles of trees could increase the average tons/acre of surface fuels, increasing the fireline intensity and resistance to control. Firefighters with handtools or water from fire engines would become less effective. Crown fire (a fire that advances from the top to top of trees or scrubs more or less independent of surface fire) potential would also remain high because none of the elements needed to propagate and sustain a crown fire would be removed (fuel ladders and canopy density). Because of the increased amount of surface fuels and the increased fire behavior associated with them, these potential crown fires would have the potential to propagate over a larger area. Table 37 below shows the indicators for current existing conditions and those associated with the conversions in Fuel Models under Alternative 1.

FL - Average Flame Length
ROS - Average Rate of Spread
FLI - Average Fireline Intensity
Crown - Crown Fire Potential
Resistance to Control - Resistance to Control Average
Fuel Loading - Average Fuel Loading
Mortality - Mortality in White Fir / Ponderosa Pine

Table 37: Indicator for Fuel Models in Shrub/Brush Areas.

Fuel Model	**ROS** (ch/hr)	**FL** (feet)	**FLI** (Btu/ft/s)	**Crown** (transition and type)	**Resistance to Control** (low, mod., high)	**Fuel Loading** (tons/acre)	**Mortality** (%) WF/PP
Existing Conditions– SH2	8.4	5.3	217	Yes/Crowning	Mod	3-8	12/9
Future Conditions – SH5	68.0	15.7	2,259	Yes/Crowning	Extreme	5-10	99/80

It is assumed that mortality in the shrub/brush species would be from stand replacing (100%) or patchy dependent on the percent of the brush cover. For mortality to occur in the scrub there needs to be enough fire to girdle the main stem. With the predicted fire behavior, as shown above it is anticipated that in the Fuels model SH2 as currently exists, there would be mortality, but not as great as in Fuel Model SH5 (heavy shrub load covering at least 50% of the site), because of the lower amount old dead woody material found on the brush.

Table 38: Indicators for Fuel Models in Timbered Covered Areas.

Fuel Model	**ROS** (ch/hr)	**FL** (feet)	**FLI** (Btu/ft/s)	**Crown** (transition and type)	**Resistance to Control** (low, mod., high)	**Fuel Loading** (tons/acre)	**Mortality** (%) WF/PP
Existing Conditions– TL8	7.6	4.0	117	Yes;Crowning	Mod	5-10	7/7
Future Conditions – TU5	11.3	8.6	606	Yes;Crowning	Mod/High	12-25	34/44
Further Future Conditions -SB2	19.4	7.3	431	Yes;Crowning	High	15-30	21/22

The above tables give an indication of what type of fire behavior could be expected if a fire were to occur within these fuel beds as they currently exist and in the anticipated fuel beds into the future with no management action taken. Because of the variability in the three facets needed to predict fire behavior; fuel, weather and topography that exist within the Fish Project area, there would be variations in the conditions and results of wildfire. On northern aspects, conditions would be expected to be cooler than southern aspects, lending to slightly slower and slightly less intense fires. Lower fuel loadings could produce slower rates of spread and intensities than predicted above. There are conditions that could produce higher rates of spread and intensities than in the above tables as well. These would include increased slopes, wind conditions, greater surface fuel loadings (both small and large down-woody debris) and increased density of ladder fuels.

Indirect Effects

Past actions in the Fish Project area, along with fire management policy of full suppression at the smallest size (97 percent of all fires will be controlled at 10 acres or less from SNF LRMP, 1996) have contributed to the current existing condition for the Fish Camp Project area and are used to depict the existing condition and the resultant fire behavior within the Project area.

Under Alternative 1, there would be very limited to no potential to allow fire to play its natural role on the landscape. The risk of escape and the consequential effects associated with utilizing fire without some form of management activity to reduce current surface fuel loadings and ladder fuels would be too great. Although prescribed fire could be implemented under more "controlled" conditions than those conceivably present during the summer fire season, it would be a very narrow prescription window that could produce reasonable outcomes that would be beneficial versus detrimental. Just like wildfire, prescribed fire produces air quality concerns, risk of escape, potential negative impacts to resources (from control lines and fire itself), resource commitments and political/social impacts.

Fire Suppression

As surface fuels continue to accumulate naturally, with no additional management actions, suppression efforts will gradually become more difficult, whereby direct attack could no longer be used in suppressing a fire, but have to be changed to more indirect tactics, whereby more area has the potential to be affected by fire, in some cases high intensity and more severe fire. With the increases in fire behavior generated by these surface fuel changes, fire suppression forces would have higher resistance to control due to fuel loading and by fire behavior. Aerial retardants would be less effective due to closed continuous canopy. If fire were to start in or burn into the Fish Project area, ground and aerial initial attack operations as well as extended attack would become less effective and firefighter and public safety would be difficult to ensure.

Fire Effects

Fire influences many portions of a fire dependent ecosystem by either its presence or even its absence. Forest stand structures, wildlife habitat, aquatic communities, watersheds, plant communities and soil conditions, to name a few can be influenced. Without frequent fire to clean the understory of stands, excessively dense stands lead to drought stress and bark beetle outbreaks, resulting in wide spread mortality of trees in many areas and the potential for extensive mortality. This leads to a large increase in the amount and continuity of both live and dead forest fuels, resulting in a substantial increase in the probability of large, severe wildfires (Weatherspoon, C.P., 1996). These are directly correlated to the conversions of Fuel Models discussed in the Existing Conditions section.

With increased rates of spread, flame lengths, and fireline intensities there is potential for greater fire effects to occur. Because of existing changes in tree species composition, from fire resistant to fire susceptible, tree mortalities would increase with small incremental changes in wildfire intensity. This, in combination with drought or insect/pathogen induced mortality in overstocked stands, could greatly increase the amount of surface fuel loading, thus increasing fire behavior and intensity of subsequent wildfires. Under Alternative 1, there would be no reduction in surface and ladder fuels, to raise mean canopy base heights and/or decrease canopy bulk densities as has been suggested in the Desired Condition for creating fire resilient stands. Vertical continuity of fuels from the forest floor to the crowns of overstory trees would be present and with sufficient radiant/convective heat could produce crown fire. Some studies and models, however, suggest a crown fire entering a stand is rarely sustained (i.e., sustained only under extreme weather conditions) (North, M., et.al., 2009). Calculated and predicted crown fire potential show that conditions are present in the Fish Project area to produce the potential for crown fire. This could be in the form of torching single trees, groups of trees and/or active crown fire dependent on weather, fuels and topography of where the fire were to occur.

Crown fires remove much or the entire tree canopy in a particular area, essentially resetting the successional and growth processes of stand and forests. These fires typically, but not always kill or temporarily reduce the abundance of understory shrubs and trees. Crown fires have the largest immediate and long-term ecological effects and the greatest potential to threaten human settlements near wildland areas (Graham, R., et.al., 2004). For wildlife species dependent on diverse forested landscapes (heterogeneity) and old forest characteristics for habitat, this successional “set-back” could pose negative consequences.

Although crown fires would be considered of higher consequence of negative effects, surface and ground fires with higher intensities similar to those predicted and anticipated in this alternative, can also have negative impacts. While surface fires can reduce vegetation and woody, moss, lichens and litter strata, ground fires that consume large amounts of woody fuels and organic soil horizons can produce disproportionately large amounts of smoke. Ground fires reduce the accumulation of organic matter and carbon storage and contribute to smoke production during active fires and long after flaming combustion has ended. These fires can also damage and kill large trees by killing their roots and the lower stem cambium. Because ground fires are often of long duration, they may result in greater soil heating than surface or crown fires, with the potential for reducing organic matter, volatilizing nutrients, and creating a hydrophobic layer that contributes to erosion. Areas where the ground cover is removed and severely burned will likely see decreased infiltration of water, increased surface runoff and peak flows, and the formation of pedestals, rills and gullies (Graham, R., et.al., 2004).

Depending on the setting (in particular topography and soil), perennial streams downstream from fires can be impacted by large volumes of sediment. Depending on the recovery of the hill slopes, these fire effects can be long lasting, and relatively little can be done to stop the problem. Large amounts of sediment can be delivered to reservoirs, reducing water storage capacity and potentially affecting fish and macroinvertebrate habitat (Graham, R., et.al., 2004).

Cumulative Effects

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Alternative 1-No Action, would not comply with the Forest Plan and other Relevant Laws, Regulations, Policies and Plans. The No Action Alternative continues with permitted and authorized projects; however the goals and objectives for the Fish Camp Project would not be met. This action does not accomplish integrating a strategy for vegetation management that is aggressive enough to modify fire behavior over the broader landscape and reduce the risk of wildfire to communities in the WUI as directed by the SNFPA ROD 2004 and the Sierra LRMP.

Summary of Effects

Alternative 1-No Action would not meet the purpose and need for this project. There would be no thinning; commercial and precommercial thinning accomplished. Forest health in the area will continue to decline. No connection and augmentation of fuel treatments within and adjacent to the Wildland Urban Interface would be completed. No fuelbreak maintenance work would be completed.

The predicted rate of spread, flame length, and fireline intensity would increase due to fuel accumulation if left untreated. Full suppression would continue to be the management direction for the Fish Camp Project area. Because of the continued and potential increased threat to life and property, under Alternative 1, firefighting resources would focus strategies and tactics on reducing the impacts on communities, protecting infrastructure and private property as the highest priority followed by protection of natural resources. The resistance to control would increase from Low/Moderate to Moderate to Very High. Aerial fire suppression would not support ground forces due to the inability of retardants to reach ground fuels because of closed canopy cover.

Alternative 2 – Proposed Action

Treatment areas within the Project area boundary were delineated to include those areas where some form of treatment was necessary to meet the purpose and need. First treatment areas were designed to create Strategically Placed Area Treatments (SPLAT's) to reduce the intensity and spread of wildfires in and around WUI. Treatment areas near key transportation corridors and within the defense zone of the WUI were designed next. Treatment areas were further designed to not only focus on those treatments needed to meet fire and fuel objectives (treatments defined for fire/fuels are designed to reduce the ladder and surface fuels and occur within the lower and limited mid-level canopy[Fire/Fuels Objectives]), but areas where the stands were considered overstocked with conifers and are in higher levels than can be sustained with changing environmental conditions and are vulnerable to loss from insect, disease and wildfire (Forest Health Objectives) (treatments defined for forest health are designed to reduce basal area and stocking to such a level that the stands are resilient to changing environmental conditions, increase growth and are vigorous with reduced susceptibility to insect and disease attack and wildfire. These treatments occur within the lower and mid-level canopy). A treatment area map can be found in the project folder.

Design Features and Mitigation Measures

The utilization of prescribed fire to maintain appropriate levels of surface and ladder fuels to meet fire and fuels objectives would be conducted in prescribed treatment areas and portions of T-8 north of road 5S06, T-9, T12, portion of T-10 north of road 5S06 and all except the very east portion of T-12. To reduce the potential impacts (fire effects) that may occur with the implementation of prescribed fire, the following criteria would need to be considered in the areas where prescribed fire would be used:

- Prescribed fire areas should be considered where there are larger residual trees (of size less susceptible to fire damage) with light fuel loadings, and/or areas where conifer reproduction is not being used for re-generation of openings.

- Prescribed fire should be used during the late fall, winter or early spring, to minimize effects to trees during active growing period and within Pacific fisher denning habitat areas.

Direct Effects

Under this alternative, thinning from below, through precommercial and commercial treatment would focus first on the smaller trees for removal gradually moving through the lower canopy levels with the potential to remove trees within the mid-level canopy to reach a silviculturally prescribed basal area and stocking level. Through the treatments in Alternative 2, the recommendations in Table 32 are accomplished by reducing surface and ladder fuels, increasing canopy base height, decreasing crown density, retaining larger trees and retaining fire resistant tree species.

Fuel Model Changes

Under Alternative 2, existing fuel model would be converted to another fuel model, typically a fuel model with lower surface fuel loadings and reduced fire behavior. In areas currently represented by Fuel Model SH2, mastication would be used to convert it to a Fuel Model SB1 (light dead and down activity fuel) and/or SB2. Mastication in effect does not remove the fuel from the site, but changes the structure of the fuel from a vertical orientation to a horizontal orientation. Small chips, shredded material and/or crushed fuels (dependent on masticator head) are left on site. A fuel model that represents an increase in fuel loading in the 10 and 100-hour time lag categories is needed to show this. SB1 and SB2 are used as base fuel models with increases in 10 and 100-hour fuel loadings to approximately 10- 30 tons per acre each and the removal of live woody fuel loading to approximate this conversion.

In timbered stands represented as Fuel Model TL3 and TL8, there would be or no conversion to a different fuel model. In stands represented by Fuel Model TU5 and SB2, treatment would convert them to a Fuel Model TL8 dependent on the overstory and surface fuels remaining. In some cases, a short-term conversion to a Fuel Model SB2 or TU5 may occur until post activity treatments were completed, then a conversion to a Fuel Model TL8 would result.

The fuel model conversions shown are used to depict the conditions anticipated in the surface fuel bed changes as a result of the treatments proposed in this alternative. This alternative is also anticipated to raise canopy base heights, with the thinning or removal of ladder fuels from an average of 0-10 feet to an average of 20 feet. Canopy bulk density would also be decreased through the thinning of lower and mid-level canopies. It is estimated that, on average the canopy bulk density would be changed from 0.0119 lb/ft^3 to 0.00874 lb/ft^3 under Alternative 2.

Surface and ladder fuels

The removal and/or thinning of the lower canopy in effect removes the ladder fuels that can provide the means for surface fires to “climb” into the overstory canopy. In areas where there is a significant amount of ladder fuels present, a combination of tractor or hand piling and burning would be used to remove excess material. In areas where brush species are the dominant vegetation cover, masticators would be used to in effect change the vertical continuity of the fuel. While mastication does not actually remove fuel from the area, it does change the structure from a vertically oriented fuel (ladder fuel) to a horizontal fuel potentially making fire suppression resistance to control lower and fire effects less in most cases. In areas where there are lower amounts of ladder fuels and/or smaller areas, mastication and/or hand cutting would be used to open or separate the lower canopy from the mid to upper level canopy. Typically, these areas have lower levels of surface fuels existing (smaller amount of trees/vegetation, less amounts of naturally accumulated or activity generated surface fuels).

Dependent on the type of harvest system used for removal of excess commercial-sized material, it is anticipated there may be a short-term increase in surface fuel loading or no significant increase. Whole-tree yarding, used as a harvesting system, can minimize the amount of activity generated fuels (Stephens, S., 2009). If whole tree yarding is not used, additional post harvest treatments would be needed to reduce surface fuel loadings that are in excess of 20 tons/acre (SNFPA ROD, 2001). These post activity treatments would include dozer and/or hand piling and burning and/or broadcast/jackpot burning.

Fire Behavior / Fire Effects

Table 39: Shows the predicted results of fuel model conversions anticipated with this Alternative.

Fuel Model	ROS (Ch/hr)	FL (Feet)	FLI (Btu/ft/s)	Crown (Transition and type)	Resistance to Control (Low/Med/ High)	Fuel Loading (Tons/ac0	Mortality (%) WF/PP
True Fir (above 6,000 ft)							
Existing Conditions- TL3	2.2	1.3	9	No/Surface	Low	3-8	0/0
Short Term Conversion-TL5	5.7	2.6	44	No/Surface	Low	7-10	4/6
Future Condition -TL1	1.2	0.7	3	No/Surface	Low	2-6	0/0
Future Condition - TL3	2.2	1.3	9	No/Surface	Low	3-8	0/0
Mixed Conifer (light fuel loading w/some brush)							
Existing Conditions- TL8	7.6	4.0	117	Yes/Crown	Low/Mod	5-10	7/7
Short Term Conversion-TL5	5.7	2.6	44	No/Surface	Low	7-10	4/6
Short Term Conversion-SB2	19.4	7.3	431	Yes/Torching	High	15-30	21/22
Future Condition - TL1	1.1	0.7	3	No/Surface	Low	2-6	0/0
Future Condition - TL8	7.6	4.0	117	No/Surface	Low/Mod	5-10	0/0
Mixed Conifer (mod-heavy fuel loading)							
Existing Conditions- TU5	11.3	8.6	606	Yes/Crowning	Mod/High	12-25	34/44
Short Term Conversion-SB2	19.4	7.3	431	Yes/Torching	Mod	15-30	21/22
Short Term Conversion-TU5	11.3	8.6	606	Yes/Torching	Mod/High	12-30	34/44
Future Condition - TL8	7.6	4.0	117	No/Surface	Low/Mod	5-10	0/0
Mixed Conifer (heavy fuel loading)							
Existing Conditions- SB2	19.4	7.3	431	Yes/Crowning	Mod	15-30	21/22

Fuel Model	ROS (Ch/hr)	FL (Feet)	FLI (Btu/ft/s)	Crown (Transition and type)	Resistance to Control (Low/Med/ High)	Fuel Loading (Tons/ac0	Mortality (%) WF/PP
Short Term Conversion-SB2	19.4	7.3	431	Yes/Torching	Mod	15-30	21/22
Future Condition - TL8	7.6	4.0	117	No/Surface	Low/Mod	5-10	5/6
Conifer Plantations (with brush understory)							
Existing Conditions-SH2	8.4	5.3	217	Yes/Crowning	Mod	5-8	12/9
Future Condition - SB1	8.0	3.7	100	No/Surface	Low	5-25	0/0
Future Condition - TU1	3.3	2.0	27	No/Surface	Low	5-10	0/0
Future Condition - SB2	19.4	7.3	431	No/Surface	Low/Mod	15-30	17/14

Table 39 above gives an indication of what type of fire behavior could be expected if a fire were to occur within these fuel beds as they currently exist, short term conversion after the treatment but before the disposal of activity created fuels, and anticipated future condition fuel beds after disposal of activity created fuels were to occur. The range of fuels models in the future condition are based on mitigation measures in mixed conifers areas and brush density in plantations. Because of the variability in the three facets needed to predict fire behavior; fuel, weather and topography within the Fish Camp Project area, there would be variations in the conditions and results of wildfire. On northern aspects, conditions would be expected to be cooler than southern aspects, lending to slower and less intense fires. Lower fuel loadings could produce slower rates of spread and intensities than predicted above. There are conditions that could produce higher rates of spread and intensities than in the above tables. These would include increased slopes, wind conditions, greater surface fuel loadings (both small and large down-woody debris) and increased density of ladder fuels.

Fire Suppression

Alternative 2 in effect reduces ladder fuels which in turn increases canopy base height. Canopy density (in the form of canopy bulk density) is decreased through the thinning of the mid-level canopy, but to a small extent through the reduction in fuel ladders. These, in combination, reduce rates of spread, flame length, fireline intensity, resistance to control and the potential for a fire to transition into crown fires. As shown in Table 39, decreasing crown density may increase surface winds (less canopy to reduce winds before they reach the ground) and surface fuels may be drier (more sunlight reaching the ground). These do have the potential to increase fire behavior. It is estimated that Alternative 2 would not open canopies to the extent needed to realize these concerns. It is estimated that in most areas, canopies would remain at 60 percent or greater in the overstory even after treatment. This change would not be significant enough to change the amount of wind reaching the surface. There would be small amounts of increased sunlight to dry fuels, but not significant enough to dramatically change fire behavior. If full fire suppression continues as the management strategy for unplanned ignitions within the Project area, fire suppression resources would have an increased capacity to control fires at initial attack with minimized risk to their safety (and the public) and increased ability to keep these fires small in size with the use of direct attack tactics versus indirect tactics. Fires would typically drop from the crowns to the forest floor. Aerial firefighting resources would be better able to penetrate the canopy to aid ground resources with reduced canopy density, even moderate amounts as an indirect effect of treatments in Alternative 2.

Design features used to minimize effects and/or retain habitat structures preferred by wildlife species such as; grouping of larger trees, oak retention with ladder fuels retained under them and Old Forest Linkages with limited treatments would have lower potential for loss since there would be treated areas between them and are not continuous. This would be similar to the variability in forest conditions produced by frequent fire (North, 2009).

In utilizing mechanical treatments, as in Alternative 2, stand structures are modified quickly and more precisely than with prescribed fire alone (North, 2009). Under this alternative, treatments are effective in breaking up the horizontal and vertical continuity of live fuels in the lower canopy layers and/or in effect pre-treating the stands to more readily allow prescribed fire to be introduced. Silvicultural cuttings can only partially substitute for fire (Weatherspoon, 1996). This alternative allows increased potential to utilize prescribed fire as either a maintenance treatment and/or in conjunction with mechanical treatments as a follow-up process to achieve forest resilience. Fire could mimic the natural ecosystem functions of frequent low-to-moderate severity fire. Under this alternative, prescribed fire, whether burning of piles and/or broadcast burns can be implemented with less risk of escape, with a broader range of acceptable conditions and in some cases less impacts to air quality (Weatherspoon, 1996).

Fire Effects

With the removal of what is considered the suppressed, intermediate and some co-dominates within a stand, the vegetation considered ladder fuels would be removed. Conifer species such as Ponderosa Pine and Sugar Pine, which are considered more fire resistant, would be favored to remain in a stand over shade tolerant and fire sensitive species, such as incense cedar and white fir. Incense cedar and white fir make up the largest percentage of conifers found in the understory of stands in the Fish Project area (based on sampled plot data). These species also tend to have increased susceptibility to wildfire as well tend to have limbs that stay closer to the ground providing increased ability to take surface fires into the crowns in the form of single tree torching or group torching. With species composition favored towards the more fire resistant, shade intolerant species and fire behavior modified, effects to stands (mortality) would be decreased.

As part of this alternative, treatments would be implemented to reduce surface fuels, where needed. In most cases, as been experienced in past projects similar to this alternative, these areas are not continuous over the entire treatment area. If a fire was to start in an area where these surface fuels have not been reduced, fire behavior would be increased (as represented by Fuel Model SB2). The results of wildfire impacts on areas treated only with mechanical methods are mixed. Some burned with higher intensity, than those where mechanical treatments were followed by prescribed burning, though with lower severity than untreated control areas (Stephens, S. 2009). The timing and sequence of these “clean-up” treatments are dependent on several factors, such as adequate funding and completion of harvesting operations. Those treatment areas closest to WUI would be treated first and then would progress into other areas from there. As stated earlier the surface fuel load changes would be largely based on harvesting system used. If whole-tree yarding is used, post treatment areas where natural fuel accumulations are above 20 tons/acre would be the areas where secondary treatment would be used. These are areas expected to be less (acres) in need of surface fuel reduction.

With reduction in fire behavior, the effects of fire on other ecosystem components would be reduced and perhaps enhanced. Many are resistant or often have favorable responses to low to moderate fire intensity and severity. The idea of preemptive work that restores historic fire regimes has not been widely discussed, considered, or used to address both the ecological and social issues surrounding fires and watershed resources. The same can be said for many of the wildlife species that live and depend on the forested ecosystem. At-risk species, and the ecological functioning systems they depend on, cannot be sustained or recovered without the immediate and longer-term ecological functioning provided by fire. In Alternative 2, integrating fire and fuels management objectives and forest health restoration with at-risk species conservation and protection are made. This is needed to provide both the viability of human communities and at-risk species where both overlap (Sugihara, N., et.al. 2006).

Indirect Effects

Climate Change and Fire Severity Relationships

As stated earlier, weather has a large influence on fire behavior and is also the most difficult to predict. Associated with the purpose and need to reduce stand densities to levels where trees would be more resilient to drought conditions, reducing surface and ladder fuels to reduce wildfire intensity and spread, can also produce benefits in drought conditions. Research suggests global mean minimum temperatures may have already begun to rise. One effect of this change for western forests would be earlier spring melt of mountain snow packs. An analysis of western U.S. fire season length over the last 50 years suggests that during the last two decades, fires begin earlier in the spring and occur later in the fall possibly due to this trend in elevated nighttime minimum temperatures. Though there are variations in predictions and models, one point of consensus is that most agree the climate would become more extreme, suggesting oscillations between wet and drought conditions would be more common (North, 2009).

Managing forests under these conditions would be challenging. In the face of uncertainty, adaptive strategies should focus on three responses; resistance (forestall impacts and protect highly valued resources), resilience (improve the capacity of ecosystems to return to desired conditions after disturbance), and response (facilitate transition of ecosystems from current to new conditions) (North, 2009). All of these are focuses that Alternative 2 is attempting to address through its purpose and need for changes in forest structure capable of surviving climate changes and reduction in fuels to adapt fire behavior that occurs under current climate and ignition conditions (North, 2009).

Cumulative Effects

Railroad logging and subsequent extensive reforestation efforts along with fire management policy of full suppression at the smallest size (97 percent of all fires will be controlled at 10 acres or less from SNF LRMP, 1996) have contributed to the current existing condition for the Fish Project area and are used to depict the existing condition and the resultant fire behavior within the Project area.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Regulatory Framework

In the recent past several fire policies and initiatives have been enacted to address the national wildfire problem in the United States. These include, but are not limited to the U.S. National Fire Plan, Ten-Year Comprehensive Strategy and Implementation Plan, and Healthy Forest Restoration Act (Stephens, S. et. al., 2009). These have provided the basis of management goals, intents and directions that are within the Forest Land and Resource Management Plans. By implementing the Fish Camp Project fire policies and forest plans would be met.

The Sierra National Forest Land and Resource Management Plan (LRMP) (dated 1991) was amended in January, 2001 with the Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA ROD 2001). Although, the priority for fuels treatments is in the Wildland Urban Intermix (WUI). This decision also employed strategically placed fuels treatment outside the WUI to support one another across the landscape so that wildland fire behavior spread and intensity be reduced. WUI is defined in the Federal Register, Forest Service Manual 5106 and the 10-Year Comprehensive Strategy Implementation Plan as "the line, area, or zone where structures and other human development meet or intermingle with undeveloped Wildland or vegetative fuels.

In 2004, a Supplemental Final Environmental Impact Statement Record of Decision, known as the Sierra Nevada Forest Plan Amendment Record of Decision, 2004 (SNFPA ROD, 2004) was signed by the Pacific Southwest Region Regional Forester and replaced the 2001 decision in its entirety. The SNFPA ROD, 2004 identifies the fire and fuels management strategy to integrate the strategy for old forest ecosystems. Outside the WUI defense zone, strategic placement of area treatments to occur across all land allocations. Desired conditions, management intents, management objectives, and standards and guidelines guide the managers in placing and designing effective area treatment while incorporating needs for retaining key habitat elements for sensitive species. (SNFPA ROD, 2004 pp 33- 34).

The standards and guidelines listed in the SNFPA ROD, 2004 give direction for locating area treatments. Site-specific fuels treatment prescriptions are designed to modify fire intensity and spread in treated areas. Managers are to consider topographic position; slope steepness; predominant wind direction; and the amount and arrangement of surface, ladder, and crown fuels in developing fuels treatment prescriptions for each treatment area. Fuels treatments are intended to reduce surface, ladder, and crown fuels. Crown fuels are modified to reduce the potential for spread of crown fire.

Fuels objectives have first priority in developing treatment area prescriptions. However, prescriptions for treatment areas may also address identified needs for increasing stand resistance to mortality from insects and disease. Thinning densely stocked stands may be used to reduce competition and improve tree vigor thereby reducing levels of insect- and disease-caused mortality (SNFPA ROD, 2004; page 35).

Revenues from the sale of commercial forest products may be obtained from some fuels treatments. This increases the likelihood of accomplishing the projected acres of treatment, an essential first step in achieving the desired reductions in acres burned. Where consistent with desired conditions, area treatments are designed to be economically efficient and meet multiple objectives (SNFPA ROD, 2004; page 35).

Within the SNFPA ROD, 2004, fire and fuels goals include reducing threats to communities and wildlife habitat from large, severe wildfires and re-introducing fire into fire-adapted ecosystems. Broad-scale goals include:

- Treating fuels in a manner that significantly reduces wildland fire intensity and rate of spread, thereby contributing to more effective fire suppression and fewer acres burned;

- Treating hazardous fuels in a cost-efficient manner to maximize program effectiveness; and
- Actively restoring fire-adapted ecosystems by making demonstrated progress in moving acres out of unnaturally dense conditions.

Management of hazardous fuels in and around communities is to be combined with strategic placement of fuels treatments across broad landscapes to modify wildfire behavior. Goals for fuels treatment include:

- Strategically placing treatment areas across landscapes to interrupt potential fire spread,
- Removing sufficient material in treatment areas to cause fire to burn at lower intensities and slower rates of spread compared to untreated areas, and
- Considering cost-efficiency in designing treatments to maximize the number of acres that can be treated under limited budget (SNFPA ROD, 2004 pp.34-35).

Summary of Effects

Under Alternative 2, ladder and surface fuels are reduced to levels that would meet the purpose and need for fire and fuels. The development of SPLATs which reduces the risk of wildfire and modifies fire behavior over the broader landscape would occur. Additional areas would be treated to provide a defensible fuels profile near key transportation corridors and within the defense zone of the wildland urban intermix. By decreasing fuel ladders, which raises canopy base heights and reducing surface fuels, fuelbeds are converted from ones that produce moderate to high fire behavior to fuelbeds that produce moderate to low fire behavior. In addition to those treatments needed to meet fire and fuels objectives, treatments would be created to reduce stand densities (basal area) to such a level as to improve the growth and vigor of remaining trees. Treatments included in this alternative are: thinning from below in conifer stands, either by pre-commercially, commercially, and/or mastication of vegetation (conifers) to reduce lower and mid- level canopy stand densities; mastication of brush and shrub patches; prescribed burning, both understory and piles; manual reduction and/or prescribed burning of noxious weed infestations; and prepare and plant failed conifer plantations.

Alternative 3 – Lower and Limited Mid-Level Canopy Treatments, All Treatment Areas

In Alternative 3, treatment areas would remain the same as in Alternative 2, treatments within these areas would include only those needed to reduce the surface and ladder fuels (within the lower and limited mid-level canopy levels) needed to achieve fire and fuels objectives. Under Alternative 3 there would be no additional treatments (i.e. additional thinning in the mid-level canopy) to fully address stand density and forest health objectives. All design criteria and SNFPA ROD (2004) standards and guidelines would be implemented with this alternative.

Design Features and Mitigation Measures

The design feature and mitigation measures are the same as those in Alternative 2.

Direct Effects

Under Alternative 3, there would be no significant change in the direct effects from those listed under Alternative 2. There is a potential for a decreased amounts additive surface fuel loading within all “T” treatment areas resulting from less conifers being removed. As stated in Alternative 2, resultant increases or decreases in surface loadings from harvesting operations are dependent on the type of harvesting operations that are used. By increasing canopy base heights and reducing surface fuel loadings, fire and fuels objectives are met

Indirect Effects

Under Alternative 3, there would be no significant change in the indirect effects from those listed under Alternative 2. There is a potential for aerial firefighting resources to be less effective in all “T” treatment areas with no reduction in mid-level canopy densities. Residual crown densities would make it difficult for retardant and/or water dropping from helicopters to penetrate to the ground. In assuring the reduction in ladder fuels to raise canopy base heights from 0-10 to 20 feet and reducing surface fuel loadings, fire intensity and spread are reduced to desired condition levels and meet the fire and fuels objectives stated in the purpose and need of the project.

Long-term, these types of disturbances could induce increases in surface fuel loadings and/or increased snag levels producing conditions similar to those already existing in the Project area with resultant fire behavior (intensity and spread rates) similar to those predicted in Alternative 1, with the exception of crown fire potential. It is assumed that with the reduction in ladder fuels, there would be increases in rates of spread, increase flame lengths, increased fireline intensity, and increased resistance to control, similar to that seen in Fuel Model TL8 in Alternative 1, but this would be as a surface fire with potential for crown fire reduced and/or eliminated. Fire intensities could cause the potential for single or group tree torching because of the increased number of fire susceptible trees such as white fir and incense cedar left in the stand, but this is expected to be less than in Alternative 1

Cumulative Effects

Under Alternative 3, there would be no significant change in cumulative effects from those listed under Alternative 2.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Alternative 3 would be in compliance with the Forest Plan and other regulatory direction. Fire and fuels objectives would be met and the purpose and need for the project would be accomplished. The project is designed to develop SPLATs to reduce the risk of wildfire in WUI and modify fire behavior over the broader landscape. By decreasing fuel ladders, which raises canopy base heights and reducing surface fuels, fuelbeds are converted from ones that produce moderate to high fire behavior to fuelbeds that produce moderate to low fire behavior.

While fire and fuels objectives are met in this alternative, all “T” treatment areas of Alternative 3 would not meet the multi-objective purpose and need of the Fish Project which includes reducing stand densities to sustain healthy forest.

Summary of Effects

Alternative 3 reduces ladder and surface fuels to levels that would meet the purpose and need for fire and fuels. But Alternative 3 does little to nothing for the multi-objective purpose and need of the project which includes reducing stand densities to improve forest health.

Monitoring

Monitoring of the conditions following initial treatments would be done to determine if additional treatments are needed to meet fire and fuels objectives. Particular attention would be given to those treatment areas associated with SPLAT's and DFPZ's surrounding the community of Fish Camp, as these are the priority areas within the project for follow-up treatments to reduce surface fuels, if needed.

As stated in the SNFPA ROD 2004, treatments are to be designed and effective for at least 10 years before re-entry is needed. With the implementation of the Fish Camp Project, there is a potential to return fire (in the form of prescribed fire) back into a fire dependent ecosystem. Existing conditions do not allow the opportunity, without some form of mechanical treatment to reduce surface and ladder fuels, to do this in a controlled manner without detrimental fire effects. Potential exist where prescribed fire can and would be utilized as maintenance for the proposed treatments.

Air Quality

The direct, indirect and cumulative effects to air quality and visibility are summarized from the Air Quality Report for the Fish Camp Project (Smith, G. 2010).

Introduction

The purpose and need of the Fish Camp Project is to reduce stand densities to improve forest health and reduce the intensity and spread of wildland fires. This report analyzes the direct, indirect and cumulative effects to Air Quality and visibility from the alternatives proposed to meet this purpose and need as well determines the General Conformity of these actions to the Clean Air Act.

Overview of Issues Addressed

Fire is an important part of California ecosystems, but it also produces combustion by-products that are potentially harmful to human health and welfare. Carbon dioxide and water are the two products of complete combustion and generally make up 90 percent of the total emissions from wildfire. In incomplete combustion that occurs under wildfire conditions, smoke is composed of carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons, and other organic compounds, nitrogen oxides, trace minerals and several thousand other compounds. Particulate matter is the principle pollutant of concern to human health from wildfire smoke for the short-term exposures typically experienced by firefighters and the public. Studies indicate that 90 percent of smoke particles emitted during wildland burning are particles that measure less than ten microns in size (PM_{10}), and about 90 percent of these are less than 2.5 microns in size ($PM_{2.5}$). Hydrocarbons and nitrogen oxides from large wildfires contribute to increased ozone formation (which causes injury to plants) under certain conditions (Ahuja 2006).

Issues Relevant to Air Quality

There are two general strategies to managing wildfire smoke: (1) emission reduction and (2) emission redistribution. All pollutants except nitrous oxide are negatively correlated with combustion efficiency, so actions that reduce one pollutant result in the reduction of all. Emission redistribution techniques may effectively keep smoke impacts away from sensitive areas, but does little to reduce the amount of emissions produced. But optimal use of reduction techniques can reduce emissions by approximately 20 to 25 percent, assuming all other factors (vegetation types, acres, etc.) were held constant and land management goals were still met. Emission reduction techniques can include reducing the area burned, reducing fuel loading, reducing fuel production, reducing fuel consumption, and scheduling burning before new fuel appears and increasing combustion efficiency (Ahuja 2006). These reduction techniques, which can include prescribed fire, mechanical harvesting (which includes road work, cutting, and hauling of material) and vegetation management treatments (mastication and mechanical piling) can produce emissions that can affect human health and visibility.

Affected Environment

The Fish Camp Project is within two air basins that are regulated by two air districts: San Joaquin Valley Air Pollution Control District (SJVAPCD) for Madera County and Mountain Counties Air Pollution Control District for Mariposa County. Each are responsible for implementing and regulating sources that degrade air quality and are responsible for meeting

Federal and State air quality standards. The Air Resources Board (ARB) has oversight authority to monitor performance of district programs. The affected environment (geographic area) in this analysis includes areas that would or could experience degradation as a result of the actions proposed. SJVAPCD and the Mountain Counties Air Pollution Control District are considered the air basin downwind from the Fish Camp Project and are the air basins direct, indirect and cumulative impact analysis is focused on.
The community of Fish Camp borders the west boundary of the Fish Camp project. Within this project are three Forest Service campgrounds, a State Snow Play area and a county refuge transfer site. There is also a special use permit for a wilderness pack station and horseback riding. Also within the project is a 244 room hotel situated on 35 acres with numerous out buildings and guest cottages. State Highway 41, also borders the west boundary of the Fish Camp project, is the southernmost route into Yosemite National Park. Vehicular traffic increases during the summer months with visitors travelling into the park, but is also used to access Badger Ski Area in the park during the winter months.

Communities, State Highways, Class I Airsheds, and recreation sites are considered smoke sensitive receptors where smoke and air pollutants can adversely affect public health, safety and welfare. These areas could be affected by smoke if weather patterns produce a stable air mass and smoke is unable to vent into the upper atmosphere. Since PM_{10}, $PM_{2.5}$and ozone are public health hazards, prescribed burns would be planned during periods of unstable air, which would allow for proper ventilation and temperatures less than 95 degrees. However, since prescribed underburns could last for several days or weeks there is the potential for recurring shifts in air masses toward more stable conditions. For this reason, all prescribed fire activities are coordinated with Mountain Counties Air Pollution Control District and the SJVAPCD and would be implemented under optimum conditions using best available control measures (listed in Chapter 2 under Air Quality [Fuels]) to prevent smoke concentrations from affecting local communities. Sensitive receptors were considered within 100 kilometers (10 miles) of the Project area and are listed in Table 40 below.

Table 40: Sensitive receptors identified within 10 miles of the Fish Camp Project

Sensitive Receptor Type	Location
Towns, Communities	Fish Camp, Yosemite Mountain Ranch, Oakhurst, Wawona, Bass Lake
Recreation Areas	Miami Motorcycle Trails, Westfall Day Use, Lewis Creek Natural Scenic Trail, Goat Meadow Winter Sports Area, Yosemite Sugar Pine Railroad, Yosemite Pack Station, Bass Lake
Campgrounds	Nelder Grove, Big/Little Sandy, Kelty Meadow, Fresno Dome, Summerdale, Summit, Soquel, Westfall, Greys Mtn., Bass Lake C.G.s
FS Work Center/Ranger Station	Westfall, Batterson, Oakhurst Visitor Information Center
Roads	State Highway 41, Forest Service and County Roads
Class I Federal areas	See Table 3 for Class I areas
Other	Private lands within and adjacent to the Project area

Existing Condition

The air quality in the San Joaquin Valley is among the poorest in the state. On average, the San Joaquin Valley experiences 35–40 days when it exceeds the federal health-based standards for ground-level ozone, and more than 100 days when it exceeds the state ozone standard. While levels of airborne particulates exceed the federal standard less than five times annually, the state standard is set at a lower and more protective level. The valley exceeds the state particulate standard an average of 90–100 days per year (www.arb.ca.gov; Trends Summary).

The BLRD underburns approximately 350 acres per year, this program would continue unaffected by the alternative chosen. The district's underburn program covers approximately 25,000 acres. None of these are within the Project area. The underburns are in ponderosa pine or mixed conifer vegetation and most have had at least one entry of prescribed fire. Most of the underburns are considered to be in maintenance status and will continue to be burned on a rotational schedule. Cumulative effects may also be the occurrence of respiratory or pulmonary distress if a wildland fire were to occur in the area while a prescribed fire was being conducted. This would be a rare occurrence. Table 41 displays the tons of estimated emissions from the BLRD underburns each year. The 56.1 tons of PM_{10} emissions is the cumulative effect for the underburn program by project. It reflects the potential smoke emissions affecting residents of the local communities.

Table 41: Tons of Estimated Pollutants per Individual Project—Annual Underburn Program of Work.

PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
56.1	50.9	15.0	0.2	36.1	520.0

PM10 = Particulate matter <10 microns in size, PM2.5 = Particulate matter <2.5 microns in size, NO_X = Nitrous oxide, SO_2 = Sulfur dioxide, VOCs = Volatile Organic Carbon, CO = Carbon monoxide

Past analysis has shown that emissions associated with thinning operations and road use is minimal due to contractual dust abatement requirements.

Desired Condition

The desired condition for Air Quality and Visibility in the Fish Camp Project is to meet the purpose and need for the Fish Camp Project while accomplishing the Sierra National Forest Land and Resource Management Plan (SNF-LRMP) goal to manage Forest activities so air quality is compatible with federal, state and local laws, including a program that achieves the Clean Air Act (CAA) responsibilities.

Regulatory Frameworks

The SNF LRMP as amended provides the standards and guidelines for the Proposed Action. It states that "Forest activities will be managed so air quality is compatible with federal, state and local laws; including a program that achieves the CAA responsibilities" (SNF LRMP 1992, pg. 4-2). The SNF LRMP has Standards and Guidelines for Air Quality (SNF LRMP 1992, pgs. 4-25) that includes the following:

- Avoid cumulative impacts to air quality by coordinating prescribed burning activities within the Forest, with burning activities conducted by others (SNF LRMP 1992 S&G # 216)

- Mitigate fugitive dust impacts on air quality by including dust abatement as a requirement for construction activities that have potential to generate dust (SNF LRMP 1992 S&G # 217).

- Avoid prolonged effects from prescribed burning activities on air quality by burning only on Air Quality Control Board (AQCB) approved burn days when satisfactory wind dispersion conditions prevail (SNF LRMP 1992 S&G # 218).

- Participate with AQCB to qualitatively define air quality control regulations and guidelines and effects of air quality on the Forest, from sources outside the Forest (SNF LRMP 1992 S&G # 219).

- Obtain appropriate permits prior to conducting prescribed burning activities (SNF LRMP 1992 S&G # 220).

- Incorporate air quality management considerations into fire management (SNF LRMP 1992 S&G # 230).

Federal Conformity Requirements - The CAA requires that all projects receiving federal funds must conform to the appropriate State Implementation Plan (SIP). Federal actions are subject to either the Transportation Conformity Rule (40 CFR 51[T]), which applies to federal highway or transit projects, or the General Conformity Rule (40 CFR 51[W]), which applies to all other federal actions. Because the Fish Camp Project is not a federal highway or transit project, it is subject to the General Conformity Rule.

General Conformity Rule Requirement - The purpose of the General Conformity Rule is to ensure that federal actions conform to applicable SIPs so that they do not interfere with strategies employed to attain the National Ambient Air Quality Standards (NAAQS). The rule applies to federal actions in areas designated as nonattainment, or in some cases maintenance, for any of the six criteria pollutants. The rule applies to all federal actions except:

- Programs specifically included in a transportation plan or program that is found to conform under the federal transportation conformity rule.
- Projects with associated emissions below specified *de minimus* threshold levels.
- Certain other projects that are exempt or presumed to conform.

A general conformity determination would be required if a proposed federal action's total direct and indirect emissions fail to meet one of these two conditions:

- Emissions for each affected pollutant for which the region is classified as a maintenance or nonattainment area for the NAAQS are below the *de minimus* levels indicated in Table 42.
- Emissions for each affected pollutant for which the region is classified as a maintenance or nonattainment area for the NAAQS are regionally insignificant (total emissions are less than 10% of the area's total emissions inventory for that pollutant).

If either of these conditions is met, the requirements for general conformity do not apply because the Proposed Action is presumed to conform to the applicable SIP for each affected pollutant. As a result, no further analysis or determination would be required. If neither of these conditions is met, a general conformity determination must be performed to demonstrate that total direct and indirect emissions for each affected pollutant for which the region is classified as a maintenance or nonattainment area for the national standards would conform to the applicable SIP.

The Fish Camp Project is within two different air basins, the San Joaquin Valley (Madera County) and Mountain Counties (Mariposa County).Currently, the San Joaquin Valley is classified by both the federal and state standards as *non-attainment extreme* for ground-level ozone and as *maintenance status* for PM10. The valley is designated as *in attainment* for all other criteria pollutants. (www.valleyair.org). The Mariposa County Federal attainment status for Criteria Pollutants is in non-attainment for 8-hour ozone and is unclassified for each of the other criteria pollutants. The two air basins are considered in attainment for all other criteria pollutants.

The Environmental Protection Act (EPA), for determining conformity, has developed *de minimus* levels for each of the criteria pollutants based on an air basins attainment status for each pollutant. The table below shows these *de minimus* level thresholds and are bolded based on air basin status.

Table 42: Federal *de minimus* Threshold Levels for Criteria Pollutants based on Air Basin attainment status.

Pollutant	Area Type	Tons/Year
Ozone (NO_x or VOC)	**Nonattainment Extreme (SJV Air Basin)**	**25**
	Other O_3 Nonattainment Area Outside an O_3 Transport Region (Mountain Counties)	**100**
Carbon monoxide, SO2 and NO2	All nonattainment & maintenance	100
PM-10	Serious nonattainment	70
	Moderate nonattainment and maintenance (SJV Air Basin)	**100**
Lead (Pb)	All nonattainment & maintenance	25

Note: Federal *de minimus* threshold levels in bold type are those where status is non-attainment or maintenance.

California Clean Air Act - Responsibility for achieving California's air quality standards, which are more stringent than federal standards, is placed on the ARB and local air districts, and is to be achieved through district-level air quality management plans that are incorporated into the SIP. In California, the EPA has delegated authority to prepare SIPs to the ARB, which in turn has delegated that authority to individual air districts.

The ARB has traditionally established state air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air emission inventories, collecting air quality and meteorological data, and approving SIPs.

Responsibilities of air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality–related sections of environmental documents required by **California Environmental Quality Act** (CEQA).

The California Clean Air Act (CCAA) of 1988 substantially added to the authority and responsibilities of air districts. The CCAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement control measures. The CCAA focuses on attainment of the state ambient air quality standards, which, for certain pollutants and averaging periods are more stringent than the comparable federal standards.

The CCAA requires designation of attainment and nonattainment areas with respect to state ambient air quality standards. The CCAA also requires that local and regional air districts expeditiously adopt and prepare an air quality attainment plan if the district violates state air quality standards for CO, sulpher dioxide (SO_2), NO_2, or ozone. These air quality attainment plans are specifically designed to attain these standards and must be designed to achieve an annual 5% reduction in district-wide emissions of each nonattainment pollutant or its precursors. Where an air district is unable to achieve a 5% annual reduction in district-wide emissions of each nonattainment pollutant or its precursors, the adoption of "all feasible measures" on an expeditious schedule is acceptable as an alternative strategy (Health and Safety Code Section 40914(b)(2)). No locally prepared attainment plans are required for areas that violate the state PM_{10} standards, but the ARB is currently addressing PM_{10} attainment issues.

The CCAA requires that the state air quality standards be met as expeditiously as is practicable but, unlike the federal CAA, the CCAA does not set precise attainment deadlines. Instead, the CCAA establishes increasingly stringent standards for areas that will require more time to achieve the standards.

Local Air Districts - Local districts are given the responsibility to develop programs and plans for achieving both Federal and State air quality standards and are given the authority to implement control measures to reduce emissions of each nonattainment pollutants or its precursors. This is implemented through the use of Rules and Regulations.

Smoke Management

In accordance with the California Code of Regulations, Title 17, all persons or entities subject to subchapter 2 Smoke Management Guidelines for Agricultural and Prescribed Burning shall comply with the requirements therein and those requirements adopted by applicable districts in local smoke management regulations. Such persons or entities proposing to conduct prescribed burning must submit a Smoke Management Plan (SMP) to the air district of jurisdiction and: 1) receive a permit to burn, 2) receive authorization to burn on a given day, and 3) maintain communication with the local air district and report on the status of the burn until it is concluded.

San Joaquin Valley Air Pollution Control District - As agreed upon by San Joaquin Valley Air District staff and the Southern Sierra Interagency Smoke Management Group, all land managers planning to implement prescribed fire treatments will follow the Unified Guidelines and Procedures for Smoke Management, which includes the submission of a required prescribed Fire Burn Plan and Smoke Management Summary. These are reviewed by district personnel and are conditionally approved. Burners are required to register prescribed burns prior to the fall burn season and authorization to burn is required prior to ignition based on air quality conditions and forecasts. For prescribed understory burning, seven days prior to ignition a Prescribed Fire Ignition Advisory (PIFA) form must be completed and submitted to district meteorology and compliance staff to begin receiving forecast for burn day potential. Participation on daily smoke management conference calls for burn project coordination is also required on a daily basis prior to and during implementation. On the day of ignition, final approval must be received from the compliance officer at the district. Pile burning approval is received through the calling the Hazard Reduction Burning phone number on a daily basis. A burn fee is applied to the total blackened acres accomplished on a yearly basis. These conditions are enforced through Air District Rules and Regulations (Rule 4103, Rule 4106).

Mountain Counties Air Pollution Control District - A SMP is required for all prescribed burns, upon review and approval a burn permit will be issued with a fee for issuance. For prescribed understory burning, seven days prior to ignition a Controlled Burn form (CB-3) must be completed and submitted to the district compliance staff and to California Air Resources' Meteorology to begin receiving forecast for burn day potential. Participation on daily smoke management conference calls for burn project coordination is also required on a daily basis prior to and during implementation. On the day of ignition, final approval must be received from the compliance officer at the district. Pile burning approval is received through the prescribed Fire Information Reporting System (PFIRS) website on a daily basis.

Prevention of Significant Deterioration - The Prevention of Significant Deterioration (PSD) provisions of the CAA require measures to "preserve, protect and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreation, scenic or historic value." The most stringent requirements for air quality apply to those established as Class I areas. These include international parks, national wilderness areas greater than 5,000 acres, national memorial parks greater than 5,000 acres, and national parks greater than 5,000 acres, and national parks greater than 6,000 acres established prior to August 7, 1977.

There are no Class I airsheds within the Project area. However, there are Class I airsheds nearby that must be considered and protected. These airsheds are listed in the Table below.

Table 43: Class I airsheds near the Fish Camp Project area.

Class I Airshed	Proximity to Project area
Yosemite National Park	Southern Park boundary borders the North boundary of Project area.
Ansel Adams Wilderness Area	Western wilderness boundary approximately 9 miles East of Project boundary.

Visibility Protection - Visibility is an air-quality related value that is protected in all federal Class I areas. Since 1984, states have been required to protect the visibility in national parks and wilderness areas, as mandated by the 1977 Clean Air Act Amendments. The 1977 amendments established a national goal for the "prevention of any future and the remedying of any existing impairment of visibility in mandatory Class I federal areas which impairment results from manmade pollution." The regulations specifically require states to consider strategies for reducing visibility impairment from prescribed burning.

Environmental Consequences

Methodology

For each alternative proposed for the Fish Camp Project, associated emissions are calculated. This is used to determine if any alternative's total direct and indirect emissions fail to be (1) below Federal *de minimus* thresholds, in this case thresholds for ozone (precursors NO_x and VOC) and PM-10, or (2) considered regionally insignificant (less than 10% of the area's total emissions inventory for that particular pollutant). If any alternative's estimated emissions do not meet either of these conditions, a General Conformity Determination must be performed to ascertain how the alternative would conform to the applicable SIP.

Smoke Emissions Modeling - Four pieces of information are needed to calculate potential emissions produced from either wildfire or prescribed fire; acres burned, fuel loading, fuel type and type of burning (pile, understory or wildfire) that can determine the amount of fuel consumed. The actions proposed by each alternative are used to estimate these as well as information within the Fire/Fuels Report-Fish Camp Project. Associated emissions for criteria pollutants are derived utilizing an emissions spreadsheet developed and approved for prescribed fire emission reporting purposes. This form was developed and built by the Interagency Smoke Management Group and SJVAPCD staff from emission formulas from publications (EPA, AP-42).

Vegetation Harvesting Equipment Emissions Modeling - Information needed to calculate associated emissions produced by vehicular traffic from road work and mechanical treatments included in Alternatives 2 and 3 (thinning operations, mastication and dozer piling) are; type of equipment and the number of hours this equipment is expected to run. The actions proposed by each are used to estimate these. Equipment hours are based on average production rates from similar projects. Equipment typically used for this type of work includes; heavy duty diesel-powered vehicles (tractor-trailers log trucks), wheeled skidders and loaders, track type dozers/masticators, road graders, and smaller gasoline powered engines such as chainsaws. Emission factors for criteria pollutants are from "A Desk Reference for National Environmental Policy Act (NEPA) Air Quality Analysis" (CH2Hill 1995) and converted to total tons of pollutant.

Fugitive Dust Emissions - The Forest Service routinely requires timber sale operators to abate dust during use of the forest development roads. This is required for several reasons among which are: retaining road surface fines which help keep the larger supporting aggregate together; reduce dust visibility traffic hazards; reduce environmental dust plumes; and minimize loose fine material accumulations which can create muddy, road rutting conditions. (Lowe, 1994)

Fugitive (visible) dust emissions (VDE) by general vehicle movement are calculated at 10 pounds per day for 5 vehicles per day on unpaved roads. This figure is reduced to 3.63 pounds per day per mile of VDE after dust abatement. This is accomplished through watering of roads or other dust abatement measures which are incorporated into the project design. Dust abatement is required for roads below 3000 feet in elevation in the San Joaquin Valley Air Basin. The Fish Camp Project is above 3,000 feet in elevation and is exempt from Regulation VIII, Rule 8011 General Requirements (www.valleyair.org), though dust abatements is still required by the Forest Service.

Because of this exemption and the use of abatement measures when they are not a requirement, specific calculations for fugitive dust emissions are not used in the analysis of potential emissions from this project, but are considered part of the direct, indirect and cumulative effects.

Modeling Used in Analysis - Associated emissions for criteria pollutants are derived utilizing an emissions spreadsheet developed and approved for prescribed fire emission reporting purposes. This form was developed and built by the Interagency Smoke Management Group and SJVAPCD staff from emission formulas from publications (EPA, AP-42).

- **Forest Vegetation Simulator with the Fire/Fuels Extension** was used to model PM2.5 emissions to show a comparison between the action and no-action alternatives. PM2.5 was used as a surrogate for PM10 emissions. FVS models a fire in the year 2022, 10-years after treatments.

Incomplete and Unavailable Information

Assumptions - This determination assumes that prescribed burning would occur under optimal atmospheric conditions for the transport of smoke and pollutants away from the San Joaquin Valley as regulated by SJVAPCD. Burning of natural and activity created dead and down woody material would occur under Best Available Control Measures (BACMS) for Air Quality as defined in Chapter 2.

Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

Cumulative effects analysis for the Fish Camp project air quality analysis is spatially bounded by the San Joaquin Valley air basin and temporally bounded by a period of 20 years which is the expected rotation based on the life of the stand. The potential cumulative effects are from exposure to organic hydrocarbons (precursors to smog under high daytime temperatures), large particulate matter, and PM_{10} and $PM_{2.5}$ produced from prescribed burning. These emissions are easily inhaled and cause respiratory and pulmonary distress.

The dispersion of pollutants is affected by local meteorological conditions. Pollutants can stay trapped in one place if there is no mixing caused by wind and temperatures. Prescribed burns are conducted on days when atmospheric ventilation transports smoke and pollutants away from the San Joaquin Valley and pollutants are not normally a problem. Burns are conducted on authorized burn days only in consultation with the APCD. Poor ventilation occurs during summer and fall months when the valley is characterized by relatively stable air masses. Ozone concentrations can reach peak levels when strong sunshine and temperatures above 95 degrees F accompany periods of poor ventilation. Although ozone is not released directly to the atmosphere, it is produced by chemical reactions involving VOCs and NO_X. The meteorological factors favorable to significant ozone formation occur only during the summer.

***Past Activities* -** Air quality in the San Joaquin Valley air basin is among the poorest in the State. With the hot, dry summers, the San Joaquin Air Basin, in 2009, experienced 98 days above the federal standard for 8-hour ozone and 122 days above the state standard. Madera County, by itself, was above the federal 8-hour ozone standard 13 days and 27 days above the state standard (www.arb.ca.gov ; Trends Summary). For PM_{10} in 2009, the estimated days over the federal standard was two, with 123 days estimated over the state standard. For $PM_{2.5}$ in 2009, the annual average days over the federal standard were 23, with 21 days over the state standard (www.arb.ca.gov ; Trends Summary).

Present Activities – Mariposa County is considered in nonattainment for both federal and state standards for ozone, Madera County is considered in nonattainment for state PM_{10}, $PM_{2.5}$ and ozone standards. The air basin is in federal attainment (maintenance level) for PM_{10}, but is in federal nonattainment for $PM_{2.5}$ and is expecting a reclassification from serious to extreme nonattainment for 8-hour ozone.

The Bass Lake Ranger District's (BLRD) prescribed fire program continues to be part of the district program of work. All of the prescribed fire projects have gone through an air quality analysis during the NEPA process. The cumulative effect of smoke emissions and degradation of visibility may occur if prescribed burns were to continue during stable atmospheric conditions that are present when wildfires occur. For this reason, all prescribed fire activities are coordinated with SJVAPCD and would be implemented under optimum conditions using best available control measures to prevent smoke concentrations from affecting local communities.

Reasonably Foreseeable Activities – Reasonably foreseeable projects on the BLRD that could contribute to cumulative effects include the afore-mentioned district prescribed burn program, the Yosemite National Park prescribed fire program, Sugar Pine Adaptive Management and Cedar Valley projects, cattle grazing, special use permits, vegetation management within plantations (mastication), hazard tree sales, Off Highway Vehicle (OHV) use, and private land management activities.

Projects that could contribute to air quality cumulative effects from exhaust emissions and/or fugitive dust through vehicle and heavy equipment can be expected from mechanical treatment for the Sugar Pine Adaptive Management and Cedar Valley project, vegetation management (mastication) within plantations, hazard tree sales, and OHV use. It is unknown how much heavy equipment use and vegetation management may occur on private property.

Projects that could and possible will contribute to air quality cumulative effects from particulate matter PM_{10} and NOx include Yosemite National Park prescribed fire program, BLRD's prescribed fire program, vegetation treatments through prescribed fire for the Sugar Pine Adaptive Management project. It is unknown how much prescribed burning may take place as part of the Yosemite National Park burning program. All prescribed burn activities on private and public lands follow the same general conformity rules and are governed by the decisions of the Mountain Counties APCD, SJVAPCD and the Sierra National Forest.

In conjunction with the typical period when prescribed burn implementation occurs, is an increased use of wood burning stoves and hazard reduction burning by local residences in the area. There are restrictions in place on the valley floor (residences below 3000 feet in elevation) to limit the use of wood burning stoves during poor dispersion days, but because older residences above 3000 feet in elevation typically only have wood burning stoves as their sole source of heat, there are little restrictions above 3000 feet elevation. Hazard reduction burning is regulated by a permitting process as well as burning only on "affirmative" burn days when meteorological conditions are adequate for good dispersion and dilution of pollutants. These affirmative burn days are fairly sporadic and can lead to high numbers of residences burning on the same day, especially during weekends. The SJVAPCD has created an educational program for the public on how to burn "cleaner" and presented some of the Best Available Control Measures for Hazard Reduction burning activities.

Alternative 1 – No Action

No actions would be taken to reduce stand densities to improve forest health and reduce the intensity and spread of wildland fires The opportunity would be loss for undertaking treatments to reduce the impacts that a wildland fire, starting in hot dry conditions, would cause the environment; both the forest environment and the airshed.

Direct Effects

No direct effects from management actions to air quality or visibility would occur under this alternative since no treatments would be completed outside of that which is already permitted or authorized.

Indirect Effects

The indirect and cumulative effects include the potential for unplanned ignitions and uncontrolled wildfires to occur in the area. The resultant smoke caused by these would have large amounts of emissions released and could potentially be of long duration. Values measured such as PM10 and visibility range used to determine the Health-Protective Value would be in the ranges assumed to be Unhealthy. Values associated with this rating are PM10 ranging from 176 to 300 µg/m³ and visibility of 1.24 to 2 miles (considered moderate smoke conditions). This would be considered the lower of the Health-Protective Values a wildfire would produce, if it occurred in the area. It is anticipated that for short periods of time the values may rise to the levels considered Very Unhealthy or perhaps Hazardous. The Statewide Emission Inventory in 2002 reported emissions (tons/day, annual average) from wildfires (Ahjua 2006) and is demonstrated in Table 44.

Table 44: Statewide Emission Inventory for Natural Sources-Wildfire

Emissions	Total Organic Gases	Reactive Organic Gases	Carbon Monoxide	Nitrogen Oxides	Sulfur Oxides	PM_{10}
Natural Sources: Wildfire	6,522	3,046	17,474	3,441	302	2,418

Total Organic Carbon (TOC) and Reactive Organic Carbon (ROC) are similar to Volatile Organic Carbon (VOC) and all are used by the air resources board to describe gases that lead to Ozone formation.

The high summer temperatures and light wind speeds that occur during the summer months, places a cap on valley air with no means for cleansing itself by dispersion or transport. Because of the poor air quality associated with the San Joaquin Valley Air Basin it does not take large amounts of additional emissions to degrade air quality into unhealthy ranges especially in the summer and fall months, where storm systems are less likely to occur and disperse smog and emissions. Emissions from a wildfire could potentially have long lasting impacts beyond the initial burning period because of this. Uncontrolled wildfires are clearly responsible for the most widespread, prolonged, and severe periods of air quality degradation (Ahuja, 2006). For comparison purposes with the purposed Alternative, table 45 below demonstrates the emissions produced from a wildfire if the acres in the Fish Camp Project were affected by an uncontrolled wildfire during typical fire season.

Table 45: Potential emissions if a wildfire were to burn within the entire Fish Project boundary.

Emissions									
Fuel Type	Total Acres	Fuel Loading (Tons/ acre)	Total tons	Tons PM_{10}	Tons $PM_{2.5}$	Tons Nox	Tons SO_2	Tons VOC	Tons CO
Forest	5440	20	108800	1332.80	1196.00	190.4	5.4	788.80	12675.2

Cumulative Effects

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Common to Alternative 2 and 3

Treatments are proposed to reduce surface, ladder fuels and some aerial fuels to meet the purpose and need of reducing the intensity and spread of wildland fires as well as reduce stand densities. This is to occur, if these alternatives were chosen, through the use of mechanical methods (thinning from below and mastication) as well as management ignited fire in the form of prescribed fires such as pile burning, understory burning and/or broadcast burning. Prescribed fire would be applied to the Project area for three purposes: (1) as a final “cleaning” after vegetation management treatments to further reduce 1, 10 and 100 hours fuels (those fuels that have the greatest influence on fire spread); (2) to maintain the lower levels of the 1, 10, and 100 hours fuels; (3) to reintroduce the fire element back into a fire dependent ecosystem.

Emissions from smoke produced by prescribed fire implementation are estimated using the number of acres to be burned, the surface fuel loading of the area being burned and the amount of consumption.

Within the treatment areas and based on the criteria provided in the Fire/Fuels Design Criteria Common to all Alternatives, it is estimated that approximately 1,367 acres could have prescribed fire used for maintenance treatment of surface fuels. There is a total of 401 acres that is proposed to utilize prescribed fire as the primary treatment type (prescribed treatment areas). This treatment involves the application of prescribed fire over a broad area and would need to have specific conditions prior to ignition. It is estimated that, as conditions permit, these types of prescribed fires could take up to 10 years to fully implement and would be used, as needed, to maintain surface fuel loadings at or below 10 to 20 tons/acre.

Dependent on where and how prescribed fire treatments are being utilized, the fuel loading can range from 3 to 30 tons per acre and be in the form of machine or hand created piles and/or in concentrations across a broad area such as the case in understory burning. On average the fuel loading for an area requiring prescribed fire as a primary treatment, maintenance and/or post activity treatment would be 20 tons/acre.

The main focus of prescribed fire implementation is to reduce surface fuel loadings that contribute to fire behavior rates of spread and flame length the greatest. These are the 1, 10 and 100 hour time lag categories (mainly needles, twigs and branches less than 3 inches in diameter). prescribed fire burn plans set objectives for what percent consumption of these fuels are to be accomplished by the implementation of the prescribed fire. For pile burning, burn plan objectives typically set the objective at 75 to 80 percent consumption. Pile burning is conducted when the fuels have had a period of time to dry and are no longer green. For understory burning, burn plan objectives typically set the objectives at 60 to 70 percent consumption (or reduction) of these fuels, though this would not be across the entire burn area. A typical understory burn is implemented to create a "mosaic" burn pattern, leaving patches of unburned areas amongst burned areas.

Alternative 2 – Proposed Action

Associated emissions from mechanical equipment used in thinning and hauling operations and emissions produced from burning are shown in table 45. Hazard fuels treatments, including prescribed fire, proposed for this Proposed Action can be found in Chapter 2 – Alternatives Considered in Detail of the Fish Camp Environmental Impact Statement

Design Features and Mitigation Measures

The following are BACMs for prescribed fire as required under Section 190 of the CAA, as amended in 1990. The U.S. Environmental Protection Agency developed implementation strategies and BACMs for areas that are designated serious non-attainment for particulate matter less than 10 microns (PM10) in 1992. Specific techniques to reduce fire emissions include the following:

- Employ commonly used reduction techniques such as burning units after harvest before new live fuels appear; burning in the springtime prior to "green-up," burning when 1,000-hour fuels (woody debris larger than 3 inches in diameter) moistures are high, and burning when the duff is wet (after fall precipitation, or during winter and spring).
- Employ avoidance techniques such as burning on cloudy days when the plume and residual smoke cannot be seen, burning during periods of atmospheric instability for better smoke dispersal, and burning during periods of low visitor use.
- Employ techniques to optimize flaming combustion, including burning piled fuels rather than broadcast burning, reducing the amount of soil in piles, and employing rapid ignition to create a high intensity fire.
- Ensure that all activities conform to the State Implementation Plan (SIP)
- Conduct a full conformity analysis, as required by the Clean Air Act and the SIP to assess whether the Proposed Action produces less than *de minimus* emissions. (For full determination, refer to the Kings River Project Air Determination, available in the project record.).

Direct Effects

Smoke Emissions - This alternative proposes to accomplish up to1,367 acres of prescribed fire; both underburning and pile burning combined. If feasible, there could be the option to dispose activity fuels through masticate thus reducing the need of pile burning in some areas. When completed, prescribed fire activities proposed under this action would create the following emissions.

Table 46: Total Emissions from All Prescribed Fire Treatments Proposed in this Action (in tons)

Treatment Type	Tons per acre	Total Acres	PM10	PM2.5	NOx	SO2	VOC	CO
Dozer Pile	20	966	75.35	70.52	50.23	.10	60.86	637.56
Underburn Only	20	401	98.25	82.22	14.04	0.40	58.15	934.33

PM10 = Particulate matter <10 microns in size, PM2.5 = Particulate matter <2.5 microns in size, NO_X = Nitrous oxide, SO_2 = Sulfur dioxide, VOCs = Volatile Organic Compounds, CO = Carbon monoxide

Vegetation Harvesting Equipment - Equipment hours are based on average production rates from similar projects on the BLRD. Most of the material would be thinned by chainsaw and skidded. Piling and mastication of activity created slash and brush would be with a track type tractor. For this analysis, all emissions are based upon use of wheeled skidders and loaders, heavy duty diesel powered highway truck and track type dozer or dozer with mastication head.

Table 47: Total tons of emissions for mechanical treatments and road maintenance-reconstruction activities for the completion of operations in Alternative 2.

Type of Equipment	Total Number of Hours	PM	Exhaust Hydrocarbons	NOx	CO	SO_x
Wheeled Tractor	1344	0.09	0.13	0.85	2.48	0.06
Wheeled Loader	378	0.01	0.02	0.16	0.04	0.01
Heavy Duty Diesel Powered Truck	7404	0.95	0.71	15.42	6.64	1.68
Track Type Tractor	14,000	0.78	0.85	8.82	2.42	0.96
Motor grader	77	0.00	0.00	0.03	0.01	0.00
Total (Entire Project)	**23,203**	**1.83**	**1.71**	**25.28**	**11.59**	**2.71**

Fugitive Dust Emissions - The Forest Service routinely requires timber sale operators to abate dust during use of the forest development roads. This is required for several reasons, including retaining road surface fine particles, which helps keep the larger supporting aggregate together; reducing dust visibility traffic hazards; reducing environmental dust plumes; and minimizing loose fine material accumulations which can create muddy, road rutting conditions (Lowe 1994 as cited in USDA Forest Service 2008).

Visible dust emissions (VDE [PM_{10}] by general vehicle movement are calculated at 10 lbs per day for 5 vehicles per day on unpaved roads. This figure is reduced to 3.63 pounds per day per mile of VDE after dust abatement through watering of roads or other dust abatement measures, which are incorporated into the project design features. For the Proposed Action, 3.63 pounds per day x 22 days to haul = 79.86 pounds, which is below *de minimus*. *De minimus* is set at 100 pounds per day for 50 vehicle trips on unpaved roads. Dust abatement is required for roads below 3,000 feet in elevation. The Fish Camp Project area is above 3,000 feet in elevation and is exempt from Regulation VIII, Rule 8011 General Requirements, though dust abatement is still required by the Forest Service.

Table 48: Emissions conformity to General Conformity Rule for Criteria Pollutants

Total Emissions (smoke and equipment)	**PM10** **175.43**	**PM2.5** **158.74**	**NOx** **44.55**
Percent of Areas Total	**1.45%**	**0.5%**	**0.08%**

Criteria Pollutants are those that determined by EPA to have *de minimus* levels

Indirect Effects

The community of Fish Camp, state highways, Class I Airsheds, and recreation sites are considered smoke sensitive areas. These areas could be affected by smoke if weather patterns produce a stable air mass and smoke is unable to vent into the upper atmosphere. Since PM_{10} and ozone are public health hazards, prescribed burns would be planned during periods of unstable air, which would allow for proper ventilation of smoke and temperatures less than 95 degrees. However, since prescribed underburns could last for several days or weeks there is the potential for recurring shifts in air masses toward more stable conditions. For this reason, all prescribed fire activities are coordinated with SJVAPCD and would be implemented under optimum conditions using best available control measures (listed in the Proposed Action) to prevent smoke concentrations from affecting local communities.

Cumulative Effects

Annual trends in ozone and PM air pollution are decreasing largely due to State regulations for vehicle emissions. This is expected to continue as technology and regulations to reduce emissions are implemented. In addition, mechanical treatments (harvesting) contribution to air pollution in particular appears to be on a downward trend likely due to decreased logging activity. The incremental effects of Alternative 2 when added to past, present and foreseeable future activities, are not likely to influence this trend of reduced logging associated emissions.

From past implementation of prescribed burning on the Bass Lake Ranger District and in particular prescribed burns within the vicinity of the Fish Camp Project, mitigations limiting the number of acres burned per day, burning during optimal transport wind directions/speeds, higher mixing heights and the quantity of other prescribed fires being conducted are considered prior to air district final approval to reduce potential impacts to sensitive receptors. This has been extended into limiting the number of days burning can occur, and requiring all active ignitions to end by late afternoon to reduce smoke production at night time and to limiting the number of consecutive days burning can occur to reduce the amount of emissions produced at any one time. Close communication with the APCD compliance staff before and during implementation and monitoring smoke conditions will aid in determining if there are impacts on sensitive receptors and Class I airsheds in the area are beginning and additional mitigations are required.

Cumulative effects can be caused by outside influences not associated with the project itself. Because of the rural surroundings, many residences utilize wood burning stoves as their main source of home heating. Hazard reduction burning is also permitted in rural communities in Madera and Mariposa counties. This can lead to cumulative impacts if prescribed fire is conducted on what is considered a marginal dispersal day when added to wood stove smoke and increased numbers of hazard reduction burns within the communities in or surrounding the Project area.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The conformity decision for the CAA prohibits federal agencies from permitting or approving any activity that does not conform to the SIP. The CARB under the General Conformity Rule regulates actions that require conformity determinations for specific pollutants. The CARB rules indicate that projects would be determined to conform to the applicable SIP if it meets the following criteria:

a. The total direct and indirect emissions from the action is in compliance with all requirements of SIP, because the actions meet one or more of the following:
    a. The emissions from the action are identified and accounted for in the applicable SIPs attainment or maintenance demonstrations,
    b. The emissions are offset,
    c. Based on air quality monitoring, the actions do not:
        i. Cause or contribute to any new violation of any standard in any area, or
        ii. Increase the severity or frequency of any existing violations of any standard,
    d. The state commits to modify SIP in accordance with the EPA rules, or
    e. Where the EPA has not approved a revision of the relevant SIP, the total emissions do not exceed the historical level (based on the calendar year 1990 or other appropriately agreed to year).

- Title 17 of the California Code of Regulations – Subchapter 2, Smoke management Guidelines for Agriculture and Prescribed Burning
- San Joaquin Valley Unified Air Pollution Control District Rule 3160 (Prescribed Burning Fee), Rule4106 (Prescribed Burning and Hazard Reduction Burning), and the District's Smoke Management Program, Rule 4103 (Agricultural Burning)
- Wildland Fires Coordination and Communication Protocol as it applies to the Current Smoke Management Program
- Public Resource Code 4291 – for hazard Reduction Burning in the foothill and mountain areas of the District.

Other Relevant Mandatory Disclosures

Exhaust hydrocarbons and pollutant levels produced from thinning activities are lower than historical levels of logging and similar activities for the Sierra National Forest. Historical timber harvesting and thinning operations were at all time highs in 1987 with 154 million board feet of timber harvested. The thinning in this alternative is approximately 2.5precent of that historical level.

Summary of Effects

This project meets the General Conformity Rule; it does not interfere with the strategies employed to attain NAAQS. The emissions from this project are considered regionally insignificant (total emissions are less than 10%) of the area's total emissions inventory for PM_{10} and NO_x. This conformity is accomplished by maintaining burn ignitions and acres within rules and guidelines developed by the SJVAPCD, as provided for by the CARB, under the Unified Guidelines for Smoke Management as developed by the Southern Sierra Interagency Smoke

Management Group. These guidelines and rules are based on the requirements found in the following:

Based upon meeting the SIP standards of CARB, the Unified Smoke guidelines discussed above and SJVUAPCD rules, the project is determined to be in compliance with SIPs General Conformity Rule and Title 17 of the California Code of Regulations. It is important when considering the determination that compliance with SIP is based upon meeting rules and guidelines managed by SJVUAPCD. These rules and guidelines are designed to meet historical emissions levels and keep projects from violating the SIP. The alternatives propose activities that will meet the rules and guidelines. Rules and guidelines along with daily SJVUAPCD direction control acres and ignitions. Meeting the acres and ignition rules and guidelines meets conformity with the SIP emission standards.

Alternative 3 – Lower and Limited Mid-Level Canopy Treatments, All Treatment Areas

Design Features and Mitigation Measures

Design features would remain the same as described in Alternative 2.

Direct Effects

Alternative 3 would not alter the number of acres where ladder and surface fuels are to be reduced through treatments, but would potentially have lower amounts of post activity surface fuels (tons/acre). As in Alternative 2, prescribed burning would be utilized to reduce surface fuel loading as either an initial treatment (understory/broadcast) or as a post activity treatment (pile burning). Mastication and road reconstruction/maintenance would continue with Alternative 3. With no commercial thinning operations, emissions from mechanical treatments would be reduced significantly from Alternative 2 and would have the potential of reducing the amount of acres in which pile burning would be needed reducing the amount of emissions from prescribed burning. Understory burning would remain the same as in alternative 2. Thus the direct effects of Alternative 3, would be the similar to Alternatives 2, but would be to a lesser degree.

Indirect Effects

Indirect effects for this alternative are the same as those described in Alternative 2.

Cumulative Effects

The cumulative effect of this alternative is similar to those under Alternative 2. The changes in the diameter limit of thinning among the alternatives alter the amount of trees removed under each alternative. These changes alter the amount of emissions that would be generated by prescribed fire. The differences in each alternative are represented by the amount of smoke that would be produced by a wildfire.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Alternative 2 & 3 would comply with the SNF-LRMP, Regulatory Frameworks, and Air Quality regulations and Policies.

Other Relevant Mandatory Disclosures

The incremental effects of smoke, dust and emissions created by the Proposed Actions in Alternative and 3 when added to the past, present and foreseeable future activities are not expected to 1) cause or contribute to any new violation of any standard in any area; 2) increase the frequency or severity of any existing violation of any standard in any area; or 3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area. (CAA Sec 176 (c) (1)) as further defined by San Joaquin Valley APCD Rule 9110-General Conformity, §51.853 and is expected to conform to the State Implementation Plan for the associated criteria pollutants of NO_x, VOC, PM_{10} and $PM_{2.5}$. This determination would be in compliance with the Sierra National Forest Land and Resource Management Plan's goals as well as meet the Standards and Guidelines written for air quality and visibility.

Monitoring

As part of prescribed fire implementation, burn bosses are to make observations on a regular basis of the smoke conditions that are being created by implementation. These include the travel direction and dispersion quality of smoke such as smoke settling into smoke sensitive areas and continued or potential for visibility degradation especially across main travel routes. When possible, lighting techniques and/or burn operations are changed to minimize the continuance of these impacts.

Engineering / Transportation

The direct, indirect and cumulative effects to the transportation resource are summarized from the Engineering Report for the Fish Camp Project (Hosford, A. 11/15/2010).

Affected Environment

The existing transportation system for the Fish Camp Project consists of approximately 42.2 miles of National Forest System Roads [(NFSR) map 11]. Mariposa County maintains 0.7 miles of roadway. The transportation system for the analysis area is nearly complete. Small areas may be identified during project planning where minor amounts of new permanent road and temporary road construction are needed.

There are 35.9 miles of NFS native and aggregate surfaced roads and approximately 6.3 miles of paved roadway. These native surfaced roads are not suited for wet weather use due to erosive soils and lack of armoring.

Most system roads are in poor condition and are experiencing erosion problems due to limited road maintenance, wet weather use, and erosive soils. Many of the local roads have received little to no maintenance over the years and will require heavy maintenance and/or reconstruction to eliminate resource damage and meet acceptable standards established in the Forest Service Handbook 7709.58.

Alternative 1 – No Action

Direct, Indirect and Cumulative Effects

Under the No Action alternative, no project activities would take place. Existing road maintenance and reconstruction needed to eliminate resource damage and support equipment access would not take place. No road reconstruction activities would take place on local roads and no new road construction would be needed. The transportation system for the area would not be updated and improved by this project to meet current access management direction. The results are negative effects on access and environmental resources and loss of the infrastructure investment.

As no action is being taken by the SNF under the No Action Alternative by definition there would be no cumulative effects. See FEIS page 31 for more explanation.

Alternative 2 – Proposed Action

Direct, Indirect Effects

This relatively low traffic volume road system has received less maintenance in recent years. These roads, mostly maintenance level 2, comprise most of the miles of the road system. Many of them are brushing in and washing out. The highest priority for District road management will continue to be safety for the traveling public and employees and improvement and restoration of roads with resource or access needs.

The Fish Camp Adaptive Management project is proposing to perform road maintenance and/or road reconstruction activities on all or portions of roads 5S06, 5S06A, 5S06G, 5S06GA, 5S22, 5S22X, 5S22XA, 5S22XC, 5S37, 5S43, 5S43C, 6S07 and 6S10. These roads will require a final field review prior to project activities to determine complete road reconstruction and/or road maintenance needs. There may be short term road control/limited public access during project implementation.

The transportation system for the area will be updated and improved by this project to meet current access management direction. These updates will result in preserving and updating access, increased safety of the system roads in the Project area, protection of environmental resources, and continuation of the infrastructure investment.

Existing road densities, in general, are acceptable from a wildlife perspective. Any system roads or unclassified roads not needed will be decommissioned to enhance wildlife habitat and reduce road densities to a more desired level.

Alternative 3

Direct, Indirect and Cumulative Effects

In Alternative 3, treatment areas would remain the same as in Alternative 2. Direct, indirect and cumulative effects would remain the same as in Alternative 2.

Economics

The Fish Camp Project area was selected for treatment based on analysis of stand density and forest health in the upper Big Creek watershed. Hazardous fuel reduction and stand density management is important here due to the proximity of the Project area to the community of Fish Camp and Yosemite National Park. The area supports recreation opportunities on and off the SNF, including special use permits issued by the forest. Treatments are needed to prevent similar situations that occurred in the last decade in Arizona and New Mexico and on the San Bernardino National Forest, where thousands of acres of trees died from insect mortality due to over-stocked conditions. Fuel reduction and density management treatments proposed would: (1) generate sawtimber volume, (2) help stimulate the economy through the utilization of forest projects, and (3) maintain jobs in the local timber and vegetation management industries.

Currently (2009) the Sierra NF is providing timber for three remaining sawmills, Sierra Forest Products (SFP), Terra Bella, CA, and Sierra Pacific Industries (SPI), at Chinese Camp, CA, and at Standard, CA. The SFP mill is the last remaining sawmill in California south of Yosemite National Park. This mill also operates a wood-fired electrical power plant co-located with its mill, which utilizes a portion of its lumber manufacturing waste product. Lumber manufacturing waste products are also utilized in several other markets including landscaping. SFP is a qualifying Small Business and SPI is a Large Business in computations for Small Business Administration market share monitoring purposes. SFP is approximately 80% dependent upon raw material from Federal Lands Conversely, the Sierra, and Sequoia National Forests are almost 100% dependent upon the SFP milling infrastructure to process and give value to excess tree inventories in the woods when considering fuels and fire management, forest health maintenance, and wildlife habitat restoration. In order to implement the types of projects considered in this analysis, an economically viable infrastructure is necessary now and into the future. Maintenance of such an infrastructure is voiced as a concern by some segments of the public.

The current depressed lumber market has caused sawtimber value to drop to historic lows. This depressed lumber market is the result of reduced housing starts and the consequences of the current global recession. In addition to the poor lumber market, local sawmills are in dire need of forest products to keep them open. If these mills close, the ability to utilize forest products in the future and offset treatment costs would be lost. The district recognizes that the project would cost more money than it could generate from the forest products removed. Therefore, additional appropriated dollars would need to be requested to complete any of the action alternatives. Treatments prescribed were developed with regard to those activities necessary to reduce the intensity and spread of wildfire and reduce stand density, not to provide positive economic returns. An economic analysis is required to comply with NEPA guidelines and can generally be helpful in selecting an alternative by showing comparative costs and\or revenues between alternatives. However, economics will not be a deciding factor for selecting any action alternative for the Fish Camp Project. Instead, alternative selection will be based on the alternative that best accomplishes the purpose and need of the project. This economic analysis, will give the public an approximate comparison of costs between alternatives.

The economic analysis for the Fish Camp Project is divided into three sections. The first section is the net value of harvested sawtimber taking into account the value of the sawtimber minus the stump to mill cost. The second section is the cost of other prescribed treatments within the Project area that address non-commercial vegetation treatments. The final section is an analysis of employment benefits both directly and indirectly based on the relationship between employment and harvesting in California. Besides the above described cost and benefits, other fixed costs are associated with the proposal. The cost of producing the environmental document is approximately $95,000. Prior to project implementation there are project preparation costs of $11.80/ccf. During project implementation there are contract administration costs of $10.80/ccf.

Tables 49 and 50 display the comparison of both action alternatives for product value, implementation costs, and employment benefits. Both action alternatives would require appropriated dollars to complete the work. Alternative 2 would require the most appropriated dollars to complete implementation and is estimated at $779,057. It would require approximately $31,426 more in appropriated funds than alternative 3. However, the employment benefits would be approximately $1,323,140 higher than alternative 3. The extra $31,426 required to implement alternative 2 would result in 562 more acres treated for density management, providing improved stand vigor and creating a more resilient forest to density induced mortality. The density management treatments also create more stand heterogeneity by promoting oak growth with the removal of larger trees that are overtopping oaks and by influencing the selection of tree removal over a greater extent. This is an investment of only an extra $55.92 per acre to fully implement the project purpose and need. Fire and fuel objective treatments in the Project area would reduce fire risk and provide public benefit. Measurement of this benefit is outlined in the paper *Investment in Fuel Removals to Avoid Forest Fires Result in Substantial Benefits (*Mason et al, 2006). For both action alternatives, fire risk would be reduced in units proposed for commercial thinning (404 acres) and those treatment areas where hand thinning/tractor pile/burn pile, mastication, and underburn take place outside of alternative 3 cut units. The fire reduction benefit could be as much as $654,100 in either action alternative.

This analysis compares the project value based on product value, implementation cost, and employment benefits for the action alternatives. The no action alternative does not have any product value or implementation costs, but has the cost of producing the environmental document and the benefit of providing Forest Service employment. The no action alternative is neutral in respect to this analysis because its cost equals its benefit.

The employment benefit of implementing product removal and fuel reduction treatments is an important aspect in project economics. Whenever you have a project that puts people to work and provides a product to the free market, there are societal benefits derived. Woods workers, truck drivers, and mill workers are directly employed and the taxes they pay benefit both Federal and State Government. Yield taxes are collected from Purchasers upon cutting sawtimber and are paid to the State. Processed materials from mills eventually reach retail stores and provide jobs for retail workers and income and sales tax to Federal and State Government. These societal benefits are a by-product of the prescribed treatments designed to meet the purpose and need of this project. When greater amounts of forest products are removed from a project, more societal benefits are realized. Alternative 2 would provide the greatest societal benefits. Generally, for each million board feet of product removal, approximately 13 jobs are supported both directly and indirectly. This ratio can range from 10 jobs to 18 jobs depending on location and the type of products removed. In addition to product removal, other vegetation treatments in the Project area help support the local economy. Table 51 displays the anticipated number of full time jobs supported by vegetation treatments other than product removal.

Table 49: Fish Camp economic analysis for alternative 2

Value - Sawtimber[1]								
Total Acres = 966								
PP 10 inch - 29.9 inch sawtimber	54%	4980	ccf	x	$85.24	/ccf		$424,495
SP 10 inch - 29.9 inch sawtimber	6%	518	ccf	x	$98.34	/ccf		$50,940
WF 10 inch - 29.9 inch sawtimber	30%	2757	ccf	x	$162.15	/ccf		$447,048
IC 10 inch - 29.9 inch sawtimber	10%	888	ccf	x	$174.39	/ccf		$154,858
LP 10 inch - 29.9 inch sawtimber	0%	3	ccf	x	$110.26	/ccf		$331
Total Value		**9146**	**ccf**					**$1,077,672**
Stump to Mill Cost								
Stump to truck Cost		9146	ccf	@	$67.62	/ccf		**$618,453**
Other Cost		9146	ccf	@	$8.97	/ccf		**$82,040**
Road Reconstruction Cost		9146	ccf	@	$12.84	/ccf		**$117,435**
Road Maintenance Cost		9146	ccf	@	$3.94	/ccf		**$36,035**
Temp Road Cost		9146	ccf	@	$0.21	/ccf		**$1,921**
Haul Cost		9146	ccf	@	$75.00	/ccf		**$685,950**
Sawtimber Scale		1143	trips	@	$1.60	/trip		**$1,829**
Advertise Rate Sawtimber		9146	ccf	@	$4.40	/ccf		**($40,242)**
Total Other Cost								**$1,503,419**
Net Value								**($425,747)**
Forest Service Agency Responsibility							**Full-time jobs[3]**	
Mastication		201	acres	x	$520	/acre	1	**$104,520**
Hand Thin/Stand Clean		393	acres	x	$125	/acre	4	**$49,125**
Tractor Pile		393	acres	x	$280	/acre	1	**$110,040**

Underburn	401	acres	x	$150	/acre	1	**$60,150**
Burn Tractor Piles	393	acres	x	$75	/acre	2	**$29,475**
						9	jobs
Total Non Harvest Cost							**$353,310**
Total Project Value							**($779,057)**
Fire Reduction Benefits[2]			$602	/acre	1055	acres	**$654,100**
Harvest Employment[3]						59	jobs
Total Full Time Jobs							**68**
Total Employee-Related Income							**$2,737,960**

Table 50: Fish Camp economic analysis for alternative 3

Value - Sawtimber[1]								
Total Acres =	404							
PP 10 inch - 29.9 inch sawtimber	98%	3987	ccf	x	$83.26	/ccf		$331,958
SP 10 inch - 29.9 inch sawtimber	0%	12	ccf	x	$69.74	/ccf		$837
WF 10 inch - 29.9 inch sawtimber	0%	18	ccf	x	$156.90	/ccf		$2,824
IC 10 inch - 29.9 inch sawtimber	1%	40	ccf	x	$167.24	/ccf		$6,690
LP 10 inch - 29.9 inch sawtimber	0%	0	ccf	x	$0.00	/ccf		$0
Total Value		**4057**	**ccf**					**$342,308**
Stump to Mill Cost								
Stump to truck Cost		4057	ccf	@	$68.93	/ccf		**$279,649**
Other Cost		4057	ccf	@	$8.49	/ccf		**$34,444**
Road Reconstruction Cost		4057	ccf	@	$28.66	/ccf		**$116,274**
Road Maintenance Cost		4057	ccf	@	$4.22	/ccf		**$17,121**
Temp Road Cost		4057	ccf	@	$0.47	/ccf		**$1,907**
Haul Cost		4057	ccf	@	$75.00	/ccf		**$304,275**
Sawtimber Scale		507	trips	@	$1.60	/trip		**$811**
Advertised Rate Sawtimber		4057	ccf	@	$4.40	/ccf		**($17,851)**
Total Other Cost								**$736,629**
Net Value								**($394,321)**
Forest Service Agency Responsibility							**Full-time Jobs[3]**	
Mastication		201	acres	x	$520	/acre	1	**$104,520**
Hand Thin/Stand Clean		393	acres	x	$125	/acre	4	**$49,125**

Tractor Pile	393	acres	x	$280	/acre	1	**$110,040**
Underburn	401	acres	x	$150	/acre	1	**$60,150**
Burn Tractor Piles	393	acres	x	$75	/acre	2	**$29,475**
						9	jobs
Total Non Harvest Cost							**$353,310**
Total Project Value							**($747,631)**
Fire Reduction Benefits[2]			$620	/acre	1055	acres	$654,100
Harvest Employment[3]						26	jobs
Total Full Time Jobs							**35**
Total Employee-Related Income							**$1,414,820**

[1]Quality Value from R5 Transactional Evidence Appraisal Spreadsheet
[2]C. Larry Mason et al. Jan/Feb 2006. *Investment in Fuel Removals to Avoid Forest Fires Result in Substantial Benefits.* Journal of Forestry:27-31 (total of firefighting cost avoided and timber loss avoided)
[3]Based on historical relationships between employment and harvest in California during the 1980's, each million board feet harvested supports 6.5 year-around jobs (1 in logging, 4 in sawmill, and 1.5 in US Forest Service employment). In regional economic models of employment for California and the Pacific Northwest, an estimate of one indirect or induced job for every direct timber job is added. Indirect jobs result from the employment created by the local purchase of materials for the sawmill, local expenditures by workers, and the demand for local government employees. Each million board feet harvested supports a total of 13 jobs that are timber related. The restoration and fuel work would support additional direct and indirect employment. There are approximately 1.4 indirect jobs for every full time field job. All jobs are equivalent to year-around employment.

Table 51: Full time Job relationship to specific project tasks

Task	# of Workers	Production		Acres of Treatment	Direct full time jobs	Indirect full time jobs	Total full time jobs
Mastication	2	4	ac./day	201	0.4	0.6	1
Hand Thin/Stand Clean	1	1	ac./day	393	1.5	2.2	4
Tractor Pile	2	5	ac./day	393	0.6	0.9	1
Underburn	10	30	ac./day	401	0.5	0.7	1
Burn Tractor Piles	7	15	ac./day	393	0.7	1.0	2

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Maintenance and enhancement of long-term productivity is accomplished through restoration treatments that reduce basal area and number of stems (stand density) in over crowed stands. Stands that exist presently are no longer sustainable or resilient to changing environmental conditions that can and are occurring now and into the future. Drought induced stress, insect or disease attacks and wildfire all can have detrimental effects on the forest of today. Short-term activities described in the action alternatives are intended to lead to the enhancement of long-term productivity by beginning to restore forest conditions that resilient to disturbances.

Actions described in Chapter 1 lead to enhancement of long-term productivity, especially:

- The need to increase the proportion of large trees across a landscape,
- The need to increase the proportion of fire resistant species such as pines,
- The need to reduce wildfire intensity and spread across the landscape, and
- The need to reduce stand density.

Unavoidable Adverse Effects

No unavoidable adverse effects would occur in the Project area.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

Approximately 0.5 miles of temporary road construction is proposed for the Fish Camp Project. Road construction results in removal of surface soils and subsoil and complete loss of soil productivity within the road prism.

The 0.5 miles of road is approximately 0.9 acres of ground with total loss of soil productivity. The direct effect of this new road construction is irreversible and irretrievable. Erosion on newly constructed roads is usually higher immediately after the road is constructed. There is potential that accelerated erosion could occur off the road prism and reduce soil productivity off site and after the road is constructed. Applicable soil and water conservation Best Management Practices (BMP) will be implemented, including erosion control measures, such as water bars, straw mulching of fills and fertilization of soils to re-vegetate the bare soils. Road reconstruction and road maintenance operate within the road prism and have little effect to the soil resource. However, there can be a positive effect to the soil resource outside of the road prism from road reconstruction by restoring proper drainage features of the road. Restoration of drainage features will result in less surface erosion and soil loss that leads to loss in soil productivity.

Legal and Regulatory Compliance

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders.” The Proposed Action and alternatives must comply with the following regulation.

Principle Environmental Laws

The following laws contain requirements for protection of the environment that apply to the Proposed Action and alternatives.

Endangered Species Act

The Forest Service is directed to comply with this Act and does so through Biological Assessments and Evaluations that are used to analyze the effects of the proposed alternatives. These assessments and evaluations make determinations on Federally-listed endangered, threatened, candidate and proposed species and their habitat. The analysis was conducted in part to determine whether formal consultation or conference is required with the United States Department of the Interior, Fish and Wildlife Service (USDI-FWS), pursuant to this act.

The Fish Camp Project, through the inclusion of design criteria established for all action alternatives for species covered under this Act as well as the completion of Biological Assessments and Evaluations for Botanical, Aquatic and Terrestrial species, is in compliance with this act.

Clean Water Act

The Fish Camp Project would comply with this Act by adoption of Best Management Practices and other design criteria established for all action alternatives as detailed in Chapter 2.

Clean Air Act

Under the General Conformity Rule the Fish Camp Project has been determined to comply with this Act and the California State Implementation Plan through the implementation of treatments following Best Available Control Measures (BACMs) for prescribed burning as well as Rules and Regulations established by the San Joaquin Valley Air Pollution Control District and Mountain Counties Air Pollution Control District as required under section 190 of this Act, as amended in 1990.

National Historic Preservation Act (NHPA)

The USDA Forest Service is directed to identify, evaluate, treat, protect, and manage historic properties by several laws. However, the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq.) (NHPA) provides comprehensive direction to Federal agencies about their historic preservation responsibilities.

Section 106 of the NHPA and the ACHP implementing regulations, *Protection of Historic Properties* (36 CFR Part 800), require that Federal agencies take into account the effect of their undertakings on historic properties, and that agencies provide the ACHP with an opportunity to comment on those undertakings. Programmatic agreements (36 CFR 800.14(b)) provide alternative procedures for complying with 36 CFR 800. Pacific Southwest Region 5, USDA Forest Service has such an agreement: *Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, California State historic Preservation Officer, and Advisory Council on Historic Preservation Regarding The Identification, Evaluation and Treatment of Historic Properties Managed by the National Forest of the Sierra Nevada, California* (Sierran PA). This agreement provides specific standards for conducting cultural resources inventory, evaluation, and management, including Forest Heritage Program requirements, identification standards, standard procedures for protecting cultural resources, reporting and public participation.

Cultural resource design criteria are established for all action alternatives and are based on stipulations within the Sierran PA. All alternatives would be in compliance with historic preservation law, policy and regulation, as this project meets the stipulations of the Sierran PA.

National Forest Management Act

The National Forest Management Act (16 U.S.C. 1604) and the Multiple-Use Sustained-Yield Act of 1960 (16 U.S.C. 528–531) gives direction to National Forests to develop National Forest Land and Resource Management Plans that (A) insure consideration of the economic and environmental aspects of various systems of renewable resource management, including the related systems of silviculture and protection of forest resources, to provide for outdoor recreation (including wilderness), range, timber, watershed, wildlife, and fish; (B) provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives, and for steps to be taken to preserve the diversity of tree species. As set forth by these Acts, the Sierra National Forest Land and Resource Management Plan, as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) in 2004, set specific standards and guidelines which are to be followed during project level planning and implementation.

By the inclusion of design criteria as part of all action alternatives to minimize or eliminate significant environmental effects from proposed management actions as well as the inclusion of standards and guidelines from the SNF-LRMP and SNFPA ROD (USDA-FS 2004b) used to design this project, this project would comply with this act.

Soil Productivity

Soil resource management is achieved by maintaining soil productivity using Regional Soil Quality Standard and Guidelines and management direction provided in the LRMP (USDA-FS 1992). The Geology/Soils section, starting on page 39 in Chapter 3, analyzes the existing soil productivity and effects of alternatives on soil productivity.

Management Indicator Species (MIS)

The bioregional scale monitoring strategy for the SNF MIS is found in the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (ROD) of 2007. Bioregional scale habitat monitoring is identified for all twelve 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 Sierra Nevada Forests Bioregional Management Indicator Species (SNF Bioregional MIS) Report (USDA-FS 2008).

Other Standards and Guidelines, especially those dealing with Water Quality

Best Management Practices will be applied to all action alternatives and are listed in Appendix B of this document. Design criteria listed in Chapter 2 incorporate additional protection measures to minimize and/or eliminate impacts to water quality.

Executive Orders

The following executive orders provide direction to Federal agencies that apply to the Proposed Action and alternatives:

Indian Sacred Sites, Executive Order 13007 of May 24, 1996, applies to the Proposed Action alternatives because of historic and prehistoric uses known in the area. This is specifically addressed in Chapter 3 under Heritage Resources and Tribal Relations. All project alternatives comply with this order.

Protection and Enhancement of the Cultural Environment, Executive Order 11593 of May 13, 1971, directs Federal agencies to inventory cultural resources under their jurisdiction, to nominate to the National Register of Historic Places all Federally owned properties that meet the criteria, to use due caution until the inventory and nomination processes are completed, and to assure that Federal plans and programs contribute to preservation and enhancement of non-Federally owned properties.

Cultural resource design criteria are established for all action alternatives and are based on stipulations within the Sierran PA. All alternatives would be in compliance with historic preservation law, policy and regulation, as this project meets the stipulations of the Sierran PA.

Invasive Species, Executive Order 13112 of February 3, 1999, applies to the Proposed Action alternatives. A risk of introducing invasive species does exist. Measures need to be in place to prevent the spread of these species. The Proposed Action alternatives comply by providing measures to prevent the introduction and spread of invasive species.

Recreational Fisheries, Executive Order 12962 of June 6, 1995, applies to the Proposed Action alternatives. Action alternatives comply with this order by implementing Best Management Practices and other design criteria and correcting existing resource problems. These design criteria are detailed in Chapter 2 and the list of specific Best Management Practices associated with this project are included in Appendix B of this document.

Migratory Birds, Executive Order 13186 of January 10, 2001. Under the National Forest Management Act (NFMA), the Forest Service is directed to “provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives (P.L. 94-588, Sec 6 (g) (3) (B)).” The January 2000 USDA Forest Service (FS) Landbird Conservation Strategic Plan, followed by Executive Order 13186 in 2001, in addition to the Partners in Flight (PIF) specific habitat Conservation Plans for birds and the January 2004 PIF North American Landbird Conservation Plan all reference goals and objectives for integrating bird conservation into forest management and planning.

> In late 2008, a Memorandum of Understanding (MOU) between the USDA Forest Service and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds was signed. The intent of the MOU is to strengthen migratory bird conservation through enhanced collaboration and cooperation between the Forest Service and the Fish and Wildlife Service as well as other Federal, State, tribal and local governments. Within the National Forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities.

The SNF is proposing to manage lands on the BLRD that are located in the Big Creek watershed. Proposed management is intended to implement direction contained within the SNF-LRMP (LRMP, USDA-FS 1992) as amended by the SNFPA ROD (USDA-FS 2004b). Opportunities to promote conservation of migratory birds and their habitats in the Project area were considered during development and design of the Fish Camp Project (MOU Section C: items 1 and 11 and Section D: items 1 and 3).

Within this Project area special considerations have been given to maintaining higher levels of biodiversity through actions such as delineating OFLs surrounding perennial streams (see DEIS and BE/BA for a description of OFLs). Higher levels of biodiversity have also been planned for by marking retention groups of large diameter trees. Over four-hundred and seventy two (472) such tree groups were identified in the main Project area. These tree groups are composed of a cluster of 3 or more trees, 30-inch dbh or greater, with touching crowns, and will benefit those species which utilize dense groupings of large trees. Another project design measure which will maintain biodiversity is the identification of retention areas around large oaks within treatment units. Two to three large oaks per acre were identified and marked with paint. These oaks will retain a zone of no activity measuring 35 feet, or dripline circumference around the oak (whichever is greater). The delineation of OFLs, retention of large tree groups, and oak no treatment zones will ensure a heterogeneous post treatment landscape resulting in the continued accessibility of both hiding cover and prey availability within these areas of biodiversity.

Likely impacts to habitats and select migratory bird populations resulting from the Fish Camp Project have been assessed in detail within the project MIS report and impacts to select TES birds and their habitats have been analyzed in the project BA and/or BE.

The project will not adversely impact migratory landbird species or their associated habitats. Potential impacts to migratory species would be minimized through the adherence of LRMP Standards and Guidelines as well as Design Criteria common to All Action Alternatives (pages 16-26). These define the retention levels for snags/down woody debris, activities occurring within riparian management areas which include SMZs, OFLs, how to minimize ground disturbance and maintenance of canopy cover. The project is designed to improve habitat conditions through the acceleration of late-successional habitat characteristics, while still maintaining current functional habitat. Specific project design criteria include: canopy cover will be maintained at 50 to 60% or greater where available; ground disturbance will be limited to those guidelines with the LRMP as amended; vegetation species diversity and composition will be maintained; management activities will be limited in designated riparian management areas; and retention of snags and downed logs would be retained at levels defined in the Design Criteria Common to All Action Alternatives. All riparian management areas within the project have been identified and buffers established. In addition, no operations will occur during the wet weather season.

Floodplain Management, Executive Order 11988 of May 24, 1977, does not apply because of exclusions and buffers that are in place through design criteria for the action alternatives and are found in detail in Chapter 2.

Protection of Wetlands, Executive Order 11990 of May 24, 1977, does not apply because of exclusions and buffers that are in place through design criteria for the action alternatives and are found in detail in Chapter 2.

Environmental Justice, Executive Order 12898 of February 11, 1994, applies to the Proposed Action alternatives. Compliance has been attempted by making this document understandable and accessible.

Use of Off-Road Vehicles, Executive Order 11644, February 8, 1972, does not apply to this proposal. No off road use is being proposed nor existing use changed in this document.

Special Area Designations

The selected alternative will need to comply with laws, regulations and policies that pertain to the following special areas.

Research Natural Areas

No research natural areas are located in the Project area. This project would comply with applicable laws, regulations and policies for research natural areas.

Inventoried Roadless Areas

No Inventoried Roadless Areas are located in the Project area. This project would comply with applicable laws, regulations and policies for Inventoried Roadless Areas.

Wilderness Areas

No Congressionally-designated wilderness areas are located in the Project area. This project would comply with applicable laws, regulations and policies for wilderness areas.

Wild and Scenic Rivers

No Congressionally-designated wild and scenic rivers occur in the project planning area.

Municipal Watersheds (FSM 2540)

No municipal watersheds occur in the project planning area.

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with…other environmental review laws and executive orders.”

Species surveys, review of recent literature, and professional judgment have been incorporated into determinations of possible effects on species. Surveys provide information on species presence and habitat on a local scale. An element of uncertainty exists for effects on species with distributions beyond the project or Sierra N.F. boundaries. The Pacific fisher and YTare Forest Service sensitive species that have also been designated by the U.S. Fish and Wildlife Service as candidate species for listing under the Endangered Species Act. A candidate species is determined by the U.S. Fish and Wildlife Service through a 12-month finding as warranted for listing. The listing process is precluded by other priorities. The Sierra N.F. requested and received technical advice from the U.S. Fish and Wildlife Service to address uncertainty related to these candidate species. Their advice is integrated extensively throughout the Terrestrial and Aquatic Species sections of Chapter 3 as well as in the design criteria for all action alternatives.

Chapter 4. Consultation and Coordination

Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental document:

ID Team Members

Mark Lemon, District Fuels Officer; ID Team Leader

Gloria Smith, Fire/Fuels Analysis

David Smith, District Silviculturist; Vegetation/Silvicultural Analysis; Core Team Member

Anae Otto, District Wildlife Biologist-Terrestrial; Biological Assessment/Biological Evaluation for Terrestrial Wildlife; Core Team Member

Keith Ballard, District Timber Management Officer; Data Collection/Analysis; Core Team Member

Denise Tolmie, Forest Fuels Officer;

Phillip Strand, Fisheries Biologist; Aquatics-Riparian Analysis; ID Team Member

Keith A. Stone, Hydrologist; Hydrology Analysis; ID Team Member

Joanna Clines, Forest Botanist; Botanical Biological Assessment/Biological Evaluation/Noxious Weed/Invasive Species Analysis; ID Team Member

Marie Mogge/Erin Potter, District Archeologist; Archeology Analysis; ID Team Member

Andy Hosford, District Engineer; Transportation Analysis; ID Team Member

Alan Gallegos, Province Geologist; Cumulative Watershed Effects Analysis/Soils Analysis; ID Team Member

Karen Nooney, District Lands/Special Uses; Special Uses Analysis; ID Team Member

Federal, State, and Local Agencies

Although no formal or informal consultation was required for this project, personnel communications with Federal, State and Local Agencies including, but not limited to; U.S. Fish and Wildlife Service, California Department Fish and Game, and The Resources Agency (CalFire); Sierra Nevada Adaptive Management Project, California University System.

Tribes

North Fork Mono Rancheria; Picayune Rancheria of the Chukchansi Indians; Mariposa Indian Council; Mono Nation; California Indian Basketweavers Association.

Distribution of the Environmental Impact Statement

This draft environmental impact statement has been distributed to individuals who specifically requested a copy of the document. In addition, copies have been sent to the following Federal agencies, Federally-recognized tribes, State and local governments, and organizations:

> Advisory Panel on Historic Preservation, USDA-Animal and Plant Health Inspection Service, USDA-Natural Resources Conservation Service, USDA-National Agricultural Library, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, South Pacific Division-US Army Engineer, Region 9-Environmental Protection Agency, US Department of the Interior, US Coast Guard, Western Pacific Region-Federal Aviation Administration, US Department of Energy, Federal Highway Administration, U.S. Fish and Wildlife Service, California Department of Fish and Game, North Fork Mono Rancheria, Picayune Rancheria of the Chukchansi Indians, Mariposa Indian Council, Mono Nation, Madera and Mariposa County Board of Supervisors, San Joaquin Valley Air Pollution Control District, local Chapter of Society of American Foresters, Eastern Madera Fire Safe Council, Mariposa Fire Safe Council, Coarsegold Resource Conservation District, Sierra Forest Legacy, National Chapter and Tehipite Chapter-Sierra Club, John Muir Project, California Indian Basketweavers Association, Sugar Pine Railroad, Yosemite Trails Pack Station and Tenaya Lodge.

Glossary

Adaptive Management: A type of natural resource management that implies making decisions as part of an on-going process. Monitoring the results of actions provides information that may indicate the need to change a course of action. Scientific findings and the needs of society may also indicate the need to adapt resource management to new information.

Air Shed: A geographical area that shares the same air mass due to topography, meteorology, and climate.

Analysis Area: A collection of land area, not necessarily contiguous, sufficiently similar in character that they can be treated as if they were identical.

Aspect: A position facing a particular direction, usually expressed as a compass direction in degrees or cardinal directions.

Bark Beetle: A member of the family Scolytidae (*Coleoptera*). Adults and larvae tunnel in the cambial region (either in the bark only or in the bark and xylem) of living, dying and recently dead or felled trees and utilize these areas for food and shelter.

Basal Area: The area of the cross section of a tree trunk near its base, usually 4½ feet above the ground. Basal area is a way to measure how much of a site is occupied by trees. The term basal area is often used to describe the collective basal area of trees per acre.

Baseline: Starting point for analysis of environmental consequences. A baseline may be conditions at a point in time or collected over a specified period of years.

Best Management Practices (BMPs): Practices determined to be the most effective and practicable means of controlling pollutants at levels compatible with environmental quality goals. BMPs were conceptualized in the 1972 FUS Federal Water Pollution Control Act. BMPs as defined in the USDA Forest Service Soil and Water Conservation Handbook.

Biomass thin: Used in this document to describe the cutting of vegetation (conifers) that may or may not have a market value, but are removed from site after cutting. For this document this is considered a conifer approximately 4-10 inches in diameter.

Breast Height (as referred to as dbh): A standard height from ground level, generally 4.5 feet for recording diameter, circumference or basal area of a tree.

Broadcast Burn: A type of prescribed fire allowed to burn over a designated area within defined boundaries to achieve land management objectives.

Buffer: A land area designated to block or absorb unwanted impacts to the area inside the buffer.

Bulk Density: The weight per unit volume of a measured material. Bulk density of plants is measured at a specified moisture tension.

Catastrophic: a violent usually destructive natural event

California Wildlife Habitat Relationship System (CWHR): A wildlife information and predictive system for mammals, reptiles, and amphibians. This system is considered a state-of-the-art information system for California's wildlife. The system provides the most widely used habitat relationship models for California's terrestrial vertebrate species. CWHR is operated and maintained by the California Department of Fish and Game, in cooperation with the California Interagency Wildlife Task Group (CIWTG).

Canopy: Foliar cover in the forest stand consisting of one or several layers.

Chaparral: Dense growth of mostly small-leaved evergreen shrubs. Found in the foothills of California.

Classified Roads: Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for motor vehicle access including State roads, County roads, privately owned roads, National Forest Transportation System roads, and roads authorized by the Forest Service that are intended for long-term use.

Climate: The composite or generally prevailing weather conditions of a region, throughout the year, averaged over a series of years

Clump: An isolated, generally dense, group of trees.

Codominant: Tree species in a forest that are about equally numerous and exert the greatest influence.

Cohort: A group of trees developing after a single disturbance, commonly consisting of trees of similar age. A considerable range of tree ages of seedling or sprout origin and trees that predate the disturbance can be included.

Commercial thin: Used in this document to describe the cutting and removal from site of vegetation (conifers) that typically has a market value. For this document this is considered a conifer over approximately 10 inches in diameter.

Conflagration Threat: Likelihood that a wildfire capable of causing considerable damage will occur. National Wildfire Coordinating Group (NWCG) Glossary of Wildland Fire Terminology

Corridor: Elements of the landscape that connect similar areas. Streamside vegetation may create a corridor of willows and hardwoods between meadows where wildlife feed.

Cover: Any feature that conceals wildlife or fish. Cover may be dead or live vegetation, boulders, or undercut streambanks. Animals use cover to rest, feed, and escape from predators.

Crown: The upper part of a tree that carries the main branch system and foliage.

Crown Closure: The point at which the vertical projections of a crown's perimeter within a canopy touches.

Crown Density: The amount and compactness of foliage for trees or shrubs.

Crown Fire –A fire that advances from top to top of trees or scrubs more or less independent of a surface fire. Crown fires are sometimes classed as running or dependent to distinguish the degree of independence from the surface fire.

Cumulative Effects: Combined effects resulting from sequential actions on a given area.

Cumulative impact: The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions 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.

Danger Tree: A standing tree that presents a hazard to people due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem or limbs, and the direction and lean of the tree. (OSHA 29 CFR 1910.266(c) and FSH 6709.00, glossary)

Den Tree: A tree that contains a weather tight cavity for wildlife.

Defensible fuels profile(s), Defensible Fuel Profile Zone(s), DFPZ(s): A strategically located strip(s) of land where the vegetation has been modified to a less dense fuel type. These are typically located along ridgetops and roads and are areas where fire fighters would make a stand to contain a fire. The width is based on potential fire behavior based on available fuels, weather and wind, and topography. They are not designed to stop an oncoming wildfire by themselves, but rather to provide a safe location to facilitate fire suppression efforts and provide an anchor point for prescribed burning projects. The DFPZ strategy initially treats a lower proportion of the landscape; treatments are located to protect specific values and are typically placed in wildland urban intermix areas. After a network of DFPZs is established, area fuel treatments (SPLATs) can be placed to enhance DFPZ effectiveness and increase the likelihood tat the overall landscape strategy will reduce wildfire intensity and size.

Diameter Class: Intervals into which a range of diameters of tree stems or logs may be divided for classification or use.

Disturbance: A force that results in changes in the structure and composition through natural events such as wind, fire, flood, avalanche, or mortality caused by insect or disease outbreaks or human events (e.g. timber harvest).

Duff: Organic material covering the forest floor (includes fresh litter from plants and older, well developed humus).

Ecosystem: An arrangement of living and non-living things and the forces that move among them. Living things include plants and animals. Non-living parts of ecosystems may be rocks and minerals. Weather and wildfire are two of the forces that act within the ecosystems.

Elevation: Vertical distance of measure displayed in feet above sea level.

Endangered Species: A plant or animal that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

Endemic Species: Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

Environmental Effects: Includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health whether direct (which are caused by action and occur at the same time and place), indirect (which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable), or cumulative (results from the incremental impact of the action when added to other past, present or reasonably foreseeable future actions).

Environmental Impact Statement (EIS): A document prepared by a Federal agency in which anticipated environmental effects of a planned course of action or development are evaluated. Federal statute (Section 102 of the National Environmental Policy Act of 1969) requires that such statements be prepared. An impact statement includes: (1) the environmental impact of the Proposed Action, (2) any adverse impacts which cannot be avoided by the action, (3) alternatives courses of actions, (4) relationships between local short-term use of the human environment and the maintenance and enhancement of long-term productivity, and (5) a description of the irreversible and irretrievable commitment of resources which would occur if the action were accomplished.

Ephemeral Stream: A stream or portion of a stream that flows only in direct response to precipitation, receiving little or no water from springs and no long continued supply from snow or other sources and whose channel is at all times above the water table.

Erosion: The wearing away of land surface by rain, running water, wind, ice, gravity, or other natural agents including gravitational creep and tillage.

Existing Condition: for the purpose of this DEIS it represents a summary of the known information, which may serve as a baseline for comparison of effects from an action and from cumulative actions.

Feasibility: Capability and suitability for specific use.

Fire Behavior: The over-arching means by which to describe how an ignited fire reacts to the influences of fuels, topography and weather when combined together. Typical terms used when describing fire behavior include rate of spread (how fast a fire travels over a given distance in a given period of time); flame height (as measured in feet from ground through middle of flame); intensity (BTUs given off from flaming front); fire type (surface vs. crown) to name a few. Computer based models are used to predict fire behavior for given environmental and fuel conditions.

Flow: The movement of a stream of water or other mobile substances from place to place. The movement of water and the moving water itself. The volume of water passing a given point per unit of time.

Forage: All browse and non-woody plants that are eaten by wildlife.

Forb: A grouping or category of herbaceous plants which are not included in grass, shrub or tree groupings, generally smaller flowering plants. Forbs contain little or no woody material.

Forest: An ecosystem characterized by a more or less dense and extensive tree cover, often consisting of stands of varying in characteristics such as species composition, structure, age class, and associated processes. Commonly includes meadows, streams, fish and wildlife.

Forest Health: The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function and vigor, presence of unusual levels of insects or disease, and resilience to disturbance. Individual and cultural viewpoints, land management objectives, spatial and temporal scales, the relative health of the stands that make up the forest, and the appearance of the forest at a point which influences the perception and interpretation of forest health.

Forest Plan: Also referred to as a Land and Resource Management Plan (LRMP). A signed document that is the source of management direction for an individual National Forest that specifies activity and output levels for a period of 10-15 years. Management direction in the Forest Plan is based on issues identified at the time of Plan development.

Forestry: The profession embracing the science, art and practice of creating, managing, using and conserving forests and associated resources for human benefit and in a sustainable manner to meet desired goals, needs and values.

Forest Type: A category of forest usually defined by its vegetation, particularly its dominant vegetation as based on percentage cover of trees.

Fragmentation: The process by which a landscape is broken into small islands of forest within a mosaic of other forms of land use or ownership.

Frequency: 1. biometrics: the number of occurrences of a given type of event of the number of members of a population falling into a specified class; 2. ecology: the number of individuals in a community.

Fuelbreak: A wide strip or block of land on which the native vegetation has been modified so that fires burning into it can be more readily suppressed. Usually strategically build in conjunction with a roadway (for access) and along ridgelines. Terms like shaded fuelbreak is used to differentiate the amount or type of vegetation that is removed to create the fuelbreak.

Fuel Model – A fuel model is a set of numerical values that describe the fuel inputs for Rothermel's mathematical model that predicts surface fire spread.

Geographic Information System (GIS): A system of computer maps with corresponding site-specific information that can be electronically combined to provide reports and maps.

Habitat: The place where an animal, plant or population normally lives and develops.

Habitat capability: The ability of a land area or plant community to support a given species of wildlife.

Headcuts: Land erosion at the head of a stream, creek, or river.

Headwater: The source of a stream. The upper tributaries of a drainage basin.

Herb: A non-woody, vascular plant.

Herbaceous: A class of vegetation dominated by no-woody plants known as herbs.

Home Ignition Zone – Includes an area surrounding the home within 100 to 200 feet. The potential for ignition depends on the home's exterior materials and design and the amount of heat to the home form the flames within the home ignition zone.

Home Range Core Area (HRCA): A home range core area is a management area established surrounding each territorial California spotted owl activity center on National Forest lands after 1986. Acreage of the HRCA on the Sierra National Forest is 600 acres, which includes the 300 acre Protected Activity Center (PAC).

Horizon (soil): A layer of soil approximately parallel to the land surface and differing from adjacent genetically related layers in physical, chemical and biological properties or characteristics such as color, structure, texture, consistency, kinds and number of organisms present, degree of acidity or alkalinity.

Indigenous: Native to a specified area or region.

Indirect Effects: Effects that are caused by an action and occur at a later time, or at another location, yet are reasonably foreseeable in the future.

Insect: A member of the class Insecta characterized by a body segmented into three distinct regions (head, thorax, abdomen), by a head with one pair of antennae, by a thorax with three segments each with a pair of legs, and usually one or two pairs of thoracic wings.

Interdisciplinary Team (IDT): A group of specialists assembled to solve a problem or perform a task.

Invasive Plants: Plant species that are introduced into an area in which they did not evolve and in which they usually have few or no natural enemies to limit their reproduction and spread. These species can cause environmental harm by significantly changing ecosystem composition, structure, or processes and can cause economic harm or harm to human health.

Kernel: Technical term used to define a animals calculated home range

Ladder fuels or fuel ladders: Arrangement of vegetation (trees, brush, etc.) that provides vertical continuity from the forest floor to the crowns of overstory trees. Example would be similar to steps on a ladder.

Land and Resource Management Plan (LRMP): See Forest Plan

Landscape: A large land area composed of interacting ecosystems that are repeated due to factors such as geology, soils, climate and human impacts. Landscapes are often used for coarse grain analysis.

Maintenance: The work of keeping something in proper condition or standard.

Masticate or Mastication: Means by which vegetation is mechanically "mowed" into small pieces and changed from a vertical to horizontal arrangement.

Management Indicator Species (MIS): Animals or plants identified in Forest Land and Resource Management Plans (LRMPs or forest plans) developed under the 1982 Planning Rule, that are selected because their population changes are thought to indicate the effects of Forest Service management activities.

Mechanical Methods: Utilization of machinery such as bulldozers and skidders for tractor logging; helicopter logging, skyline cable logging, mechanical harvesters and shredders/masticators.

Merchantable: Having the size, quality and condition suitable for marketing under a given economic condition.

Mitigation: Actions taken to avoid, minimize or rectify the impact of a land management activity.

Model: A representation of reality used to describe, analyze or understand a particular concept. A model may be a relatively simple qualitative description of a system or organization or a highly abstract set of mathematical equations. A model has limits to its effectiveness and is used as one of several tools to analyze a problem.

Mortality: Trees dying from natural causes, usually by size class in relation to sequential inventories or subsequent to incidents such as storms, wildfire or insect and disease epidemics.

Mosaic: A pattern of vegetation in which two or more kinds of communities are interspersed in patches, such as clumps of shrubs with grassland between.

National Environmental Policy Act (NEPA): Congress passed in 1969 to encourage productive and enjoyable harmony between people and their environment. One of the major tenets of NEPA is its emphasis on public disclosure of possible environmental effects of any major action on public lands. Section 102 of NEPA requires a statement of possible environmental effects to be released to the public and other agencies for review and comment.

Native Species: Indigenous species normally found as part of a particular ecosystem.

Natural Fuel: Term used to describe vegetation, live or dead, in a given area that is not associated with being created by management activities. It is usually described in terms of natural fuel accumulations or build-up from naturally falling leaves, branches and/or logs from fallen snags.

Notice of Intent (NOI): A notice printed in the *Federal Register* announcing that an Environmental Impact Statement will be prepared. The NOI must describe the Proposed Action and possible alternatives, describe the proposed agency scoping process and provide a contact person for further information.

Noxious Weeds (Plants): An undesirable, non-native plant that is difficult to control and is on either the California Department of Food and Agriculture Noxious Weed list or the California Invasive Plant Council Inventory of invasive plants in California.

Old-growth (forest): Old forests often containing several canopy layers, variety in tree sizes and species; and standing and dead woody materials.

Protected Activity Center (PAC): A Protected Activity Center is a management area for certain Forest Service Sensitive raptor species. PACs are delineated surrounding all known and newly discovered breeding territories of California spotted owls (300 acres), Northern goshawks (200 acres), and great gray owls (50 acres) on National Forest System lands.

Patch: An area of homogeneous vegetation, in structure and composition.

Pathogen: A parasitic organism directly capable of causing disease.

Perennial Stream: A stream that has running water on a year-round basis under normal weather conditions.

Piloted Wood Ignition: When wood is sufficiently heated, it decomposes to release combustible volatiles. At a sufficient volatile-air mixture, a small flame or hot spark can ignite it to produce flaming; thus, a piloted ignition

Pre-commercial thin: Used in this document to describe the cutting of vegetation (conifers) that does not typically have a market value and not removed from site after cutting. For this document this is considered a conifer approximately 4-10 inches in diameter.

Prescribed burning (fire): With a given range environmental condition (air temperature, fuel moisture, windspeed and direction, etc.) and approved plan, a fire that is management ignited to meet specific resource management objectives. This can include dozer/hand pile; understory and broadcast burning.

Rate of Spread: The relative speed with which a fire increases in size usually expressed in chains (66 feet) per hour.

Record of Decision (ROD): An official document in which a deciding official states the chosen activity (alternative) that will be implemented from a prepared EIS.

Reforestation: The restocking of an area with forest trees, by either natural or artificial means, such as planting.

Regeneration: The renewal of a tree crop by either natural or artificial means. The term is also used to refer to the young crop itself.

Residual: A tree or snag remaining after an intermediate of partial cutting of a stand.

Resilience: The ability of an ecosystem to maintain diversity, integrity and ecological processes following a disturbance.

Resistance: The ability of a community to avoid alteration of its present state by a disturbance. The ability of plants to avoid, suppress, prevent, overcome, or tolerate insect or pathogen attack.

Responsible Official: The Federal employee who has the delegated authority to make and implement a decision on a Proposed Action.

Riparian Area: The area along a watercourse or around a lake or pond.

Riparian Ecosystem: The ecosystems around or next to water areas that support unique vegetation and animal communities as a result of the influence of water.

Riparian Conservation Areas (RCAs): These are land allocations that are managed to maintain or restore the structure and function of aquatic, riparian and meadow ecosystems. The intent of management direction for RCAs is to (1) preserve, enhance, and restore habitat for riparian-and aquatic-dependent species; (2) ensure that water quality is maintained or restored; (3) enhance habitat conservation for species associated with the transition zone between upslope and riparian areas; and (4) provide greater connectivity within the watershed.

Risk: The relative probability of any of several alternative outcomes as determined or estimated by a decision maker when the outcome of an event or series of events is not known.

Road Maintenance: The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objectives.

Road Reconstruction: Activities that result in road realignment or road improvement.

Sample: A part of a population selected and examined as a representative of the whole.

Sediment (sedimentation): Solid materials, both mineral and organic, in suspension or transported by water, gravity, ice or air; may be moved and deposited away from their original position and eventually will settle to the bottom.

Sensitive Species: Plant or animal species which are susceptible to habitat changes or impacts from activities. The official designation is made by the USDA Forest Service at the Regional level and is not part of the designation of threatened or Endangered Species made by the U.S. Fish and Wildlife Service.

Shade tolerant: When used to describe a conifer, the trees prefers to grow in the shade.

Silvicultural System: The cultivation of forest; the result is a forest of a distinct form. Silvicultural systems are classified according to harvest and regeneration methods and the type of forest that results.

Silviculture: The art and science that promotes the growth of single trees and the forest as a biological unit.

Simulation: An operations research technique that represents physical, natural, social and economic systems by models in order to study the factors affecting the system and to aid decision making.

Site: The area in which a plant or a stand grows, considered in terms of its environment, particularly as this determines the type and quality of the vegetation the area can carry.

Site Preparation: Removing unwanted vegetation, slash, roots and stones from a site before reforestation. Naturally occurring wildfire, as well as prescribed fire can prepare a site for natural regeneration.

Skid Road (skid trail): A road access cut through the woods for skidding of logs.

Skidder: A self-propelled machine (cable, clam-bunk or grapple) used for dragging trees or logs.

Skidding: Hauling logs by sliding, not on wheels, from stump to a collection point.

Slash: Residue left on the ground after timber cutting or left after a storm, fire or other event. Slash includes unused logs, uprooted stumps, broken or uprooted stems, branches, bark, etc.

Snag: A standing dead tree. Snags are important as habitat for a variety of wildlife species and their prey.

Soil Compaction: Reduction of soil volume. The weight of heavy equipment, for example, on soils can compact the soil and thereby change it in some ways, such as in its ability to absorb water.

Species: The main category of taxonomic classification into which genera are subdivided, comprising a group of similar interbreeding, individuals sharing a common morphology, physiology and reproductive process.

Spotted Owl Protected Activity Center: The best available 300 acres of habitat surrounding each territorial owl activity center detected on National Forest System lands since 1986. Owl activity centers are designated for all territorial owls based on 1) the most recent document nest site, 2) the most recent known roost site when a nest location remains unknown, and 3) a central point based on repeated daytime detections when neither nest or roost locations are known.

Stand: A group of trees that occupies a specific area and is similar in species, age, and condition.

Stand density: A quantitative measure of stocking expressed either absolutely in terms of number of trees, basal area, or volume per unit area or relative to some standard condition. A measure of the degree of crowding of trees within stocked areas commonly expressed by various growing space ratios.

Stand Structure: The physical and temporal distribution of plants in a stand. Silviculture the horizontal and vertical distribution of components of a forest stand including the height, diameter, crown layers and stems of trees, shrubs, herbaceous understory, snags and down woody material.

Standards and Guidelines: Direction outlined in the Forest Land and Resource Management Plan (LRMP) for specific aspects of project planning and analysis.

Stocking: An indication of growing-space occupancy relative to a pre-established standard.

Strategically Placed Landscape Area Treatments (SPLATs): As defined in the SNFPA ROD (USDA-FS 2004b), SPLAT is a wildland fire modification strategy (created from research conducted by Dr. Mark Finney [1999]) by which a fire is forced to go around areas, by dropping the fire out of the crownsand to the ground, where fuels have been reduced or otherwise modified. Fire will continue to burn in ground litter in these areas but at lower intensity. The treated areas function as "speedbumps" on the landscape to slow the spread and reduce the intensity of oncoming fires and thereby reduce damage to both treated and untreated areas. The term SPLAT is being used in this document to describe a specific area proposed for vegetation treatment, not an area where treatment intensity would change.

Streamside Management Zones (SMZs): Management Zones established to protect and maintain water quality, site productivity, channel stability, wildlife habitat, and riparian vegetation.

Structure: Sizes, shapes and/or ages of the plants and animals in an area.

Surface Fuels: Vegetation, either dead or live, that is on the surface, which includes dead branches, blowdown timber, leaves, and low vegetation, as contrasted with *crown fuels*.

Thinning from below: A silvicultural technique by which cutting is done in an immature stand of trees to accelerate growth of the remaining trees or to improve the form of the remaining trees. From below describes the incremental cutting of trees based on its position in the stand. First starting with suppressed, then intermediates, then co-dominates to reach a desired or prescribed basal area for the stand.

Threatened Species: Plant or animal species likely to become endangered throughout all or part of their range in the foreseeable future. Designated by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973.

Uncharacteristic severe wildfire: Uncharacteristically Severe Wildfire is defined as fire occurring beyond the historical range of natural variation in terms of scope, intensity and duration.

Understory: The trees and woody shrubs growing beneath the overstory in a stand of trees.

Viability: The ability of a population of a plant or animal species to persist for some specified time into the future. Viable populations are populations that are regarded as having the estimated numbers and distribution of reproductive individuals to ensure that its continued existence is well distributed in a given area.

Watershed: The entire region drained by a waterway (or into a lake or reservoir). More specifically, a watershed is an area of land above a given point on a stream that contributes water to the streamflow at the point.

Weather: The state of the atmosphere with respect to wind, temperature, cloudiness, moisture, pressure, etc. Weather refers to these conditions at a given point in time (e.g., today's high temperature).

Weed: A valueless, troublesome or noxious plant often exotic, growing wild especially on growing profusely. A plant growing where it is not wanted.

Wildfire: Any wildland fire that is not a prescribed fire.

Wildland: Land other than that dedicated for other uses such as agriculture, urban, mining or parks.

Wildland Urban Intermix (WUI): The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. WUI has three zones associated with it and these zones have standards and guidelines associated with them. The urban core, as defined in the USDA-FS 2004 FSEIS, is an area whereby the next zones are designated from. The defense zone is the area nearest the urban core and in this project is defined as the area ¼ mile distance from the outer edge of the entire urban core. The threat zone is the next designated zone and in this project is defined as the area 1 1/4 mile distance from the outer edge of the defense zone. The total distance of the Defense and Threat Zone is 1 ½ miles. The USDA-FS 2004, FSEIS mapped these areas based on 1990 Census data and were not redefined for this project.

Wildfire Intensity: Describes the buildup of heat within a fire, both in amount and in rate of transmission-a function of heat release. Usually described as low, moderate or high intensity fires.

Wildlife: All non-domesticated animal life.

Woodland: A forested area; a plant community in which, in contrast to a typical forest, the trees are often small, characteristically short-boled relative to their crown depth and forming an open canopy with the intervening area being occupied by lower vegetation, commonly grass.

90th – 97th Percentile: These terms are used to describe the hottest 10 percent and 3 percent fire weather conditions during a given period

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Appendices

Appendix A – Map Package for Fish Camp Project

See Map Package

Appendix B – Best Management Practices - Stream Crossing Design Measures

Specific to Fish Camp Project

BMP Name, Objective, and Direction	Application to the Fish Camp Project
BMP 1-1 Timber Sale Planning Process: To incorporate water quality and hydrologic considerations into the timber sale planning process.	Implemented through the Riparian Conservation Objectives/Forest Plan Consistency report, specification of operational BMPs, Environmental Analysis including interdisciplinary team office and field discussions, and incorporation of water quality protection measures in the Timber Sale Contract for the KRP EIS.
BMP 1-4 Use of Sale Area Maps (SAM) and/or Project Maps for Designating Water Quality Protection Needs: To ensure recognition and protection of areas related to water quality protection delineated on a SAM or project map.	The sale administrator and purchaser will review these areas on the ground prior to commencement of ground disturbing activities. Examples of water quality protection features that will be designated on the project map include: 1) Location of streamcourses and riparian zones to be protected, including the width of the protection zone for each area. 2) Wetlands (meadows, lakes, springs, etc.) and other sensitive areas (such as shallow soils) to be protected. 3) Boundaries of harvest units, specified roads and roads where hauling activities are prohibited or restricted, areas of different skidding and/or yarding methods, including post-harvest fuels treatments, and water sources available for purchaser's use.
BMP 1-5 Limiting the Operating Period of Timber Sale Activities: To ensure that the purchasers conduct their operations, including erosion control work, road maintenance, and so forth, in a timely manner, within the time frame specified in the Timber Sale Contract.	The purchaser's contract operation period will be limited to contract-specified periods when adverse environmental effects are not likely. The Sale Administrator will close down operations due to rainy periods, high water, or other adverse operating conditions in order to protect resources.
BMP 1-8 Streamside Management Zone Designation: To designate a zone along riparian areas, streams and wetlands that will minimize potential for adverse effects from adjacent management activities. Management activities within these zones are designed to improve riparian values.	Streamside management zones (SMZs) have been supplemented with RMAs and RCAs (USDA 2004b) as described in the Design Measures section of the EIS. Within SMZs, the constraints defined in Sierra Supplement No. 1 (USDA Forest Service, 1989) apply. This includes no self-propelled ground based equipment, a minimum groundcover of 50%, and shade canopy may not be modified in a way that affects stream temperature. Modifications to these guidelines are possible where site-specific needs exist if the action is reviewed by a hydrologist or fisheries biologist.
BMP 1-9 Determining Tractor Loggable Ground: To minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems.	Limit ground skidding and machine piling with tractors to slopes less than 35%. Endlining can be used to remove logs from steeper slopes. Ground disturbance on areas of shallow soils, notably soils adjacent and abutting to rock outcrops, will be avoided.

BMP Name, Objective, and Direction	Application to the Fish Camp Project
BMP 1-10 Tractor Skidding Design: By designing skidding patterns to best fit the terrain, the volume, velocity, concentration, and direction of runoff water can be controlled in a manner that will minimize erosion and sedimentation.	The sale administrator and purchaser will designate all skid trails prior to ground disturbing activities. If uncertainty arises regarding potential resource impacts of skid trail location, consult with an earth science specialist (i.e., hydrologist, aquatic biologist, or soil scientist).
BMP 1-12 Log Landing Location: To locate new landings in such a way as to avoid watershed impacts and associated water quality degradation	The following criteria are to be used by the Sale Administrator when evaluating landings: a. The cleared or excavated size of landings will not exceed that needed for safe and efficient skidding and loading operations. Trees considered dangerous will be removed around landings to meet the safety requirements of OSHA. b. Selected landing locations will involve the least amount of excavation and fill possible. Landings must be located outside of SMZs. c. Locate landings near ridges away from headwater swales in areas that will allow skidding without crossing stream channels, violating SMZs, or causing direct deposit of soil and debris to a stream. d. Locate landings where the least number of skid roads will be required, and sidecast can be stabilized without entering drainages or affecting other sensitive areas. Keep the number of skid trails entering a landing to a minimum. e. Position landings such that the skid road approach will be nearly level as feasible, to promote safety and to protect soil from erosion. f. Avoid excessive fills associated with landings constructed on old landslide benches. g. Construct stable landing fills or improve existing landings by using appropriate compaction and drainage specifications. In some cases, using an existing landing located within an RCA or CAR is preferable to constructing a new landing outside of it. These situations will be reviewed on a site-by-site basis by an earth science specialist (aquatics, hydrology, geology, or soils).
BMP 1-13 Erosion Prevention and Control Measures during Timber Sale Operations: To ensure that the purchasers' operations will be conducted reasonably to minimize soil erosion.	Timber purchaser responsibilities for erosion control will be set forth in the Timber Sale Contract. Equipment will not be operated when ground conditions are such that excessive damage will result. The kinds and intensity of control work required of the purchaser will be adjusted by the sale administrator to ground and weather conditions with emphasis on controlling overland runoff, erosion, and sedimentation. Erosion control work required by the contract will be kept current. At certain times of the year this means daily, if precipitation is likely or weekly when precipitation is predicted for the weekend. Erosion prevention measures must be applied no later than October 1 and immediately upon completion of activity begun after November 1. If the purchaser fails to perform seasonal erosion control work prior to any seasonal period of precipitation or runoff, the Forest Service may temporarily assume responsibility, complete the work, and use any unencumbered deposits as payment for the work.

<table>
<tr><th>BMP Name, Objective, and Direction</th><th>Application to the Fish Camp Project</th></tr>
<tr><td>BMP 1-16 Log Landing Erosion Protection and Control: To reduce the impacts of erosion and subsequent sedimentation associated with log landings by use of mitigating measures.</td><td>Landings will be properly cross-ditched, ripped (if soils are compacted), re-contoured (as necessary), and mulched after use and before the winter precipitation period, whichever comes first. Excess material not needed for erosion control can be piled and burned. Upon completion of the project, consult with the hydrologist or soil scientist to determine the need for additional soil protection measures.</td></tr>
<tr><td>BMP 1-17 Erosion Control of Skid Trails: To protect water quality by minimizing erosion and sedimentation derived from skid trails.</td><td>Erosion control measures will be installed on all skid trails, tractor roads, and temporary roads. Erosion control measures include, but are not limited to, cross ditches (water bars), organic mulch, and ripping. Cross ditches will be spaced according to the guidelines below, maintained in a functioning condition, and placed in locations where drainage would naturally occur (i.e., swales). The level of maintenance will be contingent upon existing or predicted weather patterns as determined by the Sale Administer (see BMP 1-13).
Minimum Cross Drain Spacing<table><tr><td>% Slope</td><td>Maximum Spacing</td></tr><tr><td>0 - 15</td><td>125 feet</td></tr><tr><td>15 - 35</td><td>45 feet</td></tr></table></td></tr>
<tr><td>BMP 1-18 Meadow Protection during Timber Harvesting: To avoid damage to the ground cover, soil, and hydrologic function of meadows.</td><td>Mechanical equipment is not permitted in meadows unless specifically authorized by an aquatic biologist and hydrologist.</td></tr>
</table>

BMP Name, Objective, and Direction	Application to the Fish Camp Project
BMP 1-19 Streamcourse and Aquatic Protection: The objectives of this BMP are: a. To conduct management actions within these areas in a manner that maintains or improves riparian and aquatic values. b. To provide unobstructed passage of stormflows. c. To control sediment and other pollutants entering streamcourses. d. To restore the natural course of any stream as soon as practicable, where diversion of the stream has resulted from timber management activities.	a. The location and method of crossings on Class IV and V streams must be agreed to by the sale administrator (SA) prior to construction. b. Stream crossings on Class I – III streams must be approved by the hydrologist and aquatic biologist. c. Damage to stream banks and channels will be repaired to the extent practicable. d. All sale-generated debris will be removed from streamcourses, unless otherwise agreed to by the SA, and in an agreed upon manner that will cause the least disturbance. e. Felled trees will not be pulled across perennial or intermittent stream channels without prior approval by the hydrologist or aquatic biologist. f. Methods for protecting water quality while utilizing tractor skid trail design in stream course areas where harvest is approved include: (1) end lining, (2) falling to the lead, and (3) utilizing specialized equipment with low ground pressure such as feller buncher harvester. g. Water bars or other erosion control structures will be located so as to disperse concentrated flows and filter out suspended sediments prior to entry into streamcourse. h. Material from temporary road construction and skid trail streamcourse crossings will be removed and streambanks restored to the extent practicable. i. Special slash treatment site preparation activities will be prescribed in sensitive areas to facilitate slash disposal without use of mechanized equipment. j. Project-related bare soil areas (e.g. skid trails, landings, temporary roads, etc.) will be covered with existing native vegetation mulch, organic debris, or certified weed free straw to at least 50%, well distributed cover, and cross-ditched per BMP 1-17 requirements.
BMP 1-20 Erosion Control Structure Maintenance: To ensure that constructed erosion control structures are stabilized and working	During the period of the timber sale contract, the purchaser will provide maintenance of soil erosion control structures contracted by the purchaser until they become stabilized, but not more than one year after their construction. If the purchaser fails to do seasonal maintenance work, the Forest Service may assume the responsibility and charge the purchaser accordingly. The Forest Service sale administrator is responsible for ensuring erosion control maintenance work is completed.
BMP 1-21 Acceptance of Timber Sale Erosion Control Measures before Sale Closure: To ensure the adequacy of required erosion control work on timber sales.	The sale administrator must inspect erosion control measures to ensure their adequacy prior to accepting closure on the unit and/or sale. The effectiveness of erosion control measures will be evaluated using BMPEP protocols (see Monitoring Plan) after the sale area has been through one or more wet seasons. This evaluation is to ensure that erosion control treatments are in good repair and functioning as designed before releasing the purchaser from contract responsibility. The purchaser is responsible for repairing erosion control treatments that fail to meet criteria in the Timber Sale Contract, as determined by the Sale Administer, for up to one year past closure of the sale.

BMP Name, Objective, and Direction	Application to the Fish Camp Project
BMP 1-22 Slash Treatment in Sensitive Areas: To maintain or improve water quality by protecting sensitive areas from degradation which would likely result from using mechanized equipment for slash disposal.	All burn piles made with mechanical equipment must be located outside of the SMZ. Hand piles will be kept at least 20 feet away from all streams, meadows, springs, seeps, and other sensitive aquatic areas.
BMP 2-1 General guidelines for the Location and Design of Roads: To locate and design roads with minimal resource damage.	The following considerations are incorporated into the planning process of road location and design. These measures are preventative, apply to all transportation activities, and indirectly protect water quality: (a)Transportation facilities will be developed and operated to best meet the resource management objectives with the least adverse effect on environmental values. (b)The location, design, and construction of roads will include the use of the IDT. (c)Sensitive areas such as wetlands, inner gorges, and unstable ground will be avoided to the extent practicable. (d)Stream crossings will be designed to provide the most cost efficient drainage facility consistent with resource protection, facility needs, and legal obligations.
BMP 2-2 Erosion Control Plan: To mitigate and control erosion through effective planning prior to initiation of construction.	Any new construction would be subject to erosion control measures as per an IDT approved plan that may include but not be limited to waterbar installation, sediment fencing, culvert installation and armoring, placement of straw waddles, approved straw cover and/or slash and any other method necessary to mitigate erosion and sediment routing in the project subwatershed(s).
BMP 2-3 Timing of Construction Activities: To minimize erosion by conducting operations during minimal runoff periods and when soils are dry and less prone to compaction.	Ground-disturbing activities will occur when soils are dry. In some cases soils may never dry sufficiently. Ground-disturbing work that occurs off of existing roads will occur during the dry season and will reduce ground disturbance as much as possible.
BMP 2-5 Road Slope Stabilization Construction Practices: To reduce sedimentation by minimizing erosion from road slopes and slope failure along roads.	An adequate soils and geologic investigation will be conducted when finalizing new road construction designs for: correct cut and fill steepness based on the angle of repose for the type of material; methods to handle surface runoff; and necessary compaction standards and surfacing needs.
BMP 2-7 Control of Road Drainage: To minimize the erosive effects of water concentrated on roads, to disperse runoff from road surfaces, to lessen sediment yield from roaded areas, and to minimize erosion of the road prism.	Newly constructed or reconstructed roads will be designed to reduce hydrologic connectivity and soil erosion wherever feasible. The sale administrator or other Forest Service representative will ensure that roads are adequately maintained during project implementation to ensure that road drainage features function as designed.

BMP Name, Objective, and Direction	Application to the Fish Camp Project
BMP 2-8 Constraints Related to Pioneer Road Construction: To minimize sediment production and mass wasting from pioneer road construction.	(a)Roads will be constructed within the planned roadway limits unless otherwise specified or approved by the ER or COR. (b)Pioneer roads will be located to prevent undercutting of the designated final cut slope, avoid deposition of materials outside the designated roadway limits, and accommodate drainage with temporary culverts or log crossings. (c)Erosion control work will be completed prior to the rainy season and in accordance with the contract. (d) Crossing sites on live streams will be dewatered during construction with diversion devices (see BMP 2-15).
BMP 2-9 Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects: To minimize erosion and sedimentation from disturbed ground on incomplete projects.	Erosion control must be completed before the rainy season (usually October in the KRP Project area). Preventative measures for timely erosion control include: (a)Removal of temporary culverts, culvert plugs, diversion dams, or elevated stream crossings. (b)Installation of temporary culverts, side drains, flumes, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, debris racks, or other facilities needed to control erosion. (c)Removal of debris, obstructions, and spoil material from channels and floodplains. (d) Planting vegetation, mulching, and/or covering exposed surfaces with jute mates or other protective material.
BMP 2-10 Construction of Stable Embankments: To construct embankments with materials and methods which minimize the possibility of failure and subsequent water quality degradation.	Roadways will be designed and constructed as stable and durable earthwork structures with adequate strength to support the treadway, shoulders, subgrade and road traffic loads.
BMP 2-11 Control of Sidecast Material During Construction and Maintenance: To minimize sediment production originating from sidecast material during road construction or maintenance.	Sidecasting is not permitted within SMZs. Waste areas must be located where excess material can be deposited and stabilized.
BMP 2-12 Servicing and refueling equipment: To prevent pollutants such as fuels, lubricants, bitumens and other harmful materials from being discharged into or near rivers, streams and impoundments, or into natural or man-made channels.	Storage of hazardous materials (including fuels) and servicing and refueling of equipment will be conducted at pre-designated locations outside of RCAs and CARs. If fueling and/or storage of hazardous materials are needed within RCAs or CARs, those sites must be reviewed and approved by the District Hydrologist or Aquatic Biologist. Additional protection measures, such as containment devices, may be necessary.
BMP 2-13 Control of Construction and Maintenance Activities Adjacent to SMZs: To protect water quality by controlling construction and maintenance actions within and adjacent to SMZs so that SMZ functions are not impaired.	Construction and maintenance fills, sidecast, and end-hauled materials will be kept out of SMZs except at designated crossing sites to minimize the effect to the aquatic environment.
BMP 2-14 Controlling In-Channel Excavation: To minimize stream channel disturbances and related sediment production.	There will be no in-channel or streambank excavation during any phase of project activities unless authorized by the district hydrologist or aquatic biologist.

BMP Name, Objective, and Direction	Application to the Fish Camp Project
BMP 2-16 Stream Crossings on Temporary Roads and Skid Trails:	Mechanical equipment crossing of perennial and intermittent (generally class I – III) streams is not permitted unless approved by the district hydrologist or aquatic biologist. Ephemeral streams (stream class IV and V) may be crossed at designated locations as agreed upon by the sale administrator and purchaser. Designate skid trails to avoid stream crossings and SMZs wherever possible. Designated crossings must be as perpendicular to the channel as possible and avoid sensitive soils and riparian vegetation damage. Stream banks must be repaired upon completion of the project.
BMP 2-19 Disposal of Right-of-Way and Roadside Debris: To ensure that organic debris generated during road construction is kept out of streams so that channels and downstream facilities are not obstructed.	If slash generated by road work is disposed of within SMZs, it will be piled and burned or chipped. Material may also be removed from the SMZ for disposal.
BMP 2-21 Water Source Development Consistent with Water Quality Protection: To supply water for roads and fire protection while maintaining existing water quality.	Water drafting will not occur in streams when the base discharge is less than 1.5 cfs, and will not draft more than 50% of the ambient discharge over 1.5 cfs. New drafting sites shall be approved by the District Hydrologist or Fisheries/Aquatic Biologist and located to minimize sediment and maintain riparian resources, channel condition, meadow integrity, and aquatic species viability and habitat. Approaches will be as near perpendicular to the stream as possible and will be gravel surfaced or otherwise stabilized. If water-drafting is required, pumps with low entry velocity and suction strainers with screens less than 2 mm in size (1/8 in.) will be used.
BMP 2-22 Maintenance of Roads: To maintain roads in a manner that provides for water quality protection by minimizing rutting, failures, sidecasting, and blockage of drainage facilities, all of which can cause erosion, sedimentation, and deteriorating watershed conditions.	Roads needed for project activities will be brought to current engineering standards of alignment, drainage, and grade before use, and will be maintained through the life of the project. Roads will be inspected at least annually to determine what work, if any, is needed to keep ditches, culverts, and other drainage facilities functional and the road stable.
BMP 2-23 Road Surface Treatment to Prevent Loss of Materials:	Surface stabilization will be considered where grades exceed 12% or road is within riparian conservation areas.
BMP 2-24 Traffic Control During Wet Periods: To reduce road surface disturbance and the rutting of roads, and to minimize sediment washing from disturbed road surfaces.	On roads not designated for all weather or winter haul, heavy equipment operations will be limited until the period after the soil has dried in the top 12 inches in the spring.
BMP 2-26 Obliteration or Decommissioning of Roads: To reduce sediment generated from temporary roads, unneeded system and non-system roads by obliterating or decommissioning them at the completion of the intended use.	Temporary roads will be obliterated after serving their intended purpose for this project. This includes: (1) road effectively barricaded; (2) road effectively drained by measures such as re-contouring or outsloping to return surface to near natural hydrologic function; (3) a well distributed mulch or organic cover provides at least 50% cover, or road surface is revegetated using local native species; (4) sideslopes are reshaped and stabilized to match the natural contour (as necessary); and (5) stream crossings are removed and natural channel geometry is restored. If non-local mulch is used (such as straw), it must be approved by the Forest Service as weed free.

BMP Name, Objective, and Direction	Application to the Fish Camp Project
BMP 5-8 Pesticide Application According to Label Directions and Applicable Legal Requirements: To avoid water contamination by complying with all label instructions and restrictions for use.	This BMP requires glyphosate applicators to strictly adhere to pesticide label instructions.
BMP 5-11 Cleaning and Disposal of Pesticide Containers and Equipment: To prevent water contamination resulting from cleaning or disposal of pesticide containers.	The cleaning and disposal of glyphosate containers will be done in accordance with Federal, State, and local laws, regulations and directives.
BMP 5-12 Streamside Wet Area Protection During Pesticide Spraying: To minimize the risk of pesticide inadvertently entering waters, or unintentionally altering the riparian area, SMZ, or wetland.	When spraying glyphosate, an untreated strip of land and vegetation will be left alongside surface waters, wetlands, riparian areas, or SMZ. Strip widths established by the IDT are 5 feet for dry channels and 25 feet for flowing channels (see Herbicide Use design criteria).
BMP 6-1 Fire and Fuel Management Activities: To reduce public and private losses and environmental impacts which result from wildfires and/or subsequent flooding and erosion by reducing or managing the frequency, intensity and extent of wildfire.	The project action alternatives are designed to achieve the desired conditions of BMP 6-1.
BMP 6-2 Consideration of Water Quality in Formulating Fire Prescriptions: To provide for water quality protection while achieving the management objectives through the use of prescribed fire.	Prescribed burning is planned at the minimum intensity and severity necessary to achieve management objectives, and each Burn Plan will incorporate all relevant design measures from this EIS.
BMP 6-3 Protection of Water Quality from Prescribed fire Effects: To maintain soil productivity, minimize erosion, and minimize ash, sediment, nutrients, and debris from entering water bodies.	Fires will be allowed to back into riparian vegetation, but direct lighting within riparian vegetation will not occur. All fire lines within RCAs and CARs will be water barred per BMP 1-17 spacing requirements. Fire lines within RCA (i.e., 150 ft., seasonal streams, and 300 ft. perennial streams, springs, and meadows) will be designed and constructed to reduce sediment entry into channels. Fire lines in RCAs will cross perpendicular to streams and follow the natural landscape contour as much as possible. Firelines within the SMZ will be hand cut. Waterbars will be placed on either side of each stream crossing to prevent or reduce sediment entry into streams.
BMP 6-5 Repair or Stabilization of Fire Suppression Related Watershed Damage: To stabilize all areas that have had their erosion potential significantly increased, or their drainage pattern altered by suppression related activities.	In the event of a wildfire, protection of resources would be evaluated under the Burned Area Emergency Response, assessment and treatment Implementation protocol.

BMP Name, Objective, and Direction	Application to the Fish Camp Project
BMP 6-6 Emergency Rehabilitation of Watersheds Following Wildfires: To minimize as far as practicable: 1.) loss of soil and onsite productivity; 2.) overland flow, channel obstruction and instability; 3.) threats to life and property both on-site and off-site	In the event of a wildfire, protection of resources would be evaluated under the Burned Area Emergency Response, assessment and treatment Implementation protocol..
BMP 7-3 Protection of Wetlands: To avoid adverse water quality impacts associated with destruction, disturbance, or modification of wetlands.	Ground disturbing activities will not occur in wetlands or meadows.
BMP 7-4 Oil and Hazardous Substance Spill Contingency Plan and Spill Prevention Containment and Countermeasure (SPCC) Plan: To prevent contamination of water from accidental spills.	A spill contingency plan and spill prevention and countermeasure plan (SPCC) must be prepared if hazardous materials (including fuels and oils) stored on the Sierra National Forest exceed 1320 gallons, or if a single container exceeds 660 gallons. The plan will at a minimum include: the types and amounts of hazardous materials located in the Project area, pre-project identified locations for hazardous materials storage and fueling/maintenance activities (must be located outside of RCA and CAR unless prior approval by District Hydrologist or Aquatic Biologist is obtained), methods for containment of hazardous materials and contents of on-site emergency spill kit, and a contingency plan (including contact names with phone numbers) to implement in the event of a spill. The SPCC plan must be approved by the Forest Service prior to project implementation.

Stream Crossing Design Measures

The idea of using logs to fill-in around a culvert, placed in a live, running stream was developed over the years between several specialists (Hydrologist, Botonist, Soils and Fisheries) and myself. It started during the use of traditional logging and further refined during the use of Cut-to-Length (CTL) operations. The main emphasis was to eliminate disturbance (or to radically reduce it) within the Streamside Management Zone (SMZ); additional emphasis items were: to reduce erosion/sediment movement, to eliminate or reduce loss of plant and habitat strucure, in and around the stream crossing.

Traditonal live stream crossings, with traditional logging equipment for skid trails or temporary roads, was constructed by excavating the crossings out and placing a culvert in the stream, but filling around the pipe with dirt. When the crossings served its purpose, the culvert and fill dirt were removed, usually with the bulldozer. This practice caused sediment load into the stream, along with much disturbance of the stream banks. Rehabilitation (rehab) work consisted of placing waterbars on each bank of the stream along with grass-seed and straw. The grass-seed/straw combo was placed from stream bank to the first waterbar ditch, on each bank, depending on slope gradient.

CTL operations changed the way operations were conducted in the woods. The harvester/tree processor establishes their route of travel (forwarding trails) thru the unit. The harvester cuts trees down, delimbs and produces logs along these trails, all the while leaving the resulting limbs and tree tops (slash) in the trails as a “slash mat” for ground cover. The forwarder follows the harvester, driving over the “slash mat” to pick up the logs and returns to the landing. This procedure works well when abundant material is available in the stands, on the hand, when material is not available or is light the disturbance is limited to the vehicles tracking numerous times over the bare ground.

Over the years, starting from the late 1980’s, the need to get away from non-native materials and grass seed took shape, along with the idea that using native materials like pine needles and tree limbs (logging slash) to control erosion or to use as a ground cover. The CTL operations lent itself to this “new” concept because of the amount of “on-site” material that could be produced and how it incorperated the material as a ground cover on the trails. This is why the CTL stream crossings works well under live flow conditions. The placement and removal of the log fill is accomplished with the harvester, which can grasp the processed logs with its cutting-head, feed wheels and limb knives. This allows the logs to be lifted into and out of position, much like a crane or boom. This not only reduces or eliminates the amount of soil disturbance and stream sediment loading, but the amount of the distubed area is greatly reduced.

During

After


After


Before

Appendix C – Response to Comments

The SNF provided the Fish Camp Project (DEIS) to interested parties for public comment on February 18, 2011 The Environmental Protection Agency published a Notice of Availability (NOA) for the DEIS in the Federal Register on the same date. The 45-day comment period ended on April 4, 2011. In response to the SNF request for comments, seven interested parties submitted comments. After breaking down each letter into the individual comments contained in those letters the SNF determined that 147 unique comments needed to be addressed. For tracking purposes, the SNF assigned a letter number to each letter; and, an ID number for each specific comment.

The Forest Service has documented, analyzed, and responded to the public comments received on the DEIS. Appendix C describes the comments received on the DEIS and provides the agency's response to those comments. In general, the agency responded in the following four basic ways to the substantive public comments as prescribed in 40 CFR 1503.4 and responses to Comments, of the National Environmental Policy Act (NEPA) regulations.

- Developing and analyzing alternatives not given serious consideration in the DEIS.
- Supplementing, improving, or modifying the analysis that the DEIS documented.
- Making factual corrections.
- Explaining why the comments do not need further Forest Service response.

The following individuals, agencies and organizations provided timely comments during the 45-day comment period:

- Sierra Forest Legacy/Sierra Club Environmental Law Program (SFCSC)
- Richard E. Kangas, Sierra Club-Tehipite Chapter (RKSCTC)
- American Forest Resource Council (AFRC)
- United States Environmental Protection Agency-Region IX (USEPA)
- Kirby D. Molen for Sierra Forest Products (SFP)
- California Forestry Association (CFA)
- National Park System Partnership Program (NPSPP)

Fish Camp DEIS Comments

	Comment	Response
Sierra Forest Legacy April 4, 2011		
1-1	Defer or limit treatments in fisher habitat until studied results from adjacent projects direct a conservation strategy.	In the Purpose and Need-"Why here, Why now" section of the FEIS, a full description of the timing of this project is described. While total analysis area is 5,440 acres in size, within the Fish Camp Project area treatment units are planned for less than 30% of the total landscape. Within the Sugar Pine Adaptive Management Project treatment units are planned for less than 35percent of the total landscape. Numerous design criteria have been developed limiting treatments upon the landscape. These include measures requiring high canopy cover retention, OFL's, oak clumps, large tree groups, and shrub and understory retention. These design criteria have been developed to maintain suitable habitat post treatment for the fisher and other TES species while allowing the Forest Service to meet the purpose and the need of the project by lowering the hazardous fuels throughout the WUI, decreasing the potential for uncharacteristically severe wildfires, and improving tree growth and vigor within the Project areas.
1-2	Need of pre- and post treatment stand data. It is incomplete in BE.	At this time, stand data is only available for the treatment units in Fish Camp that have been cruised/marked. The remaining stand data will be collected during marking/cruising of the remaining stands during May-July of 2011 if the decision is made to move forward with the project. If an action alternative is selected, the crew would utilize the same silvicultural prescription that was used to mark other treatment units in Fish Camp; therefore any deviation from the trend shown in table 29 of the BE will be minimal. The post treatment stand data for the treatment units displayed in the BE is a representative sample of what the remaining mark will be, with an average of 92 percent of trees ≥20 inches dbh remaining post-treatment.
1-3	Need >20"DBH disclosed pre and post treatment, also stand information, such as basal area, mean diameter and canopy cover.	Data tables have been added to the FEIS in appendix D.
1-4	Explanation of CWHR D5 overlap in to wild stands, e.g. units T-7b, T-8a, T-8b, T-9.	Map 6 in the DEIS Map package used the base GIS feature class delineated by the Remote Sensing Lab (RSL). This coarse GIS vegetation layer was designed for forest-level management considerations, and is insufficient for project-level analysis. This feature class was refined for the BE analysis by the district silviculturist and forest GIS specialist using existing structure analysis from more than 90 stand examination plots, as well as detailed aerial photography interpretation and field verification. Map 6

		has been corrected in the FEIS. (Wrong symbology used to create map 6 in the DEIS map packet.
1-5	Increase or create potential for large snags and down logs (>20" DBH) in units with little representation (Snag/Down Log generating treatments).	Because this comment can be addressed from a number of different specialist t areas, it is being addressed from the individual specialist areas below. Silviculture: A number of factors contribute to the creation of snags and snag distributions which eventually contribute to down logs. Some of these factors are: competition for resources, age, insect attack, fire, diseases, etc. Due to the highly variable density of snags and down logs within a stand, it is quite difficult to obtain an accurate per acre number. Only 562 acres of wildstands are proposed for treatment in this project, slightly more than 10 percent of the gross Project area. Within this 10 percent, groupings of heavily stocked larger diameter trees are being retained; areas within SMZs, archaeological sites, and steep areas, etc. are being left untreated. All these Snags and down logs present are not planned to be treated unless in excess of LMP standards and guides. Wildlife snag: The Fish Camp Project forest vegetation types are primarily Westside mixed conifer and ponderosa/Jeffrey pine, both of which require maintenance of four of the largest snags per acre distributed irregularly across the landscape according to the SNFPA 2004 ROD. "Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units." (S&G 11: SNFPA ROD, 2004) Across the Fish Camp treatment units, there is an average of 9 standing dead conifers per acre ≥11" dbh; and an average of 5 standing dead conifers per acre ≥18 inches dbh. Although there are two individual treatment units: T-13 (41 acres) and T-21d (23 acres) which appear snag deficient, on average across the Fish Camp project treatment units (1200 acres) the number of snags per acre >15" dbh is 5, which exceeds the minimum requirement set forth in the SNFPA 2004 ROD. Wildlife large down logs: The Fish Camp Project emphasizes retention of CWD in the largest size classes and decay classes 1-3. Although there are three individual treatment units: T-20a (41 acres), T-21d (23 acres), and T-19a/b (25 acres) which fall below the recommended range of 5-20 tons/acre CWD (Brown et al. 2003) for warm, dry ponderosa pine and Douglas-fir forests, on average across the Fish Camp project treatment units (1200 acres) the level of CWD is 12 tons per acre, which is well within the recommended range. The alternative of Snag/Down Log Generating Treatments was considering but eliminated from detailed study because … as explained in more detail in FEIS Chapter 2 Alternatives Considered but

		Eliminated from Detailed Study .
1-6	Increase or expand past/present cumulative effects in BE to include Graham Mountain.	The Fish Camp FEIS and BE cumulative effects analysis has been updated to include Graham Mountain.
1-7	DEIS and BE (wildlife) minimize cumulative effects by assuming individual effects are small. Page 5 Sweitzer et al. (2011) find that mortality for fishers in the SNAMP study area is a concern and that bobcats are a dominant predator in the fish camp area (Sweitzer and Barrett 2010	BE updated with strengthen analysis to include fisher predation: Sweitzer et al. (2011) find that mortality for fishers in the SNAMP study area is a concern and that bobcats are a dominant predator in the Fish Camp area (Sweitzer and Barrett 2010). To date, the SNAMP fisher team has not documented any fisher mortalities within the Fish Camp Project area. To verify this, updated mortality information was requested from the SNAMP fisher team on 4/5/2011. Rick Sweitzer provided maps at two different scales displaying the fisher mortalities that SNAMP has recorded over the duration of the study. He noted that to date, the SNAMP fisher crew has not documented any fisher mortalities in the Rainier Creek Watershed east of Highway 41 (personal communication). Rick also verified that the bobcat that may be targeting fishers is in the Central Camp area, which lies 8 miles straight line distance southeast of the Fish Camp project.
1-8	Increased vulnerability of predation due to lack of hiding cover by combining adjacent projects.	Several design criteria have been developed to maintain adequate levels of hiding cover for fisher and prey, and to retain landscape heterogeneity. One new design measures developed during Fish Camp project planning takes into account the amount of shrub and understory diversity that will be retained within the treatment units. This design measure with the newest addition italicized follows: Shrub and understory diversity will be retained throughout the Project area. All understory vegetation will be maintained in Old Forest Linkages associated with riparian areas (cooler, moister sites); black oak buffer zones; as well as areas where no treatment will be conducted such as heritage resource sites, botanical areas, slopes >35 percent, and rocky areas. Tree species associated with riparian areas, such as dogwoods, alders, and willows will not be removed. *In addition, post sale treatments will retain pockets of understory growth spread throughout the treatment units so that an additional 15-20 percent of the total understory growth will be maintained in 1/10 acre pockets within plantations and ¼ acre pockets within wild stand treatment units. This will preserve stand diversity while decreasing the threat posed by ladder fuels.*

1-9	Hazard tree removal within the Project area and cumulative effects, Has recent tree removal been incorporated?	There are currently no hazard tree removal timber sales within the Project area. The Oliver Silver Hazard Reoffer is a current sale located southwest of the community of Fish Camp, along Forest Road 5S66. The last Hazard tree timber sale in the Project area was the White Hazard Timber Sale that terminated in 2002. The sale was located along Forest Road 5S06 in the eastern edge of the Project area.
1-10	Because the Forest Service violated NEPA in adopting the 2004 Framework, logging projects that implement and rely upon the 2004 Framework are also contrary to law [see e.g., *Klamath Siskiyou Wildlands Ctr. v. Boody*, 468 F.3d 549, 562 (9th Cir. 2006), *Northwest Ecosystem Alliance v. Rey*, 2006 WL 44361, at *8 (W.D. Wash. 2006), *Citizens for Better Forestry v. USDA*, 2009 WL 1883728, at *13 (N.D. Cal. 2009)]. Thus, to the extent that the Fish Camp Project implements any of the changes to the 2001 Sierra Nevada Forest Plan Amendment made by the 2004 ROD, the project is contrary to law.	The commenter expresses concern that projects predicated on the 2004 Framework decision violate NEPA and NFMA. August and September 2008 court decisions found "that the 2004 Framework complied with the provisions of the National Environmental Policy Act (NEPA) and the National Forest Management Act (NFMA), except to the extent that the 2004 Framework was implemented without sufficient review of alternatives other than the chosen option." Judge England' November 2009 ruling (United States District Court Eastern District of California No. 2:05-cv-00205-MCE-GGH Memorandum and Order dated 11/04/09) denied the request to enjoin the Forest Service from continuing to develop projects based on the 2004 Framework but rather required the violation to be addressed by development of a supplemental EIS (which is underway and currently out for public comment) and by requiring future fuels reduction projects to have a non-commercial funding alternative. The 2004 Framework can legally be used as the basis for projects as long as the project complies with Judge England's November 2009 ruling. The Fish Camp Project, which has a fuels component in the purpose and need, contains a non-commercial funding alternative (Alternative 3) which is compliant with Judge England's instructions in the November 2009 ruling and therefore the project is not contrary to law as asserted.
	Richard E. Kangas Tehipite Chapter, Sierra Club April 4, 2011	
2-1	*DEIS is not clear throughout as required by NEPA*.	Comment not specific enough to address or correct.
2-2	*Throughout the DEIS there are citations to references. Unfortunately many of those references are not included in your Literature Cited list.* That leaves the	The DEIS references were reviewed and citations have been added to the FEIS where necessary.

	DEIS unclear. That also is a scientific shortcoming.	
2-3	*The WUI needs to be defined more thoroughly in the DEIS glossary.*	The definition of WUI has been added to the FEIS glossary.
2-4	*SPLATS and DFPZ's are not clearly differentiated.* To what extent are they to be thinned? In the extreme, they could be clearcuts.	The FEIS Glossary definitions for SPLATs and DFPZs have been refined to reflect how these terms are used in the context of this document. Within those definitions, it is stated that these terms reference a specific geographical location of a treatment area and the treatment intensities will not change within these areas.
2-5	*The definition of SPLAT in the DEIS glossary states that the SPLAT will force fire to go around the SPLAT.* That is confusing. It implies that the fire will only be detoured around the SPLAT.	The FEIS Glossary definition of SPLAT has been updated.
2-6	*SPLATS are shown on Map 3, but DFPZ's are not.*	FEIS Map packet Map #3 has been revised to display the DFPZs.
2-7	*According to the Glossary, DFPZ's are to be placed along roads and on ridgetops as places of safety for firefigthers.* Those are places where earlier timber project plans left larger trees for viewshed and wildlife. With the Fish Camp Project those viewshed and wildlife trees would be removed. In addition, roads are already clearings where firefighters can organize and ridgetops are locations where fires generally decrease in intensity and often just stop.	The term DFPZ is being used in this document to describe the geographic location associated with an area of proposed vegetation treatment near roads, not an area where treatment intensity would change. While no basis is offered for the commenter's perception of why "larger trees" were left, key wildlife characteristics will be maintained (see BA/BE).
2-8	*In the Summary Table on p. viii, the comment about "artifact looting" in case a "conflagration" occurs is a scare tactic.* The Project area was extensively	It is the experience and judgment of the District Archaeologist that intense forest fires increase the visibility of cultural resources and artifact looting has occurred post-fire due to the increased visibility of artifacts on the ground surface.

	cleared of trees in the last century. During that time artifacts already were looted. Furthermore, since less than ¼ of the of the area (1200 acres of 5,440 acres) is to be treated in this Fish Camp Project and since slash from logging and chunks from masticating are highly flammable, there is no certainty that the project actions will lessen the chances of fire or provide protection from looters.	The Purpose and Need as well as Environmental Consequences clearly articulate the expected reduction in risk of uncharacteristically severe fires.
2-9	*In the Summary Table on p. ix, the comment about increased spread of noxious weeds should fire fighting equipment be brought in, shows there need to be better standards for cleaning any equipment brought into the forest.*	The text has been clarified to show that the danger exists mostly under extreme emergency situations. The Forest Service has made great strides in implementing existing direction for prevention of noxious weeds via firefighting equipment, as evidenced by the increasing number of weed-washing stations at fire camps over the past decade. However, under emergency situations when a wildfire first breaks out, the need to put equipment on the line can supersede requirements for equipment cleaning (human life and safety take priority over noxious weed prevention). This is why there is a greater risk for weed spread when a higher risk of catastrophic wildfire persists while noxious weeds continue to spread within the Project area.
2-10	*In the Summary Table on p. xii, the comment that implies air quality will be more threatened by wildfire under the No Action Alternative is unfounded.* If logging and masticating lessened the smoke effects of fire, then the clearcutting of the past should have fireproofed our forests.	The FEIS Summary Table relative to the Air Quality Resource Area for the No Action Alternative has been edited to include the following: "If an uncontrolled wildfire was to occur within the area, smoke would produce unhealthy, widespread, prolonged and sever periods of air quality degradation. Depending on upper level atmosphere Class 1 air sheds could be impacted."
2-11	*Near the bottom of p. 3 of the DEIS the phrase, "Wide swings in weather conditions over the last 30 years…" is incorrect.* A climate is based on 30 years of weather, evapotranspiration analysis, and other data. It takes 30 years to determine a climate.	The FEIS wording has been changed to use the word "weather" instead of "weather". Although the conditions stated in this paragraph such as drought and rising temperatures are considered to be due to climate changes. There is evidence for increased variability in select climate variables within the Sierra National Forest, such as increased variation in annual precipitation at Huntington Lake over the past 85 years of climate records (Western Regional Climate Center 2010). Temperature records in the SNF indicates a general warming trend (especially increasing mean minimum temp), especially over the past 30 years, that may be decreasing the diurnal temperature range (WWRC

		2010, LaDochy et al. 2007). The word "weather" has been corrected to "weather".
2-12	*On p. 10 the DEIS includes that "Commercial thinning" would take up to five years to complete after implementation.* That seems a long time. Also that does not ensure that implementation would occur in the near future. Many projects on the Sierra NF have been planned and contracted, but not completed. Thus completing plans does not assure action to remedy what the plans pretend to remedy. However, completing the plans does allow contracts to be written and then extended until the private timber industry wants the logs. We propose that contracts not be written until the timber is needed. Otherwise the U. S. Treasury is stuck with maintaining the standing inventory of logs essentially owned by the timber industry until industry sees a market gain for the product.	The Forest Service plans on a contract term of two years based on production estimates for mechanical thinning equipment. This time period accounts for unforeseeable delays due to inclement weather and fire weather shutdowns. It is expected that timber harvest would begin the year of contract execution based on the need for raw material at local sawmills. Since there is a concern over supply needed to maintain the current industry infrastructure, there is little concern that this project would not be completed within normal contractual timeframes even with a depressed market (see Economic Analysis).

2-13	*At the bottom of p. 17, is written,"Thinning will not remove any trees larger than 30-inch dbh."* This implies that even 30-inch dbh might be exceeded for some other purpose. That should not happen. The 30-inch size already is too big. It should be 10 inches generally for the expressed needs and purposes.	The only exception where a tree ≥30-inches dbh may be felled is if it is a safety hazard (snag). Snags may only be felled if they meet the definition of a danger tree as described in the Engineering Design Criteria. Snags that meet this definition and are felled during project implementation will remain on site for down woody debris. All snags not meeting these criteria will remain as standing snags within the Project area. An alternative addressing limiting lree removal diameter to 10 inch DBH was considering but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study .
2-14	*At the bottom of p. 26 discussion of Alternatives Considered but Eliminated form Detailed Study does not list any such.* Those should be explained. If there were none, it should be so stated.	The FEIS has been corrected to specifically address alternatives considered but eliminated from detailed study.
2-15	*Table 3 (p. 27) lists miles of roads, but the numbers are not clear.*	Table 3 has been updated to include total miles of road. These total miles of roads that are addresses in each alternative would not change by alternative.
2-16	*Table 3 (p. 28) lists brush areas only for Alternative 1.* The rationale is not clear.	Changed "Brush Areas" on Table 3 to; Forest Plantations – Further Future Condition This condition is described in Chapter 3-Fire/Fuels section, Alternative 1-Direct Effects.
2-17	*Table 3 (p. 29), for "Estimated Range of Tree Diameter" suggests that average tree diameter does not increase for the No Action Alternative.* That is true, but the opportunity for fire to release the larger trees still present (not logged under this project) is still there. If fire were applied, the average diameter of trees would likely increase.	The average tree size would not increase under the No Action Alternative since fire would not be applied. Since there would be Forest Service actions taken.
2-18	*On p. 30 of the DEIS begins a discussion of cumulative impacts. On p. 31 the last sentence leaves the reader hanging as it is incomplete and with no ending punctuation.*	The FEIS was changed to direct the reader from the introductory paragraph to the cumulative effects table on the following pages.….

2-19	*On pp. 30-31 of the DEIS the discussion of cumulative impacts is disconcerting as it shows that the unfortunate White House Council on Environmental Quality (CEQ) cumulative impacts doctrine from the Administration of President George W. Bush is still being utilized. That doctrine streamlines the cumulative impacts essentially to "current aggregate effects of past actions without delving into the historical details of past actions."* Such an aggregate of impacts is a moving target. We say that is unfortunate since all types of activities are thus not necessarily being considered. Of course each activity of the past, whether by a Federal or non-Federal agency or by a person, must be considered. That especially includes effects of historic logging on private lands that have now become Federal lands. And that also includes effects of fire suppression. And it includes the placement of buildings and roads as well. Each type of activity has its own types of impacts. So where will the Proposed Actions from this DEIS take the cumulative impacts? You must quantify effects of planned activities. Not all activities have the same level or type of effect.	The Fish Camp FEIS has followed the current Forest Service NEPA Regulation (36 CFR 220.4(f) to address past actions in the cumulative effects of the alternatives. CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions (40 CFR 1508.7).
2-20	*Table 4, p. 32, title caption is incorrectly*	The title caption for Table 4 has been corrected in the FEIS.

	written. It is not clear as required by NEPA.	
2-21	*In Table 4 the use of an X, or not, to represent an impact, or not, is misleading since the X implies impacts are equal when so marked for various activities.* You need to use a numeric code to show with which activity, which characteristics are affected to a greater or lesser extent. For instance, Trail Work will not have much effect (and a trail is essentially a fire line), while masticating will have a greater effect while creating a great surface fuels load. Any firefighter knows those are not equal values.	The use of a numeric code or not is not significant, the table was developed as a reference to the reader to show that impacts could occur in the indicated areas. When the design criteria in Chapter 2 are implemented actions to the landscape past, present and foreseeable are mitigated Because of the use of Standards and Guidelines as well as Design Criteria mitigate any impacts, depicting a relative value is irrelevant.
2-22	*In Table 4 on p.34, impacts have not been marked for: motorized recreation (at cultural resources and vegetation) and livestock grazing (at fuels, vegetation, and transportation).* In fact, virtually every category in the entire table could be marked to show an impact, large or small, since there is no numeric code to represent intensity of impact.	There were no marks made under these resource areas because there was no anticipate or foreseen effects that would occur.
2-23	*On p. 35 under Archaeological and Historic Values is written, "Cultural resources are not distributed equally across this landscape…."* Nevertheless they are spread over the landscape. Thus the impacts of actions on cultural resources are greater than implied and farther reaching than implied.	Chapter 2 articulates the direct, indirect and cumulative effects of all alternatives. No information was offered by commenter showing "greater" impacts to cultural impacts.

2-24	*On p. 38 under Alternative 1 and Alternative 2 it is implied that treatment actions will significantly decrease likelihood of fire, thus increasing protection (from burning and looting) of cultural resource sites.* This is a scare tactic. Less than ¼ of the Project area will receive treatments. Furthermore, we suspect the cultural resource sites will not receive those treatments. In that case, those sites will still have the present fuel load under either Alternative 1 (No Action) or Alternative 2 (Proposed Action).	Treatment around cultural resources will reduce the fuel loading and will minimize the potential for adversely affecting cultural resources due to fire. This will also increase the Forest's ability to protect cultural resources from fire should one occur in the Project area. Additionally although treatments affect only 30 percent of the treatment area, there placement helps reduce the potential for uncharacteristically severe wildfire effects over the entire Project area.
2-25	*On p. 38 the use of the term "conflagration" to represent fire effects is not defined in any technical sense. It is not listed in the DEIS glossary.* Using that term is a scare tactic.	The term *"conflagration" has been replaced with "uncharacteristically severe wildfire" throughout the FEIS and this term has been a*dded to glossary.
2-26	*The section on Botany that begins on p. 40 is confusing since it includes both those plants that need to be protected and those plants that need to be removed.*	For future documents we will consider changing this, however the two issues are integrally related: field surveys for rare plants and weeds are done by the same crew; the primary effect of allowing noxious weeds to spread is that native plants are crowded out and weeds prevail at their expense. Rare plants are threatened by the spread of weeds. Removing non-native (noxious) weeds and preventing their spread protects and restores native vegetation, including rare plants.
2-27	*On p. 40, under General description of the vegetation with an emphasis on rare plant habitat, where are "Brush Areas" (listed at the top of Table 3, p. 28)? In Table 3, are you alluding to chaparral as a "brush area"?*	Yes. Botanists tend to call areas dominated by shrubs "chaparral" while timber and fuels specialists tend to call these areas "brush".
2-28	*From the bottom of p. 40 to p. 41 is a comment that plant species considered "sensitive" are that way in the Sierra*	Text has been added to the EIS with citations to explain that many species in the California flora are thought by experts to be naturally rare. Thank you for pointing out that this needed additional explanation.

	National Forest because they are naturally rare and not because their numbers have been reduced by human activity. Gee! That is unlike other parts of the planet where human activity is wiping species off the map. What conditions (actions/inactions) could make them plentiful? Maybe those designated "sensitive" could be so from fire suppression effects or climate change. Certainly some special environment might benefit the rare and sensitive species.	
2-29	*At the bottom of p. 44 is suggested that fire suppression equipment, as a vector, can spread noxious species.* To prevent that, the equipment needs to be cleaned thoroughly before traveling from infested areas.	The Forest Service has made great strides in implementing existing direction for prevention of noxious weeds via firefighting equipment, as evidenced by the increasing number of weed-washing stations at fire camps over the past decade. However, under emergency situations when a wildfire first breaks out, the need to put equipment on the line can supersede requirements for equipment cleaning (human life and safety take priority over noxious weed prevention). Ideally, all equipment would be cleaned upon leaving an infested area.
2-30	*At the top of p. 46 it says, "No cumulative effects are expected for Botanical Resources as the project has been designed to reduce or eliminate direct and indirect effects to rare plants and to avoid the introduction of noxious weeds."* That is so easy to say on p. 46, but is refuted previously (See # 28 and #29, above.)	The FEIS has been reviesed to state that by definition the No Action alternative has no cumulative effects (see page 31 of the FEIS). As the No Action alternative has no agency action there cannot be cumulative effects which are defined as the effects of the action in addition to past, present and reasonably foreseeable actions.
2-31	*The Geology/Soils section needs to be edited.* It is not clear. There are significant organizational and syntactical problems throughout this section of the	The Geology/Soils section was reviewed for clarity and edited as appropriate. Without specific edits suggested it is difficult to make sure the commenter's concerns are addressed.

	DEIS.	
2-32	*On p. 57 under Large Woody Debris (LWD) it is written that there is a minimum of five logs per acre for LWD desired condition.* What is the maximum number of logs desired per acre?	The maximum amount of large woody debris (logs/acre) is not available in the literature however maximum fuel loading levels dictate the maximum amount of large woody debris.. Maximum fuel loading is displayed in Table 35 of the FEIS. Fuel loading varies by vegetation type from 2-6, 3-8 and 5-10 tons per acre.
2-33	*At the bottom of p. 65 is written, "Project design criteria common to all alternatives were developed through the collaborative process of the SNAMP Integration Team meetings."* The SNAMP Team, however, is not listed in Chapter 4-- Consultation and Coordination.	The FEIS has been corrected to include the SNAMP team in Chapter 4, Consultation and Coordination.
2-34	*On p. 66 the term "catastrophic fire" is used.* There is no definition for this term in the glossary. This reminds us that the term "conflagration" was used earlier. These terms should be replaced with proper technical vocabulary.	The term *"catastrophic fire" has been replaced with "uncharacteristically severe wildfire" throughout the FEIS and this term has been added to glossary.*
2-35	*Under Indirect effects on p. 67 the "Detailed CWHR assessment" is not attached to this DEIS*	Environmental Impact Statements are meant to be focused on the effects of the project related to the significant issues. The effects analysis draws upon various reference scientific documents cited and summarized. These referenced scientific documents are part of the project record and are available upon request. In this case page 67 of FEIS states that: "Detailed CWHR assessments can be found in Appendix C and G of the Fish Camp Terrestrial Wildlife BE/BA (Otto 2010)"
2-36	*Under Pacific Fisher on p. 68, a more thorough explanation of percent canopy cover needs should be included.* Otherwise the reader is at a disadvantage.	Update in FEIS. (Add general CWHR classifications of SPMD…)
2-37	*Prescribed burning described on p.71 sounds good.*	The comment has been reviewed and noted.

2-38	On p. 77 under Fish Camp Project, canopy cover should be maintained ABOVE 60percent, *not down to 50 percent*. And trees above 10 to 16 inches dbh should not be logged.	Desired Conditions for the SSFCA: Within known or estimated female fisher home ranges outside the WUI, a minimum of 50 percent of the forested area has at least 60 percent canopy cover. (ROD pg. 41) SPOW PAC's will remain at 60-70 percent cover (ROD 45) and SPOW HRCA's will remain at least 50-70 percent canopy cover. As stated in the Fish Camp EIS, p. 142, "the intent of the Fish Camp project is to retain canopy cover of 60 percent or greater in CWHR 4 and 5 size classes where it presently exists". This intent is planned to be accomplished by removing excess trees up to the 30 inch dbh limit as proposed. An alternative addressing limiting tree removal diameter to 10 inch DBH was considering but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study.
2-39	*On p. 77 the term "catastrophic, stand eliminating" wildfires* should be eliminated and replaced with a proper technical term.	The term *"catastrophic, stand eliminating fire"* has been replaced with *"uncharacteristically severe wildfire"* throughout the FEIS and this term has been added to glossary.
2-40	*On p. 77 where it says "partially opening the forest overstory"*, we suggest that fire rather than chainsaws be used.	Where applicable, both thinning and prescribed burning activities are tools that may be utilized to achieve the desired conditions for the treatment units. Light underburning in most instances, will not open the overstory since generally only trees less than 10 inches dbh would be killed. Partial opening of the overstory is needed to provide room for crown expansion of residual trees. Intermediates and some codominant trees need to be removed during the thinning operation to create room for crown expansion. As stated in the EIS, p 133, the wild stands proposed for thinning consist of mostly shade tolerant species originating from surviving advance reproduction present during logging. These stands are predominantly fire sensitive fir and incense cedar instead of the more shade intolerant less fire prone ponderosa/Jeffrey pine and sugar pine species that were prevalent before the railroad logging took place. Due to the small diameters and thin bark of these fire sensitive species and the existing fuel loadings in these stands that have resulted from 100 years of fire exclusion, the initial treatment proposed is to

		mechanically thin the stands and treat slash concentrations through piling and burning or mastication rather than underburning.
2-41	*At the bottom of p. 77 is written that Cedar Valley Project is "nearing the end of the implementation phase".* That is not clear. By what date will it be completed? These fuels reduction/forest health/community protection projects have been lingering while more projects are planned and contracted (with contracts extended due to low market demand for lumber) at low prices in this bad economy.	The Cedar Valley Project is scheduled for completion during 2011. A total of 316 acres are left to be completed.
2-42	*Table 12 on p. 78 has the term "Kernal". What is that?*	The 95 percent use kernel is the technical term used to define the animals calculated home range. The UC Berkeley SNAMP study is using a statistical method to develop home range information for each individual fisher based on radio-collar tracking information.
2-43	*At the top of p. 81, it is said that "implementation of the Sugar Pine Project will be completed before any ground operations occur on the Fish Camp Project" and that will likely be at least two years.* This again brings to question the amount of planning and contracting (low price for timber) when there is low market demand. If progress in fuels reduction needs to be made, we should not wait for market demand. Prescribed fire should be used to accomplish the needs.	The Cedar Valley Project is scheduled for completion during 2011. A total of 316 acres are left to be completed.
2-44	*On p. 82 is written, "The combination of a stable or slightly increasing amount of*	Although some aspects of the behavior of the Pacific fisher are known, information on year-to-year survival and other basic vital rates are not. These types of data are being generated by the SNAMP

	suitable fisher habitat on the SNF over the last ten years and perhaps an increasing spatial distribution of fishers make it reasonable to conclude the cumulative effects of vegetation management activities on the SNF have not reduced overall habitat suitability for fishers on the Forest." What about before 2001? Is this due to the elimination of clear-cutting? How much better should it get for the Pacific fisher?	fisher science team, and the information will be crucial for understanding how current forest management practices are influencing fisher populations, and whether changes in forest structure under different types of treatments may or may not contribute to further declines in the number of these rare animals in California. SNAMP fisher team research will continue through 2014.
2-45	*On p. 82 is explained that California Department of Fish and Game (CDFG) has assessed that the Pacific fisher does not deserve protected status in the Southern Sierra Nevada. Further comments on p. 82 imply that clearcutting may have been the cause of a previous downward trend in fisher populations.* That clearcutting resulted from Forest Service management decisions. In October 2010 the SNAMP Fisher Team presented a mid-2010-11 population year update on adult female survival. They found the adult female survival had decreased as of October 2010 in comparison to the previous two years. Perhaps CDFG should have another look at the sensitive status of the Pacific fisher.	A lawsuit was filed by the Center for Biological Diversity in November 2010 challenging the final decision made by the California Department of Fish and Game Commission to not list the fisher under the state Endangered Species Act. Hearings will be held throughout Winter/Spring 2011 with a decision on the merits of the case in late Summer 2011. Recent scientific information presented in 2011 at The Western Section of the Wildlife Society meeting indicates that the fisher population on the Sierra National Forest is stable to increasing. Values of lambda (λ) greater than 1 indicate that a population is decreasing. Calculated values for λ were presented for fisher populations within the SNAMP study area (λ 1.04) on the Bass Lake Ranger District, and the Kings River Fisher Project area (λ 1.2) on the High Sierra Ranger District (Sweitzer et al. 2011). Based on this data, fisher populations on both districts of the Sierra National Forest are stable to increasing,
2-46	*HRCA and PAC are not in the glossary.*	HRCA and PAC have been added to the FEIS glossary PAC=Protected Activity Center (Management area for Spotted Owls = 300 acres and Northern goshawks = 200 acres)

		HRCA=Home Range Core Area (Management area for Spotted owls = 300acres + 300 acres PAC)
2-47	*On p. 89 and on numerous other pages the term "existing condition" appears.* This seems to be the same as "cumulative impacts" or "cumulative effects". Is there a difference? The DEIS glossary lists only "cumulative effects".	Existing Condition on page 89 of the DEIS represents a summary of the known current information. which serves as a representation of the past actions for the cumulative effects analysis.
2-48	Units for data in Tables 13 and 14 are not explained.	The columns in Tables 13 and 14 (pages 89 and 90 of the DEIS) indicate the units applicable. Further clarification will be provided in the FEIS, such as (miles = mi.).
2-49	*On p. 97, under Fire Effects is written, "This would be accomplished using a combination of thinning and fuels reduction."* The difference between "thinning" and "fuels reduction" is not clear.	Thinning mentioned on page 97 of the DEIS involves the selective removal of trees through a reduction in stand density. Fuels reduction refers to decreasing the amount of combustible material, with thinning representing a technique that may contribute toward an objective of fuels reduction.
2-50	*On p. 97, under Fire Effects is written (in reference to Nakamura, et al. (2008) –incidentally, not listed in the Literature Cited section of this DEIS), "They also note that some fires are so large (McNally or Cedar Fires) that would likely continue to burn through or around treatment areas."* (sic) But the McNally Fire did slow at, and did not go around, a treatment area below Packsaddle Grove in the Giant Sequoia National Monument.	The referenced fire effects citations have been corrected in the FEIS and added to the Literature Cited section. There is no information provided within the cited reference indicating that the McNally Fire did slow at, and did not go around, a treatment area below Packsaddle Grove in the Giant Sequoia National Monument. The commenter did not provide a source to verify or respond to that information. The reference to a specific fire effect for a specific fire in a specific area is not necessarily a prediction of future fire behavior for another area. That being said, slower moving fires tend to burn with less intensity and generally do not result in stand replacing crown fires. This is precisely the effects we are anticipating.
2-51	*On p. 97 under Fire Effects is written, "Prescribed burning could indirectly*	The literature cited on page 97 of the FEIS identified possible indirect effects from prescribed burning. The FEIS does not indicate that these effects would be expected from an action alternative

	affect streambank stability, aquatic foodwebs, stream temperature, and large wood dynamics (Dwire, et al. 2006; Bêche, et al. 2005).” We believe these effects are more likely with logging by choice and design. The pre-1850 forest condition was the cumulative effect of natural processes without logging and fire suppression.	for Fish Camp.
2-52	*Many references cited on p. 98 and on other pages throughout the DEIS are not listed in the Literature Cited section.*	The FEIS was reviewed and all references have been included in the Literature Cited section.
2-53	*On p. 99 a maximum temperature for trout stocking by CDFG is given as 21° F.* This should be related to Figure 4: Expected Summer Temperature Range, as titled, on p. 90. The title of Figure 4 seems incorrect however since its graph is labeled “2008 Mean Daily Water Temperatures”. Data from one year likely are not the range of possible temperatures from year to year. This is misleading and needs to be corrected.	The Figure 4 on page 99 of the FEIS has been corrected to indicate it represents water temperature data from 2008.
2-54	*Under Alternative 1 – No Action on p. 99 is written, “The No Action alternative, would not implement the Fish Camp Project to reduce fire ladder conditions (thinning); pile slash for burning; burn slash piles; masticate and/or precommercially thin stands; plant trees;*	No project-generated slash would result from Alternative 1 as noted on page 99 of the DEIS. Exsisting fuel ladders and fuel loadings conditions would remain. These conditions promote crown fire and stand replacing conditions. Without some type of structural manipulation prior to reintroduction of fire forest health and stand structure goals will not be met. An alternative addressing maximizing the use of fire as the agent for achieving the project

	reduce fuel loading through controlled burning; or reconstruct and maintain roads." Yes, there would be no slash to burn as flammable logging slash would not be produced since there would be no logging, and there would be no need for logging roads either. This reminds us that fire could be introduced (ending fire suppression) to do the work economically and efficiently without logging, road building, mastication, and tree planting.	objectives was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study.
2-55	*In Table 19 Lacustrine/riverine habitat miles is 29, while in Table 22 it is 35 miles.*	It should be 29 miles and has been corrected in the FEIS.
2-56	*At the bottom of p. 101 to p.102 there is written, "Numerous effects on aquatic habitat and species have been attributed to prolonged use of riparian areas by cattle. Literature suggests potential effects from cattle grazing relating to channel function, water quantity, hydrologic alteration, and water quality. Cattle grazing has been identified as altering channel function, which reduces natural processes, habitat diversity and habitat complexity for aquatic or riparian animals (Elmore and Beschta 1987; Clary and Webster 1989; EPA 1991; Meehan et. al. 1991; Belsky et. al. 1999). Movement of cattle within riparian zones can lead to reductions in stream shading, compaction of stream*	It was identified in the paragraph in question on page 101 of the DEIS that these disturbances represented potential effects to prolonged use of riparian areas. Further, it was noted that some of these effects were described in literature as being a result of heavy or overgrazing. It does not indicate at any place in the DEIS or supporting specialist reports that these types of cattle grazing effects were observed. Table 13 (page 89 of the DEIS) and the Existing Condition section under Aquatic Biology (page 89 of the DEIS) and Hydrology/Water Quality (page 122 of the DEIS) describe current stream bank stability as generally in being in fair or better condition. Grazing of cattle is not part of the decision to be made for Fish Camp and unrelated to the current action.

	banks, and trampling of stream banks (Meehan et. al. 1991; Armour et. al. 1994). All of these factors could result in negative effects to habitat for herpetofauna. However, quantifying effects related to continued cattle grazing and recovery from past effects has proved difficult to evaluate due to absence of reference sites that have never been grazed by livestock (Kattelmannn 1996). Some of the effects described in literature are noted as resulting from "heavy" or "overgrazing". Cattle grazing is administered under U.S. Forest Service permits, which include compliance with S&G from the SNF-LRMP (USDA – Forest Service 1992; 2001; 2004). It is expected that cattle grazing is locally resulting in exposed streambanks and erosion at some sites." If cattle are the cause of this degradation, then the cattle should be removed.	
2-57	*At the bottom of p. 102 it is indicated that fire is needed in meadows to deter encroachment of conifers. But then at the top of p.103 it is implied that fire in the vicinity of a meadow will cause all sorts of changes that could be damaging.* We understand that fire causes alterations that are beneficial to forests and meadows. Incidentally, the reference citation for these ideas	As quoted on page 102 of the DEIS, the US Fish and Wildlife Service identified that the alteration of the fire regime as a potential adverse effect on Yosemite toad habitat (meadows), noting that some vegetation management may be necessary to maintain or restore habitat for the species. The reference has been added to the Literature Cited in the FEIS. Page 103 of the DEIS noted that "*In the event of a wildfire there could be varied response depending on size and severity"*. The potential effects were prefaced as those possible from a large, high severity fire and can be contrasted to the occasional setback of conifers from fire described by the U. S. Fish and Wildlife Service quote. As explained in comment response 2-56 grazing of cattle is not part of the decision to be made for Fish Camp.

	(USFWS, 2003) is not listed in the Literature Cited list. We believe that cattle continue to degrade meadows.	The FEIS was reviewed and all references have been included in the Literature Cited section including The reference has been corrected to (USFWS, 2002a.
2-58	*On p. 103 is a statement, "Meyer and Safford's (2010) review of fire literature indicates increases in fire frequency, size, total area burned and severity in the Sierra Nevada over the past 20-30 years."* The Meyer and Safford paper seems to be an in house Sierra NF document and not peer reviewed. For that reason we suspect it may not be thorough.	Meyer and Safford (cited on page 103 of the DEIS) represents a working paper by two Forest Service ecologists examining fire trends presented in the peer-reviewed scientific paper: Miller, J.D., Safford, H.D., Crimmins, M., Thode, A.E., 2009. Quantitative evidence for increasing forest fire severity in the Sierra Nevada and southern Cascade Mountains, California and Nevada, USA. Ecosystems 12:1632. The working paper includes temperature and precipitation trends based on nearby weather stations with long-term meteorological data in order to localize potential effects within the Sierra National Forest. Both Miller et al. and Meyer and Safford are available in the project record.
2-59	*On p. 115, for "retention groups of large diameter trees", it is said no tree greater than 20" dbh will be cut.* We believe no trees over 10" dbh should be cut from within those groups. We suspect larger boles have already been cut during earlier logging.	The intention of the large tree groups is to retain a heterogeneous mix of habitats throughout the treatment units rather than creating a uniform/homogenous spacing of trees from understory thinning/fuels reduction. An alternative addressing limiting tree removal diameter to 10 inch DBH was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study.
2-60	*No map is included that shows the dates of plantation establishment and locations and dates of earlier logging units (historic private and Forest Service) within the Project area.* Such maps would better help the reader understand the nature of past extractive logging and replanting.	Plantations planned for treatment under this document are displayed throughout the map section of the Fish Camp EIS. As stated in the EIS, these plantations range in age from 40 to 50 years. These planned plantation treatment areas are the more densely stocked portions of those reforested following the 1919 to 1923 railroad logging. All wild stands proposed for treatment except for 8a and 8b were previously heavily railroad logged. Locations of past railroad logging activity have been determined through the use of 1944 aerial photography. The entire area was logged during this railroad logging era. Units were not delineated. As stated in the Forest Vegetation/Silviculture, Affected Environment section (p. 133) of the EIS, wild stands present within these previously railroad logged areas, both proposed treatment and non treatment areas, originated from surviving shade tolerant, fire sensitive, advance reproduction present during logging.
2-61	At *the bottom of p. 115 a Table 1 is*	The reference to "Table 1" was deleted from the FEIS on page 20.

	listed. That does not seem to be the Table 1 on p. 20. That needs to be corrected or clarified.	
2-62	*Pages 116 to 117 regarding "MIS Project-level Effects Analysis-Shrubland…"* is not clear as it includes more than just shrubland. Table 2 that is referred to is not the Table 2 on p. 21. CWHR referred to is not with the DEIS.	This has been addressed in the FEIS in Chapter 3-Terrestrial Management Indicator Species section.
2-63	*Map 6 key is without explanation of CWHR Typing.*	The FEIS Map 6 Key has been revised to explain CWHR typing.
2-64	*On p 121 is written, "Currently across the treatment units there are 9 standing conifer snags that are ≥11" dbh and 5 standing conifer snags that are ≥ 18"dbh."* Is that all? You will need to plan for production of large snags for wildlife. No trees over 10" dbh should be cut.	The Fish Camp Project forest vegetation types are primarily Westside mixed conifer and Ponderosa/Jeffrey pine, which requires maintenance of four of the largest snags per acre (≥15" dbh) distributed irregularly across the landscape (SNFPA ROD pgs 51-52). The Fish Camp project will retain an average of 9 snags per acre ≥11" dbh and 5 snags per acre ≥18" dbh across the treatment units, exceeding the minimum requirement set forth in the SNFPA ROD. The Fish Camp Project will also retain an average of 47 large (≥20" dbh) live conifers per acre to serve as replacement snags in the future as some of these large trees receive environmental damage and decadence or succumb to disease and/or insect attacks. An alternative addressing limiting tree removal diameter to 10 inch DBH was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study. An alternative of Snag/Down Log Generating Treatments was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study.
2-65	*It is not clear how the term ROD got inserted at the bottom of p. 121.* We assume it is boilerplate erroneously left	The statement at the bottom of DEIS page 121 has been deleted from the FEIS.

	in.	
2-66	*Hydrology references at the top of p. 123 are inconsistent with the Literature Cited list.*	The FEIS was reviewed and all references have been included in the Literature Cited section including the mentioned hydrology references.
2-67	*"BMP 7-8 (Table 9)" on p. 124 is not clear.*	The SNF reviewed this section of the DEIS and determined that it would be more informative to add a table that summarizes the baseline CWE conditions of the No Action Alternative. BMP 7-8 was determined not to be needed and has been deleted from the FEIS.
2-68	*On p. 125 is written, "Conifers between 8 and 30 inches DBH exceeding desired stocking levels will be removed during harvest operations."* We believe larger size boles > 10" and up to 30" and greater are not in excess of stocking levels and should be left in place. Of course the smaller trees 8" dbh and below which ACTUALLY constitute the fuels problem are the ones that could easily be removed by use of fire. Then the forest would be restored to a "healthy" condition more quickly (Shown as desired on p. 126.). This would be in accordance with North, et al. PSW-GTR-220 (2009).	On page 6 of the 2004 Sierra Nevada Forest Plan Amendment ROD, a concern is voiced regarding the negative influence of drought and weather variances throughout the range of the Sierra Nevada. The 2004 ROD provides for density management to improve the forest's resilience to drought, and insect and disease conditions. The Fish Camp EIS Forest Vegetation/Silviculture section (pp. 132-145) describes the existing vegetation condition, the rational and the process for determining excess stocking levels as well as the direct, indirect and cumulative effects of density management. As described in the EIS, boles /basal area in excess of stocking levels are determined utilizing normal yield tables (basal area) or stand density index (SDI) methods not diameters. Numerous scientific reports substantiate the use of these methods to accomplish thinning objectives. The Purpose and Need section of the Fish Camp EIS describes the need for density management. Both the original 2009 and the February 2010 addendum to the North, et al., PSW_GTR-220 report provide examples of ecological benefits of density management through the removal of trees considered in North's report to be intermediate in size.. Thinning of the intermediate-size trees (20 to 30 inches dbh) as described by North, et al., is in accordance with GTR220 as described in response to other comments. An alternative addressing limiting tree removal diameter to 10 inch DBH was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study. Also see response to comment 2-13, 2-59 & 2-64.
2-69	*On p. 128 is written, "As part of the Timber Sale contract, all the roads to be used for project activities will be brought up to a maintenance level 3 standard (BMP 2-22). This includes maintaining roads in a manner that provides for water quality protection by minimizing*	All project roads will receive post haul maintenance upon completion of project activities. This includes blading, surface repair, and culvert and ditch cleaning. Level 1 roads will be waterbarred and barricaded to prevent access. Level 2 and level 3 roads will remain open.

	rutting, failures, sidecasting, and blockage of drainage facilities, all of which can cause erosion, sedimentation and deteriorating water conditions." We ALSO want to know what will happen to the roads after project completion.	
2-70	*On p. 129 references to "Figure 6" should be Fig. 8.*	Figure 8 has been correctly identified in the FEIS.
2-71	*On p. 133 reference is made to the condition of 40 to 50 year old plantations that have been "precommercially thinned" in the last few years. Some of that "thinning" was done by mastication, and left "shredded" material on the ground as "mulch".* We consider that mulch as highly flammable surface fuels. We would like an explanation for how you will prevent further such accumulations of highly flammable surface fuels if mastication is to be used during this Fish Camp Project.	Mastication does not reduce the fuels loading but changes the structure of the fuel from a vertical orientation to a horizontal orientation by shredding material and/or crushing fuels into small chips. By changing the fuel structure from a vertical orientation to a horizontal orientation not only eliminates ladder fuel that could provide conditions for crown fire ignition; but also lowers the resistance of control providing a safer environment for firefighters to engage in initial attack and increase the likelihood of successfully controlling a wildland fire at smaller acreage.
2-72	*On p. 133 it is written that most of those trees in 40 to 50 year old thinned plantations are now "10 inches and larger…dbh".* That seems remarkably small for trees of that age in the Fish Camp Project area. Still, 10-inch trees could have been harvested and not masticated. All that is unclear. Were any of the trees harvested for lumber?	The average tree diameter within the 40 to 50 year old plantations proposed for thinning is between 15 and 17 inches dbh. The precommecial thinning previously done in the areas proposed for treatment within these stands was completed over 20 years ago. Average stand diameters at that time were well below 10 inches dbh. Excess trees removed were below commercial size and were not harvested. Excess trees planned for removal with this entry are planned to be used as lumber and not biomass. An explanation of the plantation maintenance across the SNF is outside the scope of this document.

	Or is the quality of those trees not good for lumber? Is the present quality of those trees now good only for cogeneration biomass even after 40 to 50 years of growth? We would like a separate explanation of this situation regarding plantations on the entire Sierra National Forest.	
2-73	*On p. 134 under Weather Changes a reference, Ferrell, 1996, is not in the Literature Cited list.*	The FEIS was reviewed and all references have been included in the Literature Cited section including the mentioned Weather Changes Ferrell reference.
2-74	*On p. 134 is written, "Beginning in the 1970's temperatures began to warm noticeably. This warming resulted in a greater fraction of the Sierra Nevada precipitation falling as rain rather than snow, earlier snowmelt and earlier streamflow peaks (Dettinger, 2004)."* (sic) If we read Dettinger, et al.PSW-GTR-193 (2004, in press) correctly, the 1970's temperatures you refer to are "simulated temperatures", NOT actual temperature data. (NOTE: Your reference citation does not include reference to Dettinger's co-authors.)	The Dettinger, et al, 2004, reference covers simulated temperatures projected as a result of projected green house gas buildups. The actual temperature warming and snowmelt information references have been rewritten to: van Mantgen, 2009; Knowles, et al, 2006; and Stewart, et al, 2005. This has been clarified in the FEIS.. "Et al" has been added to the Dettinger citation to include Dettinger coauthors.
2-75	*On p. 134 under Weather Changes, is written, "Wide swings in weather conditions over the past thirty years have placed stress on many of these stands."* That statement shows a basic misunderstanding of how climate is determined. Climate is determined on the basis of 30 years of consecutive data.	The FEIS wording has been changed to use the word "weather" instead of "weather" as appropriate. Knowles, et al, 2006, states: "…they (earlier runoff, less snow, earlier snow melt) also appear to result from still longer term weather shifts." Knowles statement indicates that the climate is shifting to warmer temperatures with less snowfall and earlier snowmelt. Stewart, et al, 2005, states: "almost everywhere in western North America, a 10 percent-50 percent decrease in the spring-summer stream flow fractions will accentuate the typical seasonal summer drought with important (adverse) consequences for warm-season supplies, ecosystem, and wildfire

	See World Meteorological Organization at: http://climate.weatheroffice.gc.ca/prods_servs/normals_documentation_e.html Weather varies continuously during the succeeding 30 years, but the climate classification does not.	risks." Malcolm North's GTR 220 also makes reference to improving forest resilience to changing weather conditions.
2-76	*Again, on p. 134 under Weather Changes, the last paragraph shows the confusion of actual weather data as compared to the simulated values from Dettinger, et al. (2004).* The "projected" snowmelt and streamflow values, as such, are predictions based on a model.	The projected snowmelt and streamflows referred to in this reference are, as stated, future projections based upon a combination of existing data and projections. Future planning is based on a combination of present and expected (projected) conditions. Dettinger, et al.'s projections, as well as the projections of others, provide a basis for future planning.
2-77	*There is no entry in the Literature Cited list for van Mantgem (2009) cited on p. 134.*	The FEIS was reviewed and all references have been included in the Literature Cited section including the mentioned van Mantgem 2009 reference.
2-78	*On p. 134 is written, "Over the past 17 to 29 years noncatastrophic mortality rates were found to have doubled over a series of 76 western forest plots. Increasing mortality rates could result in substantial changes in forest structure, composition, and function. This doubling of background mortality could cause a >50percent reduction in average tree age in a forest, and a potential reduction in average tree size (van Mantgem, 2009)."* It is not clear if all of these quoted ideas are from van Mantgem. The nature of those 76 western forest plots is not explained. They could range from old forest stands to totally clearcut	The description of the 76 plots has been rewritten in the EIS to describe that all 76 plots are located in undisturbed, more than 200 year old stands. This reference is entirely from van Mantgem, 2009.

	stands for all we can see. Those forest plots might be places where all big old trees have been logged. Those plots might be overcrowded plantations where fire has been excluded and where no other thinning has been applied. The reader should not be left to mentally fill in the blanks. Each reader would likely have a different perception.	
2-79	*On p. 147 you allow, "Although there is relatively little understanding of the ecological effects of fuel treatments, in particular the extent to which mechanical treatments might emulate natural ecological processes such as fire (Stephens, S., 2009), they can be effective tools to modify stand structure and influence subsequent fire severity and extent. These mechanical treatments are often a required first treatment in forests containing excessive fuels loads (North, M., 2009)."* sic We are glad that you admit there is a lack of research to support mechanical treatments as an ecological surrogate for fire. We are surprised that such research has not been carried out considering the vast amount of logging over time. <u>That is shocking.</u> We want to remind you that the nearby National Parks (Yosemite, Kings Canyon, and Sequoia) utilize fire successfully without first applying mechanical treatments. Fire is best ecologically. And since your ultimate	While it is true that there are tractor units adjacent to Park's wilderness boundary and there were concerns expressed regarding these treatments during scoping and there potential effects on the wilderness values. The Sierra NF has collaboratively been working with the Yosemite National Park in regards to reducing fire threat along shared boundaries . Whole tree yarding and end-lining will be utilized during project implementation to minimize the impacts of mechanical treatments. The purpose and need of this project to reduce the intensity and spread of uncharacteristically severe wildfires far outweighs the potential short-term effects of mechanical treatments on the wilderness values. An alternative addressing maximizing the use of fire as the agent for achieving the project objectives was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study.

	goal is to reintroduce fire, why not do much more of that in this project. We notice that your plan includes underburning as shown on Maps 1 and 2. We also notice that those underburning units are on the boundary with Yosemite National Park, but not elsewhere and that there also are tractor units on the Park boundary as well. We are concerned that such mechanical work will have negative impacts on the Park. While you suggest North, et al. (2009) support mechanical pre-treatments, it is not clear to what severity those mechanical treatments would best be applied.	
2-80	*Use of the term "this report" at the beginning of paragraph 2 on p. 147 is a switch of content without a lead-in.* That needs to be clarified.	In this particular sentence, it should state the Fish Camp project analyses the effect of treatment within the units, not this report. This has been corrected in the FEIS.
2-81	*Near the bottom of p. 147 is written, "Also decreasing the crown density and removing smaller trees while retaining larger more fire resistant trees reduces the risk of crown fire."* For this reason only smaller trees should be removed as per North, et al., (2009).	The purpose and need for the Fish Camp Project is multi faceted and utilizes an ecosystem approach that compares the current condition of key ecosystem components against desired conditions. The sentence near the bottom of page 147 " Also decreasing the crown density and removing smaller trees while retaining larger more fire resistant trees reduces the risk of crown fire." Addresses the one of multiple purposes and needs for the Fish camp project which is to create a network of landscape area treatments and defensible fuels profiles near key transportation corridors to reduce the intensity and spread of wildfires across the landscape and near communities. This project also provides opportunity to apply treatment for larger sized trees to improve forest health by reducing inter-tree competition and improving tree vigor to provide an increased stand resistance to drought conditions, insect and disease attack. An alternative addressing limiting tree removal diameter to 10 inch DBH was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study. Also see response to comment 2-13, 2-59, 2-64 & 2-68.

2-82	*On p. 150 you indicate that General Forest allocations desired conditions are identical as those for Old Forest Emphasis areas and should resemble presettlement conditions.* That seems admirable. But your general forest designation is reduced a great deal since your Wildland Urban Interface (called "Wildland Urban Intermix" in the DEIS glossary) is too expansive at a total distance of 1 ½ miles from structures. The National Parks use a 200 foot zone recommended by Jack Cohen of the Forest Service Fire Lab instead. We note that you do not include any citation or reference to Mr. Cohen's work. We believe you are thus in violation of doctrine to avoid "selective science".	The Forest Service's primary responsibility and objective for structure fire protection is to suppress wildfire before it reaches structure. (Forest Service Manual, 5137.02). The spatial arrangement of stands and homes is crucial to the success of fuel management activities in changing the effects of large fires either at the local or landscape scale. (Finney and Cohen, 2003). Thinning trees to produce gaps in the flame front significantly reduces radiant exposure, and that a firefighter' s maximum radiant exposure is well below exposures necessary for piloted wood ignitions. The defensible space requires more vegetation fuel hazard reduction than fuels reductions required for preventing piloted wood ignitions. (Cohen and Butler, 1996). Agency WUI fuel treatment largely do not address home ignitability but rather areas outside the home ignition zone. Fuel treatment in the vicinity is expected to protect homes by creating conditions that enable successful fire suppression if a wildfire would to occur. Preventing WUI fire disasters require the problem be framed of home ignition potential. Because this principally involves the home ignition zone, the home ignition zone primarily falls within private ownership, the responsibility for preventing home ignition largely falls within the authority of the property owner (Cohen, 2008).
2-83	*On p. 151 you describe the desired conditions of the Wildland Urban Interface (WUI). <u>But something major is missing.</u>* Human structures are now part of the forest. A major part of the desired condition is that home fire-safe measures must be followed and that vegetation modifications out to 200 feet from structures should be made so that the structures will not ignite due to nearby wildfire. Jack Cohen has shown this is so. You need to cite Mr. Cohen's work. You need to explain that. Then you need	We agree that home fire-safe measures must be followed and that vegetation modifications out to 200 feet from property owner's structure(s) should be made. But because vegetation modifications around property owner's structures falls within private ownership, the responsibility for vegetation modifications out to 200 feet largely falls within the authority of the property owner. The Forest Service does not have the authority to enforce private home owners to conform to Jack's Cohen's studies. An alternative addressing limiting treatments to 200 foot zones from structures was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study .

	to write an Alternative without your expansive WUI.	
2-84	*Table 31 on p. 155 shows that only one small fire has occurred within the Project boundary, yet on p. 156, is written, "The areas east of Fish Camp received extensive logging between 1918 and 1925 which resulted in slow natural regeneration of conifer species. Railroad and ground-based logging activities as well as stand replacing fires have resulted in little of the area with trees over 100 years of age."* Your bias is showing. Logging stripped the trees off the landscape. Trees have grown back slowly since fire exclusion has allowed overstocking and consequent competition and thus slow growth of individual trees and stress related tree die off. Reintroduction of fire is the answer to your need to thin and to do so ecologically.	The header "Past Activities" was added to page 155 of the FEIS to better clarify that fire history and logging are addressed as past activities relevant to cumulative effects of the area. An alternative addressing maximizing the use of fire as the agent for achieving the project objectives was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study.
2-85	On p. 158 is written, *"Under Alternative 1, there would be very limited to no potential to allow fire to play its natural role on the landscape. The risk of escape and the consequential effects associated with utilizing fire without some form of management activity to reduce current surface fuel loadings and ladder fuels would be too great."* Here you are suggesting that fire would be used under Alternative 1, the No Action Alternative.	Under the No Action Alternative existing projects continue as planned. The statement on p. 158 refers to other National Environmental Policy Act (NEPA) compliant projects within the Fish Camp Project boundary. When the reader interprets the statements made and as referred to here, it is a misinterpretation of what is being said. Natural fire (unplanned ignitions), not prescribed fire (planned ignitions) would not be able to play a role on this landscape because of the current conditions. This FEIS section has been reworded for better clarification in its meaning. An alternative addressing maximizing the use of fire as the agent for achieving the project objectives was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study.

	That cannot be correct since no action means there will be no change from current plans. Do your current plans already require you to use fire in place of mechanical treatments? Please explain this to us in writing. We request that you rewrite the DEIS with another Alternative with fire use in place of mechanical treatments. The National Parks do that. You should see the obvious need for such a Fire-Use Alternative in the Fish Camp Project Plan and include one.	
2-86	*On p. 159 is written, "Crown fires have the largest immediate and long-term ecological effects and the greatest potential to threaten human settlements near wildland areas (Graham, R., et.al., 2004)."* Here you should also cite the work of Jack Cohen as he has found that a properly designed 200 foot home modification zone will prevent ignition of homes when a crown fire is only 200 feet away. Again, to ignore Cohen, is to show bias through application of selective science.	We agree that Jack Cohen's design of 200 feet modification zone might prevent ignition of homes if a crown fire were 200 feet away. He also states the home ignition zone falls within private ownership, the responsibility for vegetation modifications out to 200 feet largely falls within the authority of the property owner.
2-87	*On p.161 for Alternative 2 – Proposed Action, you suggest retaining larger trees to create a more fire resistant forest as per Table 28 (pp 147-148). But Table 28 also provides that "Removing only smaller trees is economically less feasible".* In this DEIS the plan is to log	One of the purpose and needs for the Fish Camp Project is to create a network of landscape area treatments and defensible fuels profiles near key transportation corridors to reduce the intensity and spread of wildfires across the landscape and near communities. The Project area was analyzed and strategically planned to concurrently leave larger trees that will be retained to develop the desired old forest emphasis and open up the crown density of larger trees improve forest health to reduce inter-tree competition and improve tree vigor to provide an increased stand resistance to drought conditions, insect and disease attack.

	up to 30" dbh. Those are larger trees that should be retained to develop the desired old forest emphasis areas extending from the 200 foot zone emphasized by Jack Cohen. North, et al. (2009) suggests that for ecological considerations only trees much smaller should be considered for logging.	Malcolm North, et al.'s PSW-GTR-220, February 2010 addendum states: "In the face of changing climate conditions, how can managers improve forest resiliency?" GTR-220 states forest resiliency is improved by producing a forest structure that keeps insects and pathogen mortality at low, chronic levels. "One method of changing this pattern is to reduce tree moisture stress and subsequent bark beetle activity by reducing stand density with mechanical thinning." The paper further states: that "in dense, fire-suppressed stands, thinning can significantly reduce the amount of transpiring leaf area often leading to decreased transpiration and increases in soil water content." GTR-220 also states: "removing such (intermediate-size trees (20-30 inches dbh) may genuinely serve an ecological goal. (Such as) locations (where) intermediate-size trees contribute to overly dense stands that are moisture stressed and at risk of bark beetle attacks." This project proposes to thin from below, concentrating removal on smaller diameter trees, as recommended in the North paper. Excess intermediate-size trees (20-30 inches dbh) are only proposed for removal where needed to obtain desired residual stocking levels. In most cases, residual trees will be larger in diameter than those removed. Thinning will generally remove the least fire resistant trees first. Thinning treatments are being proposed to reduce density stocking levels in order to increase stand vigor and better enable these stands to face changing weather conditions. Thinning will result in increased diameter growth resulting in larger diameter trees in shorter time periods. Increased diameter growth will result in creation of thicker bark in shorter time periods thus enabling residual trees to better withstand the effects of potential future wildfires or underburning. An alternative addressing limiting treatments to 200 foot zones from structures was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study. An alternative addressing limiting tree removal diameter to 10 inch DBH was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study. Also see response to comment 2-13, 2-59, 2-64, 2-68 & 2-81.
2-88	*On p. 161 mastication is emphasized as*	Mastication does not reduce the fuels loading but changes the structure of the fuel from a vertical

	a means of fuels reduction. Masticated material is highly flammable surface fuel, just witness the American River Complex fire of a few years ago. Incidentally, you have referred to various wildfires that were in the news over the last decade and more. You should also refer to the American River Complex Fire. To leave out that information is misleading and unclear as a violation of NEPA.	orientation to a horizontal orientation by shredding material and/or crushing fuels into small chips. By changing the fuel structure from a vertical orientation to a horizontal orientation not only eliminates ladder fuel that could provide conditions for crown fire ignition; but also lowers the resistance of control by reducing the rate of spread and flame length, providing a safer environment for firefighters to engage in initial attack and increase the likely hood of successfully controlling a wildland fire at smaller acreage. American River Complex fire report states that three masticated units were visited, one resisted fire on a day of moderate fire behavior, two were burned through with loss of the plantation on the day of severe fire weather. These two 20 year old plantations were masticated in 2007 and burned a year later when the high severity fire occurred in a two day period beginning July 8, when the inversion lifted, temperatures rose and humidity dropped. Energy Release Component (ERC) , a measure of fuel dryness values exceeding the 90th percentile for the season on July 9 an 10which were probably record or near record values for the dates. The Sierra National forest has experienced two wildfire incidents that burned into two masticated units. These treated units modified wildfire behavior and increased fire line production which allowed fires to be suppressed to less than one acre. The term 90th – 97th Percentiles has been added to the glossary. These terms are used to describe the hottest 10 percent and 3 percent fire weather conditions during a given period.
2-89	*At the bottom of p. 161 is written, "In areas where there is a significant amount of ladder fuels present, biomass operations will be used to remove excess material."* We want to know who will get this uneconomic biomass. As we understand it, no one wants to take a loss to obtain the biomass. Will there be a service contract to remove this biomass to a cogeneration facility?	In this particular sentence, the FEIS has been revised to state: "In areas where there is a significant amount of ladder fuels present, combination of tractor or hand piling and burning will be used to remove excess material, not biomass operations."
2-90	*On p. 164, it is suggested that prescribed fire will be "reintroduced".* Do you	In this particular sentence, the FEIS has been revised to state: "introduced" rather than "reintroduced".

	really mean "introduced"? Will you really use prescribed fire as the preferred treatment in the future, or will you continue to find rationales to continue with logging?	
2-91	*On p. 165 is written, "As stated earlier, weather (climate) has a large influence on fire behavior and is also the most difficult to predict.* Here, again, to you need to make corrections to distinguish between what is climate and what is weather.	In this particular sentence, the FEIS has been revised to state: "weather", rather than "weather (climate)". The definitions of weather and climate have been added to the FEIS glossary; **Weather** : The state of the atmosphere with respect to wind, temperature, cloudiness, moisture, pressure, etc. Weather refers to these conditions at a given point in time (e.g., today's high temperature). **Climate**: The composite or generally prevailing weather conditions of a region, throughout the year, averaged over a series of years.
2-92	*On p. 165 is written, "Managing forests under these conditions will be challenging. In the face of uncertainty, adaptive strategies should focus on three responses; resistance (forestall impacts and protect highly valued resources), resilience (improve the capacity of ecosystems to return to desired conditions after disturbance), and response (facilitate transition of ecosystems from current to new conditions) (North, 2009). All of these are focuses that Alternative 2 is attempting to address through its purpose and need for changes in forest structure capable of surviving climate changes and reduction in fuels to adapt fire behavior that occurs under current*	See response to comment 2-87. The Fish Camp Project uses resistance and resilience strategies but not a response strategy. The FEIS has been changed accordingly.

	climate and ignition conditions (North, 2009)." This general statement does not convey what will be done. Certainly, using adaptive management to change ecosystems from present to new conditions is not explained nor is it necessarily (or perhaps even likely) desirable.	
2-93	*On p. 166 is written, "The standards and guidelines listed in the SNFPA ROD, 2004 give direction for locating area treatments. Site-specific fuels treatment prescriptions are designed to modify fire intensity and spread in treated areas. Managers are to consider topographic position; slope steepness; predominant wind direction; and the amount and arrangement of surface, ladder, and crown fuels in developing fuels treatment prescriptions for each treatment area. Fuels treatments are intended to reduce surface, ladder, and crown fuels. Crown fuels are modified to reduce the potential for spread of crown fire."* Here we see the perpetuation of fire suppression.	The purpose and need for the Fish Camp Project is multi faceted and utilizes an ecosystem approach that compares the current condition of key ecosystem components against desired conditions. One purpose for the Fish camp project is to treat surface and ladder fuels (live and dead) to interrupt wildfire spread and fire intensity levels. This is proposed to be completed utilizing thinning and biomass thinning of pre-commercial and commercial conifers, mastication and/or dozer piling and burning in order to improve the ability of firefighters to suppress and control wildfires and provide a better measure of safety for the public and personnel.
2-94	*On p. 166 is written, "Revenues from the sale of commercial forest products may be obtained from some fuels treatments. This increases the likelihood of accomplishing the projected acres of treatment, an essential first step in achieving the desired reductions in acres burned. Where consistent with desired*	The total project cost is approximately $1,856,729 for Alternative 2 and $1,089,939 for Alternative 3. The value of commercial forest products harvested is $1,077,672 from Alternative 2 and $342,308 from Alternative 3 as displayed in Table 45 of the Economics Section. In both action alternatives, the cost of logging, haul to the mill and other identified activities are greater than the commercial forest product value. An estimated additional $779,057 for Alternative 2 and $747,631 for Alternative 3 of appropriated funds from the National Treasury would be necessary to accomplish the proposed activities for the project.

	conditions, area treatments are designed to be economically efficient and meet multiple objectives (SNFPA ROD, 2004; page 35).” First, why is “an essential first step” going to be to reduce the acres burned in the project? This is unclear. Earlier you said you wanted “reintroduce” prescribed burning. Second, how much of the project cost will not be covered by revenues from sale of commercial forest products? Finally, what is likely to be the overall expense to the U.S. Treasury as planned versus the cost if a Fire-Use Alternative with a 200 foot home modification zone (as per Jack Cohen) were implemented instead?	An alternative addressing limiting treatments to 200 foot zones from structures was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study. An alternative addressing limiting tree removal diameter to 10 inch DBH was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study. As these alternatives were eliminated from detailed study, an economic analysis was not prepared.
2-95	*On pp. 166 to 167 is written, “Within the SNFPA ROD, 2004, fire and fuels goals include reducing threats to communities and wildlife habitat from large, severe wildfires and re-introducing fire into fire-adapted ecosystems. Broad-scale goals include:* *Treating fuels in a manner that significantly reduces wildland fire intensity and rate of spread, thereby contributing to more effective fire suppression and fewer acres burned;* *Treating hazardous fuels in a cost-efficient manner to maximize program effectiveness; and*	The purpose and need for the Fish Camp Project is multi faceted and utilizes an ecosystem approach that compares the current condition of key ecosystem components against desired conditions. With the implementation of the Fish Camp Project, there is an opportunity to treat fuels by reducing fuel loadings and modifying forest structure to provide the ability for low intensity fire (by prescribed fire in the short term) to be re-introduced into a fire dependent ecosystem and to where wildfire effects are moderated to a level that provides a better measure of safety to public and firefighters. See response to comments 2-82, 2-83, 2-86, & 2-94.

	Actively restoring fire-adapted ecosystems by making demonstrated progress in moving acres out of unnaturally dense conditions. *Management of hazardous fuels in and around communities is to be combined with strategic placement of fuels treatments across broad landscapes to modify wildfire behavior. Goals for fuels treatment include:* *Strategically placing treatment areas across landscapes to interrupt potential fire spread,* *Removing sufficient material in treatment areas to cause fire to burn at lower intensities and slower rates of spread compared to untreated areas, and* *Considering cost-efficiency in designing treatments to maximize the number of acres that can be treated under limited budget (SNFPA ROD, 2004 pp.34-35).* We see this as continuing fire suppression even though “re-introducing fire” is claimed as a major goal. This is contradictory. Use of fire is cost-efficient as well (another goal). Additionally, if communities were managed as Jack Cohen would (that is as though the community were the firebreak) then your rationale for SPLATS would vanish. We believe your	

	real rationale for creating SPLATS is to send logs to the mill. Again, you need to consider the work of Jack Cohen and create a cost-efficient "Fire-Use Alternative for the Fish Camp Project".	
2-96	*On p. 169 in relation to creating SPLATS and DFPZ's and treatments in the WUI, it is written, "In some cases, initial treatments can in effect increase, not decrease the intensity and spread of wildfire without further treatment to remove residual (activity generated) debris (in the form of surface fuels) or vegetation that does not have a commercial value. These follow-up treatments can take up to 5 years or more or in some case less to complete dependent on funds available and location of treatments. The timeframes for follow-up treatment is dependent on several factors including the amount of funds available to do such work."* This is all the more reason to use fire to complete the work more quickly and cost-efficiently. With all the additional fuels buildup in succeeding years following mechanical treatment deposition of slash and masticated wood, the fire risk will likely increase so much that prescribed burning will look even more attractive for fuels reduction while it provides ecological benefits as well.	The comment has been reviewed and noted.

2-97	*On p. 169 in two places the term "Fish" is used in place of "Fish Camp".*	The Fish Camp Project is appropriately identified in the FEIS on page 169.
2-98	In regard to air quality (from pp. 170 to 187) we believe smoke will eventually occur, no matter what methods are implemented. Biomass removal will not be effective in preventing fires and their smoke. Fire use seems a reasonable option for management.	Biomass wording has been deleted from the FEIS on page 161.
2-99	*The "Economics" section beginning on p. 189 seems to be mainly to support local jobs while there is to be great expense to the U.S. Treasury.* We believe forest jobs could be created in other ways than timber harvest. Such other jobs could be more continuous over time and could better improve forest conditions.	The comment has been reviewed and noted.
2-100	*On p. 189 is written, "The district recognizes that the project will cost more money than it could generate from the forest products removed. Therefore, additional appropriated dollars would need to be requested to complete any of the action alternatives."* This is not surprising The late forest economist Bob Wolf (He drafted the NFMA.) said the Forest Service has always lost money on timber ever since 1905 (Personal Communication).	The comment has been reviewed and noted.
2-101	*On p. 189 is written, "…economics will not be a deciding factor for selecting any action alternative for the Fish Camp*	The alternative selected will be the alternative that best meets the purpose and need identified for the project. The Economics Section acknowledges that additional appropriated funds would be necessary to implement the project. The Proposed Action treats more land than Alternative 3, but

	Project." We believe economics is your only reason for selection of Alternative 2, the Proposed Alternative. The deciding factor is not to save the expense to the U. S. Treasury (that is always a loss), but rather to provide work and profits for local industry. This is made possible by selling timber at low bids and extending contracts until the lumber industry can market the wood profitably. Furthermore, since timber prices are low now, we assume the contracts for the timber will be fixed at low values. The timber then will not be harvested until demand and thus prices are higher for the finished material in the market. Then the implementation of the Fish Camp Project work will be delayed and fuels reduction and proposed improved ecological conditions will wait. All the while the U.S. Treasury will provide the costs to maintain the standing inventory of contracted timber.	will require more appropriated funds. Local industry will benefit from the extraction of commercial products from the forest and the Forest Service wants a healthy and viable local lumber industry as a tool to help maintain a resilient forest. Timber sale contract terms and conditions are set at the national level. The contract will allow some room for timing of market conditions. The Forest Service sells timber at the current market rate. Depending on the type of timber sale contract, prices for stumpage can escalate up and down with lumber market rates during the life of the contract. The Fish Camp project will have a two year contract term for timber removal
2-102	*Table 45 on p. 191 includes units of ccf or hundreds of cubic feet for timber volume based on sizes of boles.* The ccf units, through some manipulation, are not directly converted to the more traditional thousands of board feet (MBF). That leads to lack of clarity as to how much timber will be harvested. Furthermore, Table 45 does not reveal the volume from individual project units.	The Region 5 Timber Sale Appraisal Handbook uses costs based on CCF volume and is the reason the tables in the DEIS have volume and costs in CCF units.

	Those stand data are needed for clarity.	
2-103	*On p. 193 in relation to improving forest conditions is written, "The need to increase the proportion of large trees across a landscape,"* We believe the proportion of large trees will increase faster if the larger trees are selected to be left standing in the forest by the use of fire.	Thinning from below will reduce the competition among residual trees. North, et al.'s paper, as well as others, states that thinning can result in increased soil water content which improves water intake and metabolic function in the remaining trees. In addition, thinning will provide room for crown expansion. Increased crown size and water availability will result in increased photosynthesis resulting in increased diameter and height growth. Intermediate-size trees selected for removal will generally be smaller than the surrounding residual trees. These larger residual trees will have more full crowns and be better able to utilize increased water and nutrients. Larger diameter trees with fuller crowns will be obtained more quickly through thinning. An alternative addressing maximizing the use of fire as the agent for achieving the project objectives was considered but eliminated from detailed study. See FEIS Chapter 2 Alternatives Considered but Eliminated from Detailed Study.
2-104	*At the bottom of p. 193 under Unavoidable Adverse Effect, once the multiple negatives are removed from the single short sentence in this highlighted section, you say that NO BAD EFFECTS will occur in the Project area.* We believe you should put on your thinking caps.	The FEIS, page 199, has been corrected to state "No unavoidable adverse effects would occur in the Project area".
2-105	*On p. 194 under Irreversible and Irretrievable Commitments of Resources you fail to include the commitment of timber under contract for many years until it is finally harvested.* Once the contracts are signed with allowance for perpetual extensions, the U.S. Treasury is burdened with the requirement to provide opportunities for profits to industry even if alternative	The Forest Service expects a two year timber sale contract. Contract modification may extend contract terms due to interrupted operations during normal operating season or market related changes. Due to the local demand for logs at mills, the Forest Service expects purchaser's to finish operations within the two year contract period.

	implementation procedures were found to be needed to complete project goals.	
American Forest Resource Council April 4, 2011		
3-1	Support of Proposed Action	The comment has been reviewed and noted.
3-2	Summary, p.1 that "A variety of species are highly dependent on conditions provided by functioning ecosystems …. and are susceptible to possible loss of viability ……" is vague, and could apply to any forest land in the Sierras. Anything is possible, but unless the cause and probability of viability loss is known, meaningful remedies cannot be taken.	There are numerous on-going research projects such as the Sierra Nevada Adaptive Management Project (SNAMP) whose goal is to ascertain and clarify some of the causes and probabilities of loss of viability for TES species in the Sierra Nevada. The Forest Service will incorporate management recommendations from the best available science and scientific literature as meaningful remedies as further research is conducted.
3-3	The Design Criteria common to the action alternatives starting on page 12 of Chapter 2 should be reviewed by the Interdisciplinary Team to insure that the listed criteria are the most effective, and least constraining for efficient project implementation. It appears that many criteria require specific actions instead of the end results to be obtained. Often flexibility to use other methods or procedures becomes apparent during field operations. For instance, some of	The Design Criteria common to the action alternatives have been reviewed and clarified in the FEIS. LOPs for Spotted Owls and Northern goshawks were set in place only on units where surveys determined presence of nesting raptors. LOPs for Pacific fisher and marten are based on habitat suitability. Due to the limited duration, timing, and location of these fisher and marten LOPs, it does not appear they will be limiting to the available operating days for potential purchasers. Design criteria need to be determined fairly specifically prior to analysis since some design criteria themselves have affects beyond those that they were designed to ameliorate. The total effects of the proposed alternatives including the design criteria need to be evaluated in the environmental analysis.

	the many Limited Operating Periods (LOPs) appear to greatly limit the already scarce operating days available to potential purchasers and will increase costs and lower bids.	
3-4	An example is the silvicultural requirement for a LOP which would limit logging of any unit with greater than 50 percent true fir until after August 1. (Page 17, Chapter 2). The criteria should define the allowable percentage of damage to the residual stand, and leave it up to the operator to meet that standard. Standard contract language gives the sale administrator (SA) or Contracting Officer's Representative (COR) the authority to minimize unnecessary damage. To restrict logging to the period of highest fire danger when operations are often restricted for other reasons is unnecessary.	The EIS states the LOP would be imposed in well stocked stands heavy to fir (over 50 percent fir). It states the District Silviculturist will determine which stands require a LOP during the thinning layout phase. Data collected to date indicate that few stands exceed 50 percent fir. This LOP should have little, if any, impact on limiting overall operations. See response to comment 3-3.
3-5	Another example is the requirement to "leave a 100-foot wide buffer of 100 percent soil cover below large rock outcrops, especially in units …" (7 units listed). Geology/Soils, P 13, Chapter 2. This criteria needs qualifying language such as "when disturbed by contractor's operations". What happens if current ground cover is less than 100 percent and the area is not impacted by operations? Will a	Soil cover includes rock fragments, leaf, litter, and woody debris. If soil cover is less than 100 percent, the intent is for the contractor to increase soil cover with available material on site. A one percent reduction in ground cover will not lead to measurable effects. These treatments units were identified because rock outcrop is located within the treatment unit and the Proposed Action includes treatment of the areas adjacent to the rock outcrop. If the project is contracted as a Timber Sale Contract, then the contract will have to provide for this design measure.

	one percent reduction in ground cover lead to measureable effects? Will special contract provisions need Regional Office approval for such restrictive requirements?	
3-6	The discussion on when snags may be felled on Pages 10 and 18 of Chapter 2 should reference California OSHA (Occupational Safety and Health Act) standards in addition to the Forest Service engineering handbook. (FSH 7709.59, Chapter 40). The California OSHA definition of a "Danger Tree" controls how the purchaser must operate on the sale area. The FSH may give additional internal guidance.	OSHA29 CFR 1910.266(c) and FSH 6709.11 both define a "danger tree" as "*A standing tree that presents a hazard to employees due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem or limbs, and the direction and lean of the tree.*"
3-7	All requirements that a specific action be supervised or approved by a person who does not have contract administrative authority should be qualified to permit waivers when little or no adverse impact will occur, or when the person with designated contract authority has the skills and knowledge to supervise compliance with that criteria. For instance the discussion of possible approval of a temporary crossing of a stream course on Page 127 of Chapter 3 states that any temporary crossing will "strictly follow design measures in Appendix 2 and will be supervised by the District Hydrologist". No allowance	If the district hydrologist is not available, then other qualified personnel will be enlisted to approve such a crossing (e.g., the High Sierra RD hydrologist, the forest hydrologist, or the forest fisheries biologist). Direct supervision by the district hydrologist *during* construction is not necessary; however, the crossing location must be approved and documented prior to construction of a temporary stream crossing and inspected after the temporary crossing has been removed to ensure no damage has been caused to the channel in that location.

	is made if the District Hydrologist is not available, or if the criteria for the crossing are such that personal supervision is not necessary.	
3-8	Certain streamside management zones (SMZs) require special inspections. Item c, on Page 23, Chapter 2, requires "In all cases, the SMZ will require inspection by the district hydrologist prior to releasing the contractor". Is this a duplication of work by the Contract Administrator or will the district hydrologist have contract authority? Is disturbance of ground cover really such a technical issue that a qualified Contract Administrator can't evaluate simple cases?	Evaluation by the district hydrologist would be done in consultation with the Contract Administrator who would retain contract authority. Due to the environmentally sensitive nature of SMZ's, any disturbance in an SMZ will require evaluation by a hydrologist or fisheries biologist (2509.22 SNF Supplement No. 1)
3-9	A minor editorial comment is that two references to papers by Fettig are listed in the text of Chapter 3 on pages 131(Fettig 2007) and 141 (Fettig 2008). Fettig is not listed in the Literature Cited section of the DEIS.	The FEIS was reviewed and all references have been included in the Literature Cited section including the mentioned Fettig references.
	Environmental Protection Agency Region IX April 4, 2011	
4-1	Page 170 of the DEIS discusses the Clean Air Act (CAA) attainment status for the San Joaquin Valley and Mountain Counties air basins. Some updating/correction are needed in this	In this particular sentence, the FEIS has been correct to state: "non attainment extreme", rather than "severe".

	section. The document states that the "San Joaquin Valley is classified by both the federal and state standards as severe non-attainment" this is a conflict with Table 37 which correctly identifies the San Joaquin Valley as Non-attainment Extreme for 1-hour Ozone. See Recommendations EPA comments	
4-2	The project requires further general conformity analysis. The general conformity rule has been revised. The new rule was published in the Federal Register on April 5, 2010 (Volume 75, Number 64) and went into effect on July 6, 2010. See recommendations EPA comments.	After reviewing the new rule of the Federal Register (Volume 75, Number 64) that went into effect July 6, 2010. Pages 176, 182 – 186 of the DEIS properly demonstrate and ensure that applicable emission will conform to the approved state Implementation Plans and not cause or contribute violations of the NAAQS in accordance to the general conformity rule.
Sierra Forest Products – April 4, 2011		
5-1	Page 3 DEIS section titled "Purpose and Need for Action, within the 2nd sentence, "of fire" should be reviewed and, if necessary, revisit as the language does not appear to make sense.	The FEIS has been edited to further clarify. ………
5-2	Page 3 DEIS under the second sentence of the second paragraph under Existing Conditions, I believe the word "refuge" should actually be "refuse".	The FEIS has been edited to correctly reference "refuse" as the commenter suggests.
5 - 3	Page 53 DEIS, under soil conditions, the first paragraph makes reference to	The FEIS has been edited to correctly reference the "Fish Camp Project" as the commenter suggests.

	Dinkey South Project. Should this be in the Fish Camp Project?	
5 - 4	Regarding the content of the document, some flexibility under cultural resources site protection should be added to allow entry into specific sites with mechanical equipment as long the integrity of the site can be preserved. This is a common practice used on private lands within California and under the jurisdiction of the California State Department of Forestry and Fire Protection.	Under the *First Amended Regional Programmatic Agreement Among the U.S.D.A. Forest Service, Pacific Southwest Region, California State Historic Preservation Officer, and Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Undertakings on the National Forests of the Pacific Southwest Region*, no mechanical equipment is allowed to operate inside cultural resource boundaries with the exception of traveling along FS system roads or the explicit removal of hazard trees that threaten public health and safety.
5 - 5	Under the silvicultural section within the Limited Operating Period (LOP) restrictions due to bark slippage, we do not think this is necessary as long as the operator exhibits care with equipment operations. We propose the ability to operate within these wild stands be flexible based upon the conduct of operations.	The LOP mentioned is only planned to be imposed in well stocked stands heavy to fir (over 50 percent fir). The District Silviculturist would determine which stands would require an LOP based on on-the-ground conditions. It is anticipated that few wild stands would need this LOP. Most have a fir component below 50 percent and therefore this LOP would have a minimal affect on operations as most of the Project area will retain the opportunity to be treated during the LOP.. See response to comment 3-4.
5 - 6	Under the remaining basal area on the wild sands, we believe the top of the 240 square feet of basal area for white fir is too high. We believe a lower cap on the residual basal area within the white fir and the wild stand can be met and still meet the goals of the agency. Perhaps 160 – 180 square feet of basal area would be more in	Normal Yield Tables for 90-100 year old white fir aggregations on high sites such as those found here would be expected to carry quite high basal areas per acre. Thinning to the suggested basal area of 160-180 square feet per acre would be too heavy for these stands It would also result in reducing the residual canopy cover below that required by the 2004 SNFPA standards and guides. Retaining 240 ft^2 in fir aggregations will also contribute to recommended stand heterogeneity.

	line with the goals of the fire protection of the resource.	
5 - 7	We would propose that there not be any biomass product component to be removed from the Project boundary unless it has been designed as a stewardship project. The inclusion of biomass will make the project grossly uneconomical in a normal timber sale format.	The biomass component of the proposed treatments would only be included if sufficient funding is available under the contract to accomplish it. Residual basal area calculations take into account trees 8 inches dbh and larger. At this time it is unlikely that the value of the material being removed will offset biomass product removal costs. If excess trees less than 10 inches are not removed as biomass, then they will be treated during post sale treatments as funding becomes available. Priority treatment will be given to SPLATS first.
5 - 8	Regarding the need to upgrade the transportation system, we would suggest that due to the economic uncertainty of the project, that road reconstruction be kept to a minimum while still meeting the goals of the project. A suggestion on constraining the reconstruction costs would be to keep the placement of aggregate to a minimum. The cost is expensive due to the remote location of the project.	There is ½ mile of rock aggregate placement scheduled for 5S22 along Long Meadow. Due to the proximity of the road along the edge of Long Meadow, BMP's and S&G's dictate the placement of rock along this segment. A visual inspection of the meadow indicates lots of road surface erosion into the meadow. 5S22 is the only road in the Fish Camp Project which is scheduled for aggregate placement.
	California Forestry Association April 4, 2011	
6-0	Concurs with Alternative 2	The comment has been reviewed and noted.
6-1	Summary, p. 1 – There is no scientific evidence to our knowledge that could lead to the statement that "… Pacific fiisher, California spotted owl and Northern goshawk, to name a few [and] are susceptible to possible loss of viability…) from a project action in the Fish Camp Project area.	There are numerous on-going research projects such as the Sierra Nevada Adaptive Management Project (SNAMP) whose goal is to ascertain and clarify some of the causes and probabilities of loss of viability for TES species in the Sierra Nevada. The Forest Service will continue to incorporate management recommendations from the best available science and scientific literature as meaningful remedies as further research is conducted.

6-2	Ch. 1, bottom of page 1 and top of page 2 – reword to say declining forest health in part due to unsustainable densities of trees that also have a negative effect of CA Spotted Owl, Marten, Fisher, and Goshawk habitat.	The comment has been reviewed and noted
6 - 3	Ch. 2, p. 16 – LOPs – shouldn't there be language that states that LOP periods may be modified should surveys during implementation be done showing no denning activity occurring for a given species.	The FEIS and BEBA were updated to per comment made.
6 - 4	Ch. 2, p.17 – Pacific Fisher Den Site 700 acre buffer – doesn't this SNFPA standard and guide only apply to "occupied" dens?	Appendix A of the SNFPA FSEIS p. 372 states the objective of Forest Carnivore Den Sites is to "Protect all known fisher natal (birthing) and maternal (kit rearing) den sites, and any located in the future" and therefore the 700 acre den site buffer requirement covers both occupied and unoccupied den sites.
6 - 5	Ch. 2, p.18 – Fisher Denning Habitat LOP – since Fishers are telemetered and monitored, shouldn't this LOP be modified to say the time period will be based on fisher telemetry detection?	One of the main objectives of the SNAMP project is to test the 2004 SNFPA ROD Standard and Guideline #85 that states "Protect fisher den site buffers from disturbance with a limited operating period (LOP) from March 1 through June 30 for vegetation treatments as long as habitat remains suitable or until another Regionally-approved management strategy is implemented. The LOP may be waived for individual projects of limited scope and duration, when a biological evaluation documents that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing, and specific location." Additionally, as not all active Pacific fishers within the Project area may be collared and tracked through telemetry by the SNAMP study, it is important to adhere to the current fisher LOPs standard and guideline .
6 - 6	Ch. 2, p.18 – are there detected Marten in the Project area? If marten have only been detected above 6,000 foot elevation then why would a Marten LOP apply?	Remote camera surveys conducted by the SNAMP fisher team have verified American marten occupancy in the Fish Camp Project area, primarily during the winter and early spring months of Jan, Feb, Mar, Apr, Oct, Nov, Dec. A marten LOP from May 1 through July 31 will be instituted for all treatment units at and above the 7000' level within the Fish Camp Project to protect denning marten.
6 – 7	Ch. 2, p.18 – what science is being used to establish a guideline that there	PSW-GTR-220, An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests (North et al 2009) stresses the importance of forest heterogeneity. The authors examined research on the ecological

	will be a dense group retained every 2.5 to 3.5 acres? What size is a group? We know of no science that would support this density of "leave islands". It's hard to imagine how this guideline is consistent with the Purpose and Need fuel reduction objective.	role of fire, forest resilience under changing climate conditions, and habitat requirements of sensitive wildlife. "*Research in all these areas stresses the ecological importance of forest heterogeneity."* (North et al 2009). The design measure of large tree groups was incorporated into the Fish Camp project to maintain landscape heterogeneity throughout the treatment units while still accomplishing the stated purpose and need of fuels reduction and forest health thinning. (See Figure 5 North et al 2009).
6 – 8	Ch. 2, p. 18 – Unit 9 – has any telemetered Pacific Fisher used the 5 acre decadent stand that has been found?	The SNAMP fisher team has tracked several telemetered fishers that have utilized this area. In particular, female F34 has a den site located 400 meters southwest of this stand.
6 – 9	Ch. 2, p.20 – In the Table, the heading should be changed from "Distance from Stream" to Distance from Perennial Stream".	The FEIS and BEBA were updated as stated in the comment.
6 - 10	Ch. 2, p.23 – "light on the land" equipment should be defined (e.g. track mounted feller/bunchers…). Throughout the document, the term is used and refers to the Design Measures section for a description of what light on the land means; I can't find any such description in that section.	Since "Light on the Land" (LOL) equipment and techniques vary widely, specific silvicultural application of LOL will be done in consultation with the Contract Administrator for the areas requiring LOL (e.g., SMZ's). Thus specific equipment is not detailed in the DEIS. For more information on LOL see: http://www.nrs.fs.fed.us/fmg/nfmg/fm101/silv/p3_harvest.html
6 – 11	Ch. 3, top of page 48 – the italicized section should add to it "for fine-textured soils only". It needs to be absolutely clear that the porosity requirement only applies to fine textured soils.	The soil effects analysis identifies treatment units where fine textured soils (Ultic Haploxeral soils) are located and where the moist soil design measure will mostly be applied. The italicized section in question stands as written because soil compaction is a concern in coarse textured soils from a soil hydrologic function and cumulative watershed effects concern. This is discussed in the preceding section prior to the italicized section.
6 - 12	Ch 3, p.127 – additional discussion as to how it is practical to adverse skid	As part of the analysis process, specialists must analyze all aspects of the effects the alternatives would have on their particular resource area. As such, this paragraph does just that. It points out that the

	on a gradient that exceeds 25 percent. Does the current language mean that the unit is an average sideslope of 25 percent and a designated skid trail is needed to adverse skid the logs? Or does the language actually mean that there will have to be a designated skid trail that is greater than 25 percent?	initial sale layout would have an area in T-28b that would require a skid on a 25 percent slope and would need to be mitigated, if used. It also states in the same paragraph that an alternate egress is being considered based on this information, if this alternative was chosen. When writing about Unit T-28b, the area shown in the initial sale layout for skidding is where the 25 percent slope occurs, not the entire unit.
		NPS Partnership Program April 4, 2011
7 - 1	Has no comment	The comment has been reviewed and noted.

Appendix D – Data Tables Fish Camp Project

Fish Camp Plot Data Summary Table

Existing and Proposed Action Conditions

The Fish Camp plot data summary table displays plot data collected within the proposed treatment areas displayed on the Fish Camp EIS map. Variable plots were taken using a 30 Basal Area Factor prism for wild stands and 20 Basal Area Factor prism for plantations. Trees less than 5 inches dbh were not sampled. Due to the wide variability of vegetation present within these proposed treatment areas and the project as a whole, plots representing similar stand conditions were grouped together by proposed treatment area. It would be misleading to display an average for the Project area. The column labeled “No. Plots” displays the number of plots within each grouping. Although plots were taken within specific potential treatment areas, similar stand conditions may be present in other areas as well. Plot conditions varied widely from a basal area low of 90 ft2 to 450 ft2 per acre. Plot data recorded variations in trees 5 inches dbh and larger per acre from 15 to hundreds. In some plots no small trees were captured in the sample while in others hundreds per acre were. Several plots represent “groupings of conifers with increased BA retention (20-30” dbh)” similar to those retained in the Cedar Valley and Sugar Pine Project areas.

The term “light” which accompanies some of the proposed treatment areas refers to those areas/plots where the basal area present is generally light and would result in minimal removal of trees 10 inches dbh and larger. Although an area may be designated as “light” due to lighter basal areas present, there may still be a need to treat heavily stocked pockets of smaller diameter trees (less than 5 inches dbh) that may not have been sampled during the sampling process. One grouping of plantation aggregations of moderate stocking has been termed “mod”.

The majority of the Fish Camp Project area was heavily railroad logged between 1918 and 1924. Logs were processed at the mill at Sugar Pine. The 1944 aerial photos provide a graphic display of the extent of that activity. In some areas scattered older trees were left following logging. The vast majority of conifers present today were seedlings and saplings present in the understory that survived the logging entry. Numerous pine plantations are present within the Project area. Over 950 acres were planted between 1959 and 1970 during a concerted effort to reforest previously railroad clearcut lands that had turned into large brushfields. More than 250 acres of additional pine plantations were created during the early 1980s. Wild stands proposed for treatment average 90 to 110 years of age. Overall average site quality sampled is a Dunning 1.

Plot data indicates that wild stands proposed for thinning consist mostly of pine and mixed conifer cover. Stands heavy to white fir are found in only a few small areas. Since these stands originated from advance reproduction present in the understory during the railroad logging era, they are heavy to shade tolerant, more fire prone, species of incense cedar and white fir. Crown closures present were taken from the data sheets with a reduction made for crown overlap. A small portion of the suppressed tree canopy cover was included as part of the existing crown closure.

The mean diameter shown for these plots was taken from FIA data runs utilizing the plot data collected. The leave mean diameter was taken from the projected leave basal area and projected number of leave trees per acre. Since this data is a representative sample of aggregations found in the stands, it is not intended to imply that any particular unit averages a particular diameter. As can be seen from the data sampled, the average diameter following treatment will be larger than before due to the removal of many small trees per acre across treatment units.

The plot data and summaries shown provide insight into the variability of the vegetation present within the proposed treatment areas. During collection of the plot data, trees that might be selected for removal under the proposed thinning prescription for that species composition were noted. From that data, potential leave and cut basal area, leave and cut tree sizes and numbers and existing and post harvest crown closures were determined. On a number of plots, for various reasons, leave basal area exceeds targets for that species composition.

Legend for Sugar Pine Plot Data Summary Tables

Location

Number Corresponds to the Treatment Area Number on Project Map

(MC) represents an area that is considered a Mixed Conifer dominated stand

(plt) represents a pine plantation

(WF) represents an area that is considered a White Fir dominated stand

(PP) Pine dominated stands

Species Composition

PP – Ponderosa Pine

SP – Sugar Pine

WF – White Fir

RF – Red Fir

IC – Incense Cedar

Crown Closure

Given in percent (reduced for crown overlap). CWHR relationship for crown closure designation.

P: 25-39%

M: 40-59%

D: 60% +

Desired leave Basal Area for comparison

Pine dominated stands = 150-180 ft^2 per acre

Mixed Conifer (MC) dominated stands = 210 ft^2 per acre

White Fir (WF) dominated stands = 240 ft^2 per acre

Pine plantations = 120-140 ft^2 per acre

For Alternative 3 a surrogate of 10 inches dbh was used to display the changes that would occur based on only removing ladder fuels for each alternative. It is anticipated that some trees larger than 10 inches dbh that contribute to fuel ladders will be removed. Since these will be either intermediate or suppressed trees, overall crown closures following treatment will not change.

Age

Calculated from one sampled tree per plot. The majority of the conifers within the proposed treatment area are 90-110 years old.

Mean Diameter (Dia)

Calculated from trees within plots

Fish Camp Plot Data Summary Existing and Proposed Action Conditions Alt. 2

Location	Species Composition						Age	Site	Trees 5" dbh & larger						Basal Area 5" & larger					Crown Closure		Mean	Leave Mean	No
	PP	SP	WF	RF	IC	OK			Total	Cut 5-10	Cut 11-20	Cut 21-29	Lv 21-29	Tot Lv	Total	Cut 5-20	Cut 21-29	Lv 21-29	Tot Lv	Before	After	Dia	Dia	Plo
Plantations																								
5,6,10&14	100	0	0	0	0	0	45	1	197	18	93	3	7	81	260	110	10	10	140	95 (D)	65 (D)	15.6	17.5	2
10&28 light	86	0	7	0	7	0	45	1	82	0	15	0	14	67	140	20	0	40	120	56 (M)	50 (M)	17.7	18.0	7
16,20&28	100	0	0	0	0	0	45	1	200	24	81	2	4	93	240	95	5	10	140	95 (D)	65 (D)	15	16.5	4
28 mod	98	0	0	0	2	0	45	1	128	9	43	0	5	76	180	60	0	17	120	59 (M)	50 (M)	16	17.0	4
19&22	97	1	0	0	2	0	50	1	219	13	120	3	11	83	286	137	9	31	140	95 (D)	65 (D)	15.5	17.5	7
21	96	0	4	0	0	0	45	1	165	18	91	0	31	55	260	120	0	90	140	95 (D)	65 (D)	17	21.5	2
Wild Stands																								
7&8 (PP/MC)	12	48	27	0	12	0	104	1	263	38	29	2	31	116	248	45	7	143	188	79 (D)	60 (D)	13.1	17.0	4
7&9 light(PP/MC)	11	28	50	0	11	0	104	1	62	0	0	0	40	62	180	0	0	160	180	46 (M)	46 (M)	23	23.0	3
9(PP/MC)&13	11	44	28	0	17	0	95	1	105	0	22	10	24	73	270	30	30	90	210	70 (D)	60 (D)	21.7	23.0	2
12 (PP/MC)	29	12	18	0	41	0	79	1	104	0	24	4	39	76	255	30	15	150	210	65 (D)	52 (M)	21.1	24.0	2
17 &19 (MC)	3	9	43	0	46	0	103	1	249	73	52	13	30	111	350	80	50	170	220	86 (D)	60 (D)	13.3	18.5	3
18 (MC)	2	13	40	0	46	0	97	1	171	58	39	24	39	50	360	67	90	173	203	78 (D)	60 (D)	19.7	27.0	4
40&41 (WF)	8	0	92	0	0	0	83	1	167	34	65	7	54	61	360	105	30	210	225	77 (D)	60 (D)	19.9	26.0	2

Note: The data displayed above represents the majority of the vegetation present within a particular treatment area. Due to variability of the vegetation present, other aggregations are also present within treatment areas. Refer to the description and legend pages for more detailed explanations. (A number of aggregations combine to form a stand.)

Fish Camp Plot Data Summary Existing and Alternative 3 Conditions

Location	Species Composition						Age	Site	Trees 5" dbh & larger						Basal Area 5" & larger					Crown Closure		Mean	Leave Mean	Nc
	PP	SP	WF	RF	IC	OK			Total	Cut 5-10	Cut 11-20	Cut 21-29	Lv 21-29	Tot Lv	Total	Cut 5-20	Cut 21-29	Lv 21-29	Tot Lv	Before	After	Dia	Dia	Plc
Plantations																								
5,6,10&14	100	0	0	0	0	0	45	1	197	18	93	0	10	84	260	110	0	20	150	95 (D)	68 (D)	15.6	18.0	2
10&28 light	86	0	7	0	7	0	45	1	82	0	15	0	14	67	140	20	0	40	120	56 (M)	50 (M)	17.7	18.0	7
16,20&28	100	0	0	0	0	0	45	1	200	24	81	0	6	95	240	95	0	15	145	95 (D)	65 (D)	15.0	16.5	4
28 mod	98	0	0	0	2	0	45	1	128	9	43	0	5	76	180	60	0	17	120	59 (M)	50 (M)	16.0	17.0	4
19&22	97	1	0	0	2	0	50	1	219	13	120	0	14	86	286	137	0	40	149	95 (D)	67 (D)	15.5	18.8	7
21	96	0	4	0	0	0	45	1	165	18	91	0	31	55	260	120	0	90	140	95 (D)	65 (D)	17.0	21.5	2
Wild Stands																								
7&8 (PP/MC)	12	48	27	0	12	0	104	1	263	38	0	0	33	147	248	0	0	150	248	79 (D)	79 (D)	13.1	17.5	4
7&9 light(PP/MC)	11	28	50	0	11	0	104	1	62	0	0	0	40	62	180	0	0	160	180	46 (M)	46 (M)	23.0	23.0	3
9(PP/MC)&13	11	44	28	0	17	0	95	1	105	0	0	0	34	105	270	0	0	120	270	70 (D)	70 (D)	21.7	21.7	2
12 (PP/MC)	29	12	18	0	41	0	79	1	104	0	0	0	43	104	255	0	0	165	255	65 (D)	65 (D)	21.1	21.1	2
17 &19 (MC)	3	9	43	0	46	0	103	1	249	73	0	0	43	176	350	20	0	220	330	86 (D)	86 (D)	13.3	18.5	3
18 (MC)	2	13	40	0	46	0	97	1	171	58	0	0	63	113	360	15	0	263	345	78 (D)	78 (D)	19.7	23.5	4
40&41 (WF)	8	0	92	0	0	0	83	1	167	34	0	0	61	133	360	15	0	240	345	77 (D)	77 (D)	19.9	21.8	2

Note: The data displayed above represents the majority of the vegetation present within a particular treatment area. Due to variability of the vegetation present, other aggregations are also present within treatment areas. Refer to the description and legend pages for more detailed explanations. (A number of aggregations combine to form a stand.)

Appendix E - Sugar Pine California Wildlife Habitat Relationship Mapping and Acres

CWHR Mapped Polygons vs. CWHR Table of Acres: Polygons on the CWHR map (Map 6) shows the generalized location of CWHR vegetation types found in the Project area based on Geographic Information System vegetation mapping. Due to the high degree of variability in stand structure within the Project area and the existence of aggregations within stands, further refinement of the CWHR vegetation typing was conducted through aerial photo interpretation and field verification by the District Silviculturist/Wildlife Biologist to develop CWHR Table of acres (See next pages-Table 52 & 53). This refinement may show increases or decreases in total acreage amounts from what is displayed in the map polygons for particular CWHR types.

Legend for CWHR Map and Table:
All CWHR size classes and canopy closures are included unless otherwise specified.

D.B.H. = Diameter at breast height (consider 4.5 feet from the ground).
Tree size classes:

1 Seedling (<1" dbh)
2 Sapling (1"-5.9" dbh)
3 Pole (6"-10.9" dbh)
4 Small tree (11"-23.9" dbh)
5 Medium/Large tree (≥24" dbh)
6 Multi-layered Tree [In Ponderosa Pine and Sierra Mixed Conifer]

(From Mayer and Laudenslayer, 1988)

Canopy Closure classifications:
S = Sparse Cover (10-24% canopy closure)
P = Open cover (25-39% canopy closure)
M= Moderate cover (40-59% canopy closure)
D = Dense cover (60-100% canopy closure)

California Wildlife Habitat Relationships (CWHR)

Sugar Pine CWHR Data, Main Project area; Present Compared to Proposed Action (Alternative 2)

CWHR	Total Project Acres	Treatment Analysis Area Acres	Acres Before Treatments			Acres After Treatments			Total Project Acres After Treatments
			Tractor	Mastication[1]	Rx[2]	Tractor	Mastication[1]	Rx[2]	
MCH	6	1	0	0	0	0	0	0	6
MCP	38	24	0	19	0	0	19	0	38
MRI	1	0	0	0	0	0	0	0	1
MHW3M	5	1	0	0	0	0	0	0	5
MHW3D	27	15	0	0	0	0	0	0	27
MHW4M	81	15	3	7	0	3	7	0	81
MHW4D	**26**	**17**	**1**	**14**	**0**	**1**	**14**	**0**	**26**
MHC4P	23	23	13	5	0	13	5	0	23
MHC4M	62	50	15	26	0	15	26	2	64
MHC4D	**605**	**325**	**115**	**66**	**31**	**115**	**66**	**29**	**603**
MHC5D	**21**	**4**	**0**	**4**	**0**	**0**	**4**	**0**	**21**
PGS	3	3	0	3	0	0	3	0	3
PPN3P	6	6	1	5	0	1	5	0	6
PPN3M	16	14	5	8	1	42	8	1	53
PPN3D	186	186	167	19	0	130	19	0	149
PPN4S	8	6	0	0	0	0	0	0	8
PPN4P	56	40	40	0	0	40	0	0	56
PPN4M	312	261	136	93	0	136	93	1	313
PPN4D	**1429**	**762**	**314**	**210**	**11**	**314**	**210**	**10**	**1428**

CWHR	Total Project Acres	Treatment Analysis Area Acres	Acres Before Treatments			Acres After Treatments			Total Project Acres After Treatments
			Tractor	Mastication[1]	Rx[2]	Tractor	Mastication[1]	Rx[2]	
PPN5M	88	80	22	56	0	22	56	0	88
PPN5D	**17**	**7**	**5**	**0**	**0**	**5**	**0**	**0**	**17**
SMC3S	5	5	0	0	5	0	0	5	5
SMC3M	16	16	9	2	0	12	2	0	19
SMC3D	35	21	7	14	0	4	14	0	32
SMC4S	4	4	0	0	4	0	0	4	4
SMC4P	54	36	8	21	7	8	21	7	54
SMC4M	149	120	12	55	50	12	55	55	154
SMC4D	**1016**	**410**	**98**	**132**	**71**	**98**	**132**	**66**	**1011**
SMC5M	8	0	0	0	0	0	0	0	8
SMC5D	**30**	**6**	**0**	**4**	**2**	**0**	**4**	**2**	**30**
WFR4D	**9**	**7**	**1**	**0**	**6**	**1**	**0**	**6**	**9**
Total	**4342**	**2465**	**972**	**763**	**188**	**972**	**763**	**188**	**4342**

[1]Note: Acres Before and After Treatment for Mastication and Rx are gross acres

[2]Approximately only 65% of mastication acreage will be treated. Rx burning acreage % may be substantially less than shown

Sugar Pine CWHR Data, Hydrology Study Area; Present Compared to Proposed Action (Alternative 2)

CWHR	Total Project Acres	Treatment Analysis Area Acres	Acres Before Treatments			Acres After Treatments			Total Project Acres After Treatments
			Tractor	Mastication	Rx	Tractor	Mastication	Rx	
MCP	27	2	0	0	2	0	0	2	27
BAR	16	2	0	0	0	0	0	0	16
JPN2S	34	32	0	32	0	0	32	0	34
JPN3P	24	24	6	16	0	6	16	0	24
JPN3M	45	45	39	6	0	44	6	0	50
JPN3D	5	5	5	0	0	0	0	0	0
SMC3S	7	3	2	0	0	2	0	0	7
SMC3P	33	2	0	0	0	0	0	0	33
SMC3M	8	6	3	0	0	3	0	0	8
SMC3D	7	0	0	0	0	0	0	0	7
SMC4S	14	14	1	1	4	1	1	4	14
SMC4P	23	12	8	1	1	8	1	1	23
SMC4M	78	65	36	6	8	36	6	8	78
SMC4D	**26**	**11**	**7**	**0**	**0**	**7**	**0**	**0**	**26**
SMC5S	4	4	4	0	0	4	0	0	4
SMC5M	65	65	48	3	3	48	3	3	65
SMC5D	**109**	**63**	**57**	**0**	**0**	**57**	**0**	**0**	**109**
RFR4S	5	5	5	0	0	5	0	0	5
RFR4P	33	33	10	23	0	10	23	0	33
RFR4M	22	16	9	2	5	9	2	5	22

CWHR	Total Project Acres	Treatment Analysis Area Acres	Acres Before Treatments			Acres After Treatments			Total Project Acres After Treatments
			Tractor	Mastication	Rx	Tractor	Mastication	Rx	
RFR4D	**9**	**3**	**0**	**3**	**0**	**0**	**3**	**0**	**9**
RFR5M	23	20	14	1	0	14	1	0	23
RFR5D	**51**	**19**	**13**	**0**	**0**	**13**	**0**	**0**	**51**
WTM	**14**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**
Total	**682**	**451**	**267**	**94**	**23**	**267**	**94**	**23**	**682**