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Final Environmental Impact Statement

Trestle Forest Health Project

Eldorado National Forest
El Dorado County, California

Trestle Forest Health Project

Final Environmental Impact Statement

El Dorado County, CA.

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Abstract: The Forest Service prepared this Environmental Impact Statement (EIS) for the Trestle Forest Health Project. The overall objective of this project is to reduce the potential loss of important ecosystem components to high severity fire, to improve forest health, and to increase resilience of stands to insects and diseases. Project activities are proposed on National Forest System Lands on the Eldorado National Forest in El Dorado County, California. The EIS discloses the direct, indirect, and cumulative environmental effects that would result from the proposed action, a no action alternative, and two additional action alternatives.

Summary

The Eldorado National Forest proposes to treat up to approximately 16,764 acres using a variety of vegetation treatments in forest stands to reduce fire behavior, to improve forest health, and to increase stand resilience (the ability of the forest to survive stress) to the adverse effects of uncharacteristic wildfire behavior, insects, and diseases, while improving conditions for wildlife and enhancing watershed conditions. In its current conditions, many areas of the project landscape do not have a capacity to absorb disturbance and to reorganize while undergoing change, while still retaining essentially the same functions, structures, identities, and responses. For the Mixed Conifer Forests of the Sierra Nevada, achieving resilience can be accomplished by restoring stands to a state which is closer to the vegetation conditions created by an active fire regime (North et al., 2009). This project focuses on establishing the appropriate vegetative composition, structure, pattern, and ecological processes necessary to make the forest ecosystem sustainable, resilient, and healthy under current, as well as changing, climatic conditions. This project builds on past Forest Service projects in the area designed to modify fire behavior and to improve forest health.

Within the Trestle project area, 19,672 acres are identified as Wildland Urban Intermix (WUI), including 3,716 acres within the Defense Zone in the vicinity of the community of Grizzly Flats (population 1,404 and 819 housing units per the 2010 census). The Grizzly Flats Community Wildfire Protection Plan (CWPP) boundary extends into the Eldorado National Forest to include Leoni Meadows and Henry's Diggings properties and approximately one third, or 7,085 acres, of the Trestle project area. The Grizzly Flats Fire Safe Council updated their CWPP (March 2017) and extended the boundary to include the Grizzly Flats Community Service District's watersheds (Big Canyon Creek and North Canyon Creek watersheds), Gilberts, and a private inholding east of Grizzly Flats (near Twin Pines Mine), within the Trestle project area.

Public scoping began on March 4, 2013 with a Notice of Intent (NOI) to prepare an EIS in the Federal Register, and with the mailing of scoping letters to individuals, organizations, and government agencies, including federally recognized tribal governments, Native American organizations, and non-profit groups. Based on collaborative efforts during project development, concerns regarding potential impacts of the proposed action continued to exist. Important issues included the following:

- Potential effects to the California spotted owl population due to proposed treatment in high quality habitat, and
- The feasibility of the project due to economic considerations.

These issues led the agency to develop alternatives to the proposed action, including the following:

- Alternative 4 – Treat areas in a way that provides a low risk of reducing owl occupancy and of reducing owl use of individual territories.
- Alternative 5 – Treat areas in a way that provides a low risk of reducing owl occupancy and of reducing owl use of individual territories, and that provides for an effective fire modification strategy that can be implemented in a relative short time frame.

Effects:

- Completion of this project would increase the resiliency of this landscape to wildfire and to insect mortality; reduce the fire risk to adjacent communities and to public municipal water supplies; protect valuable forest resources including large, old trees; reduce potential fragmentation of old forest habitats; and provide for sustainable recreational opportunities.
- Significant impacts on any forest resources are not expected to result from implementation of this project; however, this project would result in the short-term risk of minor adverse effects to some forest resources, including, but not limited to, some Forest Service sensitive wildlife and plants species, watershed, and air quality.

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Chapter 1. Purpose of and Need for Action

Document Structure

The Forest Service prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EIS 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 of 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's 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 EIS.
- **Appendices:** The appendices provide more detailed information to support the analyses presented in the EIS.
- **Index:** The index provides page numbers by topic.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Placerville Ranger District office or in the electronic files: O:/NFS/Eldorado/Project/Placerville/TrestleNEPA2013.

Background

The Eldorado National Forest identified the Trestle project area as an area in great need of improved forest health and sustainable landscape. According to the desired conditions defined in the 2004 Sierra Nevada Forest Plan Amendment (SNFPA), the Trestle project area is not in a resilient condition. An interdisciplinary team of specialists developed a proposal, based on National and Regional management direction for Ecological Restoration and on desired conditions from the Forest Plan, as amended by the 2004 SNFPA, to move stands toward desired conditions.

The project area is located east of the community of Grizzly Flats, including the area surrounding Leoni Meadows, west of Caldor, and north of Big Mountain. The gross area of the project is 20,453 acres. This total includes 1,325 acres of other ownership. The project is located entirely in El Dorado

County, California in T.8N., R.13E., in all or portions of Sections 1 and 2; T.8N., R.14E., in all or portions of Sections 4-6; T.9N., R.13E., in portions of Section 1-3, 11-16, 19-30, 33-36; T.9N., R.14E., in all or portions of Sections 5-10, 14-22, 28-33; and T.10N, R.13E., in all or portions of Sections 35 and 36; Mount Diablo Base & Meridian (MDB&M). The area is accessed from Grizzly Flat using the Capps Crossing Road (9N30) or the North South Road (10N83). Elevations range from 3,200 feet on the west side of the project area to 5,800 feet on east side of the project area.

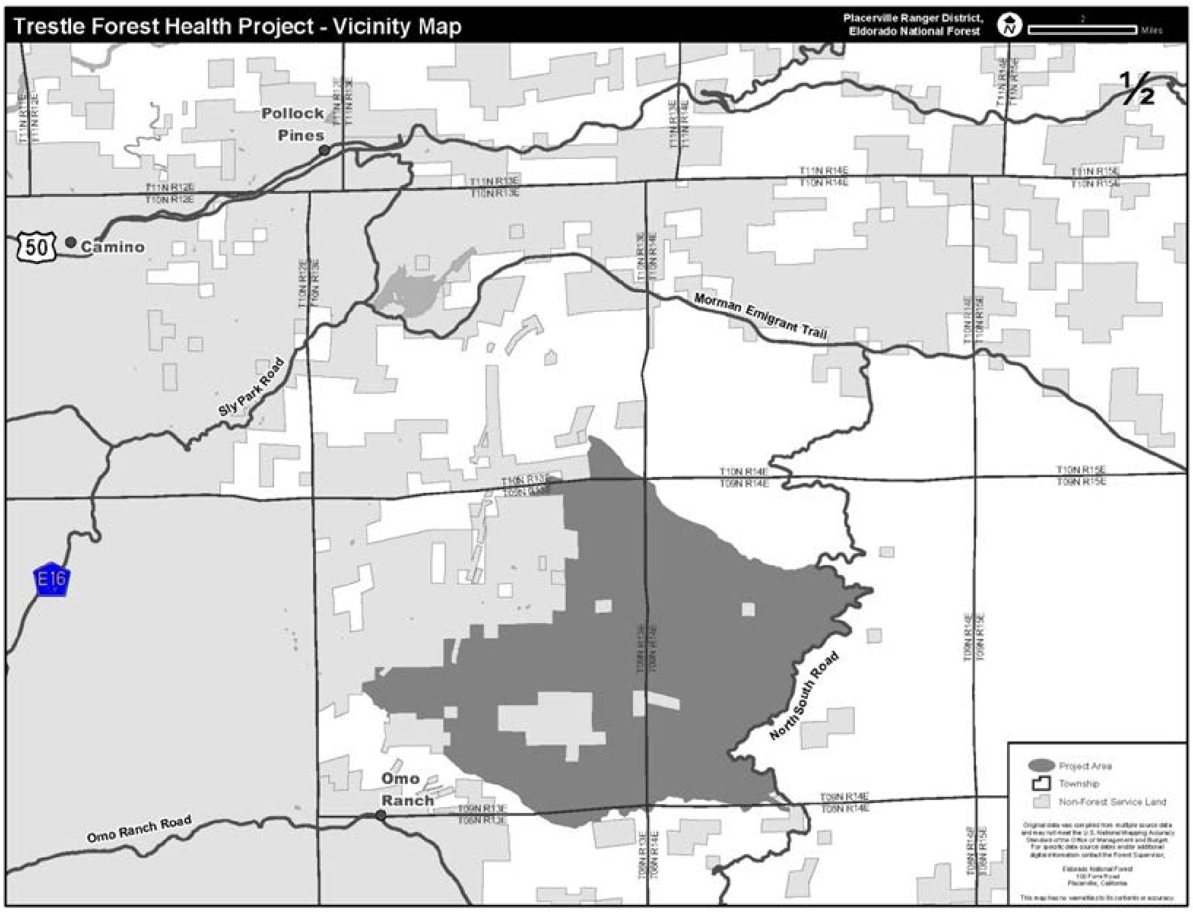

Figure 1. Project Vicinity Map

Purpose and Need for Action

The underlying needs for this proposal include the following:

1. There is a need for reducing fuel loading to reduce the threat of large, high-intensity wildfires and threats to Grizzly Flat, Leoni Meadows, and other landowners. There is a need for changing potential fire behavior during weather conditions that result in extreme fire intensity and severity across a considerable portion of the landscape to increase the fire resilience of stands and to improve options for fire suppression and wildfire management. This is a need because current

conditions put large areas of the landscape at high risk for unacceptable loss from wildfire and that loss jeopardizes the Forest Service's ability to manage the landscape for desired conditions.

The area's watersheds are important sources of clean water for domestic needs, as well as for recreational use and wildlife needs. The threat of large-scale, high-severity wildfires jeopardizes the Forest Service's directive to manage the project area for the recognized multiple-use benefits associated with healthy forests, including diverse wildlife habitat conditions, clean water, quality recreational experiences, and productive soils.

Sufficient treatment, based upon a strategic spatial design, and recognizing the historical ecological processes and landscape patterns, is needed to ensure effectiveness of fire behavior modification and to ensure enhanced stand resilience at the landscape level. The theoretical basis for changing fuel structure to reduce fire hazard is well established (Scott & Reinhardt, 2001; Graham et al., 2004; Peterson et al., 2005; Stephens et al., 2009). Real world reviews of wildfires and their interactions with fuel treatment areas support the theoretical benefits of fuel manipulation (Raymond & Peterson, 2005; Omi et al., 2006; Safford et al., 2012).

Stand structure, as it relates to live and dead fuel loading and ladder fuels, strongly influences fire behavior in the Sierra Nevada mixed conifer forest. Fuels in the area vary because of topography and previous natural and human activity. A variety of fuel conditions exist and vary between areas which have a lot of ladder fuels and those which do not. High-density stands with large amounts of ladder and surface fuels increase probability of crown fires, high flame lengths, and high fireline intensities. Surface fuels that promote high flame lengths include shrub and understory with ladder fuels present. Based on the 2014 Fuels and Fire Behavior Synopsis (Riesenhuber, 2014), areas that currently exhibit a build-up of fuels would easily allow a fire burning under 90th percentile weather conditions to make the transition from a surface fire to a crown fire, causing high mortality and the continuation of fire spread into the surrounding forest stands. Other areas are identified as needing maintenance treatments to modify fire behavior and to maintain or improve desired conditions.

The number, size, and intensity of wildfires within the Sierra Nevada have been altered from their historical range (Miller et al., 2009; Bouldin, 1999; Beesly, 1996; and McKelvey & Johnston, 1992). The lower-montane forest zone best represents the vegetation type within the project area. Major vegetation types include California black oak (*Quercus kelloggii*), Ponderosa pine (*Pinus ponderosa*), White fir (*Abies concolor*) mixed conifer, Douglas-fir (*Pseudotsuga menziesii var. menziesii*) mixed conifer, and mixed evergreen forests. Interspersed within the forests are chaparral stands, riparian forests, and meadows and seeps. Historically, fires within this zone had a frequent fire return interval. All sites in the lower-montane zone experienced fire frequently enough to reduce fuel accumulations and vegetation density, and, as a result, these fires were primarily of low to moderate intensity and severity (Sugihara et al., 2006). The general area has had a long and rich history of human use and activity. Past activities (including historic grazing of domestic animals; historic logging practices that included selective logging of larger pines and no follow-up slash treatment; mining; and, more recently, several decades of fire exclusion) have contributed to altered fire regimes. Stand-replacing fire at the current potential level is neither a sustainable nor a desired event in these systems.

Desired Conditions:

For 0-2X plantations (trees less than 12" diameter at base height (dbh):

- Surface fuel load smaller than 3 inches and less than 5 tons per acre; less than 0.5 foot fuel bed depth; stocking levels that provide well-spaced tree crowns; less than 50% surface area with live fuels (brush); and tree mortality less than 50% of existing stocking under 90th percentile fire weather conditions in 2x plantations (USDA-FS 2004).

For brush and shrub patches:

- An average of 4 foot flame lengths under 90th percentile weather conditions; double fireline production rates; and ensure treatments are effective for 5 to 10 years, achieved by removing appropriate amounts of vegetative material (2004 SNFPA ROD, p. 50).

For conifer forest types:

- Reduced fuel concentrations resulting in shorter flame lengths (< 4 feet) during 90th percentile weather conditions; increased fireline production rates for suppression forces; and treatments effective for more than 5 to 10 years (2004 SNFPA ROD, p. 51).
- Canopy fuels arranged so that the fuel continuity is broken both horizontally and vertically. Probability of crown fire initiation less than 20% during 90th percentile weather conditions (2004 SNFPA ROD, p. 50).
- Potential fire intensity decreased to a level where tree mortality would be less than 20% of the dominant and codominant trees under 90th percentile weather conditions (2004 SNFPA ROD, p. 50).

2. There is a need to improve forest health and to restore a composition of tree species and size classes that is more resilient to disturbance by applying appropriate silvicultural techniques to increase age class diversity and to favor species better adapted to disturbances typical of this forest type, so that stands are likely to be more sustainable into the future. The reasons for this need are that over-dense stands experience high levels of inter-tree competition for resources, resulting in declined health of desired species, an abundance of desired species, and an increased risk for high levels of mortality (Barrett, 1982; Oliver, 1995; Cochran & Barrett, 1995), thus threatening the ability of National Forest System lands to be managed for desired conditions. Reducing competition for moisture, nutrients, and sunlight among trees reduces stress and enables trees to withstand stress-causing situations, such as bark beetle attack. While some insect and disease activity within the forest is a natural and important part of the forest, high mortality levels can limit management options for manipulating stands to achieve desired conditions and can increase the amount of dead fuels and the potential for extreme fire behavior. Since the release of the DEIS

in July, 2015, tree mortality in the project area has increased. Field visits, landscape views, and aerial images confirm the growing number of dead trees observed in many of the dense stands in the project perimeter. Current bark beetle activity in the Trestle project area can be categorized as “incipient epidemic”: rapidly building, with high potential to reach outbreak status if favorable conditions persist (Bulaon and MacKenzie 2016). Studies of mountain pine beetle populations found incipient epidemics are the beginning stages of an epidemic as estimated by the number of dead trees/acre annually for consecutive years (Safranyik 2003, Schmid et al. 2007). Most infestations are concentrated in the larger diameter classes which can be severely depleted once populations reach epidemic stage (Safranyik 2003). Other epidemic characteristics are mortality levels that continue increasing for 2-3 consecutive years, scattered infestations begin to coalesce, and number of dead trees per group intensifies (Schmid et al. 2007). Recognition of this stage also represents the opportune time to try and actively minimize further mortality (Schmid et al. 2007).

Achieving desired conditions in these stands includes providing conditions that favor desired species and size classes of trees. In the Sierra Nevada mixed conifer forest type and ponderosa pine type, shade tolerant species (cedars and firs) currently grow at higher density levels than shade intolerant species (pines and California black oaks). Changes in species composition and in increased density are a result of changes in fire regimes and fuel loading. Dense, closed canopies that have developed in the absence of frequent fire tend to favor shade tolerant white fir, incense cedar, and Douglas fir, and they tend to exclude shade intolerant ponderosa pines, oaks, and sugar pines that would otherwise occur along ridges and south-facing aspects in the project area. These shade tolerant species form dense understories that act as fuel ladders to the larger overstory trees, and they are generally more susceptible to mortality from fire.

On the landscape, a large decrease in area identified as ponderosa pine forest type, and an increase in the mixed conifer type over the last century, indicates a clear shift from more open, pine dominated stands to stands composed primarily of more shade tolerant species due to a lack of fire and altered disturbance regimes (Collins et. al., 2011). This shift has resulted in increases in fire intensity and severity, decreases in tree vigor and growth, and suppression of hardwoods, primarily black oaks, from shade tolerant conifers.

Current stand conditions in many areas of the Trestle Project are at moderate to high risk to bark beetle infestations (National Insect and Disease Map, Krist et al. 2014). If forests are not altered from high risk conditions, bark and engraver beetle-associated mortality will likely continue. Percent mortality is consistently shown to be much lower in stands with lower stocking or basal areas, particularly for pines (Oliver 1995, Fettig et al. 2007, Egan et al. 2011). Treatments that reduce stocking levels or densities below thresholds appropriate for forest type and site, will significantly reduce infestation risk of tree mortality from damaging insects. Thinning treatments at this stage of beetle outbreak in the Eldorado NF would be preventive, not suppressive. The objectives of preventive thinning would be to increase vigor and resistance of residual trees, thereby reducing attraction of bark and engraver beetles (Bulaon and McKenzie 2016).

Desired Conditions:

- Improved composition of residual stands: strands composed of more fire and drought resilient tree species (i.e., ponderosa, sugar pine, and California black oak) (2004 SNFPA ROD, p. 52).
- Improved stand vigor, improved tree vigor, improved growth rates, and improved ability to combat insects and disease (2004 SNFPA ROD, p. 49).
- Increased regeneration of fire-resilient tree species (2004 SNFPA ROD, p. 52).
- Promoted hardwoods within stands (2004 SNFPA ROD, p. 52).
- Promoted stand heterogeneity (2004 SNFPA ROD, p. 41).

3. There is a need for protecting, increasing, and perpetuating old-forest ecosystem habitat components, and for conserving habitat for wildlife species. This is a need because stands within the project area that currently support old-forest, ecosystem-associated wildlife species, such as the northern goshawk and the California spotted owl, are at risk of loss from wildfire as well as insect and disease related tree mortality, which would result in further fragmenting old-forest ecosystem habitats; in addition, other areas are not developing sufficiently to expand habitats or to provide alternative habitats.

A purpose of this proposal is to reduce the risk of mortality and the loss of existing large, old trees and to reduce the loss of valuable wildlife structures, thereby maintaining the structure and function that they provide. The reason for this purpose is that the loss of these structures over a substantial portion of the landscape would reduce the quality and quantity of the habitat.

Desired Conditions:

- A canopy cover of 50-70% in California spotted owl home range core areas (HRCA) (2004 SNFPA ROD, p. 40).
- Stand structures that vary in size and tree species composition creating horizontal heterogeneity (2004 SNFPA ROD, p. 41).
- Multi-tiered canopies that create vertical heterogeneity by providing for a range of tree sizes from seedlings to large-diameter trees (2004 SNFPA ROD, p. 41).
- Improved continuity and distribution of old forest ecosystems and habitats (2004 SNFPA ROD, p. 41).
- Stands that provide a continuous supply of snags and live decadent trees suitable for cavity nesting wildlife across a landscape (2004 SNFPA ROD, p. 51).
- Retain four of the largest snags per acre of westside conifer and hardwood stands. Clump and irregularly distribute snags across treatment units (2004 SNFPA ROD, pp. 51-52).

4. There is a need for improving access and for reducing sediment from roads by improving the Forest Transportation System. This is a need because roads play a vital role in providing access for resource management needs and for public recreational use. However, both dispersed recreational

use and past management activities in the project area have created poorly located or unmaintained routes that are contributing to reduced watershed health, increased sedimentation and soil loss, and impaired aquatic habitat.

A purpose of this proposal is to repair road surfaces to reduce the loss of existing native surface material; to replace inadequate drainage crossings; to cut or trim trees and brush for sight distance improvement; to eliminate ruts, to repair ditches, and to install waterbars and dips on roads with inadequate runoff control; to install gates to control seasonal use or replace existing, non-functional gates or barriers on roads designated as open to the public or designated for management activities; and to restrict use and to minimize resource damage where existing roads are not designated for public use. The reason for this purpose is that unneeded and poorly located roads can negatively impact forest resources, even though road access is needed to implement project activities. A fairly extensive network of roads exists in the project area, and many are in a suitable condition or need only minor maintenance in order to implement project activities.

Desired Conditions:

- Provided access for resource management and public for recreation purposes (USDA-FS 1988).
- Improved or acceptably maintained hydrologic connectivity, erosion and sediment delivery, and channel stability (2004 SNFPA ROD, p.43).
- Improved aquatic organism passage and enhanced aquatic habitat conditions (2004 SNFPA ROD, p. 43).
- Maintained soil productivity.

5. There is a need for designing and implementing cost-effective project activities. This is to ensure that sufficient treatments occur to meet project objectives during the planning time frame and to maintain future management options for efficient and effective management of National Forest System lands. Allocated funding and grant opportunities to accomplish project activities are limited, and with several other large-scale projects occurring on the Forest, it is unlikely that funding for this project will be prioritized over funding for other projects. A combination of reasonably expected appropriated funds and cost-offset opportunities allow for efficiently accomplishing all of the treatments identified in this project. Furthermore, the role of the Forest Service in providing a supply of wood products for local manufacturers sustains a part of the employment base in rural communities and helps to maintain infrastructure near National Forest System lands. The preservation of this infrastructure helps maintain future options for effectively and efficiently achieving objectives on National Forest System lands.

Desired Conditions:

- The contribution of the Forest Service toward a continuous flow of forest products, providing for commercial product removal that contributes both directly and indirectly to the local economy, promoting activities which maintain local infrastructure and management options for the future (USDA-FS 2004).

- Accepted treatments designed to be cost-effective to maximize the number of acres treated with a limited budget (USDA-FS 2004).

6. There is a need to implement restoration activities to reduce impacts to soil and watershed resources related to dispersed camping, roads, and trails. Riparian Conservation Objective #6: Identify and implement restoration actions to maintain, restore, or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species (USDA-FS 2004).

Desired Conditions:

- Improved or acceptably maintained hydrologic connectivity, erosion and sediment delivery, and channel stability (USDA-FS 2004).
- Improved soils in regards to the soil's ability to absorb and filter precipitation and to sustain favorable conditions of stream flows (USDA-FS 2004).
- Maintained soil productivity.

Proposed Action

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

The Proposed Action includes a combination of fuels reduction and forest health improvement actions on approximately 16,113 acres of National Forest System land, including thinning with the use of both ground based mechanical and skyline harvest systems, tractor piling, mastication, hand thinning, brush cutting, and prescribed burning. Road reconstruction to facilitate treatments and to improve water quality through installation of Best Management Practices (BMPs) is proposed on approximately 84 miles of existing roads. Restoration activities associated with dispersed camping, roads, and trails would occur at seventeen locations and would maintain sustainable recreational opportunities, while also reducing impacts to soils and watershed conditions. The proposed action is described in more detail in Chapter 2, under Alternative 2 on pages 17-23.

Decision Framework

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

Forest Plan Direction

The Proposed Action and alternatives are guided by the Eldorado Forest Land and Resource Management Plan (LRMP), as amended by the 2004 Sierra Nevada Forest Plan Amendment (SNFPA). The Forest is subdivided into land allocations (management areas) with established desired conditions and associated management direction (standards and guidelines). Land allocations that apply to this proposal include the following: Wildland Urban Intermix (WUI) – Defense and Threat Zone, General Forest, California Spotted Owl Protected Activity Center (PAC), Northern Goshawk (PAC), Great Gray Owl Protected Activity Center (PAC), California Spotted Owl Home Range Core Area (HRCA), and Riparian Conservation Areas (RCAs).

Public Involvement

A Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for the Trestle Forest Health Project was published in the Federal Register on March 4, 2013 (78 FR 14072). The notice asked that input on the proposed action be received by April 8, 2013. In addition, as part of the public involvement process, the Forest Service has:

- Had this project listed on the Schedule of Proposed Actions (SOPA) since 2011;
- Sent a project specific scoping notice in March 2013 to 45 individuals, organizations, and government agencies, including federally recognized tribal governments, tribal groups currently applying for federal recognition, and Native American organizations and non-profit groups that are interested in projects that are located on this portion of the Forest or that requested notification on the project; and
- Held collaborative meetings with members of the public, industry groups, and environmental organizations who have expressed an interest in the project. Meeting notes from collaborative meetings are available in the project record.

Nine comment letters on the proposed action were received during the public scoping period, prior to the release of the DEIS in July, 2015. Most of the comments provided during the public scoping resulted in clarification to the proposed action, design criteria, or were incorporated into the effects analysis in the EIS. The summary of scoping comments and how they were considered is available in the electronic project file and have also been published on the project website.

The 45-day comment period on the Trestle Forest Health Project DEIS began with publication of the Notice of Availability (NOA) in the Federal Register on July 17, 2015. A letter announcing the availability of the DEIS was sent to 56 individuals, organizations, and government agencies, including federally recognized tribal governments. In addition, a legal notice was published in the Mountain Democrat on July 20, 2015 describing the opportunity to comment during the 45-day comment period. In response to the Forest's request for comments, 12 letters were received from individuals and organizations. The Response to Comments, Appendix D of the EIS, identifies specific comments and the Forest Service responses to those comments. The project record contains the letters received commenting on the DEIS.

Issues

Comments during the scoping period were used to formulate issues concerning the proposed action. 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 involve measurable or noticeable effects at a level too low (with or without mitigation) to drive the development of additional alternatives. These non-significant issues were considered in clarifying the proposed action, developing design criteria, or addressed through the effects analysis, but did not warrant development of alternatives to the proposed action. Non-significant issues may also be those issues that are outside the scope of the proposed action; those already decided by law, regulation, Forest Plan, or other higher level decision; those irrelevant to the decision to be made; or those conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations explains 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).

The summary of scoping comments and how they were considered is available in the electronic project record and has also been posted on the project website. Non-significant issues included concern about the waste of biomass material, protection of water improvements, concern about the impacts to black-backed woodpecker, concern about the road system and actions that will add sedimentation in the streams, actions that may affect riparian conservation areas and the absence of criteria for riparian conservation areas, These scoping comments resulted in clarification to the proposed action, design criteria, or were incorporated into the effects analysis in Chapter 3 of the EIS.

One scoping comment received related to the 2004 Framework has been rendered inadequate and obsolete by significant new information requiring a Supplemental EIS be prepared before further logging projects may proceed is outside the scope of the proposed action. The referenced 2004 “Framework” is not an ongoing, agency action, as described in case law. Therefore, NEPA’s supplementation regulations (40 CFR 1502.9(c)) do not apply to the 2004 Framework EIS; nor does NEPA require the agency to prepare a “Sierra Nevada-wide Cumulative Effects EIS." Even though the Forest Service is not required to prepare a supplemental EIS for the 2004 Framework based on new scientific information, the agency is responsible for considering new information at the project level, when such information is relevant to the project being considered. In this way, new science is addressed at the time and scale that is most relevant and practical. This issue was determined to be non-significant since it is outside the scope of this project.

As for significant issues, the Forest Service identified the following issues during scoping and collaborative efforts:

Issue #1: The proposed action may have significant negative effects on the California spotted owl population due to treatment of high quality habitat coupled with declining population trends in the area.

Alternatives 4 and 5 were developed to address this issue.

<u>Key indicators:</u> the probability for loss of occupancy and for recolonization of individual territories and the impacts of loss of occupancy to population demography.

Issue #2: Project may not be operationally feasible due to economic considerations.

Key indicators: the appraisal value and the cost of treatments.

Chapter 2. Alternatives, Including the Proposed Action

Introduction

This chapter describes and compares the alternatives considered for the **Trestle Forest Health Project**. The end of this chapter presents the alternatives in tabular format so that the alternatives and their environmental impacts can be readily compared.

Changes between the DEIS and FEIS

Bark and engraver beetles have been increasing in natural stands and plantations on the Eldorado National Forest over the past several years, as evidenced by the increase in dead trees detected by Aerial Detection Surveys (FHM, 2011-2015). To emphasize the widespread mortality that continues throughout the Eldorado National Forest, tree mortality jumped triple fold from 2014 to 2015, from an estimated 31,000 trees to 132,000 trees or 15,042 acres to 44,621 acres with some level of tree mortality. The Trestle project area is no exception. Field visits conducted by Forest Health Protection and forest staff confirm the elevated tree mortality in many of the dense stands within the Trestle project area. A growing number of dead trees were observed, including large groups of dead trees within the Wildland Urban Intermix, immediately adjacent to the community of Grizzly Flats (Bulaon and MacKenzie 2016).

Stand exams in 2012 and 2013 showed natural stands proposed for commercial thinning containing approximately 3 dead trees greater than 15 inches dbh per acre (Howard and Walsh 2014). In 2014, it was noted that additional mortality from insects, likely associated with the prolonged drought, had been observed in these stands and adjacent areas, to the extent that there are now likely few areas with less than 4 snags greater than 15 inches dbh per acre (Ibid.). With the ongoing tree mortality in 2016 (Bulaon and MacKenzie 2016), snag levels within the project area are still increasing, and as a result, the design criteria have been updated to allow the removal of snags greater than 15 inches dbh, while retaining the four largest snags per acre averaged across the project area, consistent with forest LRMP (2004 SNFPA) standards for snag retention.

In addition, the effects analysis for the California spotted owl was refined and updated to incorporate recent scientific literature.

Alternatives Considered in Detail

Based on the issues identified through public comment on the proposed action, the Forest Service developed two alternative proposals that achieve the purpose and need differently than the proposed action. In addition, the Forest Service is required to analyze a No Action alternative. The proposed action, alternatives to the proposed action, and no action alternative are described in detail below. Appendix A includes detailed maps each alternative analyzed.

Alternative 1

No Action

Under the No Action alternative, current management would continue to guide management of the project area. No commercial thinning, prescribed burning, watershed restoration activities, or other activities would be implemented under this project to accomplish the purpose and need.

Alternative 2

Proposed Action

Thinning

1. Use a combination of ground based and skyline logging systems to conduct mechanical thinning on approximately 4,887 acres (4,444 acres within natural stands and 443 acres within plantations). Thinning would include the cutting and removal of select commercial (trees 10” to 29.9” dbh) and non-commercial (trees 4” to 9.9” dbh) sized trees, using a combination of variable density thinning and thinning from below to maintain or increase within stand heterogeneity while reducing ladder fuels in strategic locations.

    a. On slopes generally less than 35%, ground-based mechanized equipment (low-impact feller-buncher, hand felling, and conventional skidding equipment) would be used to remove both commercial and non-commercial material on approximately 4,733 acres and non-commercial sized material only on 25 acres.

    b. A skyline system would be used to thin approximately 76 acres of treatment units with slopes generally greater than 35%. Units identified for thinning using skyline systems would include harvest on slopes generally less than 50% with mechanical equipment to cut and bunch thinned trees. Hand felling would be used in areas with slopes generally steeper than 50%.

    c. Within the mechanical thinning units, cutting of small trees (1” to 3.9” dbh) and brush would occur on approximately 1,575 acres.

    d. Removal of hardwoods greater than 4” dbh and trees ≥ 30” dbh would not occur, except to allow for equipment operability or safety.

    e. The removal of dead and unstable live trees (hazard trees) of all sizes would occur along utility lines, timber haul roads and landings to provide for safety of woods worker and public throughout project implementation, except where restrictions for removal apply.

    f. Existing and operations generated slash and brush would be tractor piled or grapple piled after mechanical thinning operations. Tractor piling would occur as a follow-up treatment on approximately 1,597 acres in natural stands and 310 acres in plantations to reduce ground fuels and ladder fuels. Tractor piling would not occur on slopes generally greater than 35%. Grapple piling would occur on 15 acres in natural stands.

g. Biomass (non-commercial) material accumulated on landings would be disposed of or removed in a number of ways, including on-site burning, commercial and personal use firewood, or as co-generation fuel where feasible.

2. Conduct non-commercial mechanical thinning (trees less than 12 inches dbh) up to 100 feet on one or both sides of the Capps Crossing Road (9N30) and Grizzly-Caldor Road / Leoni Road (09N73) in 5 segments totaling approximately 3 miles (approximately 57 acres). Material would be moved to landings and treated as described for biomass from thinning units. Conduct brush cutting up to 100 feet of Capps Crossing Road (9N30) and Grizzly-Caldor Road / Leoni Road (09N73) in 3 segments totaling approximately 5 miles (approximately 88 acres).

Hand Thinning

1. Hand cut and pile understory vegetation (trees less than 9 inches dbh and brush) on approximately 1,492 acres. Approximately 1,044 acres of the treatments by hand occur in units that are located within 500 feet of private property boundaries in the Wildland Urban Interface (WUI) defense zones and threat zones.

2. Within plantations, conduct approximately 6 acres of hand thinning of non-commercial sized material, with some hand piling and some lop and scatter of thinned material.

Prescribed Burning

1. Prescribed fire is proposed on 15,812 acres within the project area. Pile burning and underburning are the two primary techniques of prescribed fire proposed in this project.

    a. Underburning is proposed as the initial or primary treatment for this project on approximately 9,583 acres, where land allocations, environmental constraints, or stand conditions makes prescribed fire the preferred tool to achieve treatment objectives. Of the approximately 9,583 acres of underburning as an initial treatment, 984 acres is considered priority for prescribed fire only treatments and anticipated to be completed within the next 5 to 10 years.

    b. All treatment units, except those specifically excluded from proposed burning, are proposed for follow-up prescribed burning. Multiple burn entries would occur in burn only stands with heavy fuel build up conditions to reach desired conditions described in the purpose and need for the project.

    c. Pile burning is proposed as a follow-up treatment on 3,412 acres. Within thinning and piling units, underburning may be implemented concurrent with pile burning or separately.

    d. Prescribed fire may be ignited using ground based firing techniques or through aerial firing techniques.

    e. In preparation for prescribed burning, perimeter line construction would be needed where roads, trails, or natural barriers are absent. This may involve hand cutting of vegetation including trees up to 9-inch diameter, pruning, and scraping a bare soil line, or line construction with a D-6 or smaller dozer.

Transportation System

1. Road reconstruction to facilitate treatments and improve road conditions is proposed on approximately 84 miles. Reconstruction activities may include, repair or replacement of inadequate drainage culverts; elimination of ruts; roadside drainage maintenance; cattle guard cleaning and repair; installation of waterbars and dips with inadequate water runoff control; placement of erosion resistant and protective material (riprap), gate installation to control seasonal use or replacement of existing non-functional gates or barricades; cleaning and filling cracks and potholes on existing asphalt roads; and, cutting and removing roadside vegetation encroaching on all system roads.
2. Approximately 3 miles of existing unauthorized routes would be used as temporary roads for project operations. Once there is no longer a use for the road, the temporary roads would be obliterated using methods such as, earth barricades; ripped to alleviate soil compaction and restore infiltration; seeding, removing drainage structures; slashing; and, camouflaging road junction.
3. Obliterate approximately 3.1 miles of 3 roads not open to public use identified as causing negative watershed impacts and identified as not needed for administrative access (Routes 09N44B, 09N45D, and 09N65B). Obliteration would include: earth barricades; ripping to alleviate soil compaction and restore infiltration; removing drainage structures, mulching with native materials (slash); and seeding.

Water Hole Maintenance and Repair

1. To furnish an adequate water supply for fire or contract work, perform maintenance and repair work on eleven existing water supply facilities. Maintenance and repair work would include: clearing plugged pipes; installing temporary weirs or sandbags; placing erosion resistant and protective material (riprap) on road surfaces accessing water supply facilities; and, cleaning pond areas of debris.

Restoration - Dispersed Recreation, Roads, Trails, and Abandoned Mines

1. Steely Fork Cosumnes River Site 1: Section 15, T09N R13E
    a. Reduce watershed damage from a denuded area eroding into Steely Fork Cosumnes River while continuing to allow for dispersed recreation use and water drafting activities.
        i. Block access to stream crossing with boulders and gate to stop creek crossing, but leave access to water hole; place aggregate base between the gate and stream; and re-establish existing lead-off ditches.
        ii. Place boulders along the border of the dispersed camping area to restrict site expansion. Break up the soil compaction (outside of the defined camping

area) via sub-soiler, ripping shanks, or by hand. Avoid underground lines and sensitive sites.

2. Steely Fork Cosumnes River Site 2: Section 14, T09N R13E
    a. Reduce watershed damage from area eroding sediment into Steely Fork Cosumnes River and enhance the meadow in the area.
        i. Replace the gate blocking access to the 09N73A (road closed to public use); construct water bars on stream approaches; block access to non-system routes with boulders; break up the soil compaction (in the dispersed camping area and the spur road) via sub-soiler, ripping shanks, or by hand; and plant or seed vegetation as needed.
        ii. Meadow enhancement activities would include; removal of encroaching conifers by hand, block motorized vehicle access to the meadow using the felled trees, hand pull invasive plant species, remove barbed wire, and install nesting platform for great gray owl.
        iii. Identify designated hiking path by blocking and obscuring non-system trails with natural materials.
3. Steely Fork Cosumnes River Site 3: Sections 21-22, T09N R13E
    a. Reduce watershed damage from area eroding sediment into Steely Fork Cosumnes River.
        i. Block unauthorized route off of 09N65B using native materials; break up soil compaction in the dispersed site and non-system route via sub-soiler, ripping shanks, or by hand and mulch with straw or native vegetation; and reestablish vegetation through seeding and planting.
        ii. Obliterate 9N65B (closed to public use). Break up soil compaction via sub-soiler or ripping shanks and cover with straw or native vegetation. Reestablish vegetation through seeding and planting.
4. Dogtown Creek Site 1: Section 30, T09N R14E
    a. Reduce watershed damage from camping area eroding sediment into Dogtown Creek.
        i. Obliterate camping area. Block access through placement of boulders; break up soil compaction via sub-soiler or ripping shanks and mulch with straw or native vegetation. Reestablish vegetation through seeding and planting.
5. Dogtown Creek Site 2: Section 28, T09N R14E
    a. Reduce watershed damage from area eroding sediment into Dogtown Creek while continuing to provide for dispersed recreation opportunities.
        i. Place boulders at border of the dispersed recreation use site to restrict site expansion; break up soil compaction via sub-soiler or ripping shanks and

mulch with straw or native vegetation. Reestablish vegetation through seeding and planting. Plant riparian vegetation on stream banks with absent or suppressed vegetation.

6. Intersection of 9N34Y and 14E31: Section 25, T09N R13E.
    a. Reduce erosion and restore drainage by removing small diameter pipe with hand tools while maintaining existing water source upslope for wildlife.
7. Intersection of 14E31 trail and 10N83: Section 15, T09N R14E.
    a. Define the designated use area and reduce non-system vehicle use activities by installing barriers to define and narrow the trail, add cover to eroded areas, and place coarse woody material in open areas.
8. Intersection of 14E31 and 9N45 Site 1: Section 29 T09N R14E.
    a. Improve water control features and reduce sediment deposits on road and channels.
        i. Realign the system trail parallel to the contour.
        ii. Restore the landing by decompacting soil via sub-soiler or ripping shanks; install waterbars; and mulch with straw or native vegetation to provide soil cover.
9. Intersection of 14E31 and 9N45 Site 2: Section 30, T09N, R14E.
    a. Improve water control features and reduce sediment deposits on road and channels by aligning the system trail parallel to the contour; and obliterate, block, and restore abandoned trail.
10. 14E31 near Plummer Ridge Guard Station: Section 20, T09N R14E.
    a. Reduce impacts to sensitive soils and plant habitat (shallow lava cap soil) by defining and restoring the trail intersection through the placement of boulders and native materials.
11. Unauthorized route associated with 14E13: Section 29, T09N R14E.
    a. Reduce erosion and sedimentation by unauthorized vehicle use on large road cut bank by installing barrier rocks along the road at cut slope; placing coarse, woody material on the slope; installing dips to change the drainage patterns; and blocking and disguising access to the area from 14E31 using natural materials (hand fall trees) or boulders.
12. Unauthorized route associated with 09N45: Section 28, T09N R14E.
    a. Reduce soil compaction and improve meadow hydrology by blocking, obliterating, and disguising the non-system route using native materials. Break up soil compaction in the meadow portion using hand tools.
13. Unauthorized route associated with 09N65B: Section 21, T09N R13E.

   a. Reduce impacts to riparian vegetation and soil compaction by blocking, obliterating, and disguising the non-system route by hand -falling small material across the trail.

14. Road 09N55: Section 32, T09N R14E.
    a. Reduce sediment contribution to Middle Dry Creek while providing for OHV recreation opportunity.
       i. Reclassify the last 1.1 miles of road 09N55 from a system road to a motorized trail, allowing only vehicles <50” in width.
       ii. Rehabilitate sides of existing road to narrow the trail corridor and accommodate vehicles <50” in width.
15. Meadow near Harrel Water Tank: Section 7, T09N R14E.
    a. Restore meadow vegetation by removing debris and blocking areas with native material to enable vegetation to recover.
16. 08N49 Road: Section 32, T09N, R14E.
    a. Reduce unauthorized vehicle use in sensitive plant populations by placing boulders along the edge of the road to barricade vehicular access.
17. Abandoned mine closure Site 1 and 2: Section 23, T09N R13E.
    a. Close the shaft to provide for human and wildlife safety while protecting applicable heritage features. If identified as bat habitat, use a bat friendly enclosure.

Alternative 4

This alternative was developed based on comments proposing that the thinning of California spotted owl habitats could negatively affect owl populations in the project area, given the reported population decline. When compared to the proposed action, Alternative 2, this alternative would commercially thin 2,140 fewer acres within natural stands and increase commercial thinning in 13 acres of plantation stand; non-commercially thin 53 additional acres; reduce hand thinning by 369 acres; increase prescribed burning as an initial treatment by 3,012 acres, including increasing priority initial prescribed fire treatments by 579 acres and decreasing follow-up prescribed fire by 699 acres; increase non-commercial mechanical roadside thinning by 2 acres; increase road brushing by 79 acres; reduce road reconstruction by approximately 20 miles, while changing some of the roads to be reconstructed; increase the proposed use of temporary roads by 0.6 miles; and increase road obliteration adding 0.8 miles of one road (09N49G).

This alternative would include the following actions:

1. Conduct mechanical thinning of 2,735 acres (2,304 acres within natural stands and 431 acres of plantations) of commercial and non-commercial sized trees using ground-based equipment, with follow-up surface fuels treatments as proposed in Alternative 2.
2. Conduct mechanical thinning of approximately 53 acres of non-commercial sized trees (trees less than 10 inches dbh) within natural stands and 25 acres within plantations.

3. Conduct the cutting of small trees (1" to 3.9" dbh) and brush within the mechanical thinning units on approximately 1,007 acres.
4. Conduct non-commercial mechanical thinning (trees less than 12 inches dbh) within 100 feet on one or both sides of Capps Crossing Road (9N30) and Grizzly-Caldor Road / Leoni Road (09N73) on 5 segments of the road that are outside of mechanical thin units (approximately 59 acres).
5. Conduct mechanical brush-cutting up to 100 feet of Capps Crossing Road (9N30) and Grizzly-Caldor Road / Leoni Road (09N73) on 4 segments of the road that are outside of mechanical thin units (approximately 167 acres).
6. Hand-thin and pile on approximately 1,123 acres, including 483 acres located within 500 feet of private property boundaries.
7. Conduct approximately 6 acres of hand thinning within conifer plantations.
8. Perform tractor piling on approximately 1,049 acres within natural stands and 312 acres within plantations, and perform grapple piling on approximately 15 acres within natural stands.
9. Conduct prescribed understory burning as the initial or primary treatment on approximately 11,032 acres, of which 1,563 acres is first-priority burning.
10. Perform pile burning as a follow-up treatment on 2,508 acres.
11. Conduct prescribed understory burning as a follow-up treatment on up to 15,113 acres.
12. Reconstruct approximately 66 miles of road.
13. Obliterate approximately 3.9 miles of roads not open to public use.
14. Perform the same restoration activities as proposed in Alternative 2.

Alternative 5

This alternative was developed based on comments proposing that the thinning of California spotted owl habitats could negatively affect owl populations in the project area, and on comments proposing that treatment should provide for effective fire modification strategy that can be implemented in a relative short timeframe to protect both the community and forest resources, both given the reported population decline. When compared to the proposed action, Alternative 2, this alternative would commercially thin 1,149 fewer acres within natural stands and 13 additional acres in plantation stands; reduce hand thinning by 380 acres; increase prescribed burning as an initial treatment on 1,519 acres, while reducing prescribed fire as a priority initial treatment on 14 acres; reduce prescribed fire as a follow-up treatment on 701 acres; increase non-commercial mechanical roadside thinning by 2 acres; increase roadside brushing by 55 acres; reduce road reconstruction by approximately 15 miles, changing some of the roads to be reconstructed; increase the use of temporary roads by 0.6 miles; and increase road obliteration by adding 0.8 miles of one road (09N49G).

This alternative would include the following actions:

1. Conduct mechanical thinning of 3,726 acres (3,295 acres within natural stands and 431 acres of plantations) of commercial and non-commercial sized trees using ground-based equipment, with follow up surface fuels treatments as proposed in Alternative 2.
2. Conduct non-commercial mechanical thinning (trees less than 10 inches dbh) of approximately 25 acres of within conifer plantations.
3. Conduct the cutting of small trees (1” to 3.9” dbh) and brush within the mechanical thinning units on approximately 1,190 acres.
4. Conduct non-commercial mechanical thinning (trees less than 12 inches dbh) within 100 feet on one or both sides of Capps Crossing Road (9N30) and Grizzly-Caldor Road / Leoni Road (09N73) on 5 segments of the road that are outside of mechanical thin units (approximately 59 acres).
5. Conduct mechanical brush-cutting within 100 feet of one or both sides of Capps Crossing Road (9N30) and Grizzly-Caldor Road / Leoni Road (09N73) on 4 segments of the road that are outside of mechanical thin units (approximately 167 acres).
6. Perform tractor piling on approximately 1,231 acres within natural stands and 312 acres within plantations, and perform grapple piling on approximately 15 acres within natural stands.
7. Hand-thin and pile on approximately 1,112 acres, including 470 acres located within 500 feet of private property boundaries.
8. Conduct approximately 6 acres of hand thinning within conifer plantations.
9. Conduct prescribed understory burning as the initial or primary treatment on approximately 11,102 acres, of which 970 acres is priority burning for initial prescribed fire treatment.
10. Perform pile burning as a follow-up treatment on 2,671 acres.
11. Conduct prescribed understory burning as a follow-up treatment on approximately 15,111 acres.
12. Reconstruct approximately 69.5 miles of road.
13. Obliterate approximately 3.9 miles of roads not open to public use.
14. Perform the same restoration activities as proposed under Alternative 2.

Design Criteria Common to All Action Alternatives

The Forest Service has developed the following design criteria to be used for all action alternatives. The purpose of these design criteria is to avoid, or to minimize, the potential for adverse effects to the resources discussed below.

Activities would be conducted so as to protect water quality by using BMPs, employed by the Forest Service and the State of California, to prevent water quality degradation and to meet State Water Quality Objectives relating to non-point sources of pollution. In addition, the Forest would use site-specific mitigation measures that relate directly to these BMPs to minimize erosion and resultant sedimentation.

Mechanical and Hand Thinning

1. Identify and protect rust-resistant sugar pine trees from all activities.
2. Retain pacific yew greater than 1" dbh during thinning activities, except where removal is needed for equipment operability.
3. Use water to abate dust from logging traffic with water selected from water drafting sites that have suitable stream flow and access. When water is scarce, use EPA-approved dust palliatives (such as magnesium chloride or lignin sulfonate), for dust abatement.
4. Re-contour divots, within the skyline thinning units (under Alternative 2 only) and greater than 2 feet in depth, caused by mechanical equipment where they have a potential to channel water.
5. Temporarily close roads that are identified as open for public use to protect reconstruction investments until those roads have been stabilized, in addition to performing the seasonal closure identified by the Wheeled Motorized Travel Management Final Environmental Impact Statement (FEIS) (2008). A Forest Order would be issued in these circumstances.
6. Protect infrastructure for Grizzly Flat, including Grizzly Flat Community Services District diversion dams, drafting stations, and pipelines, as well as electric lines, phone lines, and water pipes for private inholdings, during treatment activities.
7. Coordinate activities within 500 feet of residences so that operations do not begin before 6 a.m.
8. Near residences, stack in decks some material that would otherwise be put into landing piles to facilitate access for firewood collecting when feasible.

Prescribed Fire

1. Minimize smoke emissions by following Best Available Control Measures (BACM). A smoke permit administered by the local County Air Resource Agency would accompany burn plans.
2. Place piles away from the boles of residual trees to reduce damage to residual trees and snags.
3. Design prescribed burn prescriptions in plantations to maintain tree cover over the majority of the burn unit. All trees and brush killed by prescribed burning activities shall be left in place for wildlife purposes.
4. Cease lighting within 10 feet of yew tree species to minimize mortality loss to Pacific yew (*Taxus brevifolius*). Where ceasing ignitions is unfavorable or may increase risk of mortality, firing tactics to direct heat away from yew tree would be utilized, including ring and dot firing techniques.

5. Treat burn units with dense stands of Pacific yew with hand thinning and pile burning where necessary to meet fuel objectives. Place piles to avoid large concentrations of Pacific yew. Broadcast burning would not occur in dense stands of Pacific yews.

6. Assess prescribed burn units for potential mortality in legacy pine prior to implementation of prescribed burning to minimize mortality in legacy yellow pine (Ponderosa pine and Jeffrey pine) and sugar pine. In this project area, legacy pine is defined as sugar pine and yellow pine (pines with orange, smooth bark) trees of 42” dbh or greater. Prescribed burn methods will be designed to achieve no more than 30% mortality in legacy pine averaged across all burn units within the project area. Protection measures to reduce the potential for mortality in legacy pine, such as raking, using water/foam/hoselays, or using line construction (to exclude from burning), may be implemented. Use the following criteria if raking is the preferred protection measure:

    a. Rake legacy pines (sugar pine and yellow pine trees of 42” dbh or greater) with more than 4 inches duff accumulation or with pre-existing fire scars.

    b. Remove accumulated duff and litter from raked trees within 2 feet of the tree bole.

    c. Spread out raked material 2 feet from the tree bole so that mounds are not created. Rake trees with fire scars to bare mineral soil. Rake trees so they have no more than 2 to 3 inches of duff remaining.

    d. Perform raking in late season to allow at least one growing season for fine roots to recover prior to burning. At a minimum, perform raking at least 60 days before prescribed fire implementation to allow for fine root recovery and to reduce damage potential for residual trees.

Roads and OHV Trails

1. Provide for public safety by posting traffic control signs on any off-highway vehicle (OHV) trails within project area, warning visitors of potential hazards due to project activities (burning, mastication, felling). Post closure information on local information boards and on the Eldorado National Forest website.

2. Repair or replace damage to improvements caused during project implementation in coordination with the recreation staff. If trails are damaged during contract administration, the contractor would effectively repair/restore damaged trails prior to acceptance of work.

3. Barricade skid trails that intersect system roads open to the public with natural material so as to discourage unauthorized vehicle use.

4. Perform thinning activities along system OHV trails so that the trail experience and difficulty level is maintained where possible. Place a 15-foot no-treatment buffer adjacent to designated trails that are not co-located with roads reconstructed as part of this project.

5. Where road reconstruction is co-located with designated OHV trails, constrict trails post-treatment to accommodate a trail experience and to facilitate access to fire suppression crews

should a wildfire start in the area. Have the trail location traverse across the entire road prism to provide curves for variety and challenge for the trail users. Where possible, locate the majority of the trail tread on the outer third of the road bed to facilitate drainage of the trail in the future. Incorporate trail location with the drainage features of the road, such as rolling dips, to provide drainage for the trail.

6. Utilize firing techniques to retain vegetation within the trail corridor to the extent feasible, where OHV trails are located within prescribed burn units. Where necessary to define the designated route and to discourage unauthorized travel, place barriers and native materials along these segments after prescribed burning operations have been completed.

Snags, Down Logs, and Hazard Trees

1. Designate hazard or "danger" trees following the direction prescribed in the *Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region* (Report Number RO-12-01, 2012). Fell hazard trees within the RCAs toward the stream and leave in place below roads to provide for additional down wood in RCAs. Fell hazard trees within spotted owl, great gray owl, and northern goshawk PACs and leave on site unless reviewed by a wildlife biologist. Hazard trees within down log and snag deficient areas would be felled and left in place, unless review by the fuels officer indicates removal is needed due to undesirable fuel loading.
2. Within treatment units, snags would be retained consistent with forest LRMP standards. Generally the 4 largest snags will be retained per acre, averaged over the entire project area. Snags will not be evenly spaced across the landscape but would vary based on land allocation, such as WUI, and landscape position, such as near roads, ridgetops and streams.
3. Where possible, leave large down logs (logs greater than 10 feet long and 16 inches in diameter at mid-point) in place and protect them to the extent practical during mechanical treatment and understory prescribed burning.

Hydrology and Aquatic Features

1. Limit equipment operation by exclusion zones identified in the table below. Alter protection measures as needed on the ground for a specific site based on recommendations by a Resource Specialist (Soil Scientist, Fisheries Biologist, Botanist, or Hydrologist).

Table 1
Equipment exclusion zones for aquatic features[1].

Aquatic Feature	Ground-based equipment exclusion zone (feet)			
	< 15 % slope	15 – 25 % slope	25 – 35 % slope	> 35 % slope
Perennial stream[2]	75	100	150	Requires recommendation from a resource specialist after an on-site visit.
Intermittent stream[2]	50	50	75	
Ephemeral stream[2]	25	25	50	
Draws[3]	10	25	25	
Special aquatic features[4]	75	100	150	
Sierra Nevada yellow-legged frog Habitat	100 feet for all perennial and intermittent streams above 4,500 feet in elevation. There would be no reach-in to remove vegetation within the equipment exclusion zone and no ignition for prescribed fire except to maintain control of the fire.			

[1]Exceptions to the general equipment exclusion buffers are identified for specific units under item a. below.
[2]For streams, distances are as measured from the edge of the channel or riparian vegetation, whichever is greater.
[3] For draws, distances are as measured from the bottom of the draw. Draws have a poorly defined channel, and generally do not show evidence of recent flow.
[4] For special aquatic features, distances are as measured from edge of wet area or riparian vegetation, whichever is greater, Special aquatic features includes lakes, ponds, meadows, wetlands, springs, seeps, etc.

a. Exceptions to the general equipment exclusion buffers identified in the design criteria are these:
   i. Unit 623473 - 10 ft. equipment exclusion zone for ephemeral streams and draws.

   ii. Unit 623474 - 10 ft. equipment exclusion zone for ephemeral streams and draws.

   iii. Unit 623415 - 10 ft. equipment exclusion zone for ephemeral streams and draws.

   iv. Unit 622100 (Alternative 2 only) - Equipment exclusion zones for all streams (perennial, intermittent, and ephemeral) would be the same as described for perennial streams.

b. Monitor at least one stream segment as described in Section 16.34 of the 2011 Water Quality Management Handbook for Region 5 of the Forest Service. This applies to watersheds that are currently at a very high risk of CWE (above the Threshold of Concern) and to watersheds that will be at very high risk of CWE as a result of the Trestle Forest Health Project.

c. Maintain ground cover within Riparian Conservation Areas (RCAs) at 70 percent or greater where the groundcover is currently 70 percent or greater.

d. Have a review completed by a Hydrologist, Fisheries Biologist, or Soil Scientist prior to activities within RCAs that involves the following:

   i. Construction of new landings and/or modification and use of existing landings;

   ii. Construction of temporary roads not identified in the project proposal;

   iii. Equipment crossings of perennial and intermittent streams or the placement of temporary stream crossing structures not identified in the project proposal; and

   iv. Use of EPA-approved dust palliatives (magnesium chloride or lignin sulfonate) for dust abatement.

e. Fell and remove hazard trees next to haul routes with RCAs, which would include the following:

   i. No endlining to remove trees;

   ii. The recommendation of the Sale Administrator and Resource Specialist for the fate of the tree (e.g., repositioning of the tree, leaving a portion of the tree as felled, etc.) should a felled hazard tree enter a stream course; and

   iii. The retention in place of hazard trees with no commercial value and of those outside the reach of skidding equipment, provided the felled trees would not interfere with the safe use of the road or adversely affect a stream course and associated culverts.

Aquatics

1. Survey existing waterholes and other aquatic sites including ponds, lakes, and streams used for water drafting for Aquatic TES species and take flow levels prior to use. In the event TES species are found to occur at drafting sites, sites would not be used and future surveys would be conducted by an aquatic specialist to determine presence of possible populations.

2. Construct drafting sites so that oil, diesel fuel and/or other spilled pollutants would not contaminate the stream. Maintain stream bank stability and minimize sedimentation by constructing and maintaining back down ramps using rocking, chipping, mulching or another effective method. Use a Forest Service-approved screen-covered drafting box, or other device

to create low entry velocity, while drafting to minimize removal of aquatic species, including juvenile fish, amphibian egg masses, and tadpoles from aquatic habitats.

3. Avoid usage of dust abatement palliatives (magnesium chloride and lignin sulfonate) within 100 feet of perennial and intermittent streams.

Botany

1. Flag Pleasant Valley Mariposa lily (*Calochortus clavatus* var. *avius*) populations within the project area for avoidance. The project leader or burn boss would notify the project botanist prior to line construction in order to re-flag occurrences, due to the fact that prescribed burn implementation could occur several years after completion of thinning or other treatments. Exclude all ground-disturbing activities, burn piles, hazard tree removal, roadside brushing, mechanical equipment, line construction, and spring burning from sensitive plant protection areas, with the following exceptions:

    a. Consult the project botanist to mitigate impacts where it is necessary to remove trees from within site boundaries.
    b. Directionally fell all thinning of trees adjacent to site boundaries away from the site.
    c. At the recommendation of the project botanist, hand thinning and prescribed fire within sensitive plant protection areas may occur.
    d. Notify the project botanist prior to implementation of the prescribed burn in sensitive plant populations; if available have a botanist onsite to take part in, and/or to monitor burning and associated effects.
    e. At a minimum, the botanist will conduct a post-burn visit.
    f. If new sensitive plant occurrences are discovered during project implementation, notify the project botanist to develop necessary protection measures.

2. No application of EPA approved dust palliatives (magnesium chloride or lignin sulfonate) for dust abatement will occur within 100 feet of roadside occurrences of sensitive plant or watch-list species.

3. Protect lava caps, which support unique plant communities in the project area, from motorized equipment and vehicles. Avoid line construction through lava cap communities feasible. If necessary, complete line construction with hand tools only.

4. Flag Eldorado National Forest Priority 1 and 2 invasive plant infestations within the project area for avoidance and treat such plant infestations using integrated pest management techniques as a part of the Trestle project for up to 3 years after implementation. Tier treatments under the project to the Eldorado National Forest Invasive Plant EA. This may include a combination of techniques including tarping, manual removal, string trimming, and targeted herbicide application. Currently known high-priority infestations within the project area include the following: tree of heaven, yellow starthistle, rush skeletonweed, and scotch broom. Develop new treatment strategies, under the Eldorado National Forest Invasive Plant EA and implement as part of the Trestle project, if new infestations develop as a result of project activities (i.e., within landings, areas of road reconstruction, or harvest units).

5. Before entering National Forest System lands, clean off road equipment vehicles to ensure they are free of soil, seeds, vegetative matter, or other debris to prevent the introduction or spread of invasive plants. Prior to the start of operations, the Forest Service will perform a visual inspection for such debris. Clean equipment prior to moving from weed-infested areas to weed-free areas.

6. Ensure all earth-moving equipment, gravel, fill or other materials are weed-free. Use onsite sand, gravel, rock, or organic matter where possible.

7. Use certified weed-free straw or mulch for erosion control. Require a certificate from the county of origin stating the material was inspected.

8. Obtain any seed used for restoration or erosion control from a locally collected source (ENF, Seed, Mulch and Fertilizer Prescription, 2000).

Wildlife

1. For California spotted owls, implement a limited operating period (LOP), prohibiting vegetation treatments within a quarter-mile of spotted owl activity centers during the breeding season (March 1 through August 15), unless surveys confirm that owls are not nesting.

    a. Based on the most recent survey data (most recent 2008, 2009, 2012 and 2013 and PAC monitoring done in 2014 and 2015), LOPs would be implemented for all or portions of units 622078, 622079,622081, 622082, 622084, 622085, 622086, 622087, 622089, 622091, 622092, 622094, 622095, 622096, 622097, 622098, 622099, 622101, 622103, 623401, 623404, 623407, 623413, 623414, 623415, 623416, 623417, 623418, 623419, 623425, 623427, 623431, 623436, 623437, 623459, 623460, 623463, 623465, 623466, 623467, 623468, 623470, 623470, 623471, 623375, 623476, 623477, 624573, 624585, 624586, 624587, 624588, 624594, 624605, 624606, 624607, and 624608.

2. For northern goshawks, implement an LOP, prohibiting vegetation treatments within a quarter-mile of the northern goshawk nest site during the breeding season (February 15 through September 15), unless surveys confirm that goshawks are not nesting. When the nest stand within a protected activity center is unknown, apply LOP to a quarter-mile area surrounding the PAC.

    a. Based on the most recent survey data (most recent 2008, 2009, 2015), LOPs would be implemented for all or portions of units 623438, 623439, 623440, 623407, 623416, 623418, 623419, 623427, 623439, 623440, 623441, 623442, 623459, 623460, 623469, 623470, 623471, 624576, and 624579.

3. For great gray owls, implement an LOP, prohibiting vegetation treatments within a quarter-mile of the PAC during the nesting period (March 1 to August 15), unless surveys confirm that great gray owls are not nesting.

   a. Based on the most recent survey data (most recent 2008, 2009, 2012, 2013, 2014, 2015), the LOP for great gray owl would be implemented for all or portions of units 623413, 623414, and 623415.

4. For spotted owls, implement an LOP for road reconstruction activities, for specific portions of roads which occur within a quarter-mile of roost or nest stands from March 1 to August 15.

   a. Based on the most recent survey data, the LOP for road reconstruction would be implemented for a specific segment of units 09N47 and 09N49.

5. Because prescribed fire could occur several years after the mechanical harvest work is completed, implement an LOP for future prescribed understory burning within a quarter-mile of PACs for the California spotted owl, northern goshawk, and great gray owl, unless surveys determine that the birds are not nesting. Limited operating periods can be waived to allow for early season burning on up to 5 percent of California spotted owl and northern goshawk PACs per year, with up to 10 percent per decade across the bioregion.

6. Minimize the amount of smoke entering the mine shaft to the extent practical through firing techniques to minimize potential impacts to known roosting populations of bats at Arctic Mine.

Soils

1. To control the surface erosion, mechanical activities will maintain a minimum soil cover of 70% in units with potentially moderate or higher erosion risk, including units 623400, 623403, 623407, 623408, 623414, 623416, 623422, 623436, 623439, 623440, 623441, 623442, 623450, 623456, 623457, 623458, 623459, 623460, 623463, 623465, 623470, 623471, 623475, 624572, and all Riparian Conservation Areas. In all other units, maintain a minimum of 50% cover.

2. Following prescribed burning operations, maintain average soil cover for each treated unit at 70% or greater one year following burning activities. If soil cover does not meet this threshold value after treatment, implement measures, such as mulching with lop and scatter material or weed-free straw, until vegetation re-growth can provide cover.

3. Activities will not increase unacceptable soil conditions above 15 percent in the activity area. Units 322-084, 085, 086, 087, 623-404, 405, 449, 465 and 471 were identified as above or near 15% extent for soil compaction.

   a. In units where soil disturbance currently exceeds or is expected to exceed the 15% threshold from mechanical activities, rip decompaction with a sub-soiler or rip shanks of main or secondary skid trails with detrimental compaction or displacement to the extent that detrimental soil disturbance is less than 15%.
      i. Detrimental displacement is displacement that results in “divots” where equipment has turned on loose soils where more than half the natural topsoil depth is displaced over a 100-square-foot area.

ii. Detrimental compaction is compaction that extends to the 4- to 8-inch depth, soil structure that is clearly altered to massive or platy and does not break towards a natural structure with gentle handling, and roots and pores that are flattened.

4. Ensure further reviews by the soil scientist or designee of new disturbance on shallow soils and low site areas, such as new landings, skid roads, or temporary roads; use the review to recommend actions to minimize effects to soils.

5. Install two additional cross ditches for skid trails and fire lines terminating at roads or OHV trails; install one cross ditch at approximately 30 feet from the intersection on all slopes, and install a second cross ditch 100 feet from the intersection for slopes less than 10 percent and 60 feet for slopes greater than 10 percent.

Cultural Resources

1. Protect historic properties within the area of potential effects (APE) from adverse effect through the application of the Approved Standard Protection Measures detailed in Appendix E of the *"Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), the California State Historic Preservation Officer, the Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Processes for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forest of the Pacific Southwest Region (Regional PA, 2013)."*

2. Identify all resources at risk (RAR) within the APE with flagging and/or on maps prior to initiating project activities (Klemic, R2012050360011). Consider as exclusion zones areas in which activities would occur within the APE and areas in which the archaeological survey has been deferred unless reviewed by the district archaeologist on a case-by-case basis.

3. Establish protection measures specific to prescribed burn activities, detailed in the Regional PA, 2013, Appendix E, Section 2.2, (b)(1)(A-K), for each RAR based on coordination between cultural resource managers and fuels specialists prior to implementation.

4. Should any previously unrecorded cultural resources be encountered during implementation of this project, immediately cease all work in that area and immediately notify the District Archaeologist. Resume work subsequent to approval by the District Archaeologist for implementation of additional protection measures, as necessary to meet provisions in the Regional PA (2013). Should any cultural resources become damaged in unanticipated ways by activities proposed in this project, follow the steps described in the Regional PA, 2013 for inadvertent effects.

Monitoring

Site-specific monitoring of project activities will be conducted if any of the action alternatives are implemented. This monitoring is designed to verify that the projects are implemented as designed, and that they are effective in meeting the project and Forest Plan objectives. The overarching purpose of monitoring is to provide feedback to the Forest that enables evaluation of the achievement of ecosystem health and sustainability and improvement of management to better meet the expectations of the public.

One aspect of monitoring looks at the degree to which project objectives, standards, and guidelines of the Forest Plan are being implemented. Another aspect is measuring the effectiveness of management practices used in site-specific projects. Monitoring is also used to verify the assumptions and models used in planning. Funding for monitoring may vary; this may lead to assessing priorities as needed to assure the integrity of Forest Plan monitoring and evaluation. When it is certain that regulations and standards are being met, monitoring of a particular element would cease. If monitoring evaluations show that regulations or standards are not being achieved at the desired level, management intervention would occur and monitoring would continue.

Project Level Implementation

Each active management unit would be visited at a frequency necessary to assure compliance. Monitoring of preparation and implementation would occur at regular intervals to ensure compliance with prescription intent and, where applicable, contract provisions. Minor contract changes or contract modifications would be enacted, when necessary, to meet objectives and standards on the ground.

Post-treatment monitoring within the project area may be conducted following project implementation to ensure that the design criteria are effective.

Invasive Plants

Locations of any new infestations of invasive plants would be mapped, reported to the project botanist, and documented for continued monitoring.

Monitoring for new and expanding invasive plant populations would be conducted at treatment sites known to have invasive plant occurrences throughout project implementation and after treatment for 2-3 years depending upon need.

Wildlife

California spotted owl, great gray owl, and northern goshawk nest stands or territories may be surveyed to determine occupancy where LOPs may be waived.

Water Quality and Soils

BMP monitoring would take place based on annual BMP-monitoring protocols. Onsite evaluation protocols are applied to both randomly and non-randomly selected project sites. The number of random evaluations to be completed each year is assigned by the Regional Office, based on the relative importance of the BMP in protecting water quality; and those management activities most common on the individual Forest. Forests supplement these randomly selected sites with additional sites based on local monitoring needs, such as those prescribed in an environmental document, or as required under the Regional Water Quality Conditional Waiver for Timber Sale Activities on Federal Land. Onsite evaluation protocols are used to assess the implementation and effectiveness of individual BMPs or groups of closely related BMPs. Additional details can be found in Investigating Water Quality in the Pacific Southwest Region (USDA Forest Service 2002) and Water Quality Management for National Forest System Lands in California (USDA Forest Service 2011, Water Quality Management Handbook).

Monitoring of a least one stream segment would occur as described in Section 16.34 of the 2011 Water Quality Management Handbook for Region 5 of the Forest Service. This applies to watersheds that are currently at a very high risk of CWE (above the Threshold of Concern) and watersheds that will be at very high risk of CWE as result of the Trestle Forest Health Project.

Implementation, effectiveness, and forensic monitoring of the project would occur as defined in the Central Valley Timber Harvest Waiver Eldorado National Forest Monitoring Plan.

Cultural Resources

To the extent possible, based on improved ground visibility, additional survey would be conducted of up to 20% of areas previously not surveyed or where survey was deferred within one year following completion of associated project activities.

Comparison of Alternatives

This table provides a brief summary of the alternatives and their environmental impacts in comparative format.

Table 2
Comparison of Proposed Activities for Each Alternative

	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 4	Alternative 5
Project Activities				
Ground Based Mechanical Commercial Thinning (Natural Stands)	0	4,368	2,304	3,295
Skyline Commercial Thinning (Natural Stands)	0	76	0	0
Ground Based Mechanical Commercial Thinning (Plantations)	0	418	431	431
Non-Commercial Mechanical Thinning (Natural Stands)	0	0	53	0
Non-Commercial Mechanical Thinning (Plantations)	0	25	25	25
Hand Thinning and Pile (Natural Stands)	0	1,492	1,123	1,112
Hand Thinning and Rx Burn (Plantations)	0	6	6	6
Prescribed Burn as primary treatment	0	9,583 (984 first priority; 8,599 opportunity)	12,595 (1,563 first priority; 11,032 opportunity)	11,102 (970 first priority; 10,132 opportunity)
Prescribed burning, both follow up and primary treatment	0	15,812	15,113	15,111

	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 4	Alternative 5
Non-Commercial Mechanical Roadside (Capps Crossing and Caldor-Grizzly/Leoni Road)	0	57	59	59
Roadside Brushing (Capps Crossing and Caldor-Grizzly/Leoni Road	0	88	167	143
Road Reconstruction (miles)	0	84.1	65.8	69.5
Road Obliteration (unauthorized routes)	0	3.1	3.9	3.9
Achievement of Purpose and Need				
Acres of Flame length less than 4 feet	4,429	10,826	9,494	9,771
Acres of Fireline Intensity less than 100 btu/ft/sec	4,197	8,734	7,119	7,489
Acres of Rate of Spread less than 10 chains per hour	6,770	11,671	10,316	10,659
Acres of Surface Fire type	4,863	11,057	9,660	9,950
Strategic placement of treatments (SPLAT) acres	0	3,564	2,873	2,967
Wildland Urban Intermix (WUI) treatment acres (mechanical, hand thinning, first priority rx burn)	0	7,858	6,229	6,397
Grizzly Flats CWPP treatment acres	0	3,682	3,504	3,295

	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 4	Alternative 5
Risk of mortality for residual trees and stands from competition for resources	Highest for all stands	Reduced	Reduced, but on fewer acres than Alternative 2	Reduced, but on fewer acres than Alternative 2 and more acres than Alternative 4
Changes to diameter distributions	Largest increase in the mid-sized diameter classes (10 to 11.9”) over the long term.	Slight increase in the largest diameter class and decreases in the small and mid-sized classes over the long term	Similar to Alternative 2, but on fewer acres	Similar to Alternative 2, but on fewer acres
Changes to species composition	No improvement. White fir and cedar would continue to be dominant tree species.	Increase in pine and oak and decrease in shade tolerant species over the short term and long term	Similar increase in pine and oak and decrease in shade tolerant species, but on fewer acres than Alternative 2.	Similar increase in pine and oak and decrease in shade tolerant species, but on fewer acres than Alternative 2 and more acres than Alternative 4.
Growth and maintenance of large pines	Not improved	Improved for some individual trees	Improved for some individual trees	Improved for some individual trees
Improved Aquatic and Riparian Habitat	None	Improvement due to road reconstruction and restoration of dispersed recreation sites	Similar to Alternative 2, except 20 fewer miles of road reconstruction occurring.	Similar to Alternative 2 except 15 fewer miles of road reconstruction occurring.
Erosion and sediment delivery	High in event of Wildfire	Low from activities. Lowered in event of wildfire.	Low from activities. Lowered in event of wildfire.	Low from activities. Lowered in event of wildfire.
Est. Volume Harvest in cubic feet	0	36,386	19,728	25,944
Appraised Value for Mechanical Vegetation Treatments (commercial thinning)	0	$1,455,441	$789,098	$1,106,122

	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 4	Alternative 5
Cost Directly Associated with Mechanical Vegetation Treatments (not including rx burning)	0	$1,756,317	$1,297,906	$1,349,324
Value compared to cost for treatment of mechanical units (not including rx burning)	0	-$300,875	-$508,807; cost above value of commercial treatments is approximately $208,000 more than Alternative 2.	-$243,202; cost above value of commercial treatments is approximately $58,000 less than Alternative 2.
Cost of Hand Thinning Treatments	0	$1,797,477	$1,354,344	$1,341,647
Cost of Rx Burn Treatments (follow up and primary treatment)	0	$3,162,400	$3,022,600	$3,022,200
Cost of Rx Burn as Primary Treatment (first priority units)	0	$265,680	$422,010	$261,900
Effects				
Effects to Plants	No effects, however restoration activities and prescribed burning would not occur to improve habitat for Pleasant Valley Mariposa lily.	Potential for impact to some individuals and habitat, however design criteria including “flag and avoid” minimize the potential for impacts to plants.	Similar to Alternative 2, except fewer sensitive plant occurrences occur within treatment areas.	Similar to Alternative 4.

	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 4	Alternative 5
Watershed Cumulative Effects	No Change.	Potential to increase the risk of CWE in six of the seven watersheds. Two watersheds would be at a “Very High” risk of CWE through 2026; one of which is currently at “Very High” risk.	Similar to Alternative 2, except one of the watersheds (Clear Creek-Steely Fork Cosumnes River) would be at “Very High” risk of CWE for shorter period of time.	Same as Alternative 4.
Effects to aquatic species	No Effects. Greatest risk for mortality and habitat loss from wildfire.	Minimal potential affects to aquatic species, such as foothill yellow-legged frog or western pond turtle.	Same as Alternative 2.	Same as Alternative 2.
Acres of late seral (CWHR 4M/4D and 5M/5D) habitat (15,441 acres within the project area) affected by commercial thinning	0	4,123 4M = 423 4D = 3,086 5M = 0 5D = 614	2,304 4M = 271 4D = 1,725 5M = 0 5D = 308	3,184 4M = 310 4D = 2,487 5M = 0 5D = 387
California spotted owl HRCA (17,725 suitable HRCA habitat acres within project area): Acres of suitable habitat (CWHR 4+ ≥50% canopy cover) affected by commercial thinning	0	3,871	1,971	2,933

	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 4	Alternative 5
California spotted owl HRCA (13,006 acres high quality suitable HRCA habitat within project area): Acres of high quality suitable habitat (CWHR 4+ ≥70% canopy cover) affected by commercial thinning	0	2,588	1,286	1,928
California spotted owl Circular Core Areas (9,532 acres high quality CCA habitat within project area): Acres of high quality suitable habitat (CWHR 4+ ≥70% canopy cover) affected by commercial thinning	0	1,836	847	1,444

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

In determining cumulative effects, the effects of past and present and future actions were added to the direct and indirect effects of the proposed action and alternatives. Past, present, and reasonably foreseeable activities for the planning area are displayed in Appendix C of this document. It is important to keep in mind that the cumulative-effects analysis areas for the various resources are not always identical. For instance, an aquatic environmental analysis might be based on a watershed boundary, while the sensitive plants analysis is tied to a particular set of habitat types and topographic features.

Forest Vegetation

Effects on forest vegetation are summarized from the Silviculture Report for the Trestle Forest Health Project (Howard and Walsh 2014) and Forest Health Report (Bulaon and MacKenzie 2016).

Affected Environment

The principle forest cover types found in the project area are Sierra Nevada Mixed Conifer and Ponderosa Pine. The major species mixed in this forest cover type are white fir, Douglas fir, ponderosa pine, Jeffrey pine, sugar pine, incense cedar, and oaks. In a large proportion of the project area, stands are dominated by an understory that is dominated by dense, shade tolerant white fir and incense cedar saplings and small trees. Some areas have been thinned in the past and understories are less dense, but maintenance of the stand understory and overstory is needed to continue to achieve desired fuels and density conditions. Within the project area, there are also areas of brush species including choke cherry, green leaf manzanita, deer brush, bear clover, and white thorn. The average age of the dominant trees within the natural stands in the project area is generally around 130 years, and an understory which is about 30-80 years of age. Scattered across the project area are large conifers, primarily Douglas fir, sugar pine, and ponderosa pine, that exceed 300-400 years of age.

The existing plantations within the Trestle project area were planted primarily with ponderosa pine. Plantations established during the early 1960s, 1980s, and 1990s have a low to high component of competing brush species (white leaf manzanita, bitter cherry, deer brush, white thorn, and natural regeneration of shade tolerant conifers, including incense cedar and white fir. Based upon existing stocking levels and stand densities of conifer plantations within the project area, inter-tree competition is extremely high with a relatively moderate risk of insect epidemics coupled with low growth rates of individual trees.

Historically, at the lowest elevations or higher up on the drier south or west aspects and ridges within the project area, fires were generally frequent, ranging from fire return intervals of 5 to 15 years, with individual sites sometimes burning two years in succession. Current vegetative conditions in the Trestle project area differ markedly from the historic condition and most of the current stands exceed the historical range of variability in terms of ecosystem structure and process. Multiple decades of fire exclusion, grazing by domestic livestock, and logging have altered fire regimes, fuel loadings, and vegetation composition and structure (Miller et al., 2009; Bouldin, 1999; Beesly, 1996; and McKelvey & Johnston, 1992). Unhealthy conditions are indicated by increased densities of trees, resulting in elevated levels of insect-related tree mortality and an accumulation of ground and ladder fuels within the project area.

Dense, closed canopied forests tend to favor shade tolerant white fir and incense cedar and exclude shade intolerant ponderosa pine, oak, and sugar pine. The shade tolerant species generally are more susceptible to mortality from fire, and form dense understory thickets, which act as fuel ladders to the larger overstory trees. Dense stands demand more water and other limited resources and, as a result, overly dense stands are less resistant to insect and disease-related attack, especially during periods of extended drought. The structure of the current forested landscape represents an unstable, unsustainable, and therefore, undesirable departure from the historic landscape for this area.

Key observations regarding insect and disease in the project area are: 1) Throughout the project area, white fir of all age classes were found to have moderate levels of white fir dwarf mistletoe (*Arceuthobium abietium*) infection in association with Cytospora cankers (*Cytospora abietis*); 2) overstocking, vegetation density, and pole-sized (10 inch d.b.h. and larger) trees within Jeffrey pine and ponderosa pine plantations combine to increase the risk of Jeffrey pine beetle (*Dendroctonus jeffreyi*), western pine beetle (*Dendroctonus brevicomis*), and pine engraver beetle (*Ips* species) related mortality; 3) the project area has recently experienced an increase in pine tree mortality resulting from the drought and related insect infestations (Bulaon and MacKenzie 2016); and 4) the pathogen, *Heterobasidion occidentale (*aka *H. annosum* "S" type*)* is present, but only in a nominal amount. *Heterobasidion irregular* (aka *H. annosum* "P" type) has not been discovered in ponderosa pines in the Trestle project area.

Snags and Down Logs

Stand exams in 2012 and 2013 showed natural stands proposed for commercial thinning containing approximately 3 dead trees per acre greater than 15 inches dbh, with the snags having an average diameter of 25 inches dbh and being about 60 feet tall. Snags ranged in size from 15 - 88 inches dbh and heights ranged from about 50 feet to 170 feet. Dead trees were mostly white fir with nominal amounts of sugar pine and ponderosa pine snags in various stages of decomposition, from recent dead to buckskin hard snags. More numerous snag numbers were observed in drainages and lower slopes outside of the proposed thinning units, which are primarily located on ridge top and south slopes.

Additional mortality from insects, likely associated with the prolonged drought, has been increasing since 2014 in and adjacent to the project area to the extent that there are likely few areas with less than 4 snags greater than 15 inches dbh per acre. Within the stands, exams show that there is an average of 42 logs (>12 inches and 10 feet long) per acre with an average diameter of diameter of 22 inches and an average length of 32 feet. In 2016 a Forest Health Protection review indicated that the project area was experiencing bark beetle activity consistent with “incipient epidemic”, meaning activity was rapidly building, with a high potential of becoming an outbreak if favorable conditions persisted (Bulaon and MacKenzie 2016). The report noted that this stage of insect activity represents the opportune time to attempt active management to reduce further mortality (Schmid et al. 2007). Even following the above average precipitation of the 2016-2017 winter, mortality in the overstory pines is continuing, with some patches near the community of Grizzly Flats.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

No activities would be undertaken with this alternative. Direct impacts from project related activities would not occur to vegetation resources in the project area. There would be no thinning of suppressed, intermediate, and co-dominant conifers with the project. There would be no reduction of competing brush cover or reduction of tree density. The continued susceptibility of the area to adverse wildfire effects from high fire hazard potential and insect and disease mortality endangers the long-term sustainability of the stands. No Action is still a management decision and would have indirect consequences to forest vegetation resources. This alternative is not expected to result in achievement of desired future conditions in many of the stands in the project area over time, to the extent that they remain at risk for high severity wildfire, high levels of insect mortality, and a species composition that is trending away from the desired future conditions.

Short-term effects of the No Action Alternative would be continued moderate levels of tree mortality in all size classes and all species. A great number of understory trees would continue to survive, although their growth rates would be extremely slow. There would be no major shifts in tree species or stand growth. Some individual trees that are in dominant crown positions would continue to grow well. However, insect and disease mortality would continue to take tolls on the trees with low vigor and experiencing inter-tree competition, even if they are in dominant or co-dominant positions, as demonstrated by the recent mortality of overstory pines. Although canopy bulk densities and canopy base heights would not change significantly if normal precipitation levels return and allow a full drought recovery, patches of tree mortality already occurring may result in localized canopy thinning or opening.

Long-term effects of this alternative would be evidenced by stands wherein the number of suppressed shade intolerant trees have diminished substantially because of natural mortality caused by inter-tree competition of light demanding ponderosa pine and sugar pine trees and limited soil moisture. The number of shade tolerant trees (incense cedar, white fir and Douglas-fir) in the understory is expected to continue to increase into the future. The over-story and mid-story would experience substantial amounts of natural thinning in all species, while the ingrowth of cedar and fir move to dominate the main canopy. The forest floor would generally be absent of natural regeneration because of heavy fuels and a deep duff layer, except in those areas where wind-throw or insect or diseased-caused tree mortality had sufficiently opened the stand to allow for regeneration of conifer and hardwoods species.

Diameter and height growth would vary greatly in the stand and be largely dependent upon crown position of the tree. The understory trees would experience a substantial decrease in diameter and height growth due to competition for natural resources by the over-story and mid-storied trees. The over-story and mid-storied trees would experience only nominal change is diameter and height growth.

Stand Density and Basal Area

The number of trees per acre would fluctuate over time as trees establish and die within the stands. Basal area and average diameter are expected to increase as existing trees within the stand grow until mortality from wildfire, insects, and disease causes a large proportion of large trees within the stands to die. While some large trees within the stand would continue to grow, growth is expected to be slower for these trees than it would be with the Proposed Action (Alternative 2) due to reduced availability for resources such as water and nutrients. Higher basal area modeled in untreated stands is a factor of more trees per acre rather than larger trees within these stands.

In the absence of disturbance, the proportion of trees in the smaller diameter classes is expected to decrease over time while trees in the upper diameter classes are expected to increase. Increases in the largest diameter class are expected to be reduced from Alternative 2, while trees per acre in the medium sized classes are expected to retain more trees per acre.

Species Composition

Incense cedar and white fir (shade tolerant species) would continue to dominate the understory layer, while oaks, ponderosa pine, and sugar pine would continue to be displaced. This is because these shade tolerant species are more successful at regenerating in the absence of canopy openings created by fire or timber harvest. Release of California black oak from overtopping conifers would not occur and in denser stands, oaks are expected to continue to be overtopped and crowded out by competing conifer species. The number and proportion of shade tolerant trees is expected to increase over time and the proportion of ponderosa pine, sugar pine and hardwoods, as measured in both trees per acre and basal area per acre are expected to decrease.

Canopy Cover

Canopy cover in treatment units would not decrease as a result of the No Action Alternative. In both the short-term and long-term, the No Action Alternative would result in only nominal changes in the percent canopy cover.

Snags and Down Logs

The number of snags and down logs is expected to increase over the long-term, primarily due to mortality caused by insect and disease. In much of the project area, down logs 12 inches and larger would only slightly increase due to normal snag fall. If patches of high mortality or if the insect outbreak continues to an epidemic status, these increases will be expected to be greater. The recruitment rate of snags and down logs would continue to be dependent upon the interplay of precipitation levels, stand density and other natural elements, such as the incidence of insect attack, natural mortality, and amounts of wind-throw. The general upward trend expected in snags and down logs would continue until conditions suitable for tree growth improve. Should a wildfire occur it could potentially create a tremendous number of new snags and down logs while consuming existing snags and down logs.

Plantations

Within the approximately 450 acres of plantations, composition and structure would remain unaltered, except by the processes of succession. Tree growth and vigor objectives for the project would not be achieved. If a wildland fire occurred, fire behavior would be such that mortality would be expected to be extensive and the attainment of old forest conditions would be curtailed. As trees increase in diameter and height, their susceptibility to insect attack also significantly increases without decreasing competing vegetation.

Cumulative Effects

Because no direct impacts would result from project related activities, no cumulative effects to forest vegetation are expected from implementation of the No Action Alternative, other than the continuation of the effects of fire suppression and historical management practices. Under Alternative 1, it is assumed that fires would continue to be suppressed. As previously stated, the fire interval in the project area has already been altered, with fires all but eliminated in the area since the early 1900s, except for the fires that have escaped control and burned with higher severity results. Since fire is the primary mechanism that controlled forest structure and composition, it is safe to assume that other components of the ecosystem have likewise been altered and would remain altered into the future.

Alternative 2 – Proposed Action

Direct and Indirect Effects

The implementation of Alternative 2 would substantially reduce the likelihood of tree mortality caused by insect attack or stand replacement wildfires within the planning area. The effects of this reduced risk would be substantial in terms of vegetation management implications. Some of these effects would include the following:

- The substantial reduction in the likelihood of an insect epidemic and/or wildfire would increase forest resilience and provide better assurance that the existing stands could be carried through to maturity.
- By reducing the risk of a major fire, the loss of investments associated with the destruction of high value large trees and plantations would be curtailed.
- The planning area would be managed in more of a mosaic, without large blocks of contiguous, even-aged stands dominating the landscape. This would allow greater variation in stand age, species composition, structure and function, thus providing additional resilience against insect or disease problems.
- A more constant flow of forest products would be assured, thus facilitating long-term timber management.

Stand Density and Basal Area

As a direct result of harvest, the number of trees per acre and basal area per acre would be immediately reduced in mechanically thinned stands. Because the majority of trees proposed for thinning are in the smaller diameter classes, average quadratic mean diameter (QMD) would immediately increase. Because establishment and ingrowth is expected to continue, the number of trees per acre and QMD are expected to fluctuate over the timeframe of treatments, while basal area is expected to increase as more growth is concentrated on larger trees in the stands. Prescribed burning is expected to further reduce the number of trees per acre and basal area, although the exact changes are subjective in terms of the modeled outcomes. Basal area removals average 39 square feet or 17% of the existing basal area.

Compared to current stand conditions, a reduction in smaller diameter classes would be evident in the years immediately after treatment. In both the short-term and long-term, the numbers of trees per acre in the larger diameter classes are expected to increase. Trees per acre in the smaller diameter classes are expected to decrease as a result of follow-up burn treatments and the faster movement of trees from smaller to larger diameter classes.

Long-term effects of decreased tree density would be a corresponding decrease in inter-tree competition. Reduced competition would permit individual trees greater access to light, water and nutrients. The result would be displayed by increased rates of diameter and height growth with observable growth responses 2-10 years after harvest, particularly in the smaller diameter classes that have been released from competing brush species and conifers. Height growth and corresponding crown development in large trees (generally trees greater than 36 inches dbh and larger) would be nominal because height and crowns have reached their biological potential. Since the treatment areas would have improved growing conditions, the overall resistance of the timber stands to environmental stress, including insect attack, drought, or disease would improve.

The body of forestry research shows how thinning stands helps reduces the incidence of pest damage to the stand (Cochran & Barrett, 1995). Less competition increases the health and vigor of the remaining trees, leading to a reduction of risk to bark beetle attack. As trees grow, spatially trees become crowded and fewer resources are available for each individual tree leading to a decrease in tree and overall stand vigor. Reductions in stand density increase resources available to residual trees. Increased resource availability leads to increased tree growth rates thereby enhancing the development of large trees, adding to the vigor of residual trees (greater crown mass for photosynthesis), which results in a proportional increase in overall stand health. The increase in stand health reduces the susceptibility of the stand to insects, drought, and disease. Studies have found that growth in large older trees increases significantly when high densities of adjacent small stems are removed (Latham & Tappeiner, 2002). The lower the basal area, the faster individual trees will grow. In stands with lower basal area, individual trees generally have larger diameter and larger crowns indicating a higher level of vigor compared to stands with high basal area. However it should be noted that increases in vigor and growth are not expected to result immediately after reductions in density occur as residual trees in overstocked stands may need to grow additional roots and leaves to capture newly available resources. It is expected that it will take approximately 3 to 5 years after thinning before increases in growth and vigor are fully realized.

Species Composition

Proposed treatments would immediately decrease the number and proportion of shade tolerant incense-cedar, white fir, and Douglas-fir, and increase the relative proportion of ponderosa pine, sugar pine and hardwoods, as measured in both trees per acre and basal area per acre. Over time the proportion of the stand occupied by shade tolerant species is expected to increase as growth on existing trees and re-establishment occurs. Zald et al. (2008) found that thinning and burning treatments produced resource conditions generally favoring pine recruitment, however persistence of micro-sites favorable to shade-tolerant species and heavy natural seeding by these shade-tolerant species worked against shifting future forest composition to pine. These authors found that prescribed burning alone in wetter controllable conditions failed to significantly reduce fuels or change stand composition, having little impact on canopy cover and understory light conditions. However, thinning combined with prescribed fire did significantly affect stand conditions and the type of tree regeneration. Therefore, some shade intolerant pine and oak is expected to establish within open areas created through thinning, however establishment will be patchy. Release of advanced oak and pine regeneration will also occur through proposed treatments.

Release of California black oak from overtopping conifers is expected to increase the vigor of individual oak trees. Oak species and other hardwoods greater than 4-inches are not designated for treatment; however, some minor damage may occur to individual trees during treatment activities. Some hardwoods may be removed to facilitate skid trail and landing location, while others may be damaged during the removal of neighboring conifers. It is expected that there will be some loss of individual oak trees through machine piling and burning. Immature oak species may be severely damaged by relatively hot prescribed fires. Fire may weaken the stem and make the oak more susceptible to pathogens. However, burning also provides a beneficial effect by removing pests that infest the acorn crop and by removing competing vegetation. In addition, root crown sprouting of hardwoods is expected to occur.

Canopy Cover

Canopy cover in mechanical thinning units would decrease as a result of management actions in the short-term. In the long-term, canopy cover is expected to gradually increase and move towards or above pre-treatment with the growth of residual trees. Changes in the percentage of canopy cover would vary within mechanical thinning units. Since most of the trees that are removed are in the understory and smaller diameter classes, the overall reduction in canopy cover would not be proportionate to the reduction in the number of trees or basal area.

For some stands, canopy cover would be virtually unchanged, while for others, particularly those areas dominated by trees less than 20 inches dbh, the decrease would be greater. Average canopy cover is expected to decrease approximately 18%. Prescribed burn activities are expected to further reduce canopy cover by about 5%. In the vast majority of stands monitored for canopy cover following thinning treatments on the Eldorado National Forest, we have found that canopy cover has consistently been about 10% higher following thinning than projected with FVS modeling. Therefore, it is likely that average canopy would be higher after treatment than depicted. Canopy cover is not expected to be uniform after treatment. Averages for differing variable density management areas post thinning show a range of average canopy conditions that are expected to result.

Decreases in canopy cover over time can primarily be seen in the 10-20 inch diameter size class, as this is where the majority of removal affects average stand canopy cover. The 4-10 inch class, which represents a larger portion of the trees per acre removed, rarely contributes much to canopy cover. Canopy cover in the largest diameter class is expected to increase over time, indicating that a higher proportion of stands would be moving toward a CWHR classification of 5.

Only minor reductions to canopy cover from prescribed burning and pre-commercial thinning are likely to occur, because these treatments do not target overstory trees. Pre-commercial thinning and prescribed fire only treatments are also expected to have very limited effects on CWHR type.

Snags and Down Logs

Short term direct effects upon snags and down logs would occur. This alternative would involve the felling of snags that are adjacent to roads and some trails open to the public and that pose a safety concern for operations. Additional direct effects on snag and down logs numbers are likely to occur as part of the prescribed fire, machine piling, and pile burning activities.

The specific number of created or lost snags and down logs is impossible to predict because of variations in tree age, size, fuel moisture levels, duff depth, location of snags and down logs within the treatment areas. It is anticipated that those snags and down logs consumed by prescribed fire and pile burning would be replaced by newly created snags and existing snags falling after the burn is complete. These newly created snags and down logs would be in a variety of diameter classes and would have different ecological functions. However, it can be presumed that in the long term, location of individual snags and down logs remaining within the planning area would closely approximate the natural range that existed prior to the time of fire exclusion. Reduction in future fire intensity would reduce snag and down log recruitment.

Reduction in tree numbers and stand densities through harvest would reduce the competition between trees and the development of future snags. There would be a dramatic decrease in the number of new snags formed, once stand density is reestablished within the normal range compared to Alternative 1.

Plantations

There are 449 acres of pine plantations that would receive some form of fuels/vegetation treatments. Natural conifer and hardwood regeneration would be retained where appropriate to attain the desired densities, species composition, vertical and horizontal structure. Treatment activities would directly decrease the susceptibility of the plantations to drought, insects and diseases, and generally promote the health and growth of trees within the plantations.

Indirect benefits to old forest conditions would also be achieved because of the decreased time to reach these conditions and the reduced likelihood of widespread tree mortality that would be expected to occur from a wildland fire. Tree diameter, height, and volume growth and vigor are expected to be increased with the treatments proposed under Alternative 2.

Cumulative Effects

Alternative 2, in addition to other projects in the area would improve forest health by moving stands toward a condition that is closer to that of a forest with an active fire regime. This project in conjunction with other planned and ongoing projects in the area would enable the forest to better meet desired conditions for this landscape. With this and other projects in the area, the project area landscape would be managed as more of a mosaic. This would allow greater variation in stand age, species composition, structure and function, thus providing additional resilience against insect or disease, and resilience of the stands following fire.

Treatment with Alternative 2 is not expected to change the CWHR vegetation typing or size class measure over a majority of the project area. Mechanical thinning activities would reduce the trend of treated stands toward species dominance by shade tolerant white fir, Douglas-fir and incense cedar. Some ponderosa pine stands that have been classified as Sierra Mixed Conifer as a result of in-growth of shade tolerant species may be converted back to ponderosa pine type. In the long-term it is expected some of the plantation stands identified as ponderosa pine would be converted to Sierra Mixed Conifer as a result of silvicultural practices. Additionally, benefits to oaks from treatment are expected to decrease the trend of declining oak within the project area. However, the majority of stands in this landscape managed as part of the National Forest System would not be modified through this project.

It is expected that this project would not contribute to the trend of declining large trees (greater than 30 inches dbh) within the project area that has resulted from past harvest practices and mortality of larger trees removed in salvage operations. It is anticipated that this project may increase the longevity of some of these trees.

This project is expected to alter some snag and down log location and distribution within the project area, however, this project is not expected to contribute to a decrease in these structures that resulted mainly from past treatment practices.

Alternative 4

Direct and Indirect Effects

The emphasis of this alternative is to take a more conservative approach to treatment activities to minimize impacts to California spotted owl habitat. The selection of treatment areas under this alternative is a reflection of the effort to balance the desirability of late-seral wildlife habitat improvement, forest health and stand density, and fuels reduction. Treatment areas would be prioritized and selected based on wildlife and fuels objectives, stand conditions, and locations.

Treated stands would become more resilient to fire, disease and insect infestation through the removal of dense, competing, young-growth trees, and would achieve a greater percentage of large trees in a shorter timeframe than Alternative 1. However, fewer stands would be treated under this alternative than either Alternative 2 or 5.

Because of the reduced thinning intensity in some stands and the treatment of some stands proposed for thinning in other alternatives with prescribed fire only, several hundred acres within the project area would continue to maintain higher densities and inter-tree competition compared with Alternative 2. Therefore this alternative would not achieve the same benefits of improving species composition and residual tree vigor across the landscape as compared to Alternative 2 or Alternative 5.

Increased tree density and competition for resources would be expected to result in more snags and down logs in the short and long-term as compared to Alternative 2 or 5.

Cumulative Effects

Treatment with Alternative 4 is not expected to change the CWHR vegetation typing or size class measure over a majority of the project area. Benefits to oaks from treatment are not expected to decrease the trend of declining oak within the project area. It is expected that this project would not measurably contribute to the trend of declining large trees (greater than 30 inches dbh) within the project area, that has resulted from past harvest practices and mortality of larger trees removed in salvage operations. This project is expected to alter some snag and down log location and distribution within the project area, however, this project is not expected to contribute to a decrease in these structures that resulted mainly from past treatment practices.

Alternative 5

Direct and Indirect Effects

The emphasis of this alternative is to take a more conservative approach to treatment activities to minimize impacts to California spotted owl habitat while still providing for a more effective treatment near the community and in key locations across the landscape to provide for increased implementation feasibility. The selection of treatment areas under this alternative is a reflection of the effort to balance the desirability of late-seral wildlife habitat improvement, forest health and stand density, and fuels reduction.

Treated stands would become more resilient to fire, disease and insect infestation through the removal of dense, competing, young-growth trees, and would achieve a greater percentage of large trees in a shorter time frame than Alternative 1. However, fewer stands would be treated under this alternative than Alternative 2.

Because of the reduced thinning intensity in some stands and the treatment of some stands proposed for thinning in other alternatives with prescribed fire only, some areas within the project area would continue to maintain higher densities and inter-tree competition compared with Alternative 2. Therefore this alternative would not achieve the same benefits of improving species composition and residual tree vigor across the landscape as compared to Alternative 2. However, more areas would have reduced inter-tree competition compared to Alternative 4, resulting in improved species composition over time compared to that alternative.

Increased tree density and competition for resources would be expected to result in more snags and down logs in the short and long-term as compared to Alternative 2, but less than Alternative 4.

Cumulative Effects

Treatment with Alternative 5 is not expected to change the CWHR vegetation typing or size class measure over a majority of the project area. Benefits to oaks from treatment are not expected to decrease the trend of declining oak within the project area. It is expected that this project would not measurably contribute to the trend of declining large trees (greater than 30 inches dbh) within the project area, that has resulted from past harvest practices and mortality of larger trees removed in salvage operations. This project is expected to alter some snag and down log location and distribution within the project area, however, this project is not expected to contribute to a decrease in these structures that resulted mainly from past treatment practices.

Fire/Fuels

The Fuels and Fire Analysis Trestle Forest Health Project (Riesenhuber 2014) summarizes the effects to fire behavior. This analysis reviews the fire’s role within the project area, the fire history, and the current fire hazard and risk of ignition within the project area. The methodology in the analysis provides information on the type of fire modeling and on the specific measurements used to assess the effects of each alternative. A combination of professional fire management assessment and fire modeling is used to provide a meaningful analysis of potential effects of fire behavior related to the spread, intensity, fire type, and strategies of fire managers to contain a wildland fire within the Trestle Project Area.

Fire Modeling Methodology

Assessing fire behavior characteristics allows fire mangers to utilize modeling programs to display potential fire behavior in numerical form. This allows for the comparison of each alternative considered, including the No Action or current condition. The ability to compare alternatives under the same environmental conditions is a necessary aspect in order to ensure an objective analysis of alternatives. Geospatial data can be applied to represent a "numerical" landscape which combined with environmental components of wind and fuel moistures, produces fire behavior outputs.

Fireline intensity, rate of spread, flame length and crown fire potential are modeled outputs to provide a comparison of each alternative. At a minimum, fuel treatments should treat fuels to the 90th percentile weather conditions. Utilizing Steely Fork and Grizzly Flat Remote Automated Weather Stations (RAWS) (located within the Trestle project area) and the National Fire Danger Rating System, historical weather was retrieved to determine 90th percentile weather conditions (Table 4 in Riesenhuber 2014). It is important to remember that not all types of fire behavior or mechanisms that contribute to fire spread or extreme fire behavior can be accounted for within any geospatial fire behavior modeling programs such as the contribution of falling snags, rolling debris, fire whirls, horizontal roll vortices or plume-dominated events.

BehavePlus fire modeling system and FlamMap fire mapping and analysis system were used in the analysis of the Trestle Forest Health Project. Assumptions and limitations of each program are available online at www.firelab.org/fire-behavior.

BehavePlus fire modeling program

- Surface fire behavior of vegetation to relate flame length and fireline intensity to crown fire initiation.
- Crown fire initiation characteristics.
- Probability of mortality.

FlamMap

- Combines both geospatial fuel and topographic data and historical weather conditions, fire spread, flame length, fireline intensity and crown fire type are modeled and compared to each alternative.
- Each 30 x 30 meter grid make up a landscape file used to analyze potential fire behavior compared to each alternative.
- Four ignition points were selected to analyze potential effects of the alternatives.

FlamMap is a fire behavior mapping and analysis program that computes potential fire behavior characteristics and outputs static maps of flame length, rate of spread, crown fire type, etc. The FlamMap fire mapping and analysis system is a PC-based program that describes potential fire behavior for constant environmental conditions (weather and fuel moisture). Fire behavior is calculated for each pixel within the landscape file independently, so FlamMap does not calculate fire spread across a landscape. Potential fire behavior calculations include surface fire spread, crown fire initiation, and crown fire spread. Because environmental conditions remain constant, FlamMap will not simulate temporal variations in fire behavior caused by weather and diurnal fluctuations. Nor will it display spatial variations caused by backing or flanking fire behavior. These limitations need to be considered when viewing FlamMap output in an absolute rather than relative sense. However, outputs are well-suited for landscape level comparisons of fuel treatment effectiveness because fuel is the only variable that changes.

Assumptions used for the fire behavior modeling in the Trestle project area include:

- For alternatives 2, 4, and 5 fire behavior was modeled as if all treatments were completed within the same three year time period.
- Fire behavior was modeled after completion of all mechanical treatments, hand treatments and the first priority burn units.
- Since it is unclear which burn units would be completed within the first 3 year time period, no modeling occurred for the prescribed burn areas outside of the first priority burn units.
- Ignitions points were selected based on prior fire history or locations that are of concern for a fire ignition.
    - Caldor Ignition: this is the location of a lightning fire and an area of high human recreational use. This ignition point was selected to represent a fire starting from either natural or human causes.
    - Dogtown Ignition: an area of low to moderate human recreational use. This point was selected to represent what a fire would do if one should start in the steep, untreated areas of the Cosumnes/Dogtown River drainages. This area is remote and steep with only one road in and out.
    - Long Bear Ignition: an area of high human use with abundant ignition source potential.
    - Steely Ignitions: a fire starting in the Steely Fork is a concern for the Grizzly Flat community (Grizzly Flat CWPP, 2012). There is a history of high human use and lightning fires in the entire Steely Fork drainage.

Affected Environment

Fire Hazard and Risk

Fire risk is the chance (probability) that a wildfire will start, either from natural or human causes, based on recent fire history. Fire hazard is determined by the characteristics of fuels combined with the influences of topography and weather. The fuels' characteristics apply to both dead and live fuels, and include loading (tonnage), size and shape, compactness, horizontal continuity, vertical arrangement, fuel moisture content, and chemical properties. Topographic and weather influences, combined with fuels' characteristics, determine the rate of forward spread of a fire and the intensity at which a fire will burn. Table 3 displays the predicted fire hazard and probable fire risk by 7^{th} field watersheds.

Table 3
Fire Hazard and Risk by 7th Field Watershed

Watershed Name	Hazard	Risk
Big Canyon Creek	Moderate	High
Clear Creek-Steely Fork Cosumnes River	Moderate	High
Dogtown Creek	Very High	Moderate
Lower Steely Fork Cosumnes River	Very High	High
McKinney Creek	Extreme	Moderate
Middle Dry Creek	Moderate	Moderate
Middle Fork Cosumnes River – Five Corners	Very High	Moderate
Middle Fork Cosumnes River – Pi Pi Creek	Very High	Moderate
North Fork Cosumnes River – Bear Meadow Creek	Very High	High
North Fork Cosumnes River – Van Horn Creek	Extreme	High
Upper Steely Fork Cosumnes River	High	High

Fuels

Within the project area, vegetation type varies, creating a mosaic on the landscape. With the absence of fire, due to fire suppression and other management activities, an accumulation of dead fuels, shrub, and small-tree understory connect the surface to the overstory fuels. Table 4 displays the amount and type of fuels within the planning area.

Table 4
Vegetation Classes within the Trestle Project Area

Vegetation Category	Acres	Primary Carrier of Fire
Non-Burnable	17	Barren Land, Rock, and Water
Grass	5	Grass
Grass/Shrub	364	Grass with small shrub influence
Shrub – Low/Moderate Load	479	Shrubs less than 4 foot tall
Shrub - High/Very High Load	930	Shrubs greater than 4 foot tall
Timber Shrub Understory – Low Load	814	Bear Clover, small shrubs less than 2 feet
Timber Shrub Understory – High Load	7,979	Bear Clover with ladder fuels such as small trees and shrubs
Conifer/Hardwood – Low/Moderate Load	2,409	Needle Cast and small dead and downed fuels typically 10 hour fuels
High Conifer/Hardwood – High/Very High Load	6,758	Needle Cast with heavy component of dead and down fuels
Activity Slash/Blowdown	697	Areas with natural blowdown and heavy fuel loadings; mastication

Fire Behavior Synopsis

The area presents difficult and remote access to fire starts due to topographic features and to travel time for initial-attack fire resources. Current strategies on initial fire starts is to utilize aircraft, such as air tankers and helicopters, to keep fires small and to allow ground forces the time to get to the location.

Containing large fires is difficult due to several steep drainages in the project area. The current management strategy in these areas is to utilize ridgelines and road systems to contain a large fire. The difficult task is finding a ridgeline which can be utilized to construct fireline down into these steep drainages to contain the flank of a fire. Terrain influences the ability to safely access a flank and to construct line down a usable slope.

Greater than 78% of the planning area has fuel conditions exhibiting high fuel loadings, which are capable of producing surface flame lengths greater than 4 feet, and approximately 71% of the planning area could have flame lengths in excess of 11 feet under 90th percentile weather conditions. There are enough ladder fuels in the mid-story canopy connecting to the over-story dominant and co-dominant trees to initiate crown fire activity. The current fuel conditions, in combination with topographic features, create the potential for high-severity fire on 70% of the 20,453-acre planning area exists under 90th percentile weather conditions. The amount, type, size, and arrangement of fuels result in fire intensity being extremely high on the majority of the landscape. Intensities greater than 500 btu/feet/second, which represent potential areas where crown fire and spot fires become a concern in the control of a wildland fire, represent greater than 70% of the planning area. Across the landscape, 76% of the planning area, both passive (71%) and active (5%) combined, has the potential to exhibit crown fire activity. While 71% of the landscape is modeled to have the potential to exhibit passive crown fire activity, if a large fire were to develop in the planning area, it would be expected that these areas also would have the potential to exhibit more active crown fire than shown through modeling. This is because FlamMap analyzes potential fire behavior that does not account for the convective energy of a large fire along with increased winds and preheated fuels.

Both Flame Length and Fireline Intensity are factors in determining crown fire initiation into the canopy and crown fire type given fuel and weather conditions. At 90th percentile conditions, all fuels with a canopy over-story would present some type of crown fire activity dependent on canopy base heights. Low canopy base heights require less direct flame lengths and heating to torch and reach canopies due to their connectivity to the surface fuels below. Under current conditions, 76% of the area would currently exhibit active crown and passive crown fire activity, with 53% experiencing a rate of spread greater than 20 chains per hour. Rates of fire spread less than 10 chains per hour is ideal for firefighters to use direct attack suppression tactics. Rates of fire spread greater than 20 chains per hour requires firefighters to back off to ridge tops and to implement indirect suppression tactics. This would require a significant use of heavy equipment and aircraft with large fire growth and high severity fire effects.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under Alternative 1, there would be no direct or indirect effects since no project-related activities would occur; fuels would continue to remain at their current levels and are expected to increase as surface fuels continue to accumulate. Small diameter trees and shrubs would continue to grow in the understory, increasing both the horizontal and vertical arrangement of fuels. These ladder fuels would continue to extend into the over-story. Natural decomposition of fuels would continue to occur, but not at a rate to outpace new accumulations of dead fuels.

Potential would continue to exist for high-severity fire to occur over much of the planning area. Since current fuel loadings are high, increased residence time of heat in the soil, along with increased heat transfer from surrounding fuels burning at the surface and ground level, would be expected.

In addition, ground fuels contribute to large tree mortality from excessive heating of the cambium and roots, where current fuel loading and fuel structure are such that crown fire propagation is probable; injury to the tree crowns also affects potential mortality and susceptibility to disease due to the trees' weakened state. Utilizing the Behave Plus Fire Modeling Program, tree mortality, predicted by species under 90th percentile weather conditions, shows that as tree size and dbh decrease, mortality increases for all surface fuel conditions (see Table 5 for Ponderosa Pine tree species). Under current conditions, more than two thirds of the project area consists of high to very high fuel load timber shrub and mixed conifer vegetation types. Higher mortality rates would be expected with Sugar Pine and White Fir trees in the planning area.

Table 5
Probability of Mortality of Ponderosa Pine 90th Percentile Weather Conditions, Average Tree Height100 feet, 30 inches dbh

Vegetation Type	Tree Crown Fraction (proportion of crown to tree height in ft.)			
	0.3	0.5	0.8	1
Timber Shrub Understory – High/Very High Load	32%	62%	74%	76%
Mixed Conifer – High/Very High Load	0	0	3%	10%
Timber Shrub Understory – Low/Moderate Load	0	0	0	6%
Mixed Conifer – Low/Moderate Load	0	0	0	6%

Plantations within the Trestle project area are an additional concern for fuels. These areas consist of pine trees spaced closely together with interconnected crowns. Manzanita brush, needle drape, and grass are the predominant surface fuels. A fire in these stands would be difficult to control, and a high mortality of plantation stands, due to the relative small tree size and interconnectivity to the surface fuels could be expected. Plantations could burn in a similar way as a brush field, exhibiting high rates of spread and high mortality.

Cumulative Effects

No cumulative effects from treatments would occur in the Trestle project under Alternative 1. Current potential fire behavior within the project area would continue to exist. Some private landowners are active in forest management activities, including timber harvesting, pre-commercial thinning, mastication, burning of activity slash, and tree planting. While some areas (such as clear-cuts) are a benefit to fire spread and intensity, other areas (such as plantations where pre-commercial thinning leaves cut trees within the plantation units) exacerbate fire behavior, increasing fuel loading and heights.

Within the project area, a full-suppression response would be implemented in this area due to the proximity and due to the intermixing of National Forest System Lands and private land. Under Alternative 1, should a large fire occur in the project area, only a few opportunities, specifically along Plummer Ridge and Big Mountain Ridge where previous fuel reduction treatments have occurred, exist to minimize fire size, intensity, and severity.

To provide a comparison to the action alternatives, fire modeling software was utilized to simulate fire growth on the landscape (see Figures 2 and 3 below). Landscape fire modeling of fire spread shows expected fire growth for select, random ignition points. Fire perimeter contours close together represent slow rates of fire spread, and the converse represent rapid rates of fire spread. Simulated fire in Long Canyon and Big Canyon would reach Bear Meadow and the North Fork Cosumnes River within the first burn period during 90th percentile weather and fuel conditions and no suppression actions. North Fork Cosumnes River is a steep and mostly inaccessible drainage at the northern boundary of the Trestle project area.

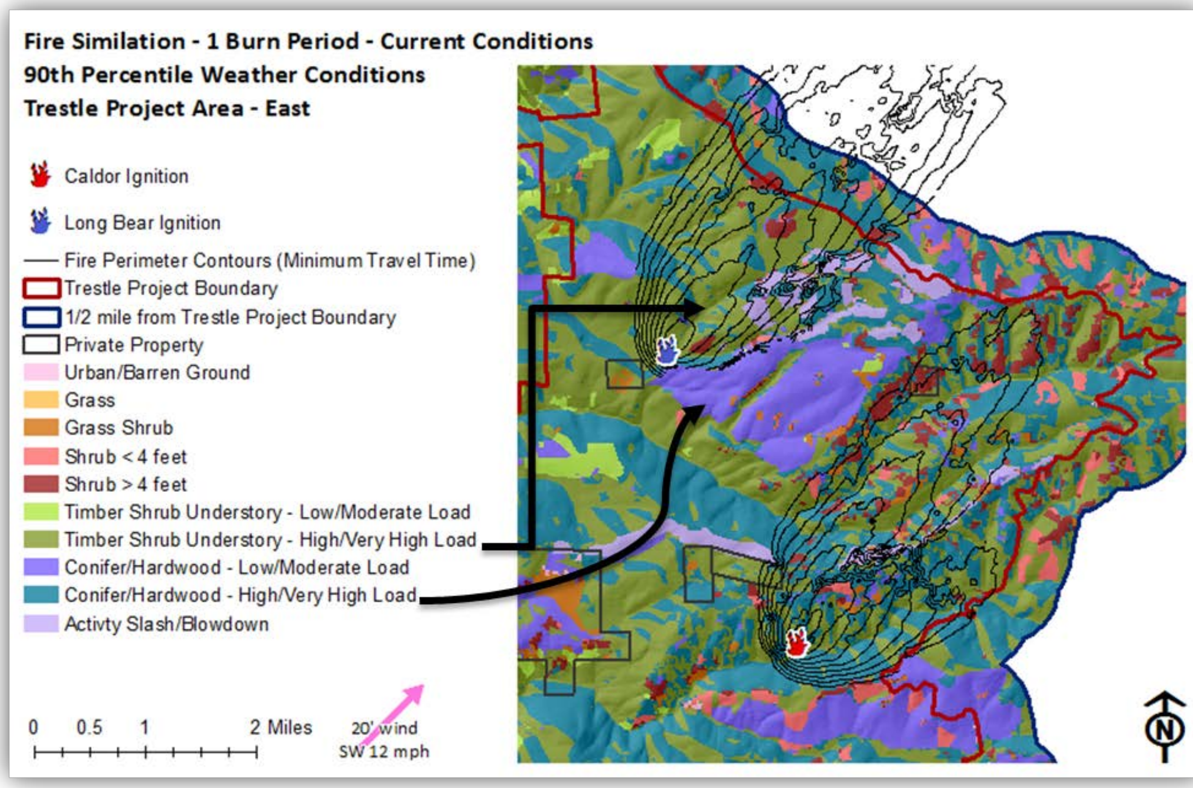

Figure 2. East Trestle Project Area, landscape fire growth modeling for Caldor and Long Bear Ignitions with No Action

Bear Meadow is located on top of a prominent ridgeline running in a southeast to northwest direction, eventually ending in the steep canyon of the North Fork Cosumnes River. A fast spreading fire under current conditions would easily spread to this ridge top and continue spreading beyond. This ridge top would be an ideal location for fire managers to contain a large fire. Under current conditions, it would be difficult to contain a fire such as the one modeled above since there would be insufficient time to prepare road systems and ridgelines for burnout operations. Fire managers witnessed this exact problem when attempting to contain the 2014 King Fire in the Eldorado National Forest.

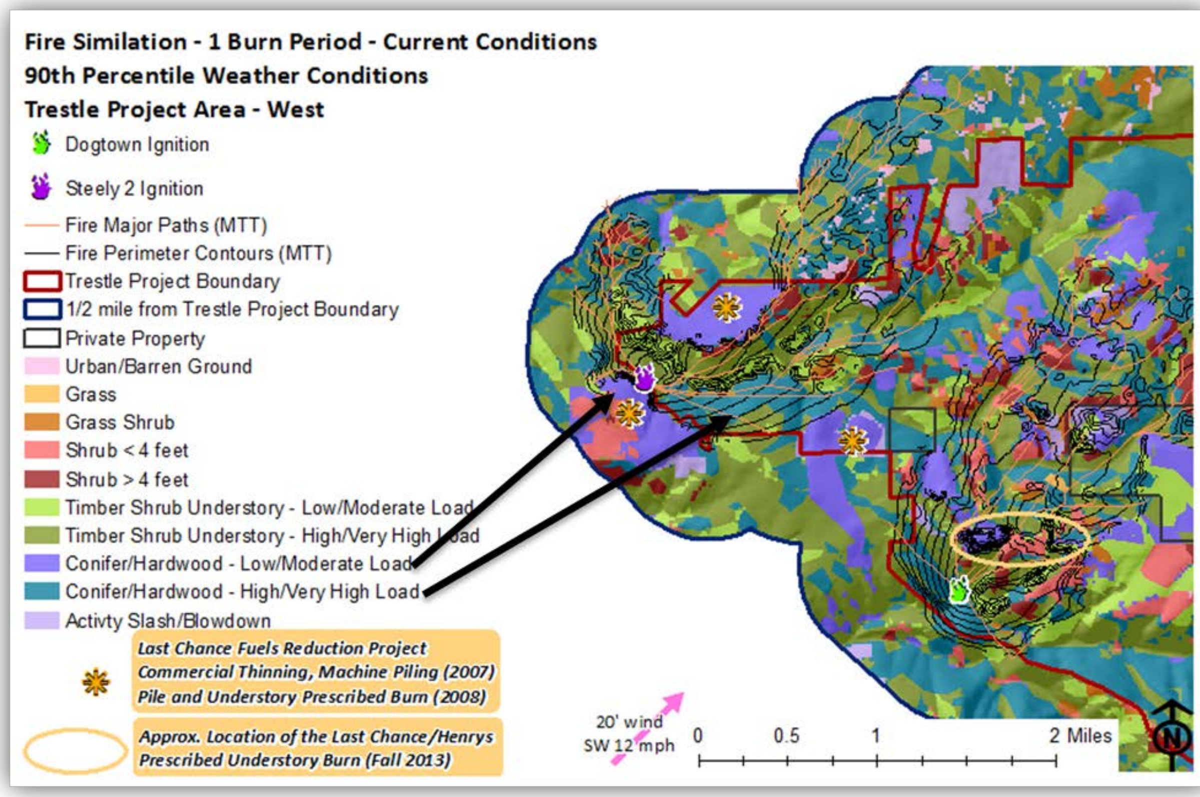

Figure 3. Trestle Project Area - West, landscape fire growth modeling for Dogtown and Steely 2 Ignitions with No Action

In Figure 2, high load fuel models reveal high rates of fire spread where the fire perimeter contour lines are widely spaced. The Last Chance Fuels Reduction Project altered surface fuel loading, increasing canopy base heights of remaining trees and reducing ladder fuels in the treatment units. This results in reduction of fire spread as shown by fire growth of the fire perimeter contour lines. Also, note how both fires slow down or stall out in the low load fuel models while a faster moving fire with several major paths are formed in the high load fuel models.

Alternative 2

Direct and Indirect Effects

Proposed thinning with follow-up pile burning and prescribed fire activities would reduce surface fuels, remove small diameter trees, reduce ladder fuels, increase canopy base heights, and reduce crown bulk density of over-story dominant and co-dominant trees within units proposed for commercial thinning. The change in surface and over-story fuels correlates to a reduction in fire behavior within the treatment units. A change in surface fuels affects flame length, rate of spread, fireline intensity, and crown fire activity. A change in surface fuels, in conjunction with removal of the ladder fuels and some over-story trees, would reduce crown fire activity and type.

Direct effects of prescribed burning are the consumption and subsequent reduction in ground and surface fuels. Typically 70% of dead surface fuel is consumed within the 1 and 10 hour dead fuel category (0- to 1-inch diameter fuels). Dependent on seasonality, 100 and 1,000 hour fuels (1- to 3-inch diameter fuels) can be partially and/or fully consumed. Ground fuels are reduced as portions of the duff layer are consumed.

Prescribed fire would naturally prune the lower branches of trees by burning the live and dead needles, effectively increasing the canopy base heights. Overall, canopy bulk density would be expected to compare to current conditions since mid-story and over-story canopies would remain intact. Isolated torching of single trees is expected where enough surface fuels exist to perpetuate activity, even at cooler weather conditions when prescribed burning is planned.

Units proposed for prescribed burn only may take up to three entries to achieve desired fuel treatment objectives. Units where prescribed burning would be the initial treatment would reduce surface fuel loads initially; however, overtime dead fuels would expect to increase as dead material from the initial burn entry fall to the ground and accumulate. A second entry utilizing hand treatments (such as hand-cutting, or pile burning) or another prescribed understory burn would then reduce those fuels and the process would once again occur. A third entry may be required depending on the remaining fuels after the second entry. Overall, it is expected that the area would have increased canopy base heights enough that additional dead over-story fuels resulting from prescribed fire activities would be minimal. Nonetheless, after each prescribed burn, surface fuel loadings, and resulting fire behavior from a wildfire during 90th percentile weather fuel conditions, would decrease compared to the current condition. Many areas previously thinned and/or burned during previous projects are ready for re-entry burning. Depending on the date of the last treatment and the conditions surrounding the recent prescribed burn, these units may take one or two prescribed burn entries to reach the desired fuel conditions.

Hand thinning within prescribed fire-only units and selected units for hand thinning would be utilized to reduce ladder fuels and to reduce fire effects surrounding large trees or other areas of concern in regards to selected resources, such as heritage sites. Proposed hand thinning with follow-up pile burning and/or prescribed understory burning would reduce surface fuels; removing small diameter trees would thereby reduce ladder fuels and increase canopy base heights.

The opportunity for prescribed burning within masticated units from previous projects, such as the Last Chance Fuels Reduction project, could be implemented with caution taken to limit mortality due to increased surface fuel loadings. The “Red Mountain Mastication Study” (Vaillant et al., 2010) on the Sequoia National Forest provides information on the effects of mastication alone and of mastication with follow-up prescribed burning. While mastication alone lessened the likelihood of crown fire, mastication followed by prescribed burning not only reduced crown fire potential, but it also reduced flame lengths and rates of spread. These results are due to the reduction of surface fuel loadings; however, caution should be applied when burning within mastication as the potential for unacceptable mortality of trees may occur due to residence time of heat during post-fire combustion. At least seven years of decomposing should occur prior to burning in masticated units. Last Chance

Fuels Reduction project was the last entry within the Trestle project area. All masticated units from previous forest activities are older than seven years.

Mechanical treatments are important because there is a high probability these treatments will be accomplished with minimal limitations to implementation. Prescribed fire can be difficult to implement for numerous reasons, including weather conditions, fuel conditions, air quality issues, and resource availability. California has some of the most restrictive air quality regulations in the country, a relatively high density of rural homes surrounded by flammable vegetation, extremely dry conditions during periods when prescribed fire could be used, and rugged topography that challenges containment efforts (North et al., 2012). The units proposed for thinning have the ability to be implemented and to meet the proposed action in a timely manner without the many restrictions of prescribed burning; mechanical thinning can take place during the extended dry conditions of summer and when air quality restricts the use of prescribed fire. Within the proposed action, prescribed burn units are intermixed between mechanical treatments to expand the effectiveness of the mechanical thinning units. Additionally, there are stand-alone prescribed burn units located throughout the Trestle project area. These prescribed burn areas would take advantage of the previous fuel reduction activities on ridge tops to use as holding lines when applying prescribed fire to steeper, untreated slopes.

The benefit in the end is mechanical treatments meet the fuels objective of reducing problematic and extreme fire behavior, with the added benefit of expanding some windows for implementing prescribed burning. Within mechanical thinning units, the change in forest structure decreases surface fuel loadings and increases canopy base heights, which reduce fireline intensities, flame lengths, rates of spread, and crown fire activity. With this reduction, the range of weather conditions where prescribed burning may occur may increase. In addition, with the change in fuel conditions, the resources required to implement and to hold the prescribed burn would be less as well, due to the decreased risk associated with burning in open stands with decreased fuel loadings. Air quality issues would lessen with the amount of fuel available to burn diminished, which leads to fewer smoke emissions. Finer fuels produce fewer smoke emissions and emissions of shorter duration when compared to larger fuels, which would be expected to produce emissions for a longer duration as these fuels continue to consume.

The longevity of fuel treatments varies by vegetation type. However, field observations from previous projects on the Eldorado National Forest indicate that mechanical fuels treatments, in-conjunction with prescribed fire, last a minimum of 10 years or more. Incorporating the use of prescribed fire as a maintenance tool can increase their longevity an additional 10 years. Stephens et al. (2012) highlight the effectiveness of fuels treatments and potential longevity. They found in their study that prescribed fire-only treatments begin to diminish in effectiveness at 10 years. Follow-up burning can increase their effectiveness by an additional 5 to 10 years. Mechanical thinning, followed by prescribed fire, has a longer effectiveness of approximately 15 to 20 years due to the consumption of surface fuels from fire.

Fire Behavior

Tables 6 - 9 provide a comparison of fire behavior characteristics between the proposed action and current conditions. Thinning, piling, and prescribed fire treatments reduce rate of spread, fireline intensity, flame length, and crown fire activity.

Table 6
Rates of Spread

Rate of Spread (chains/hour)	Alternative 2		Current Conditions		% Change
	Acres	% Project Area	Acres	% Project Area	
< 10*	11,671	57.1%	6,770	33.1%	24.0%
10-20	1,842	9.0%	2,653	13.0%	-4.0%
20-40	5,047	24.7%	8,424	41.2%	-16.5%
>40	1,892	9.2%	2,605	12.7%	-3.5%

* Desired Condition

Alternative 2 would reduce rate of spread to less than 10 chains per hour on 11,671 acres (57%) of the project immediately post-treatment. Currently, 6,770 acres (33%) would have rates of spread less than 10 chains per hour.

Table 7
Fireline Intensity

Rate of Spread (btu/ft/sec)	Alternative 2		Current Conditions		% Change
	Acres	% Project Area	Acres	% Project Area	
< 100*	8,734	42.7%	3,080	15.1%	27.6%
100-500	2,037	10.0%	2,631	12.9%	-2.9%
500-1,000	533	2.6%	483	2.4%	0.2%
>1,000	9,148	44.7%	14,258	69.7%	-25.0%

* Desired Condition

Table 8
Flame Length

Flame Length (Feet)	Alternative 2		Current Conditions		% Change
	Acres	% Project Area	Acres	% Project Area	
< 4*	10,826	52.9%	5,753	28.1%	24.8%
4-8	615	3.0%	559	2.7%	0.3%
8–11	272	1.3%	380	1.9%	-0.6%
>11	8,737	42.7%	13,760	67.3%	-24.6%

* Desired Condition

Table 9
Crown Fire Activity

Crown Fire (Type)	Alternative 2		Current Conditions		% Change
	Acres	% Project Area	Acres	% Project Area	
Surface*	11,057	54.1%	5,688	27.8%	26.3%
Passive	8,706	42.6%	13,791	67.4%	-24.8%
Active	688	3.4%	976	4.8%	-1.4%

* Desired Condition

A reduction in fireline intensities and flame length creates a reduction in crown fire potential as both surface fuels and canopy fuels are changed. In the advent of a large fire, it would be expected that, as fire enters the treated area, the fire front would slow, reducing the spread and intensity as it moves through the treated stands. Research has determined that the reduction of surface fuels is the most important component of reducing forest fire hazards since this leads to lower fireline intensity and to increased ability to manage fire when needed (Stephens et al., 2012; Stephens et al., 2009). Breaking the continuity of the overstory trees, in conjunction with the ladder fuels, would reduce crown fire activity. The second most important fuel stratum in terms of fire hazard reduction is commonly ladder fuels, which can provide vertical continuity to move fire from the surface to the forest overstory (Ibid). The potential for passive crown fires is reduced most efficiently by the reduction of surface fuels followed by a reduction of ladder fuels (Stephens et al., 2012). The potential for active crown fires is reduced most effectively by a combination of mechanical and prescribed-fire treatments, because these treatments target ladder and surface fuels and intermediated-size trees. However, prescribed fire alone can greatly increase the wind speed needed to initiate a passive crown fire, which effectively reduces stand vulnerability to torching and its ability to transition to active crown fire (Stephens et al., 2012; Stephens et al., 2009). Both modeling and empirical studies of wildfires burned through treated stands support this result (Stephens et al., 2012; Ritchie et al., 2007).

Stephens et al. (2009) discuss treatment effectiveness of using mechanical only, prescribed fire only, and a combination of mechanical and prescribed fire. These results highlight the effectiveness of reducing surface fuels, thinning from below, and retaining the larger dominant and co-dominant trees in residual stands for reducing fire severity and increasing forest resilience (Agee & Skinner, 2005). The essence of Alternative 2 (Proposed Action), meets the purpose and need of the Trestle Forest Health Project. In particular, fire behavior is altered, trees are more resilient, and the potential survival of remaining trees on site to perpetuate old forest ecosystem habitat components is increased.

Cumulative Effects

Alternative 2 has an overall effect to the landscape in the advent of a large fire. Figures 4 and 5 provide a one-day fire simulation of a free-burning wildfire within the Trestle project area. The overall cumulative result is that fire spread and size is reduced and intensity of the fire is changed adjacent to the treatment units as fire slowly moves through the treated units and the flanks around them. Treating fuels within and adjacent to Protected Activity Centers (PACs) for the California spotted owl, northern goshawk, and great gray owl would assist in reducing negative fire effects inside PACs where treatments may not occur. The more fuels that can be treated adjacent to and within these areas, the greater the fire behavior is decreased and the greater large tree survival would be expected, as a flanking fire around the treated units would lessen fire effects on those areas immediately adjacent to such units.

From a fire suppression standpoint, the majority of thinning treatments are located on strategic ridgelines that would be used to contain a large fire in the project area. Having these treatment areas in place allows fire managers to concentrate forces on other sections of a fire where line construction is needed. Fire resources can make a stand in these units either by containing the fire directly in the treatment units or by utilizing the treatment units as a place to initiate the burn. The overall effect regarding suppression strategy is that suppression damage would typically be less than the current condition since post-treatment fuel conditions would be such that either handline construction or a single blade dozer line could be utilized. For example, during the Ralston fire (2006), a minimum six-blade dozer line was utilized to control the fire (Sandoval per com, 2013). A D-8 Dozer blade is approximately 10 feet wide. Suppression damage to these areas includes approximately 40 to 60 feet of line that is constructed to mineral soil; trees shrubs and other vegetation are removed and pushed into large berms.

While Alternative 2 decreases fire behavior potential inside and immediately adjacent to the proposed treatment units, the Trestle project area still contains, and will contain, areas post-treatment that exhibit potential for high-severity fire. The current potential crown fire activity in the Trestle project area is 76%. Alternative 2 reduces that potential by at least 26%. This results in approximately 50% of the project area which still has an opportunity to experience crown fire activity and high-severity fire effects.

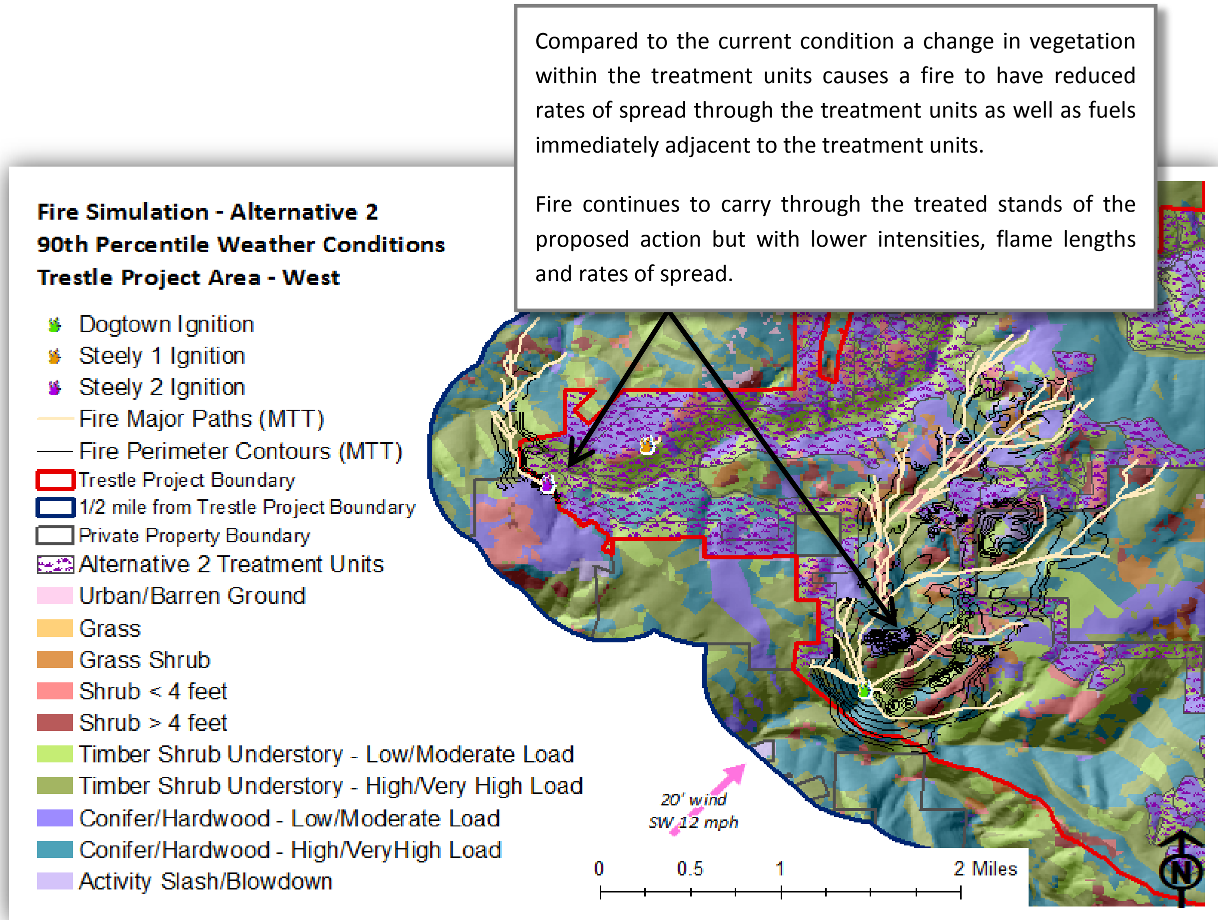

Figure 4. Trestle Project Area – West, Potential landscape fire growth under Alternative 2

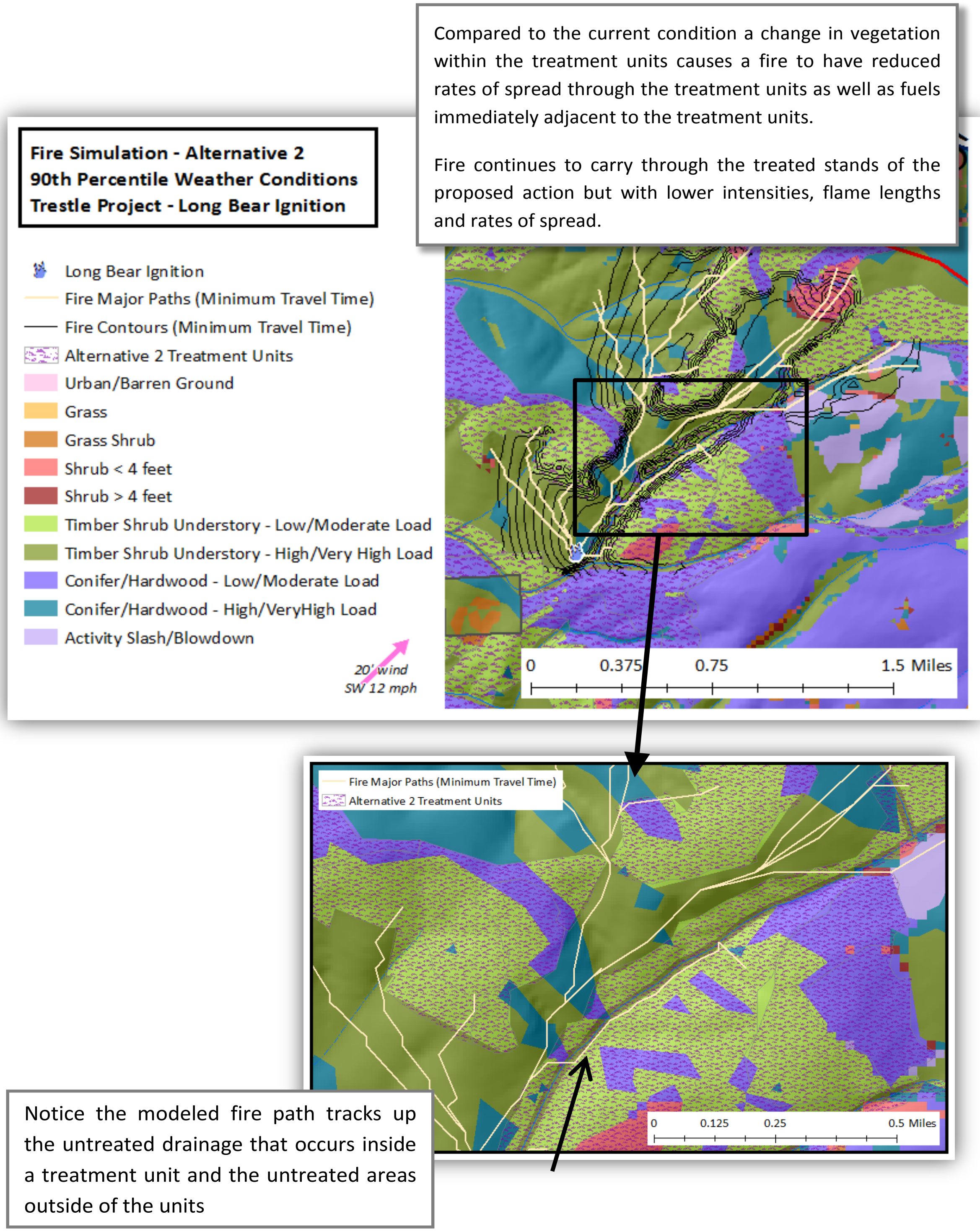

Figure 5. Trestle Project Area – East, Landscape fire growth modeling with Long Bear ignition for Alternative 2

Figure 5 displays the result of untreated drainages adjacent to and within the treatment units. These untreated drainages would act as a wick, channeling fire quickly up the drainage, especially when wind is in alignment with the drainages. However, the fire would drop to the ground and move slower in the treatment units due to the lack of receptive fuel bed. The trees and vegetation within the treatment units and adjacent to the untreated drainages would sustain increased fire behavior effects from the more intense fire burning below and adjacent to the treatment unit. This type of “edge effect” was observed in the Hey Joe project area after the King Fire moved through the area. Much of the increased mortality and high-severity fire effects within the treatment units were immediately adjacent to the untreated drainages. Dense fuel loading and surface-to-crown ladder fuels caused these drainages to burn with high-severity fire effects and, in many locations, experienced greater than 90% mortality of all vegetation classes.

Alternative 2 treats 3,564 acres of strategically placed landscape area treatments (SPLATs), 7,858 acres of the Wildland-Urban Intermix (WUI), and 3,682 acres within the Grizzly Flat Community Wildfire Protection Plan (CWPP). Overall, Alternative 2 of the Trestle project compliments the Last Chance Fuels Reduction Project. The Last Chance project treated fuels within SPLATs and along ridgelines just south of Grizzly Flat. The Last Chance project under the current condition continues to be effective at reducing fire spread. During fire behavior modeling many of the Last Chance units still exhibit lower rates of fire spread and intensities.

Alternative 4

Direct and Indirect Effects

Within the units proposed for treatment under Alternative 4, similar effects to fuels conditions would occur as discussed above in Alternative 2; however, the treatments would occur on approximately 3,005 fewer acres than Alternative 2. The treatment units proposed in Alternative 4, at which similar activities are planned, would result in breaking the continuity and vertical arrangement of fuels to decrease the threat of crown fire activity within the treated areas. Fewer acres would be mechanically treated for fuels reduction purposes with a reliance on prescribed understory burning to obtain fuels reduction objectives. Table 10 displays the fuel models and where the changes occur after implementation of Alternative 4 treatments and after the implementation of Alternative 2 treatments.

Table 10
Vegetation Post Treatment – Alternative 4 as compared to the Proposed Action

Vegetation Category	Alternative 4		Alternative 2		% Change
	Acres	% Project Area	Acres	% Project Area	
Urban/Barren Ground	17	<1%	17	<1%	0%
Grass	5	<1%	5	<1%	0%
Grass Shrub	364	1.8%	364	1.8%	0%
Shrub – Low/Moderate Load	641	3.1%	717	3.5%	-0.4%
Shrub – High/Very High Load	744	3.6%	668	3.3%	0.3%
Timber Shrub Understory – Low Load	2,995	14.6%	3,716	18.2%	-3.6%
Timber Shrub Understory – High Load	5,736	28.0%	4,981	24.4%	3.6%
Conifer/Hardwood – Low/Moderate Load	3,588	17.5%	4,896	23.9%	-6.4%
Conifer/Hardwood – High/Very High Load	5,886	28.8%	5,315	26.0%	2.8%
Activity Slash/Blowdown	476	2.3%	341	1.7%	0.6%

When compared with Alternative 2, changes in surface fuel loadings and increase in canopy base heights in mechanical treatment units result in similar fire behavior modifications of flame length, fireline intensity, rate of spread, and crown fire activity. Tables 11-14 display the change in fire behavior characteristics with Alternative 4 when compared to Alternative 2.

Table 11
Potential Rate of Spread compared to Alternative 2

Rate of Spread (chains/hour)	Alternative 4		Alternative 2		% Change
	Acres	% Project Area	Acres	% Project Area	
< 10*	10,316	50.7%	11,671	57.1%	-1355 ac. (-6.4%)
10-20	1,996	9.8%	1,842	9.0%	154 ac. (0.8%)
20-40	5,939	29.2%	5,047	24.7%	892 ac. (4.5%)
>40	2,113	10.4%	1,892	9.2%	221 ac. (1.2%)

* Desired Condition

Table 12
Potential Fireline Intensity as compared to Alternative 2

Rate of Spread (btu/ft/sec)	Alternative 4		Alternative 2		% Change
	Acres	% Project Area	Acres	% Project Area	
< 100*	7,119	20.4%	8,734	42.7%	-1,615 (-22.3%)
100-500	2,312	13.0%	2,037	10.0%	275 ac. (3.0%)
500-1,000	504	3.0%	533	2.6%	-29 ac. (0.4%)
>1,000	10,516	63.6%	9,148	44.7%	1,368 ac. (18.9%)

* Desired Condition

Table 13
Flame Length as compared to Alternative 2

Flame Length (Feet)	Alternative 4		Alternative 2		% Change
	Acres	% Project Area	Acres	% Project Area	
< 4*	9,494	46.4%	10,826	52.9%	-1,332 (-6.5%)
4-8	572	2.8%	615	3.0%	-43 (-0.2%)
8–11	291	1.4%	272	1.3%	19 (0.1%)
>11	10,094	49.4%	8,737	42.7%	1,357 (6.7%)

* Desired Condition

Table 14
Crown Fire Activity as compared to Alternative 2

Crown Fire (Type)	Alternative 4		Alternative 2		% Change
	Acres	% Project Area	Acres	% Project Area	
Surface*	9,660	47.2%	11,057	54.1%	-1,397 (-6.9%)
Passive	10,060	49.2%	8,706	42.6%	1,354 (6.6%)
Active	732	3.6%	688	3.4%	44 (0.2%)

* Desired Condition

Areas that still exhibit extreme fire behavior potential are predominately located within landscapes not being considered for treatment at all. Localized negative effects may potentially occur in those areas proposed for prescribed understory burning but not completed, due to funding or environmental constraints. These areas of no treatment would retain their current fuel loading and structure. In this situation, fuels would continue to promote problematic and extreme fire behavior conditions for fire suppression resources. Areas left untreated would allow a large fire to travel easily through the untreated areas when compared to a unit that has been treated, reducing the fuel loading and minimizing the effects of problematic and extreme fire behavior.

It is anticipated that a prescribed burn would not burn uniformly; therefore, there would still be pockets of unburned fuels with heavy fuel loading and ladder fuels. Units which were previously treated within the past fifteen years or so would expect to meet resource and fuels reduction objectives within one understory prescribed burn. Meeting fuels reduction objectives in previously untreated units scheduled for prescribed burning only under Alternative 4 would take approximately two to three entries, utilizing a combination of prescribed burning and hand treatments. Prescribed burn-only units and areas left for wildlife hiding cover would still be susceptible to crown fire activity and high-severity fire effects during a wildland fire event.

Cumulative Effects

At the landscape level, Alternative 4 is less effective at modifying fire growth within the Trestle project area. Due to the elimination of strategically placed mechanical thinning units, fire is more prone to move through and into the canopy easily when compared to Alternatives 2 and 5.

Similar fire growth is expected in Caldor and both of the Steely ignition points, as units proposed for treatment are similar to Alternatives 2 and 5. The Long Bear ignition point saw the most significant change in fire growth as treatment units were eliminated along the ridge separating Bear Meadow and Long Canyon (Figure 6).

An area of concern for high fire hazard is located in the northern portion of the Trestle project area (see Figure 6). Under Alternative 4, this general location has little fuels reduction activities planned when compared to Alternative 2. Treatment areas are disconnected, providing little to no options for firefighting resources to make a stance against a wildfire burning at 90th percentile conditions. Fire behavior modeling shows extreme and problematic fire behavior subsequently causing high-severity fire effects.

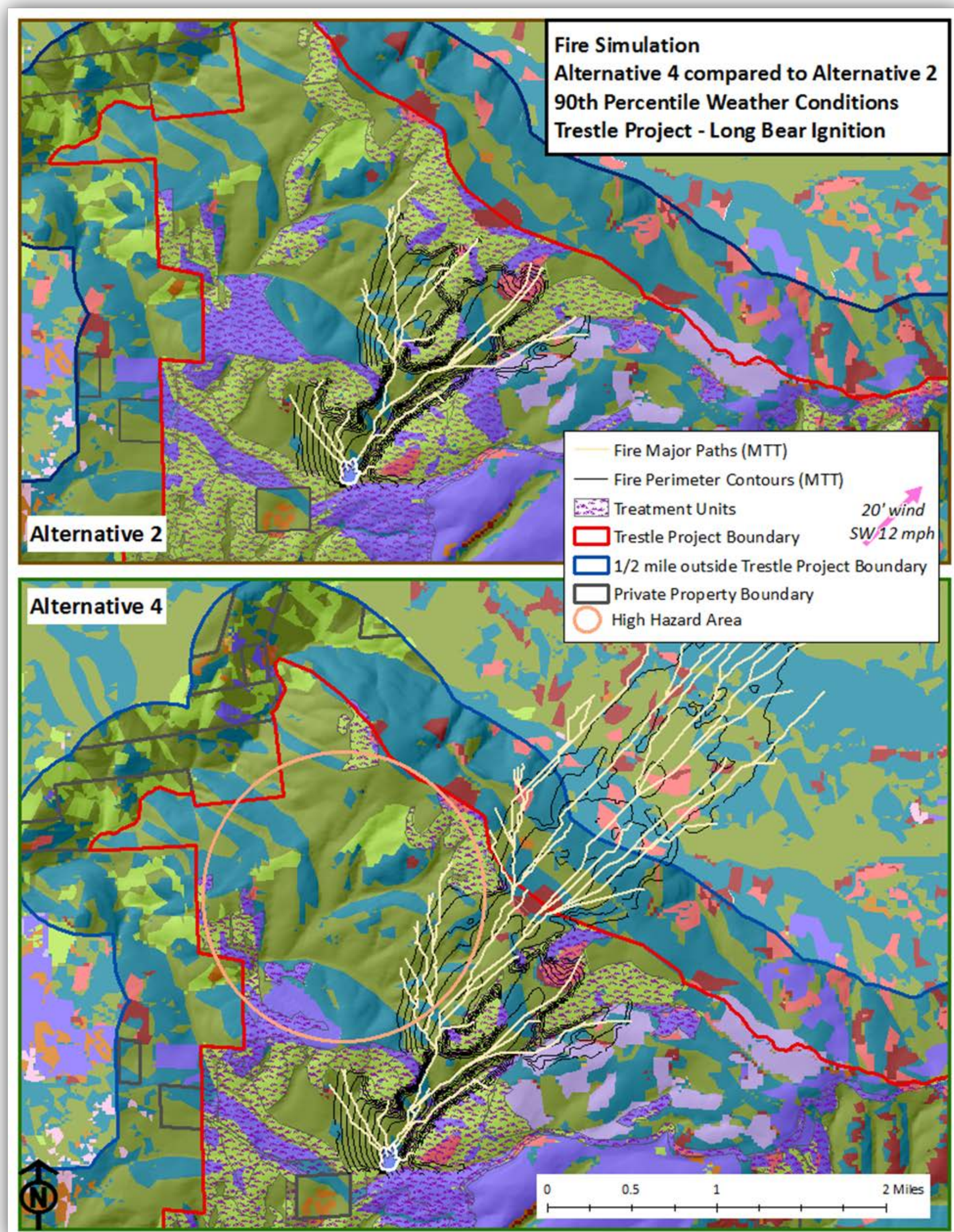

Figure 6. Landscape fire modeling for Long Bear Ignition with Alternative 4

Figure 7 displays fireline intensity comparisons for Alternatives 2 and 4 in the northern portion of the Trestle project. Note the area of High Hazard and the disconnected fuel treatments along several ridges. Under Alternative 4, firefighting resources would have little to no opportunities to implement direct fire suppression tactics on a wildfire burning at 90th percentile in this area.

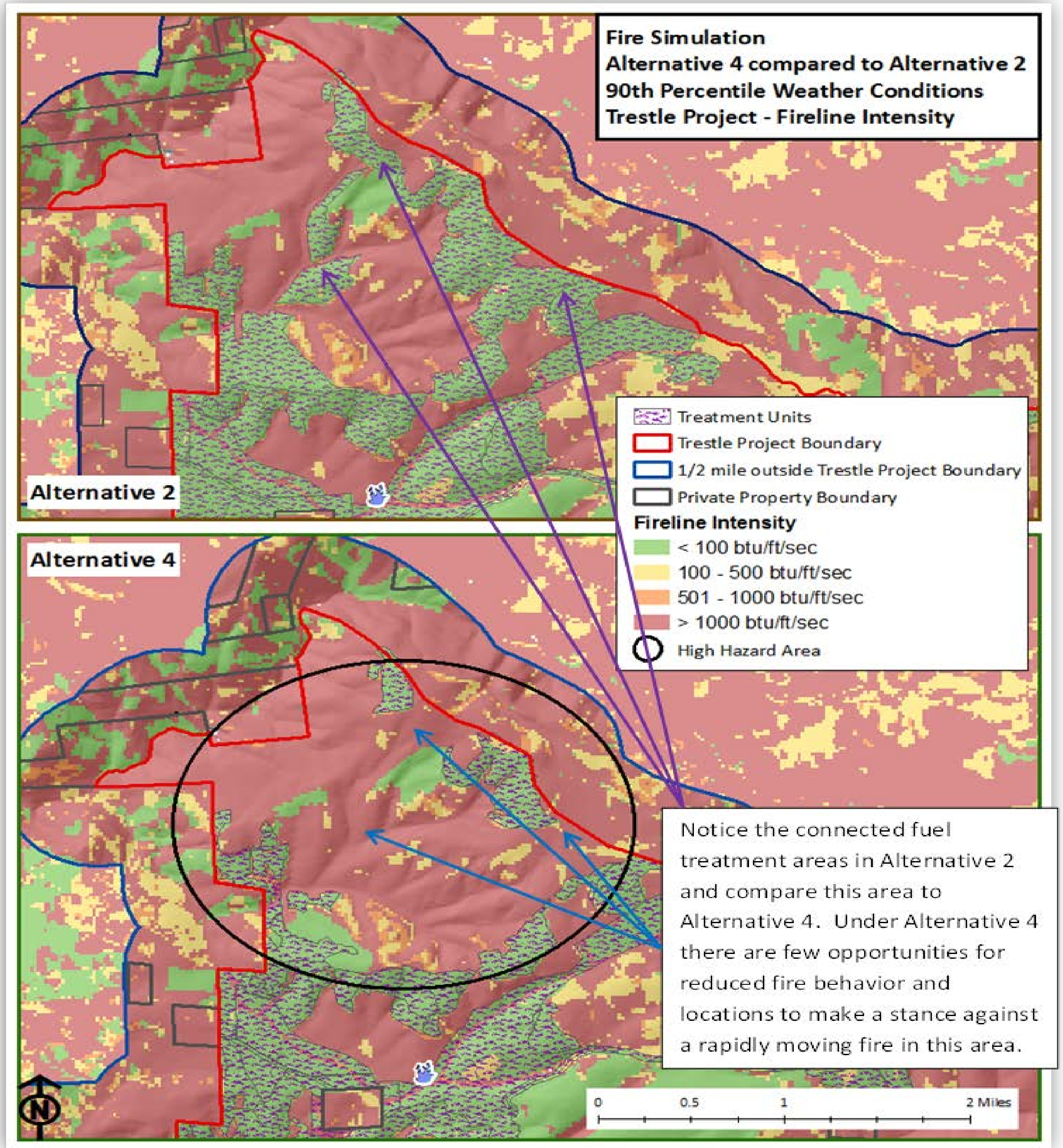

Figure 7. Landscape fire growth modeling for the northern portion of the Trestle Project area; Alternative 4 compared to Alternative 2

Under Alternative 4, there would be an increase of approximately 3,012 acres of prescribed burning as the initial treatment. Due to the backlog of understory burning across the entire Eldorado National Forest, it would be difficult to rely on prescribed burning alone to meet fuels reduction objectives. Considering the many constraints associated with prescribed burning (weather, fuels, air quality, funding, resource availability, limited operating periods, etc.), it is highly unlikely that the entire project area would meet fuels reduction objective within the same five-year time period.

In the WUI, there is a reduction of approximately 1,600 acres (8%) in Alternative 4 treatments when compared to Alternative 2 treatments. Under Alternative 4, the reduction of fuel treatments occurring in the Grizzly Flat CWPP is reduced by nearly 700 acres when compared to Alternative 2. Treatments in SPLATs are reduced by about 178 acres.

Alternative 5

Direct and Indirect Effects

Within the units proposed for treatment, similar effects to fuel conditions would compare as discussed above in Alternative 2; however, approximately 1,328 fewer acres would receive mechanical treatments when compared to Alternative 2. To decrease the threat of crown fire activity within the treated areas, similar activities are planned that would result in breaking the continuity and vertical arrangement of fuels. The activity-generated slash from removal of such trees, in combination with reducing surface fuels with use of piling slash to burn, would produce similar effects as Alternative 2 in terms of reducing fireline intensities, flame length, rates of spread, and crown fire potential during a wildfire. Treating the surface fuels and increasing the canopy base heights reduces crown fire initiation (potential for ignition).

Table 15
Vegetation Post-treatment – Alternative 5 as compared to the Proposed Action

Vegetation Category	Alternative 5		Alternative 2		% Change
	Acres	% Project Area	Acres	% Project Area	
Urban/Barren Ground	17	<1%	17	<1%	0%
Grass	5	<1%	5	<1%	0%
Grass Shrub	364	1.8%	364	1.8%	0%
Shrub – Low/Moderate Load	672	3.3%	717	3.5%	-0.2%
Shrub – High/Very High Load	713	3.5%	668	3.3%	0.2%
Timber Shrub Understory – Low Load	3,227	15.8%	3,716	18.2%	-2.4%
Timber Shrub Understory – High Load	5,503	26.9%	4,981	24.4%	2.5%
Conifer/Hardwood – Low/Moderate Load	3,809	18.6%	4,896	23.9%	-5.3%
Conifer/Hardwood – High/Very High Load	5,671	27.7%	5,315	26.0%	1.7%
Activity Slash/Blowdown	471	2.3%	341	1.7%	-0.6%

Table 16
Potential Rate of Spread compared to Alternative 2

Rate of Spread (chains/hour)	Alternative 5		Alternative 2		% Change
	Acres	% Project Area	Acres	% Project Area	
< 10*	10,659	52.1%	11,671	57.1%	-1,012 ac. (-5.0%)
10-20	2,031	9.9%	1,842	9.0%	189 ac. (0.9%)
20-40	5,674	27.7%	5,047	24.7%	627 ac. (3.0%)
>40	2,087	10.2%	1,892	9.2%	195 (1.0%)

* Desired Condition

Table 17
Potential Fireline Intensity as compared to Alternative 2

Rate of Spread (btu/ft/sec)	Alternative 5		Alternative 2		% Change
	Acres	% Project Area	Acres	% Project Area	
< 100*	7,489	21.4%	8,734	42.7%	-1,245 ac. (-21.3%)
100-500	2,223	12.7%	2,037	10.0%	186 ac. (2.7%)
500-1,000	530	3.2%	533	2.6%	-3 ac. (0.6%)
>1,000	10,209	62.7%	9,148	44.7%	1,061 ac. (18.0%)

* Desired Condition

Table 18
Flame Length

Flame Length (Feet)	Alternative 5		Alternative 2		% Change
	Acres	% Project Area	Acres	% Project Area	
< 4*	9,771	47.8%	10,826	52.9%	-1,055 ac. (-5.1%)
4-8	603	2.9%	615	3.0%	-12 ac. (-0.1%)
8–11	294	1.4%	272	1.3%	22 ac. (0.1%)
>11	9,784	47.8%	8,737	42.7%	1,047 ac. (5.1%)

* Desired Condition

Table 19
Crown Fire Activity

Crown Fire (Type)	Alternative 5		Alternative 2		% Change
	Acres	% Project Area	Acres	% Project Area	
Surface*	9,950	48.7%	11,057	54.1%	-1,107 ac. (-5.4%)
Passive	9,779	47.8%	8,706	42.6%	1,073 ac. (5.2%)
Active	723	3.5%	688	3.4%	35 ac. (0.1%)

* Desired Condition

Cumulative Effects

At the landscape level, Alternative 5 is comparable to Alternative 2. While approximately 1,328 fewer acres of mechanical and hand treatments would occur, the location of the reduced acreage is in proximity to the large areas where mechanical understory treatments and prescribed fire activities are still planned. Therefore, at the landscape level, Alternative 5 would efficiently reduce the spread and intensity of a wildfire within the project area. Figure 8 displays the Long Bear ignition as an example of effective fuel treatments under Alternative 5 when compared to Alternative 2. Under both alternatives, fuel treatments have the same effect in slowing or stopping a wildfire under 90th percentile conditions. As described in Alternative 4, there is still an area of concern for problematic wildfire in the northern portion of the Trestle project area, just north of the Long Bear fire paths and contours. Alternative 5 is more effective than Alternative 4 at reducing the fire effects of a wildland fire on the landscape and reducing chances of problematic fire behavior. Under Alternative 4, few mechanical treatments are scheduled for this area. The treatments in Alternative 5 are islands of treatments which would still slow an advancing fire as it flanked around the treatment units, creating a scenario similar to that of the SPLAT strategy.

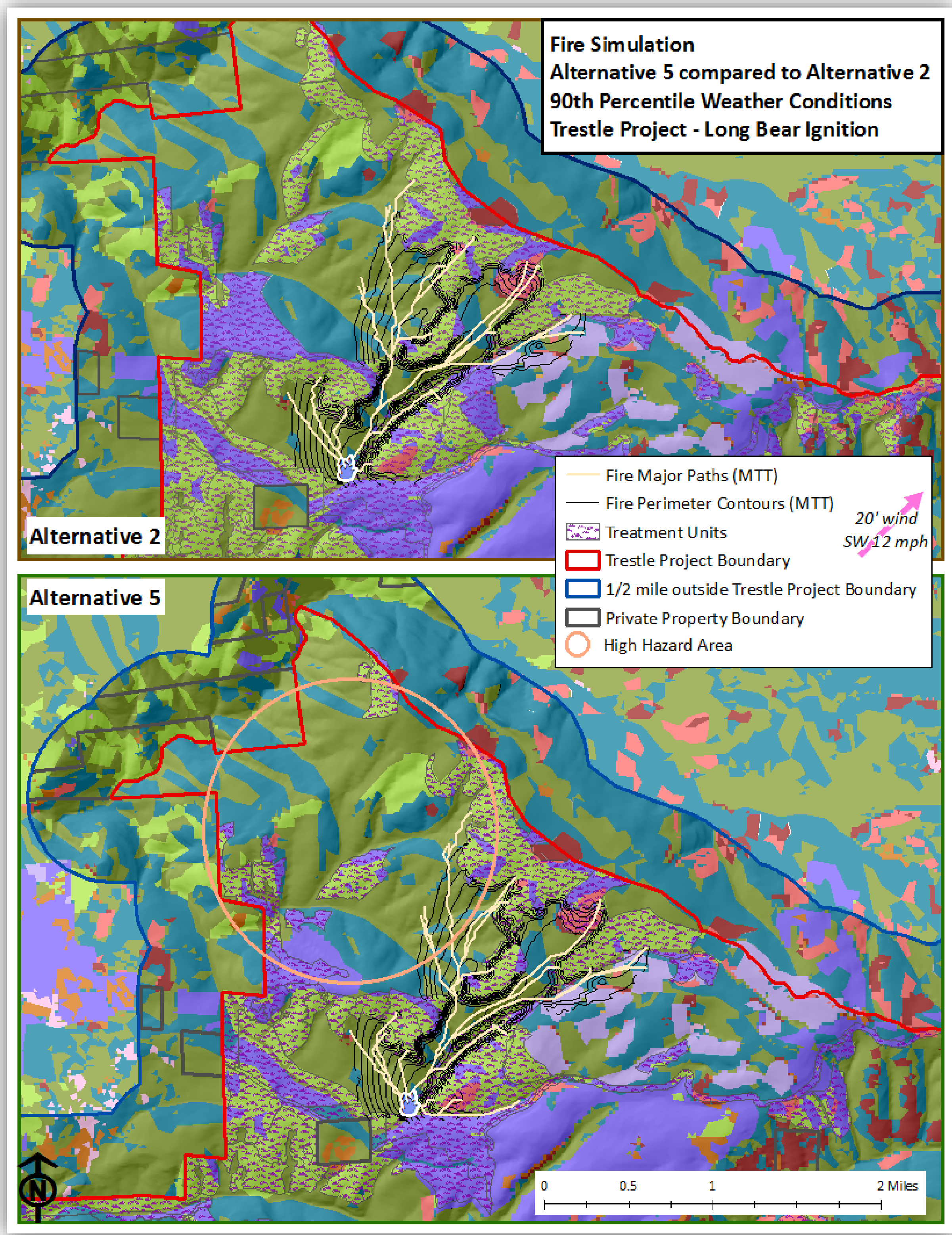

Figure 8. Landscape fire modeling for Long Bear Ignition with Alternative 5 compared to Alternative 2

Within the WUI, approximately 1,400 fewer acres are treated in Alternative 5 treatments than in Alternative 2 treatments. Under Alternative 5, the reduction of fuel treatments occurring in the Grizzly Flat CWPP is reduced by nearly 600 acres when compared to Alternative 2. Treatments in SPLATs are reduced by nearly 400 acres.

Botany

Effects to Threatened and Endangered, Sensitive, Special Interest Species (watchlist), and risk for invasive plants are summarized from Brown (2014). The Trestle project area was surveyed for sensitive and invasive plant species in 2012 and 2013. Surveys were intuitive controlled, targeting potential habitat (lava cap, riparian areas, etc.) and areas commonly infested with invasive species throughout the project area. A majority of existing sensitive plant occurrences in the project area were also monitored in 2012 and 2013.

Affected Environment

Federally Listed Plant Species

No Proposed, Threatened or Endangered plant species are documented in the project area.

Forest Service Sensitive Plant Species

One Sensitive plant species, Pleasant Valley mariposa lily (*Calochortus clavatus var. avius*) is known to occur in the Trestle project area, with 31 documented occurrences within the project area. No other occurrences of Sensitive plant species were located during surveys, although potential habitat is present for thirteen Sensitive plant species, including: *Allium tribracteatum, Botrychium ascendens, Botrychium crenulatum, Botrychium montanum, Botrychium paradoxum, Botrychium pendunculosum, Cypripedium montanum, Lewisia kelloggii ssp. kelloggii and ssp. hutchisonii, Meesia uliginosa, Ophioglossum pusillum, and Peltigera hydothyria.*

Pleasant Valley Mariposa lily (*Calochortus clavatus var. avius*)

Mariposa lily is known to grow on the Eldorado National Forest and adjoining private lands in the area between Union Valley Reservoir and the North Fork of the Mokelumne River. The elevation of known occurrences ranges from 900 to 5,400 feet. *Calochortus clavatus* var. *avius* is most often found on rocky, south-facing slopes in sparse stands of conifers, oaks, and manzanita and/or bear clover, at elevations of 2,800 to 5,700 feet. With a single exception in Calaveras County, Pleasant Valley mariposa lily is endemic to the Eldorado National Forest and adjoining private lands in the area between Union Valley Reservoir and the North Fork of the Mokelumne River and is currently known to occur at 142 locations within this roughly 420 square-mile area (FS Sensitive Plant records 2014, CNDDB). Population size ranges from a few plants into the thousands.

Potential habitat for Pleasant Valley Mariposa lily is found throughout the project area. Surface cobbles are almost universally present, though the rocks may be partly obscured by bear clover and shallow soils. The cobbles and soils are residual materials formed from andesitic lahars. The presence of *C. clavatus* var. *avius* in open stands of conifers may indicate an intolerance of deep shade and/or thick duff. Fire is a key habitat component, as evidence of past fires occurs at nearly all occurrences on the Eldorado NF. Pocket gophers may also influence the local distribution of *C. clavatus* var. *avius* by eating the bulbs. Rocky substrates may provide refugia from such herbivory as well as providing a sunny site with few competitors. The soils, though rocky, often contain considerable clay.

Within the project area, the existing condition of Pleasant Valley Mariposa lily has been influenced by past logging and OHV activity (Elkins OHV Trail System). Early logging activities in the area likely impacted past occurrences directly by trampling plants, disturbing ground, and altering overstory conditions. OHV activity can also threaten populations when vehicles travel through populations, crushing and uprooting plants, and potentially introducing invasive species. Fire suppression has also impacted habitat quality throughout the species range by limiting the role of wildfire in maintaining suitable habitat conditions for Pleasant Valley Mariposa lily.

Of the 31 known populations within the Trestle project area, seven sites are at risk for impacts from ongoing OHV or dispersed recreation activity along designated roads and trails. Recent monitoring also suggests that eleven sites have become overgrown with competing vegetation since being discovered in the mid-1990's.

Special Interest Plant Species (watchlist) and Communities

Pacific Yew (*Taxus brevifolia*) is the only ENF watchlist species known from the Trestle Project area. Pacific yew is an uncommon tree found below 5,000 feet in elevation, generally in moist sites on lower slopes of dense mixed evergreen forest, frequently growing in drainages and shady steep canyons. Pacific Yew is common throughout portions of the Trestle project area especially in the vicinity of Shingle Gulch, Big Canyon, Dogtown Creek and the Steely Fork of the Cosumnes River.

Lava Cap: There are lava cap plant communities within the project area, which are recognized by CNPS as a sensitive plant community type. These plant communities are generally dominated by high diversity of herbs and shrubs adapted to growing on rocky and volcanic soils eroded from Mehrten formation mudflow. Early each spring, these rocky areas give rise to a rich and varied ephemeral plant community. During the rest of the year, lava cap communities often have a sparse barren appearance. Threats to these unique plant communities include OHV activity, fuels reduction activities, landing construction and invasive plant introduction. Because of the lava cap physical situation, on fairly level ridgetops, much of this habitat has been impacted by the construction of roads, trails, and landings across the Eldorado NF and within the Trestle project area. During botany surveys, both pristine and impacted lava cap plant communities were noted throughout the project area.

Invasive Plant Species

Existing noxious weed records were reviewed for the Trestle project area. Generally the project area is relatively free of invasive species but there are a few small high priority infestations (ENF priority 1 and 2) scattered throughout the project area. These include yellow starthistle (*Centaurea solstitialis*), Rush skeleton weed (*Chondrilla juncea*), and Scotch Broom (*Cytisus scoparius*). All infestations occur along roads and trails, although a few have expanded away from existing roadways.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under the No Action Alternative, a number of activities identified in the proposed action that directly benefit sensitive plant populations will not occur in the near future. Pleasant Valley Mariposa lily occurrences along roads proposed for closure would continue to be vulnerable to incursion by motor vehicles. Pleasant Valley Mariposa lily site #39 would not be blocked with physical barricades to prevent further vehicle incursion. Prescribed burning within the 10 overgrown Pleasant Valley Mariposa lily populations would not occur in the near future.

Under the No Action Alternative, some potential effects to sensitive plants described in the action alternatives would be reduced. Most obviously any potential direct effects to any undiscovered occurrences within the proposed project area would be eliminated without the proposed activities. The risk of noxious weed introduction would also be much lower under the No Action Alternative compared to the action alternatives since potential vectors and ground disturbance associated with the project would not occur.

Cumulative Effects

Current and future management activities expected within the proposed project area include hazard tree removal and some minor road maintenance. It is also expected that fire suppression activities would occur in the event of a wildfire in the project area.

The cumulative effects of past activities (logging and fire suppression), current and future management, and the No Action Alternative are potentially adverse for known or any undiscovered sensitive plants within the project area. Past fire suppression and continued increases in fuels and stand density under the No Action Alternative may increase the probability of high severity wildfire occurring within the proposed project area. Both fire suppression activities and large tracks of bare-ground after high severity wildfire are extremely susceptible to invasive plants (Zouhar et al., 2008). The potential introduction and proliferation of invasive species as well as potential sedimentation and altered hydrologic processes (Neary et al., 2005) after an uncontrolled wildfire could adversely impact potential habitat for some sensitive plants. However, large wildfires have also benefited Pleasant Valley Mariposa lily populations on the Eldorado National Forest by removing competing brush and conifers so the potential effects will vary for sensitive species in the project area.

Alternative 2

Direct and Indirect Effects

Thinning units: The proposed project would conduct mechanical thinning activities on approximately 4,887 acres within the project area to reduce stand density. Adverse impacts to sensitive terrestrial plants could occur if mechanical equipment damages or uproots sensitive plants, compact soils, or alter overstory condition. Within the Trestle project area there are 16 occurrences within 500 feet of proposed thinning units, 5 of which are within proposed units. Adverse direct impacts to known occurrences within thinning units are not expected since occurrences and associated potential habitat will be flagged for avoidance prior to project implementation.

All known terrestrial sensitive plant occurrences within 500 feet of proposed thinning units are not expected to be directly impacted by proposed thinning activities. To insure that occurrences are not inadvertently impacted by additional activities associated with thinning projects (landing construction, skid trails, piling, road improvements, danger tree removal, etc.) all sensitive plant occurrences would be flagged and included on project area maps prior to project implementation. All activities would be excluded from these sensitive plant occurrences unless reviewed and recommended by the project botanist in advance of implementation.

Thinning adjacent to known sensitive plant sites can indirectly impact populations by reducing screening surrounding known sites thereby creating opportunities for new non-designated OHV trails to develop into known populations. This is of particular concern in the project area because of the OHV activity on the Elkins Trail system. Of the known sites within the Trestle project area, the greatest concern for potential impacts from non-designated OHV activity near sensitive plant occurrences could occur at CACLA-049, CACLA-056, and CACLA-069. To address this concern, sites within 500 feet of proposed thinning units would be monitored following project implementation. If any evidence of non-designated trail use near sensitive plants is observed, management actions would occur to obscure the trail using various methods such as the installation of barriers and signs.

Lava caps: Impacts to lava cap communities from equipment staging, thinning activities, landing construction, and intensive fire line construction would be avoided during project implementation.

Activities associated with prescribed fire (line construction, pile burning, broadcast burning): Within the Trestle Forest Health project area, approximately 15,812 acres of prescribed burning would be conducted. In general, the actual prescribed fire has limited impacts on understory terrestrial plant communities and sensitive plant species since these species are adapted to growing on a landscape where wildfire was historically an integral component of shaping and maintaining the plant communities. Prescribed burning activities proposed for the Trestle project includes creepy pile, jackpot, and general understory burning. While the actual burning activities are relatively benign, the prep work associated with burning does involve some risk to terrestrial sensitive plants.

Fire-line construction can directly impact terrestrial sensitive plant occurrences by potentially uprooting, crushing, or altering habitat condition (canopy closure, microsite hydrology, covering plants, etc.) if fire-line is constructed through an occurrence. Of the known sensitive plant population in the project area, 23 occur within proposed burn units, some of which may be impacted by future fire line construction which may occur were roads, trails, or natural barriers are absent. Since fire-line construction can occur several years after completion of thinning and other treatments, the project botanist would be consulted prior to line construction to reflag any sensitive plant occurrence that may need to be updated and to insure line construction within the project area does not affect known sensitive plant occurrences. When laying out future burn units, fire-line construction would be developed to avoid direct impacts to sensitive plant occurrences. Other activities that may impact sensitive plants include creating handpiles prior to burning or felling hazard trees into sensitive plant occurrences. Since sensitive plant occurrences would be flagged for avoidance, this is not expected to be a concern within the project area.

Prescribed understory burning may improve habitat for Pleasant Valley Mariposa lily (*Calochortus clavatus var. avius*). Pleasant Valley Mariposa lily tends to be found in open stands of conifers and is intolerant of deep shade and/or thick duff. Fire was likely a key component in maintaining open habitat on the Eldorado NF prior to widespread fire suppression activities. The proposed prescribed burning in the Trestle project area could indirectly benefit known occurrences and any undiscovered individuals by reducing duff and cover of competing vegetation and opening the overstory. Fall burns are generally conducted on the Eldorado NF which would be favorable for any undiscovered occurrences within the project area. Of the 31 known occurrences in the project area, 25 occurrences are within proposed prescribed burn areas. Of these occurrences, 11 were identified in 2012 as being overgrown by young conifer and shrub species. To minimize the potential for undesired effects from prescribed burning to sensitive plants, the project botanist would be consulted prior to burning within sensitive plant sites and would be onsite during burning operations if available.

Pacific yew: Pacific yew tends to grow in cool protected drainages that generally experienced infrequent fires on the Eldorado NF. Yews often occur in the understory of mature forests, and are sensitive to drastic reductions in overstory canopy cover (increase heat and light exposure). Disturbance from fire will often result in mortality of adult plants and seedlings because Pacific yew lack a thick protective bark common on other conifer species occurring in the Sierras. Following disturbance from fire, recruitment of yews will generally occur from remaining offsite populations (bird dispersed seeds), although the recovery can be quite slow.

While thinning and prescribed fire would impact individual plants within the project area, a number of protective measures have been included in the project to minimize potential impacts to Pacific yew including altering lighting techniques within 10 feet of yew species, limiting removal of large yew during thinning activities, and avoiding broadcast burning in dense stands of yew. Additionally, restrictions on thinning and prescribed fire lighting within Riparian Conservation Areas are expected to further limit impacts to Pacific yew species, which is predominantly found near drainages.

Roadwork in the project area: Proposed road work for the Trestle project includes 84 miles of reconstruction. Potential threats for terrestrial sensitive plants during road construction are primarily the physical disturbance to roadside occurrences. There are eight known occurrences of Pleasant Valley Mariposa lily adjacent to or bisected by designated roadways in the project area. Impacts to these known occurrences are not expected since all occurrences would be flagged for avoidance. If road maintenance, reconstruction or brushing is required adjacent to sensitive plant species, the project botanist would be consulted prior to initiating roadwork to insure impacts to sensitive plants are avoided.

Under the proposed action, approximately 53 miles of system roads would be closed using physical barricades or gates, with an additional 3.1 miles on non-system routes being obliterated. A number of these identified routes currently bisect or are adjacent to existing populations of Pleasant Valley Mariposa lily. The proposed gating and blocking of these route segments would benefit known populations by limiting potential vehicle traffic near and within known occurrences.

Under the proposed Trestle project, Pleasant Valley Mariposa lily occurrence #39 would be protected from non-designated vehicle travel currently occurring between 8N49 and 14E36. The proposed action includes installation of barricade rock around the sensitive plant site to discourage vehicle travel that currently threatens to trample plants and compact potential habitat.

Dust abatement*:* The application of EPA approved dust palliatives such as magnesium chloride for dust abatement may directly impact sensitive plant species if magnesium chloride is applied to roadside sensitive plant populations or is transported to sensitive plant species downslope of the application site. This is of particular concern for Pleasant Valley Mariposa lily occurrences on shallow soils along existing roads in the project area. Magnesium and chloride are both essential nutrients for normal plant growth but at application rates used for dust abatement can become toxic causing leaf necrosis, or even death for some species. There are currently 27 occurrences of Pleasant Valley Mariposa lily within 100 feet of existing road ways in the Trestle project area. These occurrences will be flagged for avoidance prior to application of dust palliatives, limiting the potential for direct and indirect effects.

Hazard trees and roadside brushing: Roadside brushing could impact sensitive plant populations by crushing or disturbing plants. Additionally, chipping brush could introduce a thick layer of mulch atypical for sensitive plant populations in the project area, potentially impacting recruitment of new seedlings for Pleasant Valley Mariposa lily. Piling materials could also crush individual plants. For all alternatives, the only sensitive plant occurrence where roadside brushing is being proposed is a single occurrence of Pleasant Valley Mariposa lily (CACLA-007) along Grizzly Caldor Rd (9N73). This occurrence would be flagged for avoidance during roadside brushing activities limiting the potential for effects from project activities. Hazard tree removal in sensitive plant populations could result in individual plants being crushed during felling operation. If hazard trees are identified in sensitive plant populations, the project botanist would be consulted to mitigate impacts. If hazard trees are identified on the perimeter of an occurrence, trees would be directionally felled away from the occurrence.

Restoration activities: The Trestle Project includes 18 restoration actions addressing dispersed recreation, roads, trails, and an abandoned mine. Of the 18 proposed restoration sites 17 do not occur in the vicinity of sensitive plant populations so negative effects are not expected. The one proposed restoration item in close proximity to a sensitive plant occurrence is the proposed barricading along 08N49 to protect Pleasant Valley Mariposa lily occurrence #39 from OHV impacts. This proposed restoration activity would benefit Pleasant Valley Mariposa lily by preventing further OHV incursion into the sensitive plant population.

Invasive plant introduction: Soil disturbances can provide opportunities for the introduction and proliferation of invasive species. These species have the potential to quickly outcompete native plants including sensitive plants for sunlight, water, and nutrients. These species can also form dense monocultures which can alter habitat for sensitive plant species. Seeds of these species can be carried into sensitive plant areas on prescribed burning equipment, vehicles, and on workers boots and clothing. The magnitude of this impact is difficult to predict since it is contingent on the introduction of a noxious weed species into an area, an event which may or may not occur.

Generally the Trestle project area is free of invasive plant species, but there are a number of priority isolated infestations along access routes, adjacent to thinning units, and within the proposed prescribed burn areas. These infestations could easily be spread during project activities including into Pleasant Valley Mariposa lily populations. Additionally the proposed thinning and fuels work in the Trestle project area would increase the susceptibility of treated units to future invasions. To limit the potential for spread, known priority infestations would be monitored and treated during Trestle project implementation using methods described in the Eldorado Forest Invasive Plant Environmental Assessment. This would reduce existing seed sources throughout the project area which is an important preventive measure when using mechanical equipment and prescribed fire to manipulate forest structure. Additional standard measures included in the proposed Trestle project such as excluding vehicle traffic from known infestations, equipment cleaning, and use of weed free material would further limit the risk of invasive species spreading into the project area and impacting sensitive plant occurrences. While the risk of invasion cannot be completely eliminated, these measures are expected to greatly limit the potential introduction and spread of invasive species in the project area, thereby reducing the risk of invasive plants resulting in long-term habitat alteration or impacting known sensitive plant occurrences.

Cumulative Effects

Adverse impacts to sensitive plants from recent (1989-2011) activities have largely been minimized by the use of mitigation measures, mainly the use of avoidance. Ongoing and future management activities in the Trestle project area would likely include trail maintenance, hazard tree removal and implementation of ongoing FS projects in the area including Raintree. It is anticipated that future impacts to sensitive plants would continue to be minimized through the use of avoidance for the above foreseeable actions.

The establishment of noxious weeds in sensitive plant habitat can impact species by competing with native species for resources. Historic logging, grazing, and OHV travel have already introduced noxious weeds, primarily nonnative annual grasses, into portions of the project area and into sensitive plant populations. These annual grasses likely became established early in the project area during the Euro American settlement of the Sierras, probably as a result of grazing, logging, and mining activities. These grasses are common in both natural and developed openings such as lava caps, landings, and roadways throughout the Eldorado NF. The proposed Trestle project is not expected to result in a detectable increase in the spread or proliferation of these non-native species above existing levels. Proposed design criteria for the project, including eradication of known priority infestations is expected to reduce the risk of introducing and spreading high priority noxious weeds in the project area.

The threat of noxious weeds (current and future) introduction cannot be completely eliminated for the proposed Trestle project or other expected activities in the area. Therefore, it is necessary to continue to monitor and control high priority infestations that already occur or may develop in the project area. The Eldorado NF noxious weed program is expected to continue monitoring and managing noxious weeds and would take necessary actions to address new infestations if they are discovered in the project area. Continued surveys for noxious weeds are expected to occur during future projects in the project area.

Alternative 4

Direct and Indirect Effects

Direct and indirect effects for Alternative 4 are expected to be similar to the proposed action, since all the action alternatives will include ground disturbing activities and prescribed fire over largely similar areas in the Trestle project area. Specific differences between the proposed action and Alternative 4 largely result from differences in proposed units for the two alternatives. Effects described for Alternative 2 also apply to Alternative 4 except for the following specific differences.

Thinning units: Alternative 4 has six fewer sensitive plant occurrences within and adjacent to proposed thinning units compared to Alternative 2. Pleasant Valley Mariposa lily occurrences: CACLA-091, CACLA-130, CACLA-087, CACLA-095, and CACLA-130 all dropped from Alternative 4.

Activities associated with prescribe fire (line construction, pile burning, understory burning): One hand cut, pile burn unit with Pleasant Valley Mariposa lily (CACLA-038) under Alternative 2 was dropped from Alternative 4.

Roadwork in the project area: Five Sensitive plant occurrences (CACLA-070, CACLA-022, CACLA-087, CACLA-130, and CACLA-131) are not within 200 feet of proposed road work under alternative 4, but were within 200 feet of roadwork under Alternative 2. One additional occurrence of Pleasant Valley Mariposa lily (CACLA-095) is near proposed roadwork under Alternative 4, but is not a concern for Alternative 2.

Cumulative Effects

Cumulative effects for Alternative 4 would be similar to those described for Alternative 2.

Alternative 5

Direct and Indirect Effects

Direct effects for Alternative 5 are expected to be similar to the proposed action, since all the action alternatives would include ground disturbing activities and prescribed fire over largely similar areas in the Trestle project area. Specific differences between Alternative 2 and Alternative 5 largely result from differences in proposed units for the two alternatives. Effects described for Alternative 2 also apply to Alternative 5, except for the following specific differences.

Thinning units: Alternative 5 has six fewer sensitive plant occurrences within and adjacent to proposed thinning units compared to Alternative 2. Pleasant Valley Mariposa lily occurrences: CACLA-091, CACLA-130, CACLA-087, CACLA-095, and CACLA-130 all dropped from Alternative 5.

Activities associated with prescribed fire (line construction, pile burning, understory burning): One hand cut, pile burn unit with Pleasant Valley Mariposa lily (CACLA-038) included in Alternative 2 was dropped from Alternative 5.

Roadwork in the project area: Three sensitive plant occurrences (CACLA-070, CACLA-022, CACLA-087) are not within 200 feet of proposed road work under Alternative 5, but were within 200 feet of roadwork proposed under Alternative 2. One additional occurrence of Pleasant Valley Mariposa lily (CACLA-095) is near proposed roadwork under Alternative 5 but is not a concern for Alternative 2.

Cumulative Effects

Cumulative effects for Alternative 5 will be similar to those described for Alternative 2.

Water Quality / Hydrology

Effects to the hydrology resource that are likely to result from the Trestle Forest Health Project are summarized from the Hydrology Report (Markman 2014). The analysis area for the hydrology resource includes a portion of seven HUC 7 watersheds. HUC 7 is the finest scale for which the Eldorado National Forest has current watershed data and is the scale at which the forest calculates cumulative watershed affects.

A Riparian Conservation Objective analysis (Markman et al. 2014a) further evaluates whether activities proposed with the Trestle Forest Health Project would be consistent with Riparian Conservation Objectives (RCOs) specified in the Final Supplemental Environmental Impact Statement, Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004).

Affected Environment

The landscape of the Trestle Forest Health Project is mountainous and forested in the headwaters of the Cosumnes River drainage basin. There are over 44 miles of named perennial streams in the seven HUC 7 watersheds. These streams include: North Fork Cosumnes River, Big Canyon Creek, North Canyon Creek, Steely Fork Cosumnes River, Salt Rock Creek, South Fork Steely Creek, North Steely Creek, Clear Creek, Dogtown Creek, and Middle Dry Creek. Most of these streams flow west/northwest and directly or ultimately into the North Fork Cosumnes River or Middle Fork Cosumnes River, which in turn flows to the west and into the Cosumnes River.

Beneficial uses include: municipal water supplies for domestic use; hydropower generation; contact and non-contact recreation; canoeing and rafting; cold freshwater habitat; spawning habitat; and wildlife habitat.

The condition of perennial streams is variable by stream and stream segment, ranging from good to somewhat degraded. The water quality during low flows is good.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under Alternative 1, the potential for impacts from project related activities would not occur, however the potential for wildfire would be increased as described in the Fire and Fuels Analysis for the project (Riesenhuber 2014). There would be a greater risk of adverse effects to aquatic resources as a result of a large, high severity wildfire. The hydrologic response to a high severity wildfire is well documented in the literature. Runoff and erosion rates increase by two or more magnitudes for several years after a high severity fire, and frequently decline to near pre-wildfire levels within four or five years. Since the Trestle Project includes portions of seven watersheds (HUC 7 scale), there is the potential for a high-severity fire to affect all of the streams in those watersheds. The potential effects within and downstream of the project area include: 1) an increase in the suspended sediment and turbidity levels of streams during and immediately after rainfall events and periods of rapid snowmelt; 2) deposition of fine-grained sediment in stream channels; 3) deposition of ash in streams, which can increase nutrient levels for several years; and 4) increases in runoff during rainfall events tend to result in an increase in peak flows of streams, which can cause stream channel erosion and degradation of aquatic habitat.

Long-term improvement (greater than 5 years) to water quality and aquatic habitat may occur at a slower rate since road reconstruction and restoration activities would not occur under the No Action Alternative.

Cumulative Effects

Cumulative effects would not occur under this alternative.

Alternatives 2, 4, and 5

Direct and Indirect Effects

Direct and indirect effects to water quality and aquatic habitat in the Trestle project area and downstream of the project area are expected to be minor or negligible, with the implementation of Regional and National BMP guidance and the design criteria. Therefore adverse impacts to beneficial uses of water in the watersheds are not expected. In the long-term (greater than five years), there may be an improvement in water quality and aquatic habitat of several perennial streams, primarily due to the result of restoration activities proposed under the action alternatives. As a result, the Trestle Project is expected to meet the Riparian Conservation Objectives (RCOs) in the 2004 Sierra Nevada Forest Plan Amendment, Record of Decision (Markman 2014a).

Sediment and Turbidity: A minor, short-term (less than five years) increase in the suspended sediment concentrations and turbidity levels of the streams that flow through or adjacent to treatment units may occur during and immediately after large rainfall events. This increase, should it occur, should not exceed state water quality standards for turbidity or sediment. This is due to the following:

- A number of design features would minimize the amount of sediment delivered to the streams and other aquatic features, including no ground disturbing activities adjacent to streams and other aquatic features. All aquatic features in the project area have ground-based equipment exclusion zones, ranging from 10 feet for draws to 150 feet next to some segments of perennial streams.
- Ground-disturbing activities would occur in a relatively small percentage of the Riparian Conservation Areas (RCAs) next to streams. The RCA is 300 feet on each side of perennial streams and 150 feet on each side of intermittent and ephemeral streams.
    a. Ground disturbing activities would occur in less than 5 percent of the RCA of 12 perennial streams when the entire length of the stream within a watershed is considered.
    b. Ground disturbing activities would occur in approximately 0 to 22.5 percent of the RCA of 12 perennial streams when only the RCA within thinning units is considered. For eight of the 12 perennial streams, less than 10 percent of the RCA would have ground-disturbing activities.
- Best management practices (BMPs) would be implemented during project operations that are designed to protect water quality, soils, and vegetation. Implementation of BMPs, which include established riparian buffers, have generally been shown to decrease the negative effects of timber harvest activities on water quality (USDA 2010).
- Nearly all of the roads located near streams in the project area would receive treatments that are likely to reduce the amount of road-related sediment that is delivered to these streams in the long-term. Road reconstruction would occur on approximately 84 miles of system roads and would include the replacement of inadequate drainage crossings, elimination of ruts, ditch repair, installation of waterbars and dips with inadequate water runoff control, gate installation to control seasonal use or replacement of existing non-functional gates or barricades, and removal of brush and small trees encroaching on roads.
- There would be no construction of new, permanent roads. Approximately 3.6 miles of existing non-system roads would be obliterated after being used for project operations.
    a. The obliteration of these “temporary” roads would consist of one or more of the following: removal of drainage structures (such as culverts), ripping of the surface to reduce compaction of the road surface and improve infiltration, seeding, the application of slash, placement of barricades to prevent vehicle access, and the camouflaging of the junction of the temporary road with the system road.

b. The obliteration of 3.6 miles of temporary roads complies with BMPs 2.2, 2.3, and 2.4 of the 2011 Water Quality Management Handbook for Region 5 of the Forest Service.

c. Nearly all (approximately 99.9 percent) of the 3.6 miles of these temporary roads are not located in the Riparian Conservation Areas (RCAs) of perennial and intermittent streams; however, much of the 3.6 miles of temporary roads are located within the RCA of one or more ephemeral streams. (*The RCA is 300 feet on each side of perennial streams and 150 feet on each side of intermittent and ephemeral streams*.)

Water Quality: The effects to the water quality of streams (outside of suspended sediment and turbidity discussed above) should be negligible or minor.

- Temperature: According to a stream temperature model, the maximum potential stream temperature increase would range between 0.0 and 3.8 degrees Fahrenheit (F) for 12 perennial stream segments in the project area. For six of the streams, the maximum potential stream temperature increase would be less than 2.0 degrees F. This is in large part due to the design criteria that would limit the removal of vegetation near perennial streams, which in turn would result in a small decrease in the amount of shade on the surface of streams. For small streams in a forested setting, the research indicates that elevated water temperatures usually decrease to pre-disturbance levels within 500 feet downstream of the zone of vegetation removal (USDA 2010). Streams that flow seasonally (intermittent and ephemeral streams) have no surface flows during the time of year (early summer to early fall) when an increase in stream temperatures are most likely to occur.
- Nutrients: Two recent studies have shown that partial timber harvest near streams resulted in limited effects to nutrients (Jones 2013; Gravelle 2009). With regard to prescribed fire and the burning of slash piles, the bulk of the published research has shown that increases in the nutrient levels of streams are minor or negligible and short-term.

Flows: Changes to water yield, peak flow, and timing of flow of all streams in the project area and downstream of the project would likely be negligible and not measurable. Research indicates that, *"…fuels reduction treatments in forested watersheds have little detectable impact on water yields either on-site or downstream. Most prescriptions are not likely to remove the 20 percent of the basal area that is needed in most areas to generate a detectable change in flow"* (USDA 2010). Alternative 2 would decrease the basal area in commercial thinning units by approximately 17 percent and would decrease canopy cover approximately 18 percent between 2013 and 2026 (Howard and Walsh 2014). Reductions in forest basal area and canopy cover would be similar for Alternative 4 and 5.

Cumulative effects

The analysis of cumulative watershed effects (CWE) considers all past, present, and likely future land effects in a given drainage area. In the Eldorado National Forest, the risk of the occurrence of CWE is based on a quantitative evaluation of the land disturbances in the watershed using the method of

Equivalent Roaded Acres (ERA). Based on the ERA and threshold of concern (TOC), a given watershed is assigned a relative risk – *low, moderate, high,* or *very high* – of CWE. A *very high risk* is merely a warning that cumulative impacts – such as an increase in sediment delivery to streams – might occur.

Table 20

Cumulative Watershed Effects in terms of percent ERA by 7th Field Watershed for the Trestle Forest Health Project

Watershed	Acres	Current % ERA (% TOC)	Alternative	Projected % ERA (% TOC) (2018[1] / 2026)	Current Risk of CWE	Projected Risk of CWE (2018[1] / 2026)
Big Canyon Creek	3,535	7.0 (43.8)	Proposed Action	11.3 (70.6) / 9.9 (61.9)	Low	Moderate
			Alt. 4	10.0 (62.5) / 8.8 (55.0)		
			Alt. 5	10.8 (67.5) / 9.5 (59.4)		
Lower Steely Fork Cosumnes River	6,966	10.1 (101)	Proposed Action	11.4 (114) / 11.0 (110)	Very High	Very High
			Alt. 4	11.2 (112) / 10.8 (108)		
			Alt. 5	11.2 (112) / 10.8 (108)		
Upper Steely Fork Cosumnes River	6,831	8.1 (57.9)	Proposed Action	13.7 (97.9)/ 12.5 (89.3)	Moderate	High / High
			Alt. 4	11.3 (80.7) / 10.8 (72.1)		High / Moderate
			Alt. 5	12.3 (87.9) / 11.0 (78.6)		High / Moderate
Dogtown Creek	6,849	7.5 (62.5)	Proposed Action	10.3 (85.8) / 9.1 (75.8)	Moderate	High / Moderate
			Alt. 4	9.3 (77.5) / 8.1 (67.5)		Moderate
			Alt. 5	9.3 (77.5) / 8.3 (69.2)		Moderate
Clear Creek – Steely Fork Cosumnes River	2,891	12.0 (75)	Proposed Action	18.8 (117.5) / 17.7 (110.6)	Moderate	Very High
			Alt. 4	16.5 (103.1) / 14.3 (89.4)		Very High / High
			Alt. 5	17.1 (106.9) / 14.9 (93.1)		Very High / High
Middle Dry Creek	3,414	11.0 (68.8)	Proposed Action	13.2 (82.5) / 11.4 (71.3)	Moderate	High / Moderate
			Alt. 4	12.8 (80) / 11.1 (69.4)		
			Alt. 5	13 (80) / 11.2 (70)		

Watershed	Acres	Current % ERA (% TOC)	Alternative	Projected % ERA (% TOC) (2018[1] / 2026)	Current Risk of CWE	Projected Risk of CWE (2018[1] / 2026)
North Fork Cosumnes River – Bear Meadow Creek	6,278	6.4 (64)	Proposed Action	7.2 (72) / 6.4 (64)	Moderate	Moderate
			Alt. 4	7 (70) / 6.1 (61)		
			Alt. 5	7.2 (72) / 6.3 (63)		

[1] The year 2018 represents the maximum ERA between 2016 and 2026, assuming implementation will begin in 2016.

The risk of cumulative watershed effects (CWE) is currently low or moderate in six of the seven watersheds, and one watershed is currently at a very high risk of CWE. The Lower Steely Fork Cosumnes River watershed is currently at a very high risk of CWE, which is largely the result of residential development and past timber harvest on private lands. Alternatives 2, 4, and 5 would increase the risk of CWE in six of the seven watersheds for at least several years. Alternative 2 would result in two watersheds (Lower Steely Fork Cosumnes River and Clear Creek-Steely Fork Cosumnes River) at a very high risk of CWE for a longer period of time as compared to Alternatives 4 and 5.

Aquatic Wildlife

Direction to maintain the viability of Region 5 endangered, threatened, and sensitive species is provided by the National Forest Management Act, the Code of Federal Regulations (CFR 219.19), the Forest Service Manual (FSM 2672), and the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004). Potential effects by this project are summarized from Chow (2014).

Threatened and Endangered Species

California Red-legged Frog

Affected Environment

California red-legged frog (CRLF) has not been documented within the project area boundary following extensive protocol-level surveys in suitable habitats (1997-2013). Habitat suitability for CRLF was deemed low within the project boundary in habitats below 4,000 feet due to high spring flows, lack of backwater and deep pooling areas, and the presence of rainbow trout. Designated Critical Habitat does not exist within the project area or the affected watersheds. The Cosumnes River Watershed is listed as Core Recovery Habitat for CRLF.

Environmental Consequences

All Alternatives

Direct, indirect, and cumulative effects to CRLF, its designated Critical Habitat or Core Recovery Habitat, are not expected under any of the alternatives. This conclusion is based on the following assumptions:

1. The nearest known breeding population (Spivey Pond) is approximately 12 air miles northwest of project area boundary in a different river drainage system (American River);
2. Extensive protocol-level surveys (2 day-2 night and 8-day) have occurred (1997-2013) in the most optimal habitats at the most optimal times for detection within the Trestle project and failed to detect CRLF;
3. Habitat suitability within the Trestle project has been deemed low due to the presence of high spring flows, lack of deep pools (0.5 m) in low gradient reaches, and the presence of rainbow trout in all perennial stream habitats; and,
4. Effects to aquatic resources (water quality, stream condition, and aquatic habitat) will be negligible due to project-level design criteria and the Riparian Conservation Objectives and associated guidelines being met.

Sierra Nevada Yellow-legged Frog

Affected Environment

Sierra Nevada yellow-legged frog (SNYLF) has not been documented and is not known to be found within the project area boundary. However, the nearest sighting occurred 0.6 miles east of the project boundary on the North Fork Cosumnes River in 2003. SNYLF are highly aquatic and do not venture far from water; therefore, only activities occurring within, or immediately adjacent to, Riparian Conservation Areas (RCAs) are likely to impact this species or their preferred habitat. No extensive protocol surveys in potential habitat have been conducted since the species has been officially listed as endangered in April 2014. The elevation range for this species ranges from 4,500 ft. to over 12,000 ft. as designated from the federal listing on June 30, 2014. Habitat suitability for SNYLF is deemed low within the project boundary since elevation is at the lower limit for the species. SNYLF detections have never occurred nor been documented on the Eldorado National Forest (ENF) below 5,000 feet in elevation. Designated Critical Habitat does not exist within the project area or the affected watersheds. Based on habitat suitability, no prior detections, and elevation, SNYLF are not likely to occur within the Trestle Project boundary.

Environmental Consequences

All Alternatives

Direct, indirect, and cumulative effects to SNYLF, and its proposed Critical Habitat, are not expected to be impacted under any of the alternatives. This conclusion is based on the following assumptions:

1. The nearest known breeding population (Tragedy Creek) is approximately 15.2 air miles northwest of project area boundary in a different river drainage system;
2. The proposed critical habitat is 20.3 and 12.2 air miles northeast and southeast of the project boundary in Desolation and Mokelumne wildernesses;
3. Protocol-level surveys have occurred (1997-2013) in some potential habitats for detection within the Trestle project area and failed to detect SNYLF;
4. The exclusion buffers of 100 feet enforced for all project activities would avoid effects to SNYLF;
5. Habitat suitability within the Trestle project area has been deemed low due to the elevation range limits and lack of prior detections;
6. The presence of rainbow trout in all perennial stream habitats reduces habitat suitability; and
7. Effects to aquatic resources (water quality, stream condition, and aquatic habitat) would be negligible due to project-level design criteria and the Riparian Conservation Objectives and associated guidelines being met.

Forest Service Sensitive Species

Foothill Yellow-legged Frog

Affected Environment

Foothill yellow-legged frog (FYLF) is found in, or adjacent to, rocky streams in a diversity of habitats, such as valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and various wetland types. In California, they are found west of the Cascades and are distributed along the length of the western flank of the Sierra Nevada Mountains to Kern Co. The maximum upper elevation extent of known occurrences of foothill yellow-legged frog on the Eldorado National Forest is believed to be closer to 4,500 feet.

Foothill yellow-legged frog has only been documented in one location (Sopiago Creek – Amador RD) adjacent (approx. 1.0 mile south) to the project-area boundary, but it was likely historically widespread in many streams and tributaries of the project-area based on suitable habitat present. Foothill yellow-legged frog is highly aquatic and does not venture far from water; therefore, only activities occurring within, or immediately adjacent to, RCAs are likely to impact this species or its preferred habitat. Introduced rainbow trout and stream alteration from past mining, timber harvest, grazing, road construction, and resulting effects may preclude this species from recolonization.

Extensive surveys for California red-legged frog (1997-2013) have been conducted in the major perennial streams of the project area and associated watersheds (HUC 14) in favorable stream habitats below 5,000 feet. If present, FYLF would have likely been detected during these surveys since they occupy similar habitat types, specifically suitable breeding areas (deep pools). However, a nearby occurrence of FYLF (Sopiago Creek, Amador RD) is known. An adult FYLF was observed approximately 1 air mile and only 2 stream miles, via the confluence of the Middle Fork Cosumnes River, away from the project area boundary on August 30, 1999 by an Eldorado National Forest fisheries survey crew. Given the proximity of this sighting, along with the lack of targeted surveys outside of low gradient reaches and given that FYLF may still occur in higher gradient reaches, FYLF has a higher potential to be present within the project-area boundary than California red-legged frog.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under this alternative, fuels would not be reduced, but would continue to accumulate. The risk for high-severity wildfire, along with the possibility of stand replacement mortality, would remain or increase for much of the project area. No action could lead to a greater risk of erosional effects to aquatic features during periods of increased run-off and snowmelt in the years following a high-severity wildfire than would be experienced by Alternatives 2, 4, and 5.

The hydrologic response of erosion rates after a high-severity wildfire is increased by two or more magnitudes for several years post-fire and returns to near pre-wildfire levels within four or five years. However, the effects to aquatic features and the beneficial uses of water, both within and downstream of a high severity wildfire, are difficult to predict in fire-suppressed landscapes and depend on many factors. The single most important factor is often the size of the rainfall events that occur during the first several years after the wildfire when the ground is most vulnerable to accelerated runoff and erosion. Tree mortality (snags) in riparian zones, as a result of wildfire, may contribute to large, woody debris recruitment that is lacking in most drainages and may remain elevated for the next 10 – 15 years post-wildfire (Gresswell, 1999). There would be no direct or indirect effects to FYLF or its habitat as the result of project activities not being implemented under Alternative 1. However, effects to FYLF from potential wildfire under Alternative 1 from the lack of fuels reduction-related activities could negatively affect FYLF aquatic habitat by increasing sediment deposition to streams where it occurs or by suppressing recolonization in unoccupied but suitable habitats.

Cumulative Effects

Cumulative effects would not be expected with this alternative.

Alternatives 2, 4, and 5

Direct and Indirect Effects

Foothill yellow-legged frogs were detected within one mile of the Trestle project area boundary project during past project surveys in the area (1999), and suitable breeding and non-breeding habitat exists in most of the tributary and main stream reaches below 4,500 feet. Since FYLFs have been detected adjacent to the project area (Sopiago Creek), this species has the potential to be affected by project activities under Alternative 2. Also under Alternative 2, effects from timber harvest, road related activities, fuels reduction, prescribed burning, and restoration activities are possible. However, since

FYLF is highly associated with water within stream channels, meadows, and ponded areas, in conjunction with project design features, any direct or indirect effects to FYLF or aquatic habitat are expected to be minimal and limited to treatment areas within RCAs. The greatest threat to FYLF would most likely be from prescribed fire-related mortality or injury, or from post-fire related sediment deposition in response to precipitation events in, or near, riparian zones, in which the outcome of prescribed fire and post-fire effects can be difficult to predict.

Direct and indirect effects to FYLF could also occur from the use of dust palliatives, such as Magnesium Chloride (MgCl2) (dust suppressant) for dust abatement, on logging roads under the design criteria for thinning treatments. Limited studies have occurred on the effects of road salts on amphibians; however, some conclusions can be drawn from present research and studies. In a study conducted in Nova Scotia, field surveys were conducted on roadside aquatic habitats to determine affects from road salts and chloride concentrations on amphibian species. Acute toxicity tests (LC50) were performed on five locally common amphibian species using a range of environmentally significant NaCl concentrations. Field surveys indicated that spotted salamanders (*Ambystoma maculatum*) and wood frogs (*Rana sylvatica*) did not occupy high-chloride ponds. American toads (*Bufo americanus*) showed no pond preference based on chloride concentration. Acute toxicity tests showed spotted salamanders and wood frogs were most sensitive to chloride, and American toads were the least sensitive. Spring peepers (*Pseudacris crucifer*) and green frogs (*Rana clamitans*) showed intermediate sensitivities. The study concluded that chloride concentrations in aquatic ponds, due to application of salts, influenced community structure by excluding salt-intolerant species (Collins & Russell, 2008). A similar study on the wood frog was conducted in Ohio and it indicated that wood frog survival decreased from salinization of freshwater habitat brought about by road salt run-off (Langhans et al., 2011).

The effect to aquatic life and habitat can vary based upon species and is dependent on concentrations of suppressants used and proximity (Lewis, 1999). Impacts are also dependent on whether the suppressant is used as a diluted liquid or a dry palliative. For the Trestle project, it will be used as dry palliative and, in this state, is less likely to be carried off by water runoff into drainages when compared to a liquid application. However, since the suppressant is water soluble and moves laterally, movement will depend on concentrations and amount of rainfall. Application of the suppressant will occur in the summer months where rainfall is minimal (approximately July 1) which increases the likelihood of the suppressant not moving into drainages and effecting water quality and aquatic life.

The Colorado Department of Transportation (Colorado Department of Transportation (CDOT) 1998) conducted extensive research on the environmental impacts of magnesium chloride as a de-icer on state roads. While this research focuses on a different activity than dust abatement, the results in terms of the chemicals' environmental impact are relevant. Chloride concentration from two separate sources, magnesium chloride and sand with chloride, increased background chloride concentrations by 50 to 100 mg/L during winter application. These concentrations are below levels considered potentially harmful to the most sensitive aquatic organisms (CDOT 1998). The conclusions of the CDOT report stated that magnesium chloride is “highly unlikely to cause or contribute to environmental damage at distances greater than 20 yards. Even very close to the roadway, the potential for magnesium chloride to cause environmental damage is probably much smaller than other factors related to road maintenance."

Goodrich et al. (2009) monitored stream chemistry in 16 streams in the Rocky Mountains upstream and downstream of unpaved roads on which magnesium chloride had been applied. They found that 8 of the 16 streams monitored had significantly significant downstream increases in both magnesium and chloride concentrations, as well as other ions and compounds commonly found in dust palliatives such as sodium, calcium, and sulfate. However, concentrations detected were below those reported to adversely affect aquatic organisms.

Magnesium Chloride concentrations and additions in streams could directly affect larval stages of FYLF. From various studies and research, an increase in salinity concentrations would decrease dissolved oxygen content which can lead to embryonic and larval mortality. Increased salinization could also deter amphibians from aquatic sites and make them less likely to utilize areas for breeding. Indirect effects would include decreased water quality and elevated chloride concentrations, which decrease biological oxygen demand for aquatic life. Osmotic pressure of soils could possibly increase and negatively impact hardwood and tree growth. These effects are likely and are dependent on the movement of the suppressant. The Colorado research above concludes minimal impacts will occur based on time of application and precipitation.

The Dust Palliative Selection and Application Guide (USDA FS 1999), indicates lignin sulfonate as having no water quality impacts. Roald (1977), in a study focused on levels found in effluent from pulp mills, found that the 48hr LC50 for lignin sulfonate in rainbow trout was 7,300 ppm, however since this effect seemed to be related to reduction in dissolved oxygen, it is likely that amphibians would be significantly less impacted by comparable concentrations of lignin sulfonate. In a literature review, Heffner (1997) found that at the rates of application used for dust abatement, environmental impacts were highly unlikely. The FDA allows the use of lignin sulfonates as binder in animal feed at a rate of up to 4% of mass. In high concentrations, lignin sulfonate can cause discoloration and foaming in waterbodies however this effect takes place when it is being directly discharged as waste product at far higher concentrations than would be observed in its use as a road surfactant. Overall, there is little in the literature to indicate that the use of lignin sulfonate at standard application rates would have harmful effects on aquatic biota.

Cumulative Effects

When considered with past, present, and reasonably foreseeable future activities, any cumulative impacts to FYLF or its preferred habitat as a result of implementing Alternative 2, are expected to be minor for the following reasons: there are no treatments within, or adjacent to, known occupied or suitable breeding areas; the expected duration of project-level effects is short; stream buffer exclusion zones were established to minimize potential effects to suitable habitat; the project provides an overall reduction in wildfire risk; and the project restores of dispersed recreational sites in riparian habitat.

Overall, the actions of Alternative 2 will ultimately benefit FYLF because they will reduce wildfire risk, promote riparian habitat through prescribed fire, reduce sediment delivery to streams from road reconstruction and maintenance, and restore dispersed recreational sites. Since response of amphibians depends on the type and magnitude of disturbance, the amount and configuration of remaining habitat, as well as their life-history characteristics, project activities may still impact this species even when the outcome is positive.

Western Pond Turtle

Affected Environment

The western pond turtle (WPT), one of only two species of freshwater turtle native to the west coast of the United States, can be found anywhere from at sea level to approximately 5,000 feet in elevation. Western pond turtles are habitat generalists, occurring in a wide variety of permanent and intermittent aquatic habitats, and found in a variety of habitat types, including ponds, lakes, streams, irrigation ditches, and semi-permanent pools of intermittent streams. Most populations in the Sierra Nevada are restricted to smaller stream habitats.

There is only one WPT sighting within the project area boundary in Leoni Meadow (private) observed in 1995 by forest fisheries crew (with permission). Western pond turtles were not detected within the project area boundary during project-level surveys (2012 and 2013) or during other past project surveys in the area. Habitat suitability was not established for every stream in the project, but it is reasonable to assume that suitable WPT habitat exists in the same reaches identified as suitable for CRLF and FYLF, since these species are commonly found occupying the same habitats below 5,000 feet. A GIS analysis within the project boundary identified 46 treatment units with a total of 830 acres of potentially suitable western pond turtle nesting habitat on south-facing slopes. A total of approximately 2,883 acres of suitable nesting habitat occurs within the project area boundary where prescribed fire activities could affect WPT.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under this alternative, fuels would not be reduced, but would continue to accumulate. The risk for high-severity wildfire, along with the possibility of stand replacement mortality, would remain or increase for much of the project area. No action could lead to a greater risk of erosional effects to aquatic features during periods of increased run-off and snowmelt in the years following a high-severity wildfire than would be experienced by Alternatives 2, 4 and 5.

The hydrologic response of erosion rates after a high-severity wildfire is increased by two or more magnitudes for several years post-fire and returns to near pre-wildfire levels within four or five years. However, the effects to aquatic features and the beneficial uses of water, both within and downstream of a high-severity wildfire, are difficult to predict in fire-suppressed landscapes and depend on many factors. The single most important factor is often the size of the rainfall events that occur during the first several years after the wildfire when the ground is most vulnerable to accelerated runoff and erosion. Tree mortality (snags) in riparian zones, as a result of wildfire, may contribute to large, woody debris recruitment that is lacking in most drainages and may remain elevated for the next 10 – 15 years post-wildfire (Gresswell, 1999). There would be no direct or indirect effects to WPT, its habitat, or its nesting habitat as the result of project activities not being implemented under Alternative 1. However, effects to WPT from potential wildfire under Alternative 1 from lack of fuels reduction-related activities could negatively affect WPT aquatic habitat by increasing sediment deposition, by increasing nutrient loading to streams where they may occur, or by suppressing recolonization in unoccupied but suitable habitats.

Cumulative Effects

No cumulative effects are expected with this alternative.

Alternatives 2, 4, and 5

Direct and Indirect Effects

Effects from timber harvest, road-related activities, fuels reduction, prescribed burning, and restoration activities under Alternative 2 are possible, since WPT is highly associated both with water within stream channels and with adjacent riparian zones, meadows, and ponded areas. In conjunction with project design features, any direct or indirect effects to WPT or aquatic habitat are expected to be marginal. The greatest threat to WPT would most likely be from prescribed fire-related mortality or injury, or from post-fire-related sediment deposition in response to precipitation events in, or near, riparian zones, in which the outcome of prescribed fire and post-fire effects can be difficult to predict. Equipment-related mortality to nesting female turtles, nests, and emerging hatchling turtles in upland habitats are the greatest risks in the upland, non-aquatic habitats.

Individual WPTs (usually males) may have large home ranges and may wander within a given watercourse for several kilometers on a regular basis (Reese, 1996). Western pond turtle nests have been found as far as a quarter-mile from water (Reese & Welsh, 1997) in open, sunny areas on hillslopes, generally with south- to southwest-facing aspects. Threats to nests and hatchlings would occur from May through March since the incubation period for WPTs is approximately eight months, and they may remain in the nest for a week or more. Western pond turtles also move into upland slopes while overwintering. Overwintering movements are poorly understood; however, in Trinity County California, WPTs left the study-area river in September and began return movements in February, ending them in June; the only lull in activity occurred between December and January (Reese & Welsh, 1997). In the Sierra Nevada, the most likely time for western pond turtle overwintering movements is during the fall/late fall and early spring and would represent movements to and from upland overwintering sites. If WPTs were overwintering within the proposed project area, crushing of individuals could occur during these timeframes; however, the majority of mechanical project activities are expected to occur within the standard operating period (May through October). Therefore, risk to overwintering turtles in the project area is low.

Direct and indirect effects to WPT could also occur from the use of dust palliatives, such as Magnesium Chloride ($MgCl2$) (dust suppressant) for dust abatements, on logging roads under the design criteria for thinning treatments. Even fewer studies have been conducted on the effects of road pollutants to reptilian species than on the effects to amphibian species. Impacts to aquatic sites would be similar for all aquatic species. The effect to aquatic life and habitat can vary based upon species and is dependent on concentrations of suppressants used and proximity (Lewis, 1999). Impacts are also dependent on whether the suppressant is used as a diluted liquid or a dry palliative. For the Trestle project, it will be used as a dry palliative and, in this state, is less likely to be carried off by water runoff into drainages when compared to a liquid application. However, since the suppressant is water-soluble and moves laterally, movement will depend on concentrations and amount of rainfall. Application of the suppressant will occur in the summer months when rainfall is minimal (approximately July 1), which increases the likelihood of the suppressant not moving into drainages and affecting water quality and aquatic life.

Direct physiological effects from magnesium chloride for WPT may not be known; however, it is reasonable that similar issues exist with the uptake (ingestion) of the pollutant directly from the environment) or from prey items (Andrews et al., 2008). Indirect effects would include alterations in water quality and negative impacts on growth of vegetation due to osmotic pressure in soils. Chloride levels may be elevated from runoff after precipitation events, which can cause a decrease in biological, oxygen-demand influences on the aquatic site.

The Colorado Department of Transportation (CDOT, 1998) conducted extensive research on the environmental impacts of magnesium chloride as a de-icer on state roads. While this research focuses on a different activity than dust abatement, the results in terms of the chemicals' environmental impact are relevant. Chloride concentration from two separate sources, magnesium chloride and sand with chloride, increased background chloride concentrations by 50 to 100 mg/L during winter application. These concentrations are below levels considered potentially harmful to the most sensitive aquatic organisms (CDOT 1998). The conclusions of the CDOT report stated that magnesium chloride is "highly unlikely to cause or contribute to environmental damage at distances greater than 20 yards. Even very close to the roadway, the potential for magnesium chloride to cause environmental damage is probably much smaller than other factors related to road maintenance."

The Dust Palliative Selection and Application Guide (USDA FS 1999), indicates lignin sulfonate as having no water quality impacts. Roald (1977), in a study focused on levels found in effluent from pulp mills, found that the 48hr LC50 for lignin sulfonate in rainbow trout was 7,300 ppm, however since this effect seemed to be related to reduction in dissolved oxygen, it is likely that amphibians would be significantly less impacted by comparable concentrations of lignin sulfonate. In a literature review, Heffner (1997) found that at the rates of application used for dust abatement, environmental impacts were highly unlikely. The FDA allows the use of lignin sulfonates as binder in animal feed at a rate of up to 4% of mass. In high concentrations, lignin sulfonate can cause discoloration and foaming in waterbodies however this effect takes place when it is being directly discharged as waste product at far higher concentrations than would be observed in its use as a road surfactant. Overall, there is little in the literature to indicate that the use of lignin sulfonate at standard application rates would have harmful effects on aquatic biota.

Cumulative Effects

When considered with past, present, and reasonably foreseeable future activities, any cumulative impacts to WPT, its preferred habitat, or its nesting habitat, as a result of implementing Alternative 2, 4 or 5, are expected to be minor for the following reasons: there are no treatments within or adjacent to known occupied streams; the expected duration of project-level effects is short (less than 5 years); stream buffer exclusion zones were established to minimize potential effects to suitable habitat; the project provides an overall reduction in wildfire risk; and the project provides for the restoration of dispersed recreational sites in riparian habitat.

Overall, the actions of Alternative 2, 4 and 5 are most likely to benefit WPT because they will reduce wildfire risk, promote riparian habitat through prescribed fire, reduce sediment delivery to streams from road reconstruction and maintenance, and restore dispersed recreational sites, and a decrease in canopy cover. However, project activities may still impact this species even when the outcome is positive. Response of WPT likely depends on the type and magnitude of disturbance, the amount and configuration of remaining habitat, as well as nesting habitat, and the timing of activities as they relate to life-history characteristics.

Pacific Lamprey

Affected Environment

The Pacific lamprey (PALA) is an anadromous fish that has been documented within two miles of the western forest boundary (near Fairplay, CA) by the California Department of Fish and Wildlife (1994) in the Middle Fork Cosumnes River (an undammed river). There are no PALA sightings within the project area boundary, but targeted PALA surveys in the rivers and streams within the project have not been conducted. The PALA was not observed within the project area boundary during project-level surveys (2012 or 2013) or during past project surveys in the area. Lamprey are not restricted by natural barriers that otherwise might inhibit fish migration. Adult lamprey can migrate over natural barriers (using their sucking disk); consequently, lamprey might be selecting spawning habitats without high fish-predator density; thus, the introduction of nonnative trout in many foothill streams may play a role in lamprey success.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under this alternative, fuels would not be reduced, but would continue to accumulate. The risk for high-severity wildfire, along with the possibility of stand replacement mortality, would remain or increase for much of the project area. No action could lead to a greater risk of erosional effects to aquatic features during periods of increased run-off and snowmelt in the years following a high-severity wildfire than would be experienced by Alternatives 2, 4 and 5.

The hydrologic response of erosion rates after a high severity wildfire is increased by two or more magnitudes for several years post-fire and returns to near pre-wildfire levels within four or five years. However, the effects to aquatic features and the beneficial uses of water, both within and downstream of a high-severity wildfire, are difficult to predict in fire-suppressed landscapes and depend on many factors. The single most important factor is often the size of the rainfall events that occurs during the first several years after the wildfire when the ground is most vulnerable to accelerated runoff and erosion. Tree mortality (snags) in riparian zones, as a result of wildfire, may contribute to large, woody debris recruitment that is lacking in most drainages and may remain elevated for the next 10 – 15 years post-wildfire (Gresswell, 1999). There would be no direct or indirect effects to PALA, its habitat, or its nesting habitat as the result of project activities not being implemented under Alternative 1. However, effects to PALA from potential wildfire under Alternative 1 from the lack of fuel-reduction-related activities could negatively affect PALA aquatic habitat by increasing sediment deposition, by increasing nutrient-loading to streams where they may occur, or by suppressing recolonization in unoccupied but suitable habitats.

Overall, the lack of actions implementing Alternative 1 would likely not affect PALA,; however, since there would be no reduction in wildfire risk in an untreated landscape, effects could be expected, and may have lasting consequences, if habitat is rendered unsuitable from lack of these activities. Response of lamprey from lack of treatment will likely depend on the type and magnitude of disturbance, the amount and configuration of remaining habitat, and life-history characteristics.

Cumulative Effects

No cumulative effects are expected with this alternative.

Alternative 2, 4, and 5

Direct and Indirect Effects

Effects from timber harvest, road-related activities, fuels reduction, prescribed burning, and restoration activities under the action alternatives are possible; however, since PALA is highly associated with water within stream channels, meadows, and pond areas. In conjunction with project design features listed, any direct or indirect effects to PALA or aquatic habitat are expected to be minimal and limited to treatment areas within RCAs. The greatest threat to PALA would most likely be from prescribed fire-related mortality or injury, or from post-fire related sediment deposition in response to precipitation events in, or near, riparian zones in which the outcome of prescribed fire and post-fire effects can be difficult to predict.

Direct and indirect effects to PALA could occur from the use of dust palliatives, such as Magnesium Chloride (MgCl2) (dust suppressant) for dust abatements, on logging roads under the design criteria for thinning treatments. Impacts to aquatic sites would be the same for all aquatic species.

The effect to aquatic life and habitat can vary based upon species and is dependent on concentrations of suppressants used and proximity (Lewis, 1999). Impacts are also dependent on whether the suppressant is used as a diluted liquid or a dry palliative. For the Trestle project, it will be used as a dry palliative and, in this state, is less likely to be carried off by water runoff into drainages when compared to a liquid application. However, since the suppressant is water-soluble and moves laterally, movement will depend on concentrations and amount of rainfall. Application of the suppressant will occur in the summer months when rainfall is minimal (approximately July 1), which increases the likelihood of the suppressant not moving into drainages and affecting water quality and aquatic life.

The Colorado Department of Transportation (CDOT 1998) conducted extensive research on the environmental impacts of magnesium chloride as a de-icer on state roads. While this research focuses on a different activity than dust abatement, the results in terms of the chemicals' environmental impact are relevant. Chloride concentration from two separate sources, magnesium chloride and sand with chloride, increased background chloride concentrations by 50 to 100 mg/L during winter application. These concentrations are below levels considered potentially harmful to the most sensitive aquatic organisms (CDOT 1998). The conclusions of the CDOT report stated that magnesium chloride is “highly unlikely to cause or contribute to environmental damage at distances greater than 20 yards. Even very close to the roadway, the potential for magnesium chloride to cause environmental damage is probably much smaller than other factors related to road maintenance.”

Direct physiological effects from magnesium chloride for PALA may not be known; however, it is reasonable that similar issues exist with the osmoregulation of fish affecting their survival, growth, and reproduction (Hunt et al., 2012). They can also be affected through the uptake (ingestion) of the pollutant directly from the environment or from prey items, such as plankton. Indirect effects would include alterations in water quality and negative impacts on growth of vegetation due to osmotic pressure in soils. Chloride levels may be elevated from runoff after precipitation events, which can cause a decrease in biological, oxygen-demand influences on the aquatic site. These potential impacts could only occur if the suppressant enters drainages, and, based on the Colorado study and the timing of application, impacts are unlikely.

Cumulative Effects

When considered with past, present, and reasonably foreseeable future activities, any cumulative impacts to PALA, its preferred habitat, or its nesting habitat, as a result of implementing the action alternatives, are expected to be minor for the following reasons: there are no treatments within, or adjacent to, known occupied or suitable breeding areas; the expected duration of project-level effects is short (less than 5 years); short buffer exclusion zones were established to minimize potential effects to suitable habitat; the project provides an overall reduction in wildfire risk; and the project restores dispersed recreational sites in riparian habitat.

Overall, the actions of Alternative 2, 4, and 5 will ultimately benefit PALA because they will reduce wildfire risk, promote riparian habitat through prescribed fire, reduce sediment delivery to streams from road repair and road closure, and restore dispersed recreational sites. However, project activities may still impact this species even when the outcome is positive. Response of PALA likely depends on the type and magnitude of disturbance, the amount and configuration of remaining habitat, and their life-history characteristics.

Terrestrial Wildlife

The National Forest Management Act, the Code of Federal Regulations (CFR 219.19), the Forest Service Manual (FSM, 2672), and the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004) provide direction to maintain the viability of Region 5 endangered, threatened, and sensitive species. Yasuda and Allen (2017) summarizes the potential effects of project activities to federally listed threatened, endangered or proposed species, and to Region 5 Forest Service-designated sensitive terrestrial wildlife species.

Federally Listed Species

There are no federally listed threatened or endangered terrestrial wildlife species or designated critical habitats are known to occur in the project area.

Forest Service Sensitive Species

California Spotted Owl

Affected Environment

The Eldorado National Forest (ENF) occurs in the central portion of the species range and represents about 16% of the known population in the Sierra Nevada. The California spotted owl has several characteristics that are associated with increased species vulnerability: they have large individual spatial requirements, they have low population densities, and they are habitat specialists. Spotted owls have high adult survival rates and low reproductive rates—these life-history characteristics render spotted owl populations slow to recover from population declines (Verner et al., 1992). California spotted owl demographics and population trends are monitored at four study areas, one of which occurs in the ENF.

The sole source of empirical data to establish status and trend of the California spotted owl in the Sierra Nevada are from four long term demographic studies: (1) Eldorado National Forest (since 1986); (2) Lassen National Forest (since 1990); (3) Sierra National Forest (since 1990); and (4) Sequoia-Kings Canyon National Park (since 1990). A primary objective of these demographic studies is to monitor rate of change (lambda, λ) in owl populations (i.e., the number of owls present in a given year divided by the number of owls present the year before). For these demographic models a lambda (λ) value of 1 indicates a stable population; less than 1 indicates the population is decreasing, and greater than 1 indicates an increasing population. For the California spotted owl demographic studies, lambda has been estimated individually for each study area at five-year intervals (Franklin et al. 2004, Blakesley et al. 2010).

A robust analysis of these data, called a meta-analysis, combines comparable data across the demographic studies to increase sample size and improve accuracy of detecting population trends. The most recent meta-analysis, using data collected between 1990 and 2005, provided estimates of lambda for all four Sierra Nevada demography study areas (Blakesley et al. 2010). Blakesley et al. (2010) concluded that with the exception of the Lassen study area, California spotted owl populations were stable with adult survival rate highest at the Sequoia-Kings Canyon study site.

Since the meta-analysis, population trends have been reanalyzed for all four study areas using new statistical techniques and incorporating additional information from the meta-analysis. With the exception of the Seqouia-Kings study area, all of the Forest Service demographic study areas were declining (Conner et al. 2013, Tempel and Gutiérrez 2013, and Tempel et al. 2014a). Tempel et al. 2014a developed an integrated population model for the Eldorado study area using all data (occupancy, reproductively, and mark-recapture) and concluded that the population was declining [$\lambda < 1.0$ (95% confidence interval, 0.957-0.980)] with a 50% decrease in population size from 1992-2012.

Jones et al. 2016 reported that the Eldorado demographic study area proportion of occupied spotted owl sites declined by 43% over a 22-year period leading up to the 2014 King Fire (Jones et al. 2016; Figure 3e). For approximately 7 years from 2007-2013, the population within the Eldorado demography study was stable (Jones et al. 2016; Figure 3e). In September and October 2014, a human-ignited fire, the “King Fire” burned 39,545 ha and was one of the largest and most severe forest fires recorded in California history with high-severity fire (75–100% canopy mortality) occurring on 19,854 ha (50% of the area burned), with one continuous 13,683-ha high-severity burned patch (Jones et al. 2016). The King Fire affected 15,594 ha (44%) of the 35,500 ha Eldorado demographic study area and overlapped 30 of 45 spotted owl sites that have been monitored continuously since 1993 (Tempel et al. 2016). Of the 15,594 ha that burned within the study area, 64% burned at high-severity. One year post fire, occupancy dropped from 0.57 to 0.44 following approximately 7 years of relatively stable occupancy (Jones et al. 2016). The 22% decline in site occupancy after the fire was the greatest single-year decline recorded in the Eldorado study area over the 23-year study period (Jones et al. 2016).

Recent radio telemetry research within the King Fire area found California spotted owls strongly avoided high-severity burned areas with the authors concluding that megafires were an emerging threat to old-forest species (Jones et al. 2016). The extreme nature of the fire, more than two decades of pre-fire site occupancy data, and location information on owls – outfitted with Global Positioning System (GPS) receivers and tagged with colored leg bands for identification of individual birds – allowed the researchers to draw strong inferences regarding the effect of severe fire on a species considered to be a barometer of old-forest wildlife community health (Simberloff 1998). Their results suggest that (1) reducing the frequency of large, severe fires could benefit spotted owls and, by extension, other old-forest species, and (2) forest restoration and old-forest species conservation objectives may be more compatible than previously believed (Jones et al. 2016). In general, factors driving these population trends are not known (Keane 2014) and the causation factors are not known.

Habitat

In the ENF, California spotted owls are known to occur between 2,000 and 7,200 feet in elevation, with most nesting pairs found in the Sierran mixed-conifer habitat type. California spotted owl habitat is often subdivided into nesting habitat, roosting habitat, and foraging habitat. Habitats used for nesting and roosting are very similar, and so they are combined and described as "nesting-roosting habitat." Such areas are used for nesting, roosting, foraging, and dispersal by spotted owls, and these areas are usually forests with more late-seral forest characteristics than those of a “foraging” habitat. The spotted owl's foraging habitat is largely used for foraging and for dispersal, but it often lacks nest or roost sites or may have insufficient canopy cover to provide nesting or roosting opportunities. These categories are generalizations; however nesting-roosting habitats are generally considered to provide all or most habitat requirements, whereas foraging habitats are considered to provide only a subset of the spotted owl’s habitat requirements. Studies suggest the presence of large trees and high overstory canopy cover are the most important conditions associated with spotted owl occurrence and survival (North 2012, Verner et al. 1992, Blakesley et al. 2005, Seamans 2005, Seamans and Gutierrez 2007, Tempel et al. 2014b, Tempel et al. 2016). High structural diversity, and canopy layers, is thought to benefit spotted owls by contributing to a greater diversity of prey species, a variety of perch sites for increased hunting opportunities, and cooler microclimates for roost sites and increased protection from predators (North et al. 1999, Verner et al. 1992, Weathers et al. 2001).

Suitable habitat for the California spotted owl consists of mature forested habitats with large trees, and dense canopy cover with at least two canopy layers with 70 percent canopy closure preferred for nesting and roosting and more than 50 percent canopy closure preferred for foraging (USDA Forest Service, 2001; USDA Forest Service, 2004; Verner et al., 1992). Based on this, the following California Wildlife Habitat Relationships (CWHR) classification system types having the highest probability of providing stand structure associated with preferred nesting, roosting and foraging are CWHR classes 6, 5D, 5M, 4D, and 4M (USDA Forest Service 2001). On the ENF, high quality nesting habitat is found within Sierra Mixed Conifer, White Fir, and Ponderosa Pine, CWHR classes 5D and 5M. Suitable foraging habitat includes CWHR classes 4D and 4M. Stands considered to be suitable for foraging have at least two canopy layers, dominant and co-dominant trees in the canopy averaging at least 12 inches in dbh, at least 40 percent canopy closure, and higher than average levels of snags and downed woody material. Using the 2005 Forest Vegetation Inventory data and modeling of spotted owl habitat using CWHR, there are approximately 15,441 acres of California spotted owl habitat (CWHR 4M, 4D, 5M, 5D) on National Forest System lands within the 20,453-acre project area, and an additional 890 acres of suitable habitat on private lands for a total of 16,331 acres of suitable spotted owl habitat within the project area. Of those acres, most CWHR classes are 4M/4D (foraging habitat) and 5D (nesting/roosting habitat). Approximately 4,547 acres of 5D habitat occurs on National Forest System lands within the project area. Few acres of 5M and no CWHR size 6 occurs within the project boundary.

Protected Activity Centers (PACs) – 300 Acres

California spotted owl habitat are managed through established Protected Activity Centers (PACs) and Home Range Core Areas (HRCAs) (USDA Forest Service 2004). PACs are 300 acres of the best available habitat surrounding each PAC on National Forest System lands. PACs are maintained regardless of California spotted owl occupancy status. However, after a stand-replacing event (i.e., catastrophic wildfire), habitat conditions are re-evaluated within a 1.5-mile radius around the activity center to identify opportunities for re-mapping the PAC.

Home Range Core Areas (HRCAs) – 1,000 Acres

HRCAs are delineated by selecting the most suitable 1,000 acres on National Forest System lands within 1.5 mile radius of the activity center, including the 300-acre PAC (USDA Forest Service 2004). HRCAs are defined as the nearest high quality blocks of habitat surrounding the PAC. Substantial overlap in acreage can occur between HRCAs due to the relatively dense configuration of PACs in some locations near proposed units.

Circular Core Areas

Seamans and Gutierrez (2007) used a different method of analysis called a circular core area around owl activity centers. The circular core area is 1,000 acres in size and are defined as the nearest best available habitat within 0.7 miles of the activity center. Seamans and Gutierrez (2007) did not determine that California spotted owls use circular home ranges, but used this area for their statistical analysis to represent a core use area and to evaluate habitat and activities in direct proximity to activity centers.

Research results from the Eldorado demographic study area (Seamans, 2005; Seamans & Gutierrez, 2007) suggest that California spotted owl territories with greater amounts of mature, dense-canopied conifer forest, defined as having an average tree size greater than 12 inches dbh and a canopy cover 70% or greater, have a higher probability of being colonized and a lower probability of becoming unoccupied. On the ENF, Seamans and Gutierrez (2007) found that, within 0.7 miles of spotted owl activity centers, composition of large and medium-sized trees (≥ 12” dbh) and high canopy cover (≥ 70% canopy cover), was positively correlated with survival and territory colonization and negatively related to territory extinction. Tempel et al. 2016 found that Forests with medium (40-69%) and high (>70%) canopy cover were the most important predictors of territory occupancy. On the Eldorado site, high canopy cover was significantly negatively associated with extinction and medium canopy positively associated with colonization (Tempel et al. 2016). Furthermore, on the Eldorado, medium canopy cover was more positively correlated with occupancy than high canopy cover.

Status of PACs and HRCAs on the ENF and in the Project Area

On the ENF, there are 213 California spotted owl protected activity centers (PACs) and 187,423 unique acres of HCRAs (excluding acres of overlapping HRCAs). The Trestle project area is located within the Placerville Ranger District which has 86 PACs.

With the exception of the surveys conducted annually as part of the Eldorado demographic study area, surveys for California spotted owls on the ENF are primarily conducted for project-level activities to determine spotted owl occupancy within a project area. The Trestle Forest Health project area has been surveyed to protocol for spotted owls (USDA Forest Service 1993) in 2008, 2009, 2012, and 2013 and PAC monitoring occurred in 2014 and 2015. Nineteen spotted owl PACs and corresponding Home Range Core Area (HRCA) boundaries within the project boundary were assessed, updated, and redrawn based on the survey data. Five additional HRCAs overlap the project boundary [ELD0018, ELD0038, ELD0109, ELD0159 (6 acres), and ELD0162] and have zero to few acres of suitable habitat affected by the project and therefore will not be considered for further analysis. Four additional PACs (ELD0023, ELD0038, ELD0109, and ELD0159) occur within a 0.25 mile of the project boundary but do not overlap the project boundary. Table 21 provides the status of these nineteen PACs and their associated HRCAs.

Table 21
Status of California Spotted Owl PACs within the Trestle Project area

PAC	HRCA Habitat Suitability Acres (CWHR Size Class 4+ with ≥ 50% canopy cover)	Most recent survey year	Owl Occupancy Status	Activity Center
ELD0007	976	2002	Pair	2002 Pair
ELD0011	827	2009	1 Adult, 2 Young	2009 1 Adult, 2 Young
ELD0017	952	2015	1 Adult	1992 Pair, 2 Young; 2008 Pair, potential roost
ELD0019	916	2015	1 Adult	2000 Pair, 1 Young
ELD0035	982	2015	Nest Stand, 1 Adult, 1 Young	1992 Pair, 2 Young
ELD0059	957	2010	No detections	1991 Pair
ELD0063	876	2010	1 Adult, Roost	2009 Pair, 2 Young
ELD0110	988	2001	Pair	2001 Pair
ELD0111	1,000	2015	1 Adult, Roost	2002 Pair
ELD0112	961	2012	1 Adult	2000, 1 Adult
ELD0155	876	2014	1 Adult	1992 Pair, 2 Young

PAC	HRCA Habitat Suitability Acres (CWHR Size Class 4+ with ≥ 50% canopy cover)	Most recent survey year	Owl Occupancy Status	Activity Center
ELD0208	940	2015	Pair, Roost	1992 Pair, 2 Young
ELD0322	863	2010	1 Adult, Roost	2010 1 Adult, Roost
ELD0323	902	2015	Pair	2012 Male and Female Adult, possible Young
ELD0324	818	2015	1 Adult	2012 Pair, Roost
ELD0325	996	2012	1 Adult, Roost	2010 Pair
ELD0326	961	2015	1 Adult, 1 Young	2015 1 Adult, 1 Young
ELD0328	979	2012	1 Adult	2012 1 Adult
Total HRCA Acres	17,725[1]			

[1] Acres are more than suitable habitat available in the project area due to HRCA acreage that extends outside the project area boundary.

Environmental Consequences

Methodology

For the analysis of each of the alternatives, effects will be described at both the stand scale, as well as the territory scale (PAC, HRCA, and CCA).

The analysis of potential impacts to California spotted owls and their habitat was based on the land allocations for California spotted owls defined in the 2004 SNFPA which designates a 300-acre protected activity center (PAC); and a home core range (HRCA), 1,000-acre including the PAC. These are National Forest System lands managed only by the Forest Service. The HRCA, is the most suitable habitat (1,000 acres) of National Forest System lands within 1.5 miles of a PAC (USDA Forest Service 2004). These lands are contiguous and can vary in shape depending upon the best suitable habitat nearest to the owl activity center.

The HRCA was compared to Seamans and Gutierrez study (2007), which used a different scale and mixed ownership to define a home core range than the Forest Service. Seamans and Gutierrez's equivalency to a HRCA is a circular core area (CCA) with 1,000 acres of suitable habitat within 0.7 mile circular buffer of the activity center. These lands are a mix of private and federal lands. For analyzing potential impacts to spotted owl territories, the HRCA and the CCA were compared across alternatives.

The magnitude of potential impacts depend upon location, timing, frequency, and duration of activities. The types of impacts discussed in the effects analysis include habitat modification (i.e. mechanical thinning, hazard tree removal, brush/piling, prescribed burning, temporary road construction), disturbance, prey base alterations (i.e. changes in plant communities that prey rely on), and habitat resiliency (i.e. reduction or increase in potential for catastrophic wildfire).

Alternative 1

Direct and Indirect Effects

There are no activities related to this project; therefore, there will be no direct effects to spotted owls or their habitat. None of the project objectives would be accomplished with this alternative. The risk of catastrophic wildfire to spotted owls would still exist.

Cumulative Effects

Since there would be no activities, this alternative would not contribute toward any adverse cumulative effects related to disturbance of individuals or habitat. Under current management, the existing conditions and associated risks of wildfire, and habitat trends in the project area would remain unchanged. There would be no increased capacity for fire suppression within the project area, and nearby spotted owl PACs, HRCAs and other suitable habitat could suffer more intense and larger wildfires, than would be expected to occur with the three action alternatives. The No Action Alternative would, therefore, provide less protection for existing high quality habitat, and could in the long-term result in loss of habitat that might be retained with the implementation of any of the action alternatives.

Alternative 2

Direct and Indirect Effects

DIRECT DISTURBANCE

Disturbance during the nesting season can result in nest-site failure or abandonment. It is assumed that reproductively active spotted owls roost primarily within their PACs close to nest sites. Project activities will occur during the daylight hours, which would reduce the risk of disturbance to either nesting or foraging owls, as spotted owls are nocturnal. Direct disturbance to nesting owls would be avoided by the implementation of a Limited Operating Period (LOP) for units within a quarter-mile of the spotted owl activity center.

Prescribed burn units that come within a quarter-mile of PACs will need surveys in future years to determine if LOPs are required. Additional surveys would occur through project implementation to provide valid information in accordance with survey protocols or to assess if LOP timeframes can be altered or lifted.

Since prescribed fire use would occur within several PACs, which include roost sites and areas in which spotted owls do a substantial amount of foraging, prescribed fire implementation is likely to cause temporary disturbance from people, smoke, and other consequences of natural understory wildfires. Activities may cause individual roosting owls to awaken or relocate within the stand, particularly from the noise associated from hand thinning with chainsaws. This activity will be of less effect when it occurs in the late fall outside the breeding season (October) and when the fledglings are no longer completely dependent on the adult birds.

Road reconstruction could cause disturbance to spotted owls during breeding season if they are in close proximity to these activities. Measures of behavioral response or fecal corticosterone hormone levels (hormones that indicate stress) have been used to assess spotted owl response to disturbance. Tempel and Gutierrez (2003, 2004) found little evidence for disturbance effects from chainsaws and roads as measured by fecal corticosterone hormone levels for California spotted owls in the central Sierra Nevada. Hayward et al. (2011) found no association between baseline hormone levels and distance to roads for northern spotted owl response on the Mendocino National Forest. Owls had higher corticosterone levels when exposed to continuous traffic exposure, and they found that owl response may vary with age of owls and physiological body condition. Hayward et al. (2011) reported lower reproductive success for owls near roads with continuous loud noise versus owls near quiet roads. Closure of roads through gating or decommissioning will enhance habitat in the area for spotted owl by decreasing habitat fragmentation and decreasing disturbance to owls from road traffic.

HABITAT ALTERATION

The effects to spotted owl habitat from project activities can occur at multiple scales: 1) PAC – protected activity center, 2) HRCA – 1,000-acre home range core area of a protected the activity center, and 3) the stand – stand density, structure and understory vegetation. Seamans and Gutierrez (2007) used a different scale to define a home core range than the Forest Service. The Forest Service uses the HRCA, which is the most suitable habitat (1,000 acres) only on National Forest System lands within 1.5 miles of a protected activity center (USDA Forest Service 2004). Seamans and Gutierrez's equivalent to a HRCA is a circular core area (CCA) which is suitable habitat (1,000 acres) within a 0.7 mile circular buffer of the activity center.

For the analysis of each of the alternatives, effects will be described at both the stand scale, as well as the territory scale (PAC, HRCA, and CCA).

EFFECTS AT THE STAND SCALE

Collectively, studies suggest the presence of large trees and high overstory canopy cover are the most important conditions associated with spotted owl occurrence and survival (North, 2012; Blakesley, 2005; Seamans, 2005; Seamans & Gutierrez; 2007). High structural diversity, provided through a diversity of tree heights and canopy layers, is thought to benefit spotted owls by contributing to a greater diversity of prey species, providing a variety of perch sites for increased hunting opportunities, providing cooler microclimates for roost sites, and increasing protection from predators (North et al., 1999; Verner et al., 1992; Weathers et al., 2001). Reductions in canopy cover may have adverse effects on site occupancy, survival, and reproduction of spotted owls due to exposure to weather, predators, and modification of preferred forest structure for prey (Federal Register, 2006).

Mechanical Thinning and Follow-up Treatments of Surface and Ladder Fuels:

Vegetation treatments that are designed to reduce stand density and reduce surface and ladder fuels can alter spotted owl habitat by reducing canopy cover and structural diversity in nesting and foraging habitats; reducing the density of snags and the amount of down, woody debris; and affecting understory vegetation and ground cover. Under Alternative 2, 4,123 acres of suitable spotted owl habitat would be treated with mechanical thinning. Of this, approximately 614 acres would be within CWHR 5D habitat, 3,086 acres within 4D, and 423 acres within 4M habitat.

Mechanical thinning treatments in Alternative 2 will result in removal of small and intermediate size (less than 30” dbh) co-dominant and understory trees, resulting in measurable reductions of canopy cover and a simplification of stand structure (reduction in tree height diversity) from pre-treatment conditions. Objectives established in the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) allow for up to 30% canopy reduction. For the Trestle project, it is estimated that average canopy cover will decrease approximately 18% following commercial thinning (Trestle Silvicultural Report 2014).

Follow-up prescribed burn activities are expected to reduce canopy cover by another 5%. Thus, thinning and follow-up treatments are estimated to reduce existing canopy cover by a maximum of 23%. Canopy cover should return to pre-treatment levels within 20 to 30 years. Prescriptions are generally expected to retain at least 50% canopy cover in spotted owl HRCAs. Thinning treatments measured on the ENF in 2007 found the density of large trees (greater than 30” dbh) decreased between the pre-treatment and post-treatment sampled plots within mechanical thinning treatments, but these declines, which could have resulted from hazard tree removal, placement of landings, and skid trials, were relatively minor (Guitierrez & Whitmore, 2008).

Alternative 2 follows General Technical Report (GTR) prescriptions and will retain some patches of vegetation for heterogeneity in the stand; however, these could be consumed during follow-up prescribed burning if they are not avoided, further reducing prey habitat in these units. Shrub and understory cover along with prey species abundance and composition after prescribed burning, would decrease in treatment units but would be expected to return to pre-treatment conditions within 5 to 10 years. Large downed, woody material would decrease with piling and burning (Silviculture Report, 2014). Retention patches following GTR prescriptions may retain some coarse, woody debris on the ground. Nonetheless, thinning and follow-up treatments will reduce large coarse, woody debris and canopy cover, which is likely to reduce habitat quality for spotted owl prey (woodrats and flying squirrels) within treatment units (Meyer et al., 2007). Herbers (2008) found that northern flying squirrel density in the northwest averaged 60% lower in harvested treatments from 1 to 4 years following treatment, regardless of intensity or pattern of logging. Flying squirrels were detected on multiple occasions and locations during spotted owl surveys (Yasuda, pers. obs. 2012 and 2013) and would be a prey species of concern to maintain for spotted owls in the Trestle project.

Prescribed Fire Treatments

Studies that have investigated the effects of fire on spotted owls have generally indicated that low- to moderate-severity fires, which were historically common within montane forests of the Sierra Nevada, maintain habitat characteristics essential for spotted owl site occupancy (Roberts et al., 2010; Lee et al., 2012, 2013, Lee and Bond 2015, Jones et al. 2016). Keane et al. (2011) reported that California spotted owls did not avoid foraging in areas treated with prescribed fire and reported that, in fact, one owl strongly selected underburn treatments over untreated forest for foraging. Bond et al. (2009) reported that owls nested and roosted in unburned or low- to moderate-severity patches of forest, and, four years after the fire, they foraged selectively in high-severity burn patches that were located within larger home ranges that generally burned at low- to moderate-severity. Patches of early successional vegetation recovering from high-severity fire may provide access to early successional associated prey, such as woodrats and gophers, within the mosaic of mixed fire-severity landscapes. North (2012) concluded that where overstory tree mortality remains low and areas of high canopy cover remain after a burn, prescribed burning is likely to retain habitat features that are important for roosting and reproducing spotted owls.

Alternative 2 would treat 9,583 acres of spotted owl habitat using prescribed fire. Regional monitoring of vegetation changes associated with prescribed burn treatments documented no significant change in canopy cover or structure (Fites-Kaufman, 2007). Roberts (2010) found that prescribed fire treatments implemented in Yosemite National Park resulted in similar basal area of large snags between burned and unburned sites. However, Bagne et al. (2007) found an overall loss of about 12% of snags as a result of prescribed fire treatments in Sierra Nevada pine-dominated forests.

Prescribed fire treatments under Alternative 2 are not expected to reduce canopy cover more than 5%, averaged across the treatment area. Delayed mortality of large diameter trees following prescribed burn treatments has occurred on the ENF where treatment areas have contained a heavy layer of duff. Design criteria, such as raking, to reduce the potential for mortality in large diameter legacy pine will substantially reduce the likelihood of large tree mortality.

Available studies suggest that, with careful implementation, prescribed burning may benefit California spotted owls by protecting their nesting and roosting habitat from catastrophic fires while creating a diversity of landscape conditions (Roberts, 2011; Gallagher, 2010; Lee et al., 2012).

Snags and Down Logs

Late decay large diameter snag levels have been low (e.g., project area on average had three snags per acre) primarily from past insect salvage sales, illegal wood cutting; and lack of fire (2014 Silvicultural Report). However, the recent insect mortality (2015-2016), has increased the level of early decay stage small and large diameter snags, on the landscape, making more snags available in the project area. Because of the increase in snags within the project area, design criteria to retain four of the largest snags per acre has been incorporated into the project design, consistent with the 2004 Sierra Nevada Forest Plan Amendment.

Hazard tree and dead tree (snag) removal and prescribed burning will change the existing snag and down log component by altering the existing age and size classes currently within the area. Higher levels of snags and down wood are associated with spotted owl habitat use and are likely important elements supporting prey. Snags provide nesting and denning habitat for spotted owls, and habitat for prey such as squirrels and woodrats (Verner et al. 1992). Management practices that decrease these elements, as well as decreases in litter depth and the soil organic layer, could affect the production of hypogeous fungi, which is major food source for flying squirrels and white footed mice (Meyer et al. 2007). In the eastern Cascade Range snag populations were found to decline following thinning treatments, probably as a result of snag removal to prevent safety hazards. However, thinning followed by burning was found to increase total snag abundance and clumpiness in all but the largest diameter class (Hessburg et al. 2010). Though new snags will be created from burning; late decay snags may be consumed; reducing or removing this habitat component for both spotted owls and prey that may be utilizing existing cavities within these trees for nesting or denning.

EFFECTS AT THE TERRITORY SCALE (PAC, HRCA, AND CCA)

Tempel et al. 2016 assessed occupancy dynamics of 275 spotted owl territories (1,000-acre circle of an activity center) in 4 study areas in the Sierra Nevada, California from 1993 to 2011 and found that mechanical treatments (i.e., timber harvest) within a spotted owl territory, had no significant impact on territory occupancy and was positively correlated with occupancy on the ENF. Overall, high canopy cover (> 70%) and medium canopy cover (40-69% and were the most important predictors of territory occupancy (Tempel et al. 2016) with medium canopy cover positively associated with colonization on the ENF, further emphasizing the importance of maintaining medium canopy cover for spotted owl territories (Tempel et al. 2016).

Irwin et al. 2015 monitored radio-tagged northern spotted owl and California spotted owl response to study short-term direct responses (< 2 years post treatment) to various sivicultural treatments. Before harvest, radio-tagged owls generally used stands scheduled for harvest treatment in proportions significantly less than availability. Across all owls and all post-harvest conditions, the overall selection ratio increased after harvesting, suggesting that many of the harvests were benign or may have resulted in improved habitat. Irwin et al. 2015 study suggested that sivicultural treatments are likely to increase value of low-quality foraging habitat such as young and intermediate forests with dense canopy cover but generally without large trees.

Seamans and Gutierrez (2007) research (monitoring 66 owl territories from 1990-2004), suggested that there may be a higher probability of breeding dispersal for owl territories (1,000 acres of an activity center, circular core areas) with less than 150ha (~370 acres) of mature forest in a 400ha (~1,000 acre) circle and where > 20ha (~50 acres) are altered. Mature conifer forest is defined as >12” dbh and >70% canopy cover (Seamans and Gutierrez 2007). Their results suggested that owls following dispersal did not necessarily choose a new territory with more mature conifer forest (i.e., higher habitat quality) (Seaman and Gutierrez 2007). Selection of new territories by breeding individuals was not correlated with mature conifer forest but may have been associated with a mate (Seamans and Gutierrez (2007).

No mechanical thinning would occur with PACs, therefore the analysis will focus on the Home Range Core Area (HRCA) and Circular Core Area (CCA). Tables 22 and 23 displays the acres of suitable habitat and acres that would be affected by mechanical thinning within the HRCAs and CCAs.

Table 22
Mechanical Thinning Treatments Proposed within Home Range Core Areas (HRCAs). Acres of suitable habitat, acres proposed for mechanical thinning, and acres and percentage of the HRCA unaffected by mechanical thinning treatment under Alternative 2.

PAC #	HRCA Spotted Owl Habitat CWHR Size 4 and 5 with ≥50% canopy closure				HRCA Spotted Owl Habitat CWHR Size 4 and 5 with ≥70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned
ELD0007	976	541	435	45%	653	280	373	57%
ELD0011	827	190	637	77%	565	111	454	80%
ELD0017	952	35	917	96%	787	32	755	96%
ELD0019	916	202	714	78%	694	137	557	80%
ELD0035	982	330	652	66%	916	311	605	66%
ELD0059	957	76	881	92%	800	41	759	95%
ELD0063	876	170	706	81%	589	59	530	90%
ELD0110	988	398	590	60%	862	311	551	64%
ELD0111	1000	346	654	65%	863	309	554	64%
ELD0112	961	261	700	73%	515	118	397	77%
ELD0155	876	90	786	90%	490	61	429	88%
ELD0208	940	22	918	98%	721	20	701	97%
ELD0322	863	171	692	80%	677	102	575	85%
ELD0323	902	125	777	86%	517	120	397	77%

PAC #	HRCA Spotted Owl Habitat CWHR Size 4 and 5 with >50% canopy closure				HRCA Spotted Owl Habitat CWHR Size 4 and 5 with >70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned
ELD0324	818	108	710	87%	422	72	350	83%
ELD0325	996	90	906	91%	851	82	769	90%
ELD0326	961	0	961	100%	556	0	556	100%
ELD0328	979	539	440	45%	729	357	372	51%
ELD0329	955	177	778	81%	799	65	734	92%
Total	**17,725**	**3,871**	**13,854**	**78%[1]**	**13,006**	**2,588**	**10,418**	**80%[1]**

[1] Average percentage of untreated acres across the HRCAs within the project area.

Table 23
Mechanical Thinning Treatments Proposed within Circular Core Areas (CCAs). Acres of high quality suitable habitat, acres proposed for mechanical thinning, and acres and percentage of the CCA unaffected by mechanical thinning treatment under Alternative 2.

PAC #	Circular Core Area Spotted Owl Habitat CWHR Size 4 and 5 with >70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% CCA Not Thinned
ELD0007	516	199	317	61%
ELD0011	315	50	265	84%
ELD0017	493	32	461	94%
ELD0019	392	45	347	89%
ELD0035	698	184	514	74%
ELD0059	616	63	553	90%
ELD0063	476	17	459	96%
ELD0110	747	317	430	58%
ELD0111	686	195	491	72%
ELD0112	467	113	354	76%
ELD0155	442	97	345	78%
ELD0208	434	7	427	98%
ELD0322	496	83	413	83%
ELD0323	486	54	432	89%
ELD0324	284	32	252	89%
ELD0325	646	72	574	89%
ELD0326	349	0	349	100%
ELD0328	580	266	314	54%

PAC #	Circular Core Area Spotted Owl Habitat CWHR Size 4 and 5 with >70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% CCA Not Thinned
ELD0329	409	10	399	98%
Total	**9,532**	**1,836**	**7,696**	**81%** [1]

[1] Average percentage of untreated acres across HRCAs within the project area.

Cumulative Effects

Analysis of cumulative effects to the spotted owl considers the impacts of this alternative when combined with lingering effects of past, other present actions, and reasonably foreseeable future actions and events that have affected or may affect the quantity or quality of spotted owl habitat.

Within the cumulative effects analysis area for the spotted owl, there have been many past actions that altered the vegetation on both private and National Forest lands. Activities have included tree removal through commercial and non-commercial timber harvest, salvage of insect killed trees, thinning in plantations, and hazard tree removal for trails and roads, reforestation, prescribed burning, mechanical piling and burning, firewood collecting, herbicides, recreation trail use, wildfires and activities on adjacent private lands (timber harvest plans, road right of ways, and continued recreational and residential development).

Actions before 2005, reflected in the 2005 Forest vegetation layer, have included: historic timber clear-cutting, shelterwood, and fuels reduction logging. Historic timber harvest practices that included the practice of clear-cutting removed or altered some suitable and potentially suitable owl habitat in the past, though it is unknown what habitat existed before these timber management activities were implemented. These areas were reforested and are managed to enhance the growth and survival of planted conifers. Eventually, these plantations will likely develop into suitable owl habitat where site conditions allow. Plantations from these timber management activities are all generally at least 10 years old. All of these varied actions upon the analysis area are incorporated into the 2005 Forest Vegetation layer. As these previously treated areas attain structural conditions identified by their CWHR habitat types, they may function as foraging habitat and eventually nesting habitat. The quality of those future habitats will be tempered by the presence of structural elements of snags and down logs and tree species composition that remain within the treated areas. Some of the most important habitat elements (e.g. large trees with cavities for nests, large decaying down logs, and lichens to support flying squirrels) need time to establish within the stands.

On National Forest System lands, vegetation management projects after 1993 have been designed as fuels reduction projects under the 1993 California Spotted Owl Interim Guidelines (USDA Forest Service 1993b) to maintain those habitat elements most important to the owl and the most difficult to replace, such as large trees (>30” dbh.), canopy closures >40%, large snags, and downed woody debris.

There are no reasonably foreseeable future actions in the project area on FS lands. Timber harvest plans for private timberlands are anticipated to continue; particularly with the recent insect mortality.

Summary of Effects

- Of the approximately 15,441 acres of suitable spotted owl habitat available on National Forest System lands within the project area, mechanical thinning would occur within 4,123 acres of suitable habitat, of which nearly 3,700 acres would be in CWHR 4D/5D habitat (614 acres within CWHR 5D habitat). Mechanical thinning treatments would result in the removal of small and intermediate size (less than 30 inches dbh) co-dominant and understory trees, resulting in reductions of canopy cover and simplification of stand structure from pre-treatment conditions. Prescriptions are generally expected to retain at least 50% canopy cover.
- PAC: No mechanical thinning would occur within the 19 spotted owl PACs that occur within the project area. A limited operating period for mechanical vegetation treatments within ¼ mile of spotted owl activity centers during the breeding season (March 1 to August 15) would limit the potential for disturbance effects to nesting spotted owls.
- HRCA: Of the 17,725 HRCA acres of suitable habitat (e.g., CWHR Class size 4+ with at least 50% canopy closure) associated with the 19 activity centers in the project area, approximately 3,871 acres (or 22%) would be treated by mechanical thinning treatments. An average of 78% or 13,854 acres of suitable habitat within the HRCA would not be affected by mechanical thinning treatments. Eighteen of the nineteen HRCAs within the project area would receive some level of commercial thinning treatments within suitable habitat, with five receiving commercial thinning treatments in over 30% of the suitable habitat within the HRCA. (Table 22)
- HRCA: Of the 13,006 high quality HRCA acres (e.g., CWHR Class size 4+ with at least 70% canopy closure), associated with the 19 activity centers in the project area, approximately 2,588 acres (or 20%) would be treated. Averaged across units, 80% or 10,418 acres of the high quality habitat within the HRCA would not be affected by mechanical thinning treatments. Eighteen of the nineteen HRCAs within the project area would receive some level of commercial thinning treatments within suitable habitat, with five that would have over 30% of the high quality habitat within the HRCA being commercially thinned. (Table 22)
- CCA: Of the 9,352 acres of high quality habitat (e.g., CWHR Class size 4+ with at least 70% canopy closure) within the CCAs, approximately 1,836 acres or 19% of the CCAs would be affected by mechanical thinning treatments, leaving less than 370 acres of high quality habitat (≥ 70% canopy cover) for 8 spotted owl CCAs (Table 23). The CCA for ELD0326 (reproductive in 2015) will not receive any commercial thinning, but currently contains less than 370 acres of high quality habitat. Eleven spotted owl CCAs will meet the 370 acres of

high quality habitat suggested by Seamans and Gutierrez (2007) for maintaining territory occupancy. Approximately 81% or 7,696 acres of the high quality habitat within the CCAs would not be affected by commercial mechanical thinning treatments.

- Seamans and Gutierrez (2007) research (monitoring 66 owl territories from 1990-2004), suggested that there may be a higher probability of breeding dispersal for owl territories (1,000 acres of an activity center, circular core areas) with less than 150ha (~370 acres) of mature forest in a 400ha (~1,000 acre) circle and where > 20ha (~50 acres) are altered. Their results suggested that owls following dispersal did not necessarily choose a new territory with more mature conifer forest (i.e., higher habitat quality) (Seaman and Gutierrez 2007). Selection of new territories by breeding individuals was not correlated with mature conifer forest but may have been associated with a mate (Seamans and Gutierrez (2007).
- Irwin et al. 2015 did not observe abandonment of occupied (Northern spotted owl and California spotted owl) territories that were treated up to 58% of area and found that after silvicultural treatment, spotted owls increased overall use of treated stands (selected against them before treatment, used in proportion to availability after treatment).
- Peery et al. 2015 study using 20 years of demographic data collected at 74 spotted owl territories that included the Last Chance Study Area (LCSA) and the nearby Eldorado Study Area (ESA) suggested that reductions in the area of high-canopy forest resulting from either logging or high-severity wildfire could reduce the viability of California spotted owl populations and may be contributing to ongoing declines in abundance and territory occupancy.
- Tempel et al. 2016 found that “logging” (i.e. mechanical treatment) had no significant impacts at any of the demography sites, but had a non-significant positive impact on the Eldorado (Tempel et al. 2016). On the Eldorado site, high canopy cover was significantly negatively associated with extinction, and medium canopy cover positively associated with colonization and medium canopy cover was more positively correlated with occupancy than high canopy cover (Tempel et al. 2016).
- In terms of population dynamics, spotted owl surveys between 1993-2012 within the North and South Fork of American River 345 km2 study area, where 60% of the lands were managed by the Forest Service, the amount of forest with high (70%) canopy cover dominated by medium- or large-sized trees was the most important predictor of variation in demographic rates (Tempel et al. 2014b). Stephen et al. 2016 suggested that by accepting short-term movement or loss of individuals in response to restoration treatments, local populations may benefit long-term from improving survivability of key habitat features (e.g., large trees) in future wildfires (Franklin et al. 2014, Stephens et al. 2014 Hessburg et al. 2015).
- In addition to prescribed fire, significant expansion of mechanical treatments will be needed to achieve long-term forest resilience objectives (Stephens et al. 2016). The long-term effects of alternative 2 would be beneficial to individuals and their habitat as prevention of stand-

replacing wildfire would help to maintain suitable spotted owl habitat on the landscape. Thus, effects to spotted owls and their habitat in the short term would be outweighed by the long term benefits of reduced potential for stand-replacing high severity fire.

- Because none of the 19 PACs would be impacted by commercial thinning and minimal treatment through prescribed burning would occur in any of the PACs; 10,418 acres (or 80%) of high quality habitat and 13,854 acres (or 78%) of suitable habitat would not be affected by mechanical thinning in HRCAs; and 7,696 acres (or 81%) of high quality mature conifer forest habitat would be unaffected within CCAs (0.7 mile radius of activity center), no significant impacts are anticipated to occur to spotted owls. Short-term negative effects from treatments may affect reproductive success or occupancy during implementation; however, effects to spotted owls and their habitat in the short term would be outweighed by the long term benefits of reduced potential for stand-replacing high severity fire. In addition, logging (i.e. mechanical treatments) were found to have a non-significant positive impact on the Eldorado and medium canopy cover was more positively correlated with occupancy on the Eldorado (Tempel et al. 2016).

Alternative 4

Direct, Indirect, and Cumulative Effects

Alternative 4 has similar direct, indirect, and cumulative effects as Alternative 2 with the following exceptions:

1. Alternative 4 was developed to reduce project effects upon spotted owls by focusing mechanical thinning treatments in areas that are outside high-quality spotted owl habitat and/or are a greater distance from owl territory centers, particularly where such habitat may be limited for an owl site.
2. When compared with Alternative 2, Alternative 4 proposes for 1,819 fewer acres of suitable habitat to be commercial mechanically thinned. Effects at the stand scale are the same as described for Alternative 2; however, the effects of mechanical thinning and follow-up treatments would occur on fewer acres as compared to Alternative 2. The acreage treated with prescribed fire (follow up and primary treatment) is similar between both alternatives, although prescribed fire as the primary treatment is approximately 3,000 acres more than under Alternative 2. The effects of prescribed fire treatments would be similar to Alternative 2. The location of thinning treatments would generally be a greater distance from owl activity centers, and approximately 1,600 fewer acres of 4D/5D habitat (1,361 fewer acres of 4D and 306 fewer acres 5D habitat) would be treated through commercial mechanical thinning treatments than would be treated under Alternative 2.
3. Alternative 4 assessed canopy cover reducing treatments in spotted owl habitat within HRCAs and circular core areas (CCAs). This resulted in removing areas that were planned for harvest

under Alternative 2, to lower the risk of reducing occupancy of existing spotted owl sites. Under Alternative 4, canopy-reducing treatment units that affected territories with limited mature conifer forest habitat (CWHR 4+ with ≥70% canopy cover) are reduced when compared to Alternative 2 and Alternative 5.

4. HRCA: Of the 17,725 suitable HRCA acres (e.g., CWHR Class size 4+ with ≥50% canopy closure), associated with the 19 PACs in the project area, approximately 1,971 acres (or 11%) would be treated by mechanical thinning treatments (Table 24), as compared to 3,871 acres (or 22%) under Alternative 2. On average, approximately 89% or 15,754 acres of the HRCA would not be affected by commercial mechanical thinning. Seventeen of the nineteen HRCAs within the project area would receive some level of commercial thinning treatments within suitable habitat. Under Alternative 4, commercial thinning treatments would affect less than 20% of the suitable habitat for most of the HRCAs. (Table 24)

5. HRCA: Of the 13,006 high quality HRCA acres (e.g., CWHR Class size 4+ with ≥70% canopy closure; high quality habitat), associated with the 19 activity centers in the project area, approximately 1,286 acres (or 9%) would be treated (Table 24), as compared to 2,588 acres (or 20%) under Alternative 2. On average, approximately 91% or 11,788 high quality habitat HRCA acres would not be affected by mechanical thinning treatments. Sixteen of the nineteen HRCAs within the project area would receive some level of commercial thinning treatments within high quality suitable habitat, with two that would have over 20% of the high quality habitat within the HRCA being commercially thinned.

6. CCA (or territories): Of the 9,352 acres of high quality habitat (e.g., CWHR Class size 4+ with ≥70% canopy closure), approximately 847 acres or 9% of the circular core areas (or territories) would be affected by mechanical thinning treatments, leaving less than 370 acres of high quality habitat (≥ 70% canopy cover) for 3 spotted owl CCAs (Table 25), as compared to 1,836 acres (or 19%) and 8 spotted owl CCAs under Alternative 2. Similar to Alternative 2, the CCA for ELD0326 (reproductive in 2015) will not receive any commercial thinning, but currently contains less than 370 acres of high quality habitat. Sixteen spotted owl CCAs will meet the 370 acres of high quality habitat suggested by Seamans and Guitierez (2007) for maintaining territory occupancy. Approximately 91% or 8,685 acres of high quality habitat would not be not be commercially mechanically thinned within the CCAs.

7. Because none of the 19 PACs would be impacted by commercial thinning and minimal treatment through prescribed burning would occur in any of the PACs; 11,788 acres (or 91%) of high quality habitat, and 15,754 acres (or 89%) of suitable habitat would not be affected by mechanical thinning treatments in HRCAs; and 8,865 acres (or 91%) of high quality mature conifer forest habitat would be unaffected by mechanical thinning in CCAs (0.7 mile radius of activity center), no significant impacts are anticipated to occur to spotted owls or their habitat. Short-term negative effects from treatments may affect reproductive success or occupancy during treatments; however, effects to spotted owls and their habitat in the short term would be

outweighed by the long term benefits of reduced potential for stand-replacing high severity fire.

Table 24
Mechanical Thinning Treatments Proposed within Home Range Core Areas (HRCAs). Acres of suitable habitat, acres proposed for mechanical thinning, and acres and percentage of the HRCA unaffected by mechanical thinning treatment under Alternative 4.

PAC #	HRCA Spotted Owl Habitat CWHR Size 4 and 5 with ≥50% canopy closure				HRCA Spotted Owl Habitat CWHR Size 4 and 5 with ≥70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned
ELD0007	976	135	841	86.2%	653	67	586	90%
ELD0011	827	166	661	79.9%	565	87	478	85%
ELD0017	952	34	918	96.4%	787	74	713	91%
ELD0019	916	198	718	78.4%	694	172	522	75%
ELD0035	982	229	753	76.7%	916	39	877	96%
ELD0059	957	76	881	92.1%	800	19	781	98%
ELD0063	876	84	792	90.4%	589	1	588	100%
ELD0110	988	280	708	71.7%	862	205	657	76%
ELD0111	1000	185	815	81.5%	863	161	702	81%
ELD0112	961	106	855	89.0%	515	70	445	86%
ELD0155	876	69	807	92.1%	490	47	443	90%
ELD0208	940	0	940	100.0%	721	29	692	96%
ELD0322	863	8	855	99.1%	677	2	675	100%
ELD0323	902	74	828	91.8%	517	53	464	90%
ELD0324	818	46	772	94.4%	422	50	373	88%
ELD0325	996	9	987	99.1%	851	8	843	99%

PAC #	HRCA Spotted Owl Habitat CWHR Size 4 and 5 with >50% canopy closure				HRCA Spotted Owl Habitat CWHR Size 4 and 5 with >70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned
ELD0326	961	0	961	100.0%	556	0	556	100%
ELD0328	979	93	886	90.5%	729	71	658	90%
ELD0329	955	179	776	81.3%	799	64	735	92%
Total	**17,725**	**1,971**	**15,754**	**89%[1]**	**13,006**	**1,286**	**11,788**	**91%[1]**

[1] Average percentage of untreated acres across the HRCAs within the project area.

Table 25

Mechanical Thinning Treatments Proposed within Circular Core Areas (CCAs). Acres of high quality suitable habitat, acres proposed for mechanical thinning, and acres and percentage of the CCA unaffected by mechanical thinning treatment under Alternative 4.

PAC #	Circular Core Area Spotted Owl Habitat CWHR Size 4 and 5 with >70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% CCA Not Thinned
ELD0007	516	27	489	95%
ELD0011	315	19	296	94%
ELD0017	493	0	493	100%
ELD0019	392	6	386	98%
ELD0035	698	72	626	90%
ELD0059	616	61	555	90%
ELD0063	476	14	462	97%
ELD0110	747	223	524	70%
ELD0111	686	126	560	82%
ELD0112	467	105	362	78%
ELD0155	442	42	400	91%
ELD0208	434	7	427	98%
ELD0322	496	2	494	100%
ELD0323	486	38	448	92%
ELD0324	284	11	273	96%
ELD0325	646	2	644	100%
ELD0326	349	0	349	100%
ELD0328	580	82	498	86%
ELD0329	409	10	399	98%

PAC #	Circular Core Area Spotted Owl Habitat CWHR Size 4 and 5 with >70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% CCA Not Thinned
Total	**9,532**	**847**	**8,685**	**91%[1]**

[1] Average percentage of untreated acres across HRCAs within the project area.

Alternative 5

Direct, Indirect, and Cumulative Effects

Alternative 5 has similar indirect, direct, and cumulative effects as Alternative 2 with the following exceptions:

1. Alternative 5 was developed to reduce project effects upon spotted owls by focusing mechanical thinning treatments in areas that are outside high-quality spotted owl habitat and/or are a greater distance from owl territory centers, particularly where such habitat may be limited for an owl site.

2. When compared with Alternative 2, Alternative 5 proposes for 939 fewer acres of suitable habitat to be mechanically thinned. Effects at the stand scale are the same as described for Alternative 2; however, the effects of mechanical thinning and follow-up treatments would occur on fewer acres as compared to Alternative 2. The acreage treated with prescribed fire (follow up and primary treatment) is similar between both alternatives, although prescribed fire as the primary treatment is approximately 1,500 acres more than under Alternative 2. The effects of prescribed fire treatments would be similar to Alternative 2. The location of thinning treatments would generally be a greater distance from owl activity centers, and approximately 2,500 fewer acres of the 4D/5D habitat (599 fewer acres within 4D and 227 acres fewer within 5D habitat) would be treated through commercial mechanical thinning treatments than would be treated under Alternative 2.

4. HRCA: Of the 17,725 suitable HRCA acres (e.g., CWHR Class size 4+ with >50% canopy closure), associated with the 19 PACs in the project area, approximately 2,933 acres (or 16%) would be treated by mechanical thinning treatments (Table 26), as compared to 3,871 acres (or 22%) under Alternative 2. On average, approximately 84% or 14,792 acres of the HRCA would not be affected by commercial thinning. Sixteen of the nineteen HRCAs within the project area would receive some level of commercial thinning treatments within suitable habitat, with two that would have over 30% of the high quality habitat within the HRCA being commercially thinned as compared to eighteen and five under Alternative 2.

5. HRCA: Of the 13,006 high quality HRCA acres (e.g., CWHR Class size 4+ with ≥70% canopy closure; high quality habitat), associated with the 19 activity centers in the project area, approximately 1,928 acres (or 15%) would be treated (Table 26), as compared to 2,588 acres (or 20%) under Alternative 2. On average, approximately 85% or 11,078 high quality habitat HRCA acres would not be affected by mechanical thinning treatments. Sixteen of the nineteen HRCAS within the project area would receive some level of commercial thinning treatments within high quality suitable habitat, with two that would have over 30% of the high quality habitat within the HRCA being commercially thinned.

6. CCA (or territories): Of the 9,352 acres of high quality habitat (e.g., CWHR Class size 4+ with ≥70% canopy closure), approximately 1,444 acres or 15% of the circular core areas (or territories) would be affected by mechanical thinning treatments, leaving less than 370 acres of high quality habitat (≥ 70% canopy cover) for 7 spotted owl CCAs (Table 27), as compared to 1,836 acres (or 19%) and 8 spotted owl CCAs under Alternative 2. Similar to Alternative 2, the CCA for ELD0326 (reproductive in 2015) will not receive any commercial thinning, but currently contains less than 370 acres of high quality habitat. ELD0324 (pair in 2012 and single in 2015) is currently under 370 acres, with minimal thinning proposed (11 acres). Twelve spotted owl CCAs will meet the 370 acres of high quality habitat suggested by Seamans and Guitierez (2007) for maintaining territory occupancy. Approximately 85% or 8,088 acres of high quality habitat would not be commercial mechanically thinned within CCAs.

7. Because none of the 19 PACs would be impacted by commercial thinning and minimal treatment through prescribed burning would occur in any of the PACs; 11,078 acres (or 85%) of high quality habitat and 14,792 acres (or 84%) of suitable habitat would be retained in HRCAs; and 8,088 acres (or 85%) of high quality mature conifer forest habitat CCAs (0.7 mile radius of activity center), no significant impacts are anticipated to occur to spotted owls. Short-term negative effects from treatments may affect reproductive success or occupancy during treatments; however, effects to spotted owls and their habitat in the short term would be outweighed by the long term benefits of reduced potential for stand-replacing high severity fire.

Table 26

Mechanical Thinning Treatments Proposed within Home Range Core Areas (HRCAs). Acres of suitable habitat, acres proposed for mechanical thinning, and acres and percentage of the HRCA unaffected by mechanical thinning treatment under Alternative 5.

PAC #	HRCA Spotted Owl Habitat CWHR Size 4 and 5 with >50% canopy closure				HRCA Spotted Owl Habitat CWHR Size 4 and 5 with >70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned
ELD0007	976	347	629	64%	653	209	444	68%
ELD0011	827	190	637	77%	565	111	454	80%
ELD0017	952	0	952	100%	787	0	787	100%
ELD0019	916	155	761	83%	694	99	595	86%
ELD0035	982	236	746	76%	916	223	693	76%
ELD0059	957	48	909	95%	800	39	761	95%
ELD0063	876	84	792	90%	589	19	570	97%
ELD0110	988	345	643	65%	862	260	602	70%
ELD0111	1000	242	758	76%	863	212	651	75%
ELD0112	961	241	720	75%	515	114	401	78%
ELD0155	876	90	786	90%	490	61	429	88%
ELD0208	940	0	940	100%	721	0	721	100%
ELD0322	863	158	705	82%	677	100	577	85%
ELD0323	902	74	828	92%	517	71	446	86%
ELD0324	818	46	772	94%	422	31	391	93%
ELD0325	996	51	945	95%	851	48	803	94%
ELD0326	961	0	961	100%	556	0	556	100%
ELD0328	979	445	534	55%	729	266	463	64%

PAC #	HRCA Spotted Owl Habitat CWHR Size 4 and 5 with >50% canopy closure				HRCA Spotted Owl Habitat CWHR Size 4 and 5 with >70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% HRCA Not Thinned
ELD0329	955	181	774	81%	799	65	734	92%
Total	**17,725**	**2,933**	**14,792**	**84%[1]**	**13,006**	**1,928**	**11,078**	**85%[1]**

[1] Average percentage of untreated acres across the HRCAs within the project area.

Table 27
Mechanical Thinning Treatments Proposed within Circular Core Areas (CCAs). Acres of high quality suitable habitat, acres proposed for mechanical thinning, and acres and percentage of the CCA unaffected by mechanical thinning treatment under Alternative 5.

PAC #	Circular Core Area Spotted Owl Habitat CWHR Size 4 and 5 with >70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% CCA Not Thinned
ELD0007	516	160	356	69%
ELD0011	315	19	296	94%
ELD0017	493	0	493	100%
ELD0019	392	6	386	98%
ELD0035	698	111	587	84%
ELD0059	616	61	555	90%
ELD0063	476	14	462	97%
ELD0110	747	289	458	61%
ELD0111	686	163	523	76%
ELD0112	467	108	359	77%
ELD0155	442	97	345	78%
ELD0208	434	7	427	98%
ELD0322	496	83	413	83%
ELD0323	486	38	448	92%
ELD0324	284	11	273	96%
ELD0325	646	36	610	94%
ELD0326	349	0	349	100%
ELD0328	580	231	349	60%
ELD0329	409	10	399	98%

PAC #	Circular Core Area Spotted Owl Habitat CWHR Size 4 and 5 with >70% canopy closure			
	Current Acres	Acres Proposed Thinning	Acres Not Thinned	% CCA Not Thinned
Total	**9,532**	**1,444**	**8,088**	**85%[1]**

[1] Average percentage of untreated acres across HRCAs within the project area.

Northern Goshawk

Affected Environment

It is estimated that there are around 600 known goshawk territories on National Forest system lands in the Sierra Nevada, with over 75 territories occurring in the ENF. Territories appear to be well distributed across the Sierra Nevada; however, occupancy of many territories is unknown and population trend is unknown due to a lack of demographic studies for this species. On the ENF, known goshawk sites appear to be fairly well distributed across the forest, between 4,000 and 7,000 feet in elevation (USDA Forest Service, 2001). Northern goshawk habitat remains broadly distributed on the ENF; however, habitat gaps exist in the areas burned by the Cleveland, Star, Freds, Power, and King wildfires on the forest.

Suitable habitat for the northern goshawk consists of mature-forest habitats with large trees, dense canopy cover with at least two canopy layers, and abundant snags and down logs (USDA Forest Service, 2001 and 2004). Northern goshawk habitat is defined on the Eldorado National Forest using the California Wildlife Habitat Relationships Models (CWHR) canopy and size classes. In general, foraging habitat is defined as canopy cover greater than 40% and trees greater than 12 inches dbh (CWHR 4M, 4D, 5M, 5D), nesting habitat is defined as canopy cover greater than 60% and trees greater than 24 inches dbh (CWHR 5M, 5D).

Using the 2005 Forest Vegetation Inventory data and modeling of goshawk habitat using CWHR, there are approximately 15,441 acres of suitable habitat (CWHR 4M, 4D, 5M, 5D) on National Forest System lands within the 20,453-acre project area. There are an additional 890 acres of suitable habitat on private lands within the project area.

The northern goshawk primarily preys upon passerine birds, particularly favoring Stellar's Jays and woodpeckers, as well as squirrels and chipmunks. Passerine birds are common throughout the open- and dense-canopied forest. It is believed that mature forest, with open understory and with 40% overstory canopy cover and large trees, allow for northern goshawks to hunt prey most efficiently, due to maneuverability between trees (Beier & Drennan, 1997; La Sorte et al., 2004). Goshawk reproduction is known to be linked to habitat structure, prey density, and prey availability due to forest structure. Low levels of supplemental feedings to goshawks were found to make the difference in successful fledging of goshawk young in poorer habitats (Bytholm & Kekkonen, 2008). Because goshawks select foraging sites based upon habitat structure, goshawks would forage in suitable habitat even when prey densities are lower than other habitats (Beier & Drennan, 1997). Thus goshawks would likely continue to forage where they have foraged in the recent past.

Goshawk nesting habitat requirements are thought to be more specific than foraging requirements, as goshawks are generally believed to be foraging generalists (Federal Register, 1998). Northern goshawk protected activity centers (PAC) have been delineated around territorial goshawk activity centers and include the best 200 acres of suitable habitat surrounding known activity center and habitat with highest nesting habitat capability (CWHR type 5D). Habitat patches surrounding nest locations are known to range from 25 to 250 acres in size; therefore, the SNFPA required 200-acre protected activity centers (PAC) to be delineated around breeding sites (USDA Forest Service, 2004). There are five goshawk PACs within the project boundary and one additional PAC within a quarter-mile of the project area.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Since there are no project activities proposed under this alternative, there would be no direct or cumulative effects to the northern goshawk or its habitat.

Cumulative Effects

Since there would be no activities, this alternative would not contribute toward any adverse cumulative effects related to disturbance of individuals or habitat.

Alternative 2

Direct and Indirect Effects

Disturbance during the nesting season can result in nest site failure or abandonment. There are five goshawk PACs located within a quarter-mile of the proposed units (PACs T26-03, T27-02, T27-07, T37-04, and T37-06), and all would have LOPs around their nest site. The LOP should protect nesting goshawks from disturbance during the breeding season. The SNFPA allows a breeding season LOP to be waived when necessary to allow for early-season prescribed fire use in up to 5% of goshawk PACs per year.

The proposed treatment units contain about 4,123 acres of suitable nesting and foraging habitat for goshawk. The effects on goshawk habitat on the west slope of the Sierra Nevada from treatments following the SNFPA standards and guidelines are analyzed in the SNFPA Final Environmental Impact Statement (FEIS) and Final Supplemental Environmental Impact Statement (FSEIS) and that analysis is incorporated by reference (USDA Forest Service 2001 and 2004). Known nest locations (PACs) and the surrounding habitats are protected, and Standards and Guidelines requiring retention of large trees are followed, and 40% to 50% of canopy cover is available in treated stands and snags. Habitat should be maintained with capability to support goshawks.

Stand structural components will be altered from project activities potentially affecting goshawk foraging behavior. Foraging opportunities for goshawks would be enhanced in these areas (provided prey habitat is maintained) by opening up the understory, enabling higher maneuverability through the stand. Weber's (2006) study on the Six Rivers National Forest found that nearly 81% of trees in the Post-Fledgling Area (PFA) were at least medium-sized and only 11% of the PFA's total area was composed of trees in the smallest size class. Goshawks' ability to fly through early seral stands of shrub and pole sized trees may be limited due to their size (Weber, 2006).

Reduction in understory density may also enable a greater number of prey species, which favor a moderate canopy closure (40% to 69%), medium size openings (greater than 4 acres), and a medium- to high-level of interspersion of seral stages within forest habitats to occur (Reynolds et al., 1992). In general, a greater number of prey species favor a moderate canopy closure (40% to 69%), medium size (greater than 4 acres) openings and a medium to high level of interspersion of seral stages within forest habitats (Ibid), which are conditions that will be created by the proposed thinning treatments. However, a more recent study suggests "that prey availability is more important than prey abundance in habitat selection" by goshawk and "as long as prey numbers are above a rather low threshold, goshawks select foraging sites where structural characteristics favor their foraging strategies" (Greenwald et al., 2005). This study also suggests that recommendations focusing on increasing prey abundance at the expense of forest structure within occupied home ranges are not likely to improve goshawk occupancy rates (Greenwald et al., 2005).

Cumulative Effects

Past timber management may have lessened habitat quality by reducing canopy closure and by removing larger size class trees that goshawk tend to prefer for nesting. "There is a concern that northern goshawk populations and reproduction may be declining in North America and California due to changes in the amount and distribution of habitat or reductions in habitat quality (Bloom et al., 1986; Reynolds et al., 1992; Kennedy, 1997, Squires & Reynolds, 1997; Smallwood, 1998; DeStefano, 1998 as cited in USDA Forest Service, 2001). However, the United States Fish and Wildlife Service (USFWS) completed a formal review of the species and determined that the goshawk is currently well distributed throughout its historic range and that there is "no evidence that the goshawk population is declining in the western United States, that habitat is limiting the overall population, that there are any significant areas of extirpation, or that a significant curtailment of the species' habitat or range is occurring" (Federal Register, 1998). The USFWS further found that the goshawk appears to be a "habitat generalist in terms of the variety and age classes of forest types it uses to meet it life requirements" and that the "contention that the goshawk is dependent on large, unbroken tracts of old growth and mature forest" was not supported by available information (Ibid). Observations of goshawk nest sites on the ENF have found numerous nests in second-growth forests with medium-size trees (USDA Forest Service, 2005). Since goshawks prefer open understories for foraging, past fire exclusion in the Trestle Project may have reduced habitat quality due to the ingrowth of shade tolerant species.

Habitat effects across the landscape in the project boundary, as well as cumulative effects to goshawk habitat (4M, 4D, 5M, and 5D), would be the same as described for the spotted owl as the two species utilize similar habitats. It is estimated that within 20 years, areas treated on NFS lands are expected to recover higher canopy closures and tree size and therefore have an increase in habitat quality (USDA Forest Service, 2001 and 2004). The proposed project will not impact goshawk nest stands from commercial harvest and will maintain suitable habitat for goshawk foraging following treatments, by retaining large trees and 40% canopy cover where it currently meets or exceeds it.

Alternative 4

Direct, Indirect, and Cumulative Effects

Alternative 4 has similar indirect, direct, and cumulative effects as Alternative 2 with the following exceptions. Alternative 4 was developed to aid in maintaining habitat components on the landscape for the California spotted owl. Harvest prescriptions in the majority of the units proposed under Alternative 4 would primarily focus on maintaining understory trees contributing to fuel loading, and on maintaining larger diameter trees contributing to a dense canopy, which is favored by late seral dependent species, such as the northern goshawk.

The proposed treatment units contain about 2,304 acres of suitable nesting and foraging habitat for goshawk (compared to 4,123 acres under Alternative 2). There are 308 acres of 5D within treatment units (compared to 614 acres under Alternative 2); there are 1,725 acres of 4D (compared to 3,086 acres under Alternative 2); and there are 271 in acres of 4M (compared to 423 acres under Alternative 2) proposed for thinning. Effects to goshawk habitat (4M/D and 5M/D) would be similar to spotted owls, as the majority of this habitat type across the landscape falls within spotted HRCA acreage.

Medium- to large-diameter trees will not be intentionally removed from the remaining acres within units containing 4M, 4D, 5M or 5D habitat (outside of HRCAs), thus retaining the integrity of the existing CWHR classification of these stands. These stands will be having understory trees (4" to12" dbh) removed to reduce fuel ladders within the understory. This alternative will serve to retain large diameter trees and dense canopy and to reduce the risk of wildfire by removing small diameter trees, particularly those adjacent to and near large diameter legacy trees in the stands that may be contributing to ladder fuels.

Alternative 5

Direct, Indirect, and Cumulative Effects

Alternative 5 has similar direct, indirect, and cumulative effects as Alternative 2 with the following exceptions. The unit treatments are focusing on thinning trees 4" to 12" in dbh. These stands will be having understory trees removed to reduce fuel ladders within the understory. These size trees will be able to re-establish in the understory within a few years, if conditions permit, and they will be able to contribute to a multi-story stand. This alternative will serve to retain large diameter trees and dense canopy and to reduce the risk of wildfire by removing small-diameter trees, particularly adjacent to and near large-diameter legacy trees in the stands that may be contributing to ladder fuels.

The proposed treatment units contain about 3,184 acres of suitable nesting and foraging habitat for goshawk (compared to 4,123 acres under Alternative 2). There are 387 acres of 5D (compared to 614 acres in Alternative 2); there are 2,487 acres of 4D (compared to 3,086 acres under Alternative 2), and 310 in acres of 4M (compared to 423 acres under Alternative 2) proposed for thinning. Effects to goshawk habitat (4M/D and 5M/D) would be similar to spotted owls, as the majority of this habitat type across the landscape falls within spotted HRCAs.

Great Gray Owl

Affected Environment

Great gray owls in California utilize pine and fir forests adjacent to meadows between 750 and 2,250 meters (Winter, 1986). The Conservation Strategy for Great Gray Owls (Wu 2016) documents use of great gray owls also in lower elevations within mixed hardwood-conifer forests, including areas far from montane meadows. Availability of nesting structures and prey limit their use of habitat. Foraging habitat in the Sierra Nevada is generally open meadows and grasslands in forested areas, and trees along the forest edge are used for hunting perches. Leaning trees that lay against other trees provide structure for non-flying owlets to maneuver on and get off the understory floor. Openings caused by fires or timber harvest serve as foraging habitat when the vegetation is in early successional stages (Hayward, 1994; Greene, 1995). Greene (1995) found that sites occupied by great gray owls had greater plant cover, vegetation height, and soil moisture than sites not occupied by owls. Canopy closure was the only variable of three variables measured (canopy closure, number of snags greater than 24" dbh, and number of snags less than 24" dbh) that was significantly larger in occupied sites than in unoccupied sites. Meadows are utilized for breeding and wintering habitat and also provide attributes important for foraging areas. Recent studies in Yosemite National Park showed that over 60% of detections occurred within 328 feet and 80% occurred within 656 feet of a meadow (Van Riper et al., 2006).

The diet of the great gray owl may vary locally but consists primarily of small mammals, predominantly rodents (Kalinowski et. al, 2014). All available literature indicates that great gray owls in the western United States overwhelmingly select only two prey taxa: voles (*Microtus spp.*) and pocket gophers (*Thomomys spp.*). Voles prefer meadows with dense herbaceous vegetative cover (CWHR, 2005). A four-inch stubble height at the end of the growing season is thought to provide suitable cover for voles (Beck, 1985), although other studies suggest herbaceous heights of 12" are preferred (Greene, 1995). Gophers are predominantly subterranean but they also appear to have herbaceous cover preferences (Ibid). Great gray owls catch these mammals by breaking through their tunnels. Compaction of meadow soils may reduce the suitability of areas for prey. During the winter, great gray owls have been observed plunging through the snow to capture prey.

Using the 2005 Forest Vegetation Inventory data and modeling of great gray owl habitat using CWHR, there is approximately 15,442 acres of suitable habitat (4M, 4D, 5M, 5D and wet meadow) on National Forest System lands within the 20,453-acre project area. There is approximately 913 acres of suitable habitat on private lands within the project area, including 23 acres of wet meadow habitat.

Great gray owls currently occur within the Trestle Project boundary. Surveys specific for great gray owls were not conducted for this species however; surveys for spotted owls in the area for the Trestle project and historical projects detected incidental detections of great gray owls in the project area. In 2004 and 2005, Sears in coordination with the California Department of Fish and Wildlife (formerly California Department of Fish and Game), surveyed 82 meadow sites in CA and detected owls at 12 sites; however, though meadow sites occurred on the Eldorado National Forest, none of the great gray owl detections occurred on the Eldorado National Forest (Sears 2006). Great gray owls do occur on and adjacent to the Eldorado National Forest land, including on Sierra Pacific Industries land and other property managed by private entities.

Two great owl PACs are located within the Trestle Project Boundary. The Leoni Meadow PAC is incorporated into California spotted owl PAC ELD0007 bumping that spotted owl PAC acreage up to 350 acres. The great gray owl PAC is adjacent to an unrelated "preserved" natural area on Leoni Meadows property that is not incorporated into recreational camp activities and to enable it to retain relatively undisturbed. A territorial pair as well its roost and potential nest (adult was sitting in broken top snag but unable to observe young) were located at this site. The great gray owls forage in Leoni Meadows and nearby Gould Meadow (private); primarily on meadow voles.

A fifty acre PAC was established for a territorial adult great gray owl detected in 2012 during spotted owl surveys in Tony's Gulch drainage. This PAC has great gray owl presence, but the nest or roost location is not known. The owl may be foraging for voles in small wet areas as well as gophers in nearby plantations where foraging conditions are suitable.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

There are no activities related to this project, therefore, there will be no direct or indirect effects to great gray owls or their habitat.

Cumulative Effects

Since there would be no activities, this alternative would not contribute toward any adverse cumulative effects related to disturbance of individuals or habitat.

Alternative 2

Direct and Indirect Effects

Disturbance during the nesting season can result in nest site failure or abandonment. There are two great gray owl PACs located within a quarter mile of the treatment units. A limited operating period

(LOP) would be implemented for great gray owls, prohibiting vegetation treatments within ¼ mile of the PAC during the nesting period (March 1 to August 15), unless surveys confirm that great gray owls are not nesting. The LOP should protect nesting great gray owls from disturbance during the breeding season.

The proposed treatment units contain about 4,123 acres of suitable nesting and foraging habitat for great gray owl (CWHR 4M/4D and 5M/5D). Effects to great gray owl habitat would be similar to spotted owls as the majority of this habitat type across the landscape falls within spotted owl HRCA. Treatment of understory brush and small diameter trees (less than 10” dbh) through prescribed burning as well as machine piling, especially in plantations will alter prey habitat (cover and forage), including that of the gopher. However, meadow and other riparian protection and restoration projects will benefit habitat for voles, which is another primary prey species.

Restoration efforts along road 9N73A will enhance the meadow to condition where it could potentially become suitable to provide nesting habitat for future occupancy by great gray owls. Efforts to control invasive plants, remove disturbance and vegetation damage from vehicle use; hand remove encroaching seedlings and saplings; will benefit future great gray owl use and current vole populations which a preferred prey item.

Cumulative Effects

Alternative 2 will not contribute to adverse cumulative effects on great gray owl in combination with any past, present, or reasonably foreseeable future projects. This is based on no treatment in the WUI that overlaps suitable habitat for the only known roost/nest site for great gray owls on the Forest.

Alternative 4

Direct, Indirect, and Cumulative Effects

Alternative 4 has similar indirect, direct and cumulative effects as Alternative 2 with the following exceptions. Alternative 4 was developed to aid in maintaining habitat components on the landscape for the California spotted owl. Alterations to harvest prescriptions in the majority of the units proposed under Alternative 4 would primarily focus on understory trees contributing to fuel loading; and maintaining larger diameter trees that are contributing to a dense canopy which is favored by late seral dependent species.

The proposed treatment units contain about 2,304 acres of suitable nesting and foraging habitat for goshawk (compared to 4,123 acres under Alternative 2). There are 308 acres of 5D (compared to 614 acres in Alternative 2) within treatment units; there are 1,725 acres of 4D (compared to 3,086 acres under Alternative 2) and 271 acres of 4M (compared to 423 acres under Alternative 2) proposed for thinning. Effects to great gray owl habitat (4M/D and 5M/D) would be similar to spotted owls as the majority of this habitat type across the landscape falls within spotted owl HRCA acreage.

The remaining acres within units containing 4M, 4D, 5M or 5D habitat (outside of HRCAs) and having understory trees (4” to 12” dbh) removed to reduce fuel ladders, will not be removing medium to large diameter trees; retaining the integrity of the existing CWHR classification of these stands as they currently are classified. These stands will be having understory trees (4” to 12” dbh) removed to reduce fuel ladders within the understory. This alternative will serve to retain large diameter trees, dense canopy and reduce the risk of wildfire by removing small diameter trees that may be contributing to ladder fuels; particularly adjacent to and near large diameter legacy trees in the stands.

Alternative 5

Direct, Indirect, and Cumulative Effects

Alternative 5 has similar indirect, direct and cumulative effects as Alternative 2 and 4, with the following exception. The proposed treatment units contain about 3,184 acres of suitable nesting and foraging habitat for great gray owl (compared to 4,123 acres under Alternative 2). There are 387 acres of 5D (compared to 614 acres in Alternative 2), there are 2,487 acres of 4D (compared to 3,086 acres under Alternative 2), and there are 310 in acres of 4M (compared to 423 acres under Alternative 2) proposed for thinning.

Pacific Fisher

Affected Environment

On October 7, 2014, the USFWS issued a Proposed Rule to list the West Coast DPS of fisher as Threatened (Federal Register 2014). The Proposed Rule finds that “extant fisher populations in California consist of two remnant populations located in northwestern California and the southern Sierra Nevada Mountains (69 FR 18771).” “In California, recent survey efforts have not detected fishers in the northern Sierra Nevada, outside of the reintroduced population.” The Trestle Project does not occur in or near these two populations. On April 18, 2016, the USFWS did not list the fisher (Federal Register 2016). Therefore, the fisher will continue to be addressed as a FS sensitive species.

There have been no known sightings of fisher within or adjacent to the project area, although specific surveys have not been conducted. Limited track plate surveys have occurred on the Placerville Ranger District with no detections in 1992, 1997, 2001, 2003, 2005 or 2011. All surveys have had negative results for fisher. In 2011, one of the survey plots occurred approximately 5 miles to the east of the Trestle Project boundary; however; no fisher were detected during the 2011 surveys. It has been conjectured, based upon the lack of recent sightings and results of limited systematic surveys, that fisher may be extirpated from the Sierra Nevada north of Yosemite National Park and south of Lassen National Park (USDA Forest Service, 2001).

Habitat characteristics for Pacific fisher are believed to be mature timber stands with moderate to fairly dense canopy cover, large trees, and abundant snags and down logs (USDA Forest Service, 2001 and 2004). Mature hardwoods are also thought to be important habitat components used by fisher (Ibid), and the presence of large conifers and hardwoods is a highly significant predictor of fisher occurrence (USDA Forest Service, 2005). Preferred habitat for fisher is generally found between 3,000 and 8,000 feet elevation in large, relatively unfragmented blocks of older forest, characterized by a 60% to 100% canopy closure, multistoried structure, and a high number of large snags and down logs. Suitable habitat in this analysis is defined as forested types with CWHR 4M, 4D, 5M, 5D, and 6.

Suitable habitat has been mapped for Pacific fisher on the forest. Using the 2005 Forest Vegetation Inventory data, there is approximately 4,561 acres of 5M/5D habitat and 10,880 acres of 4M/4D habitat on National Forest lands within the 20,453 acre project area. Key habitat areas are den sites and the surrounding 700 acres of best habitat. No key habitat has been identified on the Eldorado National Forest, as there have been no den sites located within the project or on the Forest.

The presence of fisher is unlikely due to lack of recent sightings as well as high public use; high fragmentation; and high density of road areas; and private property comprised of urban development in the Trestle Project area. Riparian areas and ridges may provide movement areas for the fisher, but also are heavily roaded and receive disturbance from a multitude of human users. In addition, both the USFWS Proposed Ruling (Federal Register 2014) and the Sierra Nevada Adaptive Management Project Appendix D: Fisher Team Final Report (Sweitzer et al 2015) found that the two extant fisher populations occur in northwestern California and southern Sierra Nevada Mountains and not on the Eldorado National Forest. As the project will not affect individuals since it is assumed that fisher do not occupy habitat in the central Sierra Nevada, the analysis for the Trestle Project will focus on habitat and not individuals. The analysis on habitat will focus on effects relative to future expansion and not based on any current occupancy.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

There are no activities related to this project, therefore, there will be no direct effects to fisher or their habitat.

Cumulative Effects

Since there would be no activities, this alternative would not contribute toward any adverse cumulative effects related to disturbance of individuals or habitat.

Alternative 2

Direct and Indirect Effects

Direct disturbance to fisher from project activities is unlikely since it is unlikely that fisher occur in the area.

The proposed treatment units contain about 4,123 acres of habitat for fisher. Key habitat characteristics on which fisher depend include higher than average downed woody material, snags, and high canopy cover. The effects on fisher habitat from treatments following the SNFPA standards and guidelines are analyzed in the SNFPA FEIS and FSEIS and that analysis is incorporated by reference (USDA Forest Service, 2001, section 4.4, pp. 6-18; USDA Forest Service, 2004, pp. 242-253). Immediately following treatment, all of the stands treated would be within the range of habitats used by fisher due to the retention of larger size class trees and canopy cover, but reduction of stand density and understory structure is likely to reduce habitat quality.

Enhancement of oaks along ridgetops and protection and restoration of riparian areas contribute to improvement of potential movement corridors for the fisher. Understory thinning will increase the vigor of residual trees and may provide future benefits to the fisher by increasing the amount of canopy cover provided by large trees. The proposed conifer thinning will not affect large hardwoods, and may actually improve conditions around scattered individual oaks by reducing competition and increasing the hardwood component within the stands. An exception would be thinning round cavitory hardwoods which could degrade potential denning habitat for fisher by removal of security cover and access routes to the cavity. Marking guidelines have incorporated retaining conifers around cavitory oaks which will minimize impacts to these habitat features.

Prescribed burning may result in some consumption of down logs. The use of ignition techniques to reduce effects to large down logs that could provide hiding cover or den sites will be incorporated into the burn plan. In general, burning within these mature and late-seral stands would decrease the risk of losing the stands to wildfire through reduced ground and ladder fuels, and the restoration of fire as a natural process in the ecosystem. This addresses one of the threats to the continued existence of the fisher in the Sierra Nevada (Lamberson et al., 2000).

Alternative 2 utilizes harvest prescriptions consistent with SNFPA guidelines. By potentially reducing wildfire through thinning and fuels treatments, it is expected to make habitat more sustainable over time. Habitat components in the form of large trees, canopy, down logs, snags and hardwoods area being maintained and/or enhanced for continued persistence of fisher habitat on the landscape should future expansion or relocation efforts occur.

Cumulative Effects

Some of the higher quality habitat for fisher occurs within spotted owl PACs and northern goshawk PACs that are dispersed throughout the cumulative effects analysis area, and do not have any proposed project activities that will result in significant vegetative changes or reduced habitat quality. These areas will have prescribed burning so reduction of ground cover, understory, existing snags, down logs, and mature oaks may be reduced or removed in localized areas.

The importance of protecting mature forest conditions from loss as a result of wildfire is exacerbated for fisher, as they are known to avoid open canopy areas. It could be over 100 years to re-develop quality habitat for this species should habitat be lost from fire. Alternative 2 will augment the other fuels reduction activities that have occurred within the cumulative effects analysis area in establishing prescribed burning treatments to reduce the risk of habitat loss from wildfire. Cumulative effects to fisher habitat (4M, 4D, 5M, and 5D) would be the same as described for the spotted owl.

Alternative 4

Direct, Indirect, and Cumulative Effects

Alternative 4 has similar direct, indirect, and cumulative effects as Alternative 2 with the following exceptions. Alternative 4 was developed to aid in maintaining habitat components on the landscape for the California spotted owl. Alterations to harvest prescriptions in the majority of the units proposed under Alternative 4 would primarily focus on understory trees contributing to fuel loading; and maintaining larger diameter trees that are contributing to a dense canopy which is favored by late seral dependent species such as the fisher.

The proposed treatment units contain about 2,304 acres of suitable habitat for fisher (compared to 4,123 acres under Alternative 2). There are 308 acres of 5D (compared to 614 acres in Alternative 2) within treatment units; there are 1,725 acres of 4D (compared to 3,086 acres under Alternative 2) and 271 acres of 4M (compared to 423 acres under Alternative 2) proposed for thinning. Effects to fisher habitat (4M/D and 5M/D) would be similar to spotted owls as the majority of this habitat type across the landscape falls within spotted owl PAC and HRCA acreage.

Alternative 5

Direct, Indirect, and Cumulative Effects

Alternative 5 has similar indirect, direct and cumulative effects as Alternative 2, with the following exceptions. The unit treatments are focusing on thinning trees 4-12" in dbh in a large portion of the units. These stands will be having understory trees removed to reduce fuel ladders within the understory. These size trees will be able to re-establish in the understory, conditions permitting within a few years and contribute to a multi-story stand. This alternative will serve to retain large diameter trees, dense canopy and reduce the risk of wildfire by removing small diameter trees that may be contributing to ladder fuels; particularly adjacent to and near large diameter legacy trees in the stands.

The proposed treatment units contain about 3,184 acres of suitable fisher habitat (as compared to 4,123 under Alternative 2). There are 387 acres of 5D (as compared to 614 acres in Alternative 2), 2,487 acres of 4D (compared to 3,086 acres under Alternative 2), and 310 in acres of 4M (423 acres under Alternative 2) proposed for thinning.

Pallid Bat, Townsend's Big-eared Bat, and Fringe-tailed Bat

Affected Environment

Pallid Bat

Throughout California, the pallid bat is usually found in low to middle elevation habitats below 6,000 feet (Philpott, 1997); however, the species has been found up to 10,000 in the Sierra Nevada (Sherwin, 1998). Pallid bats are most common in open, dry habitats that contain rocky areas for roosting. They are a yearlong resident in most of their range and hibernate in winter near their summer roost (Zeiner et al., 1990). Day roosts may vary but are commonly found in rock crevices, tree hollows, mines, caves and a variety of human-made structures. Tree roosting has been documented in large conifer snags, inside basal hollows of redwoods and sequoias, and bole cavities in oaks (Sherwin, 1998).

There is a strong association with roosting in black oak cavities (Pierson, 1996) for pallid bats. Maternal roosts are typically colonies (usually between 20 to several hundred individuals). Breeding occurs between May and July, with young weaned in mid-late August (Sherwin, 1998 as cited in USDA Forest Service, 2008) and maternity colonies breaking up by mid-October (Barbour & Davis, 1969 as cited in USDA Forest Service, 2008). Little is known about the winter habits of this species although it is thought to winter near the summer roost sites (Ibid). Pallid bats forage near and at ground level. Pallid bats are known to feed predominately on ground-dwelling arthropods, such as scorpions and Jerusalem crickets (USDA Forest Service, 2001). Foraging occurs over open ground, where pallid bats are more often found along edges and open stands, particularly hardwoods (Ibid).

Townsend's Big-eared Bat

The Townsend's big-eared bat occurs throughout the west, and is distributed from the southern portion of British Columbia south along the Pacific Coast to central Mexico and east into the Great Plains (Sherwin as cited in USDA Forest Service, 2008). In California, the species is typically found in low desert to mid elevation montane habitats, although sightings have been reported up to 10,800 feet (Philpott, 1997; Sherwin, 1998 as cited in USDA Forest Service, 2008). Habitat associations include desert, native prairies, coniferous forests, mid-elevational mixed conifer, mixed hardwood-conifer forests, riparian communities, active agricultural areas and coastal habitat types (Kunz & Martin, 1982; Brown, 1996; and Sherwin, 1998 as cited in USDA Forest Service, 2008). Refer to the section on hardwood guidelines under the SNFP ROD in section II under the bat species. Populations have incurred serious declines over the past 40 years in parts of California (Brown, 1996 as cited in USDA Forest Service 2008).

Foraging usually begins well after dark (Kunz & Martin, 1982 as cited in USDA Forest Service, 2008). Foraging associations include edge habitats along streams and areas adjacent to and within a variety of wooded habitats (Sherwin, 1998 as cited in USDA Forest Service, 2008). In California, the species is shown to forage preferentially in association with native vegetation (Brown, 1996 as cited in USDA Forest Service, 2008). Flight is slow and maneuverable, with the species capable of hovering (Zeiner et al., 1990) and gleaning insects off foliage (Brown, 1996 as cited in USDA Forest Service, 2008). The Townsend's big-eared bat is a moth specialist, with over 90% of its diet composed of lepidopterans (Sherwin, 1998 as cited in USDA Forest Service 2008).

Fringe-tailed Bat

The species was added to the sensitive species list for Region 5 in 2013 and as such has not had specific management direction associated with it at this time. The following information on this species is taken from the 2013 Angerer and Pierson species account (draft in review). In California, the species is found throughout the state, from the coast to greater than 5,900 feet in elevation in the Sierra Nevada. The species occurs in open habitats with nearby dry forest and open water (Keinath, 2004 as cited in Angerer & Pierson, 2013). It occurs in pinyon-juniper, valley foothill, hardwood, and hardwood-conifer habitats. The species has been documented from mist net captures, utilizing secondary streams. Roosts utilized are crevices in rocks, cliffs, buildings, underground mines, bridges and large decadent trees (Weller, 2005 as cited in Angerer & Pierson, 2013).

The fringe-tailed bat may migrate short distances to lower elevations; however; winter records show it does not migrate long distances and may also become active intermittently in CA, during winter months (O'Farrell & Studier, 1980 as cited in Angerer & Pierson, 2013). The species primarily forages on beetles but will also eat other flying insects.

Mating occurs in the fall after maternity colonies have dissolved. Nursery colonies are formed mainly in early to mid-decay stage large diameter snags from 23" to 66" dbh (Weller & Zabel, 2001 as cited in Angerer & Pierson, 2013). May to July, primarily the later end of the season in California, is when young are born.

Surveys

No species specific surveys for the three bat species have been conducted in the project area, and the distribution of these species on the Forest is unknown with the exception of 2001 and 2002 bat inventories conducted by the Sierra Nevada Framework monitoring crew, recent abandoned mine surveys on the Forest (2010-2012), and incidental sightings during spotted owl surveys (2012). No Townsend's big-eared bats were captured or observed during any of the survey efforts or incidental sighting detections.

Protective closures; typically in the form of gates enhance bat habitat and aid in public safety when abandoned mines are closed. Mine workings, particularly adits and shafts provide roosting habitat for a variety of species throughout the year or during portions of the year. Mine surveys in 2010, at Artic Mine in the project boundary, detected two individual bats but identification could not be verified. Based on suitable bat habitat and occupancy this feature was fitted with a bat friendly gate to maintain current bat species and provide habitat for other bat species that may find the protected site suitable for roosting. Mine surveys in 2011, within ½ mile west of Henrys Diggins, outside the project boundary, detected two species - big brown and California myotis. As these areas provide suitable bat habitat based on occupancy by bats; it could also serve as potential roost habitat for fringe-tailed, pallid and Townsend's big-eared bats. Pallid bats have been captured in mist nets along the Silver Fork of the American River as a result of the monitoring efforts. They have also been observed flying in the Trestle Project during spotted owl surveys east of Tony's Gulch, within Sierran mixed conifer habitat with large black oaks (Yasuda, pers. obs., 2012).

Environmental Consequences

Alternative 1

Direct and Indirect Effects

There are no activities related to this project, therefore, there would be no direct effects to pallid bat, Townsend's big-eared bat or fringe-tailed bats or their habitat.

Cumulative Effects

Since there would be no activities, this alternative would not contribute toward any adverse cumulative effects related to disturbance of individuals or habitat.

Alternative 2

Direct and Indirect Effects

Activities associated with the alternative may disturb individuals that could be roosting in hardwoods, snags, or mines within or adjacent to treatment units. Prescribed burns could cause displacement of bats and possible increased risk of mortality due to predation and exposure. Smoke from prescribed burning may also disturb and displace roosting bats during active burning (usually less than two hours of smoke around any given tree). The health effects of smoke on bats are unknown, but the duration, intensity and frequency of exposure from this project is not expected to be substantial. Since prescribed burns occur during the day, displacement of bats could result in increased mortality due to predation and exposure. Design criteria for Artic Mine and prescribed burning will aid in reducing or avoiding impacts to known roosting populations of bats within this mine.

There are likely to be both beneficial and adverse effects of understory thinning and prescribed burning on foraging habitat for these bat species. On approximately 1,006 acres of bat habitat, treatments may reduce foraging quality for bats in the immediate and short-term by removing understory shrubs and herbaceous species and reducing the associated invertebrate fauna. However, new growth of understory shrubs and forbs are anticipated to occur within 1 to 5 years. Thinning and prescribed fire may have positive effects for foraging bats by opening the stand understory sufficiently to allow for foraging where current undergrowth prevents flight. Thinning unit prescriptions are designed to leave downed woody material and pockets of untreated areas and prescribed burning units would be designed to create a mosaic, allowing unburned islands to remain, will reduce effects to foraging bats. Understory thinning, pre-commercial thinning, brush-cutting, and prescribed burning may, overall, improve foraging habitat for bats by removing “clutter” that can impair echolocation.

Hardwoods, large trees and large snags would not be directly removed, except for large snags that pose a risk to woodworker safety and for operability where necessary. The short-term and long-term increase in hardwoods as a result of treatments within thinning units should increase possible bat roosting habitat. A thinned understory would improve conditions around roosting areas for bats since roosts are generally in areas that are free of immediately adjacent obstacles that might hinder emergence or allow predators access to roost sites. Effects to oaks will primarily come from prescribed burning.

The effect of understory thinning and prescribed burning on favored prey species is unknown. There may be short term effects on prey availability in treatment areas, particularly where shrubs are removed. Leaving pockets of untreated areas and prescribed burning with a mosaic pattern allowing unburned islands to remain will reduce this effect. Timing of brush treatments may impact larvae preferred by Townsend’s big-eared bats, particularly in May and June when large quantities were observed during spotted owl surveys, throughout the project area in shrub habitat; including alongside roadways (Yasuda pers. obs., 2012 and 2013).

Cumulative Effects

Given the changes in forest vegetation that have been described within the Sierra Nevada over the last 100 years, it is likely that vegetation is denser between 0 and 8 feet high and that there are fewer mature hardwoods within mid-elevation stands than there were historically. This would suggest a historic reduction in foraging habitat quality. It is unclear what the cumulative effect of past actions may have been on sensitive bat species in the analysis area.

Timber harvest and previous fuels reduction projects have removed large trees and snags that could have been utilized by bats for roosting, however some treatments have opened the understory increasing foraging opportunities. Forest openings may have benefited bats as they are found foraging more often in edges and open stands. This and other projects in the area with the primary prescription of understory thinning and prescribed burning will likely improve habitat across the landscape for bats by improving foraging opportunities, provided adequate prey habitat (shrubs, etc.) and roosting habitat (snags and mature oaks) are retained. The reduction in risk of future wildfires, promotion of future hardwood habitat, and maintenance of open understory over the long term meets several of the conservation measures suggested for bats in the SNFPA (USDA Forest Service, 2004).

Alternative 4

Direct, Indirect, and Cumulative Effects

Direct, indirect, and cumulative effects of Alternative 4 are anticipated to be similar to Alternative 2, except that Alternative 4 focuses more on the removal of understory trees contributing to fuel loading; and maintaining larger diameter trees that are contributing to a dense canopy which is favored by late seral dependent species such as the spotted owl. Less acreage will be affected by treatments. However, development and retention of hardwoods for bat foraging and roosting would not be as great under this Alternative.

This alternative will have a large portion of the treatment units having understory trees (4" to 12" dbh) removed to reduce fuel ladders within the understory. This alternative will serve to retain large diameter trees which will serve as future recruitment snags. It will also reduce the risk of wildfire by removing small diameter trees that may be contributing to ladder fuels; particularly adjacent to and near large diameter legacy snags and live trees in the stands. The removal of dense understory tree thickets will also enhance foraging for bats by removing “clutter” that may interfere with their foraging attempts.

Alternative 5

Direct, Indirect, and Cumulative Effects

Direct, indirect, and cumulative effects of Alternative 5 are anticipated to be similar to Alternative 2 and 4 except that Alternative 5 enhances hardwoods less than Alternative 2, but more than Alternative 4. Prescribed burning acres are similar resulting in effects mentioned under Alternative 2.

Western Bumble Bee

Affected Environment

The western bumblebee was added to the Regional Forester's sensitive species list in 2013. Bombus occidentalis currently occurs in all states adjacent to California. Historically, the species was broadly distributed across western North America along the Pacific Coast and westward from Alaska to the Colorado Rocky Mountains (Thorp & Shepard, 2005; Koch et al., 2012). Historically, B. occidentalis was one of the most broadly distributed bumble bee species in North America (Cameron et al., 2011). Currently, the western bumble bee is experiencing severe declines in distribution and abundance due to a variety of factors including diseases and loss of genetic diversity (Tommasi et al., 2004; Cameron et al., 2011; and Koch et al., 2012).

There are 94 collection records for the western bumble bee Bombus occidentalis on 11 national forests of the PSW Region, in California (Hatfield, 2012): the Angeles (one record), Eldorado (2), Klamath (15), Lake Tahoe Basin Management Unit (7), Lassen (8), Modoc (3), Plumas (21), Sequoia (1), Shasta-Trinity (25), Six Rivers (5), and Tahoe (6). There are only three collection records from national forest lands since 2000: two are on the Plumas, and one is on the Lake Tahoe Basin Management Unit.

Queens overwinter in the ground in abandoned rodent (i.e. mouse, chipmunk or vole) nests at depths from 6-18 inches and typically emerge about mid-March. The queen then lays fertilized eggs and nurtures a new generation. She first creates a thimble-sized and shaped wax honey pot, which she provisions with nectar-moistened pollen for 8-10 individual first-generation workers when they hatch. The larvae will receive all of the proteins, fats, vitamins and minerals necessary for growth and normal development from pollen. Eventually all the larvae will spin a silk cocoon and pupate in the honey pot. The workers that emerge will begin foraging and provisioning new honey pots as they are created to accommodate additional recruits to the colony. Individuals emerging from fertilized eggs will become workers that reach peak abundance during July and August.

Foraging individuals are largely absent by the end of September. Those that emerge from unfertilized eggs become males, which do not forage and only serve the function of reproducing with newly emerged queens. During the season, a range of 50 to hundreds of individuals may be produced depending on the quantity and quality of flowers available. When the colony no longer produces workers, the old queen will eventually die and newly emerged queens will mate with males and then disperse to found new colonies. During this extended flight that may last for up to two weeks she may make several stops to examine the ground for a suitable burrow.

Unlike all other bees, bumble bees are large enough to be capable of thermoregulation, which allow them to maintain their foraging activities for longer periods of the day, but also to occupy regions with more extreme latitudes and temperatures compared to other bees (Heinrich, 1979). Bumble bees may continue to forage when temperatures are below freezing even in inclement weather (Heinrich, 1979). Queens end the year by locating a sheltering burrow, where they may spend the winter months under cover.

Bumble bees need habitat for foraging (flowering plants), nesting, and overwintering (Hatfield et al. 2012). Protecting existing habitat and maintaining new habitat are immediate and productive steps in conserving bumble bees on the landscape (Ibid.). Bumble bees are threatened by habitat alterations that may fragment or reduce the availability of flowers that produce the nectar and pollen they require, and decrease the number of abandoned rodent burrows that provide nest and hibernation sites for queens. Forest stands with understories of dense shrubs are poor habitat for pollinators. Forest stands with open canopies through which sunlight reaches the forest floor are beneficial for bees. Most bees prefer open habitats and benefit from some disturbance that prevents shrub and tree encroachment and maintains flowering herbaceous plants.

Suitable habitat occurs randomly within the project boundary where forage and nesting substrate occur.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Since there are no project activities proposed under this alternative, there would be no direct or cumulative effects to the western bumble bee or their habitat.

Cumulative Effects

Since there would be no activities, this alternative would not contribute toward any adverse cumulative effects related to disturbance of individuals or habitat.

Alternative 2

Direct and Indirect Effects

The Trestle Forest Health Project may affect the western bumblebee by:

- Creating gaps and promoting flowering plant growth in the understory of stands will aid in creating nesting, overwintering and foraging habitat.
- Creating openings along roadsides by removing dense brush will create openings for new flowering plants to establish aiding in movement corridors for the bee.
- Retention of down woody debris and improvement of riparian areas, especially meadows will benefit and expand potential habitat.
- Prescribed burning will aid in opening up stands and enabling other forest flowering understory plants to develop.
- Project activities occur at the same time of year bumble bees are active.
- Ground disturbance can destroy underground nests and overwintering habitat of bumblebees.
- Burning and piling can remove substrate on the ground utilized by bumblebees for nesting (bunchgrasses, etc.)

- Shrub and understory plant removal (burning, piling) that bumblebees may forage on can impact both individual bees and developing bee larvae.

Cumulative Effects

Earlier timber and fire salvage harvest on the Eldorado National Forest within the cumulative effects area that had plantations as an outcome potentially provide shrub habitat capable of producing flowering plants and shrubs for forage. They also provided early seral habitat with open ground cover with rodent burrows (squirrels and gophers), bunchgrasses and remnant small woody debris for nesting and overwintering. The reduction of shrub ground cover and ground disturbance from mastication, piling and burning will reduce habitat quality for bumble bees. Treatment units could potentially affect up to 12% of the available shrub habitat where eventual growth of conifers will shade out shrubs in the understory. The remaining shrubland habitat (up to 88%) will be altered to younger stages of shrub from prescribed burning primarily due to the large acreage being considered for treatment. However; mosaic burn prescriptions may aid in retaining patches of flowering shrub where it currently exists. Prescribed burn plans should take into consideration, the distance between flowering plants; particularly shrub species, preferred by the bumble bee to avoid habitat fragmentation and disruption of dispersal and foraging patterns.

Other major threats that alter landscapes and habitat required by bumble bees include pesticides, agriculture and urban development. In the absence of fire, native conifers encroach upon meadows, which also decrease foraging and nesting habitat available for bumble bees.

Alternative 4

Direct, Indirect, and Cumulative Effects

Alternative 4 has similar direct, indirect, and cumulative effects as Alternative 2 with the following exceptions: less disturbance would occur from reduction in road miles having brush treatment; and less road reconstruction miles, retaining more nesting, overwintering and foraging habitat where current conditions allow based on reduced ground disturbance.

Alternative 5

Direct, Indirect, and Cumulative Effects

The effects of Alternative 5 would also be very similar to those for Alternative 2 and 4, except that Alternative 5 has fewer acres of potential impact to bumble bee than Alternative 2, but more than Alternative 4, based on acreage affected in the project area.

Black-backed Woodpecker

Affected Environment

The Oregon Cascades-California population and Black Hills population of the black- backed woodpecker (*Picoides arcticus*) warranted listing in March 2013, under the Endangered Species Act of 1973, as amended (Act), as subspecies or distinct population segments (DPSs) that are endangered or threatened, and to designate critical habitat concurrent with listing (Federal Register, 2013b).

The black-backed woodpecker has been managed on the forest as a MIS species to represent the habitat “snags in burnt forest”. There have been no recent large wildfires in the project area; therefore; this aspect of the black-back woodpeckers nesting and foraging behavior is not being analyzed for any existing habitat in the project area that would represent burnt forest. Recent concerns pertaining to live green trees; particularly large and dense patches of trees, have been raised as how they could contribute to future black-backed habitat should they be killed during a wildfire. This analysis focuses on the concern of thinning green trees and its potential effect of the future capability of the project area to provide for black-backed woodpecker habitat should a wildfire alter the landscape to favor preferred nesting and foraging habitat for this burnt forest species specialist.

Black-backed woodpeckers have been found in green forest or utilizing snags created by insects or other causes. However, the black-backed woodpecker is primarily a fire specialist that relies on large trees in dense accumulations that have died as a result of wildfire. The woodpeckers are drawn to fire areas in search of their preferred prey (beetles) and remain to nest and continue foraging in the burn areas. In order for fire killed trees to be present after a wildfire; there first must be green trees on the landscape to succumb to the fire and become snags.

Within the project boundary, there are approximately 16,738 acres of green trees (CWHR size class 4+) that could support habitat for future snags. There are 12,067 acres (11,196 acres of NF and 871 private acres), or 69%, within medium snag size categories (assuming size class CWHR 4) and 4,671 acres (4,607 acres of NF, and 64 private acres), or 31%, within large (assuming size class 5) snag size categories.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Since there are no project activities proposed under this alternative, there would be no direct, indirect, or cumulative effects to the black backed woodpecker.

Cumulative Effects

Since there would be no activities, this alternative would not contribute toward any adverse cumulative effects related to disturbance of individuals or habitat.

Alternative 2

Direct and Indirect Effects

There are 3,946 acres of green trees, that should they burn from a wildfire, could support size 4 snags and 610 acres that could support size 5 snags, within the treatment units, for a combined total of 4,556 acres. The remainder of the habitat type outside of the treatment units will potentially be prescribed burned only.

Based on stand surveys and the Trestle Silvicultural Report (USDA Forest Service 2014) there are approximately 3 snags per acre. Snags range in size from 16-50 inches dbh with heights ranging from about 50 feet to 180 feet. They are mostly white fir with smaller percentages being made up of sugar pine and ponderosa pine snags in various stages of decay. Recent insect mortality (2015-2017) however, has caused the level of early decay stage small and large diameter snags, to increase on the landscape. No snag surveys have been conducted to assess the extent of the mortality. It is unknown how many snags there are or other information such as size and location to determine the number of snags per acre that could currently exist. The mortality, however, has increased the snag levels in portions of the Trestle Project boundary. Hazard tree removal during both the harvest and the burn associated portions of the project will reduce the average snag levels per acre even further in localized areas. Hazard tree removal and prescribed burning will change the existing snag and down log component by altering the existing age and size classes currently within the area. It can be expected that losses of late decay stages will occur reducing this age class in the area. It is also expected that there may be creation of new age classes from the death of green trees that become snags and serve as recruitment logs from prescribed burning. This could result from the natural falling of both existing snags and live green trees weakened from both fire and loss of previous vegetation (that served as protection from high winds) which would reduce snag levels but increase early decay class down logs within the area.

Though some later decay stage snags and down logs may be lost; prescribed burning may also result in additions to the existing snag and down log component through mortality of individual live green trees. The extent and numbers are difficult to determine due to unpredictability of the exact behavior of prescribed fire; current numbers of snags and down logs; and number of susceptible live green trees in individual stands. If snags are lost and snag recruitment doesn’t occur during prescribed burning, average snags per acre will be reduced further; particularly late decay stage snags and logs. Project design to protect specific large down logs and snags from consumption will be incorporated into the burn plan to avoid impacts to these habitat components, including consumption of snags created through prescribed burning or scorching from pile burning.

Harvest of green trees 16” dbh and larger will alter future snag and down log recruitment including age classes and size ranges in both the short and long term.

Cumulative Effects

Past activities have included tree removal through commercial and non-commercial timber harvest, salvage of insect killed trees, thinning in plantations, hazard tree removal (for trails and roads), reforestation, prescribed burning, mechanical piling and burning, firewood collecting, herbicides, recreation trail use, wildfires, and activities on adjacent private lands (timber harvest plans, road right of ways, and continued recreational and residential development). The majority of the projects occurred after 2005 with the exception of large scale insect salvage sales in the 1990’s. CWHR data from the 2005 vegetation data layers were used to display habitat conditions in the project area from that timeframe.

Project activity that occurs in treatment units as well as burn only units that support the green trees that could provide for size 4 and size 5 future snags, will maintain existing snag levels (except hazard trees), retain trees over 30" dbh, retain high levels of retention live green trees, and potentially increase snag levels during prescribed burning.

Hazard tree removal and prescribed burning will change the existing snag and down log component by altering the existing age and size classes currently within the area. It can be expected that losses of late decay stages will occur reducing this age class in the area. It is also expected that there may be creation of new age classes from the death of green trees that become snags and serve as recruitment logs from prescribed burning. This could result in the natural falling of both existing snags and live green trees weakened from both fire and loss of previous vegetation (that served as protection from high winds) which would reduce snag levels but increase early decay class down logs within the area.

There have been no projects in the project area since 2005 that have affected large size trees (size 5). Past projects utilizing CASPO and Sierra Nevada Framework guidelines retained at least 40% canopy cover and trees over 30” dbh through understory thinning prescriptions. Earlier timber and post-fire salvage harvest on National Forest that resulted in the creation of plantations within the project area removed late seral habitat. In plantation treatment areas it can be expected that in the short-term there will be no significant changes but in the long term, treatments to move stands to late seral conditions will increase large diameter tree habitat and potential future recruitment snags for the black-backed woodpecker.

Alternative 4

Direct, Indirect, and Cumulative Effects

Alternative 4 has similar direct, indirect, and cumulative effects as Alternative 2, with the following exceptions. There are 2,169 acres of habitat, that if burned by wildfire, could support medium size snags (size 4) and 305 acres that could support large size snags (size 5), within the treatment units, for a combined total of 2,474 acres.

Under this alternative, treatments focus on thinning understory trees 4-12” in dbh to reduce ladder fuels. These size trees will be able to re-establish in the understory, conditions permitting, within a few years. The remaining treatment units will have similar treatments as described under Alternative 2 in that trees up to 29.9” dbh will be harvested, affecting future size class 4 and 5 snags. The remainder of the acres, providing green trees for future size 4 and 5 snags, outside the treatment units, will be prescribed burned. This could potentially create new snags that would provide the proper conditions to attract beetles and the black-backed woodpecker to forage on them.

Alternative 5

Direct, Indirect, and Cumulative Effects

The effects of Alternative 5 would also be very similar to those for Alternative 2 and 4, except that Alternative 5 has fewer acres of potential impact than Alternative 2, but more than Alternative 4. There are 3,074 acres of green trees, that if burned by wildfire, could support size 4 snags and 372 acres that could support size 5 snags, within the treatment units, for a combined total of 3,446 acres.

Management Indicator Species

Management Indicator Species (MIS) are animal species identified in the Sierra Nevada Forest MIS Amendment Record of Decision (ROD) signed December 14, 2007. Guidance regarding MIS set forth in the Eldorado National Forest LRMP as amended by the 2007 SNF MIS Amendment ROD directs Forest Service resource managers to complete the following actions: at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects; and, at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the Eldorado National Forest LRMP as amended.

Effects to MIS species are summarized from the MIS Report for the Trestle Forest Health Project (Yasuda, 2017a).

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

The fox sparrow was selected as the MIS for shrubland (chaparral) habitat on the west-slope of the Sierra Nevada, comprised of montane chaparral (MCP), mixed chaparral (MCH), and chamise-redshank chaparral (CRC) as defined by the California Wildlife Habitat Relationships System (CWHR) (CDFG 2005).

Affected Environment

There are approximately 591 acres of shrubland (chaparral) habitat [CWHR montane chaparral (MCP), mixed chaparral (MCH) within the analysis area. Shrub age varies across similar acres from mature fields to young plants in newly created gaps. Based on field review, additional montane chaparral occurs within the understory of stands with low canopy cover (1X, 2X, 2S, 3S, 3P, 4S, 4P), particularly in plantations consisting of pre-commercial size trees. These areas are a mix of shrub and young trees and not pure dense MCP or MCH, which may be why they were not categorized as MCP or MCH under GIS, but rather classified as to what tree size and density the area fell under. For this analysis the effects to MCP and MCH will be in regards to those acres classified under CWHR MCP or MCH.

Table 28
California Wildlife Habitat Relationship Strata and Code Definitions

Tree Canopy Closure			Shrub Canopy Closure			Herbaceous Canopy Closure		
Closure	**Class**	**Canopy Closure**	**Closure**	**Class**	**Canopy Closure**	**Closure**	**Class**	**Canopy Closure**
S	Sparse	10-24%	S	Sparse	10-24%	S	Sparse	2-9%
P	Open	25-39%	P	Open	25-39%	P	Open	10-39%
M	Moderate	40-59%	M	Moderate	40-59%	M	Moderate	40-59%
D	Dense	60-100%	D	Dense	60-100%	D	Dense	60-100%
Tree Size Class			**Shrub Size Class**			**Herbaceous Size Class**		
Size	**Class**	**dbh**	**Size**	**Class**	**Crown Decadence**	**Height**	**Class**	**Height at Maturity**
1	Seedling	< 1 in.	1	Seedling	seedlings or sprouts < 3 years	1	Short	< 12 in.
2	Sapling	1 to 5.9 in.	2	Young	None	2	Tall	> 12 in.
3	Pole	6 to 10.9 in.	3	Mature	1 - 25%			
4	Small	11 to 23.9 in.	4	Decadent	> 25%			
5	Medium/ Large	> 24 in.						
6	Multi - Layered*							

*Size class 5 trees over a distinct layer of size class 4 or 3 trees, total tree canopy exceeds 60 percent closure.

Status and Trend

There are currently 1,009,681 acres of west-slope chaparral shrubland habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is slightly increasing (changing from 8% to 9% of the acres on National Forest System lands).

Monitoring of the fox sparrow across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with PRBO Conservation Science, as part of a monitoring effort that also includes mountain quail, hairy woodpecker, and yellow warbler (USDA Forest Service, 2010a). Fox sparrows were detected on 36.9% of 1659 point counts in 2009 and 44.3% of 2266 point counts in 2010, with detections on all 10 national forests in both years. The average abundance (number of individuals recorded on passive point count surveys) was 0.563 in 2009 and 0.701 in 2010. These data indicate that fox sparrows continue to be distributed across the 10 Sierra Nevada National Forests. In addition, the fox sparrows continue to be monitored and surveyed in the Sierra Nevada at various sample locations by avian point count, spot mapping, mist-net, and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA Forest Service, 2008). 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.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under Alternative 1, no direct or indirect effects would occur to shrubland habitat because no project activities would occur.

Cumulative Effects

Cumulative effects are not expected with this alternative. There would be no changes in shrubland habitat from current conditions under this alternative.

Alternatives 2

Direct and Indirect Effects

This project would prescribe burn and/or pile the brush component within up to 72 acres of shrubland habitat. These actions would remove shrub habitat from approximately 72 acres of shrubland habitat in Alternative 2 and 46 acres of shrubland in Alternatives 4 and 5. Project activities within commercial harvest units or prescribed burning within plantations may have indirect effects that could affect conditions for brush enhancement and/or retention both in the short and long term in regards to reaching a condition where it would be considered as CWHR MCP or MCH in the future.

Prescribed Burning

Prescribed understory burning would result in mortality of small diameter trees and shrubs within areas treated. In areas with prescribed burning, changes to the amount of acres of shrub dominated habitat are expected to result from the Trestle Project. The age class and ground cover of shrubs will change from mature or decadent to seedlings or sprouts. Shrub cover will be reduced for two to three years as shrubs regenerate and resprout following prescribed burning. Fox sparrows prefer burned-over forest land at a stage of recovery with heavy growth of brush (Austin, 1968). At sites in the Sierra Nevada, post-fire, fox sparrow densities change as brushy fields of chaparral mature (Bock & Kynch, 1970; Bock et al., 1978). Approximately 10 years after a fire, montane chaparral reached a density sufficient to support the species.

Based upon this information, the Trestle Project will reduce habitat for fox sparrows for approximately 10 years following prescribed burning, in areas with complete consumption. Mosaic burning leaving unburned large patches of shrubs will aid in providing habitat that will continue to support fox sparrows over this 10 year period. Additional shrub growth within openings created in forested stands are likely to increase for the species in the long term until conifer canopy development shades out the brush component in the stand.

Machine Piling

Piling and cutting small trees and brush, with follow-up pile burning will occur within commercial harvest units. Some of the brush removal acres here will overlap acres within commercial harvest units that may have brush removal to facilitate tree removal. Within the acres of machine piling, shrub habitat could be removed from the area through the effects of dozers pushing materials into piles; removing this habitat from the unit understory.

Restoration Activities – Roads and Trails

Restoration activities will create additional shrub habitat that will develop within these areas, increasing habitat quality in the short term. Depending on site conditions, conifer establishment may occur within ten to twenty years, potentially reducing or eliminating the conditions for shrub retention and/or establishment, resulting in site specific habitat reductions.

Cumulative Effects to Habitat

There is 591 acres of shrubland habitat in the cumulative effects analysis area. The project activities that temporarily reduce shrub ground cover and decadence will affect up to 72 acres out of the 591 acres of habitat within the cumulative effects analysis area. This may change the age structure and localized distribution of shrub habitat, but will not alter existing trend in the habitat, nor will it lead to a change in the distribution of fox sparrow across the Sierra Nevada bioregion. This is based on effects primarily coming from prescribed burning, in which it is anticipated that not all acres will be burned or burned at the same time, leaving pockets of habitat across the landscape.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale

Though the quality of size class and cover class shrub habitat will be altered, the change in acres of shrubland habitat on potentially up to 72 acres in harvest units and prescribed burning outside of treatment units out of 591 acres (less than 1% of shrubland habitat in the Sierra Nevada) of shrubland habitat occurring across the Sierra Nevada area will not alter the existing trend in the amount of habitat acres, nor will it lead to a change in the distribution of fox sparrows across the Sierra Nevada bioregion.

Oak-Associated Hardwoods and Hardwood/Conifer Habitat (Mule deer)

The mule deer was selected as the MIS for oak-associated hardwood and hardwood/conifer in the Sierra Nevada, comprised of montane hardwood (MHW) and montane hardwood-conifer (MHC) as defined by the California Wildlife Habitat Relationships System (CWHR) (CDFG, 2005). Mule deer range and habitat includes coniferous forest, foothill woodland, shrubland, grassland, agricultural fields, and suburban environments (CDFG, 2005).

Affected Environment

A total of 539 acres of oak associated hardwood and hardwood/conifer habitat [CWHR montane hardwood (MHW), montane hardwood-conifer (MHC)] habitat is within the analysis area. Hardwoods also occur mixed in the CWHR Sierra Mixed Conifer (SMC) designated stands as individual trees or small groves intermixed with conifers. These areas are a mix of hardwoods and conifer and are not pure stands of hardwoods which may be why they were not categorized as MHW or MHC under GIS but rather classified as Sierra Mixed Conifer (SMC) which contains a mixture of conifer species as well as hardwoods within stands. For this analysis the effects to MHW and MHC will be in regards to those acres classified by GIS under CWHR MHW or MHC.

Status and Trend

There are currently 808,006 acres of oak-associated hardwood and hardwood/mixed conifer habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is slightly increasing (changing from 5% to 7% of the acres on National Forest System lands).

The mule deer has been monitored in the Sierra Nevada at various sample locations by herd monitoring (spring and fall) and hunter survey and associated modeling (CDFG, 2007 and 2010). These data indicate that mule deer continue to be present across the Sierra Nevada, and current data at the rangewide, California, and Sierra Nevada scales indicate that, although there may be localized declines in some herds or Deer Assessment Units (including DUA 5 of which the Grizzly Flat deer herd resides), the distribution of mule deer populations in the Sierra Nevada is stable.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under Alternative 1, no direct or indirect effects would occur to oak associated habitat because no project activities would occur. Oak would continue to decline over time due to competition with conifers.

Cumulative Effects

Cumulative effects are not expected with this alternative.

Alternatives 2, 4, and 5

Direct and Indirect Effects

A total ranging between 49 acres under Alternative 5 to 76 acres under Alternative 2 of oak associated habitat would be affected by the project. The project would be anticipated to improve the oak component of oak associated habitat through the removal of competing and overtopping conifers, allowing for more sunlight and less competition of oaks with adjacent vegetation (primarily conifers). Openings will also enable acorn establishment and multi-aged hardwood stands, perpetuating black and canyon oak within the project area.

Similar effects can be anticipated for prescribed burning in regards to removal of small diameter conifers that may compete with young and mature oak for resources. Prescribed burning could affect oak established seedlings and saplings through consumption. Re-sprouting of oak, or ground cover removal for the establishment of oak seedlings, will enable hardwoods to remain and/or increase within the stands.

A few incidental oak hazard trees may be fallen for safety or operations reasons, although these incidental trees would be too few to affect overall CWHR types.

Cumulative Effects to Habitat

The cumulative effects analysis contains 539 acres of oak associated habitat. Because project activities are expected to maintain or improve oak habitat, the project would be expected to slightly increase oak associated habitat for mule deer in the analysis area.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale

As there will be no adverse change in size class, canopy cover or quantity of CWHR montane hardwood (MHW)/montane hardwood-conifer (MHC) oak-associated hardwood and hardwood/conifer habitat from project activities in the Trestle Project area, the project will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of mule deer across the Sierra Nevada bioregion under Alternative Two for the Trestle Project. Localized conifer removal around existing hardwoods or prescribed burning may improve conditions in localized areas but acreages are not large enough to alter existing trends or population distributions.

Early and Mid-Seral Coniferous Forest Habitat (Mountain quail)

Affected Environment

There is a total of 14,995 acres of early and mid-seral coniferous habitat in the analysis area [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, 3, and 4, all canopy closures]. Most of this habitat is in the mid seral stage, mostly consisting of 4M and 4D CWHR types. No white fir, red fir, or eastside pine types are present.

Status and Trend

There are currently 530,851 acres of early-seral and 776,022 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. Over the last two decades, the trend for early seral is decreasing (changing from 9% to 5% of the acres on National Forest System lands) and the trend for mid seral is increasing (changing from 21% to 25% of the acres on National Forest System lands).

Monitoring of the mountain quail across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with PRBO Conservation Science, as part of a monitoring effort that also includes fox sparrow, hairy woodpecker, and yellow warbler (USDA Forest Service, 2010a). Mountain quail were detected on 40.3 percent of 1659 point counts (and 48.6% of 424 playback points) in 2009 and 47.4% of 2266 point counts (and 55.3% of 492 playback points) in 2010, with detections on all 10 national forests in both years. The average abundance (number of individuals recorded on passive point count surveys) was 0.103 in 2009 and 0.081 in 2010. These data indicate that mountain quail continue to be distributed across the 10 Sierra Nevada National Forests. In addition, mountain quail continue to be monitored and surveyed in the Sierra Nevada at various sample locations by hunter survey, modeling, and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA Forest Service, 2008b). Current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of mountain quail populations in the Sierra Nevada is stable.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under Alternative 1, no direct effects would occur to early- and mid-seral coniferous habitat because no project activities would occur. Early- and mid-seral would continue along the succession trajectory at the current pace.

Cumulative Effects

Cumulative effects are not expected with this alternative.

Alternatives 2, 4, and 5

Direct and Indirect Effects

Overall between 2,575 acres under Alternative 4 and 4,090 acres under Alternative 2 of early- and mid-seral habitat would be affected by the project.

Changes in the percentage of canopy cover would vary within the mechanical thinning units. Thus some stands would have a larger change than others in CWHR canopy cover class. The removal of competing understory conifers though thinning will move stands into mature forest sooner, reducing the habitat capability for quail in these areas in the long term. In the short term, forage and cover in the form of dense stands of young trees will be removed, reducing both forage and cover until these components return in these stands (3 to 5 years) as site conditions allow. The remaining acres of early-mid seral habitat, outside of treatment units, may be potentially burned within the prescribed burn units. Both harvest and burn units will result in changes in tree size and canopy closure.

Reduction of tree canopy closure from the removal of conifers will open up the understory, changing site conditions and potentially enhancing development of shrubs preferring a more xeric environment. An increase in understory shrubs and associated canopy closure, though small, may occur in the openings created by the reduction in tree canopy closure.

The effects of fire suppression in the project area have caused preferred habitats for the mountain quail to become decadent or succeed into later seral stages, reducing the amount of available forage and cover. Prescribed understory burning would result in mortality of small diameter trees within areas treated. In areas with prescribed burning, changes to the amount of acres of shrub dominated habitat are not expected to result from the Trestle Project. However; shrub cover will be reduced for two to three years as shrubs regenerate and resprout following prescribed burning. The age class and ground cover of shrubs will change from mature or decadent to seedlings or sprouts. Since the Trestle Project will not burn at the same intensity as a wildfire, it is expected that some unburned patches of shrubs will remain in the project area and will continue to support mountain quail.

Additional shrub growth within openings created in forested stands is likely to increase for the species in the long term until conifer canopy development shades out the brush component in the stand. Burning of vegetation retention islands or created brush piles may permanently remove these components as hiding or nesting habitat.

Loss of existing shrub component may occur in units with tractor piling from activities such as piling, cutting small trees and brush (1” to 3.9” dbh) and follow-up pile burning within commercial harvest units. Within the acres of machine piling, shrub habitat could be removed through the effects of dozers pushing materials into piles; removing both plants and their root structures; resulting in a longer re-establishment of shrubs within created openings. Some of the brush removal acres will overlap acres that occur within commercial harvest units that may have brush removal to facilitate tree removal.

Cumulative Effects to Habitat

Projects utilizing CASPO and Sierra Nevada Framework guidelines retained at least 40% canopy cover and reduced the amount of early-mid seral habitat through understory thinning prescriptions. Earlier timber and post-fire salvage harvest on National Forest that resulted in the creation of plantations within the project area provided early-seral habitat. The Trestle Project will have beneficial effects upon shrub and early seral conifer regeneration within the project area over time, increasing the diversity and structure in early and mid-seral stands within areas of prescribed burning. In areas of commercial and plantation treatments, it can be expected that in the short-term there will be reductions in brush and early-mid seral conifer habitat after initial treatment. Openings created in stands as well as follow-up burning may mitigate this by improving site conditions for shrub establishment within 1 to 3 years. However; in the long term, treatments to move stands to late seral conditions will reduce habitat for the mountain quail.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale

The change in canopy closure and short-term reduction of understory shrub and tree cover in commercial harvest units on up to 4,090 acres and up to an additional 8,376 in burn areas (outside of treatment units) out of 14,125 acres of habitat in the cumulative effects analysis area, will change the age structure and localized distribution of early and mid-seral habitat but 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. This is based on the effects primarily coming from prescribed burning in which it is anticipated that not all acres will be burned or burned at the same time, leaving pockets of habitat across the landscape.

Late Seral Open Canopy Coniferous Forest Habitat [Sooty (blue) grouse]

Affected Environment

Total late seral open canopy coniferous forest habitat [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P] in the analysis area is 87 acres. Current forest vegetation inventory does not include understory shrub canopy closure information, and thus this information is described qualitatively. In general areas with less than 40% canopy cover tend to have an understory shrub component, as the analysis area is generally lower elevation coniferous forest.

Status and Trend

There are currently 63,795 acres of late seral open canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is decreasing (changing from 3% to 1% of the acres on National Forest System lands).

The sooty grouse has been monitored in the Sierra Nevada at various sample locations by hunter survey, modeling, point counts, and breeding bird survey protocols, including California Department of Fish and Game Blue (Sooty) Grouse Surveys (Bland, 1993, 1997, 2002, and 2006); California Department of Fish and Game hunter survey, modeling, and hunting regulations assessment (CDFG 2004a, CDFG 2004b); Multi-species inventory and monitoring on the Lake Tahoe Basin Management Unit (LTBMU 2007); and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al., 2007). These data indicate that sooty grouse continue to be present across the Sierra Nevada, except in the area south of the Kern Gap, and current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of sooty grouse populations in the Sierra Nevada north of the Kern Gap is stable

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under Alternative 1 no direct effects would occur to late seral open canopy coniferous habitat because no project activities would occur.

Cumulative Effects

Cumulative effects are not expected with this alternative.

Alternatives 2, 4, and 5

Direct and Indirect Effects

There is no anticipated change in number of acres in 5P or 5S post-harvest in the commercial units as no 5P or 5S occurs within any harvest units. Based on the low acreage (87 acres) in the project area and lack of this habitat type in the units, it is not expected that there will be a change in acres of late seral open canopy coniferous forest from unit treatments. In addition, a substantial increase in canopy from burning will not occur; therefore; canopy conditions will remain stable for sooty grouse in the area, where it occurs.

The Trestle Project will have beneficial effects upon understory shrubs over time, increasing the diversity and structure in areas of prescribed burning. In areas of commercial treatments, it can be expected that in the short-term there will be reductions in brush but in the long term, treatments to move stands to late seral conditions will increase habitat for the sooty grouse by creating large diameter roosting trees for the species, providing canopy closure and shrub conditions remain suitable for the habitat of this species.

Cumulative Effects to Habitat

There have been no projects in the project area since 2005 (2005 vegetation data is used for this analysis) that have affected late seral open canopy forest. Past projects utilizing CASPO and Sierra Nevada Framework guidelines retained at least 40% canopy cover and trees 30” dbh and larger through understory thinning prescriptions. Earlier timber and post-fire salvage harvest on National Forest land that resulted in the creation of plantations within the project area removed late seral habitat but provided shrub habitat interspersed around any remaining large diameter trees within or adjacent to the plantations. As there are no direct or indirect changes in existing circumstances due to the small acreage of habitat in the project area and no treatments anticipated to alter it unsuitable; there will be no cumulative effects associated with this project under this alternative in regards to change in acres of late seral open canopy coniferous forest; tree canopy closure; or understory shrub canopy closure class associated with late seral open canopy coniferous forest.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale

As there is no anticipated change in late seral open canopy coniferous forest; tree canopy closure; or understory shrub canopy closure class on 87 acres of 5P or 5S habitat in the Trestle cumulative effects analysis area, the project will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of sooty grouse across the Sierra Nevada bioregion.

Late Seral Closed Canopy Coniferous Forest Habitat (California spotted owl and northern flying squirrel)

Affected Environment

There is a total of 4,611 acres of late seral closed canopy coniferous forest habitat [CWHR 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] in the project area.

Status and Trend

There are currently 1,006,923 acres of late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is slightly increasing (changing from 7% to 9% of the acres on National Forest System lands); since the early 2000s, the trend has been stable at 9%.

California spotted owl. California spotted owl has been monitored in California and throughout the Sierra Nevada through general surveys, monitoring of nests and territorial birds, and demography studies (Verner et al., 1992; Gutierrez et al., 2008, 2009, and 2010; USDA Forest Service, 2001, 2004, and 2006b; USFWS, 2006; Sierra Nevada Research Center, 2007, 2008, 2009, and 2010). Current data at the rangewide, California, and Sierra Nevada scales indicate that, although there may be localized declines in population trend [e.g., localized decreases in “lambda” (estimated annual rate of population change)], the distribution of California spotted owl populations in the Sierra Nevada is stable.

Northern flying squirrel. The northern flying squirrel has been monitored in the Sierra Nevada at various sample locations by live-trapping, ear-tagging, camera surveys, snap-trapping, and radiotelemetry: 2002-present on the Plumas and Lassen National Forests (Sierra Nevada Research Center, 2007, 2008, 2009, and 2010), and 1958-2004 throughout the Sierra Nevada in various monitoring efforts and studies (see USDA Forest Service, 2008, Table NOFLS-IV-1). These data indicate that northern flying squirrels continue to be present at these sample sites, and current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of northern flying squirrel populations in the Sierra Nevada is stable.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under Alternative 1, no direct effects would occur to late seral closed canopy coniferous habitat because no project activities would occur.

Cumulative Effects

Cumulative effects are not expected with this alternative.

Alternatives 2, 4, and 5

Direct and Indirect Effects

A total ranging between 308 acres under Alternative 4 to 614 acres under Alternative 2 of late seral closed canopy coniferous forest habitat would be affected by the mechanical thinning treatments. There are up to 614 acres of 5D occurring within treatment units, primarily overlapping spotted owl Home Range Core Areas (HRCAs). These 5D acres comprise approximately 13% of the harvest unit acres. There are additional 5M/5D acres outside these units that are proposed for prescribed burning. This habitat primarily overlaps goshawk PACs, spotted owl PACs and HRCAs.

Acres of 5D/5M will be altered to a different CWHR size or density type within commercial harvest units under the Trestle Project. Trees that would potentially reach a size (30" or greater dbh) faster (where site conditions allow) that are being harvested could provide additional 5M/5D stands within the project area in the long term to provide nesting, denning, roosting and resting habitat for the California spotted owl and northern flying squirrel; particularly trees 20” dbh and greater.

Canopy Closure

Trees up to 29.9” dbh will be thinned under the Trestle Project; resulting in a reduction in canopy closure for the California spotted owl and northern flying squirrel within those units. Canopy cover and basal area would be retained and measured at the individual stand treatment level and would comply with SNFPA for harvest treatments. Mechanical thinning treatments will result in removal of small and intermediate size (<30” dbh) co-dominant and understory trees, resulting in measurable reductions of canopy cover and a simplification of stand structure (reduction in tree height diversity) from pre-treatment conditions. Objectives established in the Sierra Nevada Forest Plan Amendment (2004) allow for up to 30 percent canopy reduction; however; the Silvicultural Report for the Trestle Project estimates, that on average, canopy cover would decrease a maximum of 18% following commercial thinning (Trestle Silvicultural Report 2014). Canopy cover should return to pre-harvest treatment levels within 20-30 years. Prescriptions are generally expected to retain at least 50% canopy cover in spotted owl home range core areas, based on Standard and Guidelines.

Large Down Logs per Acre or Large Snags per Acre

Based on stand surveys and the Trestle Silvicultural Report (USDA Forest Service 2014) there are approximately 3 snags per acre. Snags range in size from 16-50 inches dbh with heights ranging from about 50 feet to 180 feet. They are mostly white fir with smaller percentages being made up of sugar pine and ponderosa pine snags in various stages of decay. However; recent insect mortality (2015-2016) has caused the level of early decay stage small and large diameter snags, to increase on the landscape.

Recent green tree mortality from bark beetles have increased the number of early decay stage snags across the landscape, particularly during 2015 and 2016. No snag surveys have been conducted to assess the extent of the mortality. It is unknown how many snags there are or other information such as size and location to determine the number of snags per acre that could currently exist. The mortality, however; has increased the snag levels in portions of the Trestle Project boundary.

Snag levels have been affected in the project area, particularly from past insect salvage sales, illegal wood cutting; and lack of fire. Hazard tree removal during both the harvest and the burn associated portions of the project will reduce the average snag levels per acre even further in localized areas. Hazard tree removal and prescribed burning will change the existing snag and down log component by altering the existing age and size classes currently within the area. It can be expected that losses of late decay stages will occur reducing this age class in the area. It is also expected that there may be creation of new age classes from the death of green trees that become snags and serve as recruitment logs from prescribed burning. This could result in the natural falling of both existing snags and live green trees weakened from both fire and loss of previous vegetation (that served as protection from high winds) which would reduce snag levels but increase early decay class down logs within the area.

Though some later decay stage snags and down logs may be lost; prescribed burning may also result in additions to the existing snag and down log component through mortality of individual live green trees. The extent and numbers are difficult to determine due to unpredictability of the exact behavior of prescribed fire; current numbers of snags and down logs; and number of susceptible live green trees in individual stands. If snags are lost and snag recruitment doesn’t occur during prescribed burning, average snags per acre will be reduced further; particularly late decay stage snags and logs. Project design to protect specific large down logs and snags from consumption will be incorporated into the burn plan to avoid impacts to these habitat components, including consumption of snags created through prescribed burning or scorching from pile burning.

Harvest of green trees 16” dbh and larger will alter future snag and down log recruitment including age classes and size ranges in both the short and long term.

Cumulative Effects to Habitat

The cumulative effects analysis area contains 4,625 acres of late seral closed canopy coniferous habitat. There have been no projects in the project area since 2005 (using 2005 vegetation data for the analysis) that have affected late seral closed canopy forest. Past projects utilizing CASPO and Sierra Nevada Framework guidelines retained at least 40% canopy cover and trees over 30” dbh through understory thinning prescriptions. Earlier timber and post-fire salvage harvest on National Forest that resulted in the creation of plantations within the project area removed late seral habitat. In areas of commercial treatments, it can be expected that in the short-term there will be no significant changes but in the long term, treatments to move stands to late seral conditions will increase habitat for the spotted owl and northern flying squirrel through increased growth rates of remaining trees. Trees that could potentially reach 30" or larger (where site conditions allow) are being removed, potentially affecting additional 5M/5D stands that could develop, within the project area in the long term and increasing the distance between trees that could change gliding distance for flying squirrel to reach nearby trees.

Hazard tree removal and prescribed burning will change the existing snag and down log component by altering the existing age and size classes currently within the area. It can be expected that losses of late decay stages will occur, reducing this age class in the area. It is also expected that there may be creation of new age classes from the death of green trees that become snags and serve as recruitment logs from prescribed burning. This could result in the natural falling of both existing snags and live green trees weakened from both fire and loss of previous vegetation (that served as protection from high winds) which would reduce future snag levels but increase early decay class down logs within the area.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale

In Alternatives 2, 4, and 5, a potential change of 610 acres, 308, or 387 acres, respectively of 5D CWHR habitat type out of 4,625 acres 5D available, the project when combined with cumulative effects where projects generally maintain at minimum 5M habitat and promote resiliency to stand replacing fires, would not alter the existing trend in the habitat, nor with it lead to a change in the distribution of the California spotted owl or northern flying squirrel across the Sierra Nevada bioregion.

Snags in Green Forest Ecosystem Component (Hairy woodpecker)

Affected Environment

The analysis area has approximately 16,683 acres of forest with CWHR size class of 4 or larger that could support habitat as “snags in green forest ecosystem component.” Based on stand surveys and the Trestle Silvicultural Report (USDA Forest Service 2014) there are approximately 3 snags per acre. Snags range in size from 16-50 inches dbh with heights ranging from about 50 feet to 180 feet. They are mostly white fir with smaller percentages being made up of sugar pine and ponderosa pine snags in various stages of decay. Recent insect mortality (2015-2017) however, has caused the level of early decay stage small and large diameter snags, to increase on the landscape. No snag surveys have been conducted to assess the extent of the mortality. It is unknown how many snags there are or other information such as size and location to determine the number of snags per acre that could currently exist. The mortality, however, has increased the snag levels in portions of the Trestle Project boundary.

Status and Trend

The current average number of medium-sized and large-sized snags (greater than 15" dbh, all decay classes) per acre across major coniferous and hardwood forest types (westside mixed conifer, ponderosa pine, white fir, productive hardwoods, red fir, eastside pine) in the Sierra Nevada ranges from 1.5 per acre in eastside pine to 9.1 per acre in white fir. In 2008, snags in these types ranged from 1.4 per acre in eastside pine to 8.3 per acre in white fir (USDA Forest Service, 2008).

Data from the early-to-mid 2000s were compared with the current data to calculate the trend in total snags per acre by Regional forest type for the 10 Sierra Nevada national forests and indicate that, during this period, snags per acre increased within westside mixed conifer (+0.76), white fir (+2.66), productive hardwoods (+0.35), and red fir (+1.25) and decreased within ponderosa pine (-0.16) and eastside pine (-0.14) Detailed information by forest type, snag size, and snag decay class can be found in the 2010 SNF Bioregional MIS Report (USDA Forest Service, 2010).

Monitoring of the hairy woodpecker across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with PRBO Conservation Science, as part of a monitoring effort that also includes mountain quail, fox sparrow, and yellow warbler (USDA Forest Service, 2010). Hairy woodpeckers were detected on 15.1% of 1659 point counts (and 25.2% of 424 playback points) in 2009 and 16.7% of 2266 point counts (and 25.6% of 492 playback points) in 2010, with detections on all 10 national forests in both years. The average abundance (number of individuals recorded on passive point count surveys) was 0.116 in 2009 and 0.107 in 2010. These data indicate that hairy woodpeckers continue to be distributed across the 10 Sierra Nevada National Forests. In addition, the hairy woodpeckers continue to be monitored and surveyed in the Sierra Nevada at various sample locations by avian point count and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA Forest Service, 2008).Current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of hairy woodpecker populations in the Sierra Nevada is stable.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Under Alternative 1, no direct effects would occur to snags in green forest habitat because no project activities would occur. The number of snags is expected to increase over the long-term, primarily due to mortality caused by insect and disease. The recruitment of snags would continue to be dependent upon the interplay of precipitation levels, stand density and other natural elements, such as the incidence of insect attack, natural mortality, and amounts of wind throw.

Cumulative Effects

Cumulative effects are not expected with this alternative.

Alternatives 2, 4, and 5

Direct and Indirect Effects

The project would affect up to 4,556 acres (ranging from 2,474 acres under Alt. 4 to 4,556 acres under Alt. 2) of CWHR size class 4 or larger stands. Snag levels have been affected in the project area, particularly from past insect salvage sales, illegal wood cutting; and lack of fire. Hazard tree removal during both the harvest and the burn associated portions of the project will reduce the average snag levels per acre even further in localized areas. Hazard tree removal and prescribed burning will change the existing snag and down log component by altering the existing age and size classes currently within the area. It can be expected that losses of late decay stages will occur reducing this age class in the area. It is also expected that there may be creation of new age classes from the death of green trees that become snags and serve as recruitment logs from prescribed burning. This could result in the natural falling of both existing snags and live green trees weakened from both fire and loss of previous vegetation (that served as protection from high winds) which would reduce future snag levels but increase early decay class down logs within the area.

Though some later decay stage snags and down logs may be lost; prescribed burning may also result in additions to the existing snag and down log component through mortality of individual live green trees. The extent and numbers are difficult to determine due to unpredictability of the exact behavior of prescribed fire; current numbers of snags and down logs; and number of susceptible live green trees in individual stands. If snags are lost and snag recruitment doesn't occur during prescribed burning, average snags per acre will be reduced further; particularly late decay stage snags and logs. Project design to protect specific large down logs and snags from consumption will be incorporated into the burn plan to avoid impacts to these habitat components, including consumption of snags created through prescribed burning or scorching from pile burning.

Harvest of green trees 16 inches dbh and larger will alter future snag and down log recruitment including age classes and size ranges in both the short and long term.

Cumulative Effects to Habitat

The cumulative effects analysis area contains 16,683 acres of CWHR size class 4 or larger stands. Project activity that occurs in commercial thinning units, as well as burn only units that support the "snags in green forest ecosystem component" with the Trestle project will maintain four of the largest snags per acre averaged across the treatment units, retain trees over 30 inches dbh, and potentially increase snag levels during prescribed burning.

There have been no projects in the project area since 2005 (using 2005 vegetation data for the analysis) that have affected large size trees (CWHR size class 5). Past projects utilizing CASPO and Sierra Nevada Framework guidelines retained at least 40% canopy cover and trees over 30” dbh through understory thinning prescriptions. Earlier timber and post-fire salvage harvest on National Forest that resulted in the creation of plantations within the project area removed late seral habitat. In plantation treatment areas, it can be expected that in the short-term there will be no significant changes but in the long term, treatments to move stands to late seral conditions will increase large diameter tree habitat for hairy woodpecker.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale

Project activity that occurs on up to 4,556 acres in commercial thinning units and in burn only units that support coniferous forest (that could provide snags in green forest) will maintain snags and live recruitment trees to provide for habitat within the project area. Therefore, the Trestle project would not lead to a change in the distribution of hairy woodpecker across the Sierra Nevada bioregion.

Migratory Birds

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, the January 2004 PIF North American Landbird Conservation Plan and the 2016 PIF North American Landbird Conservation Plan Revision for Canada and the Continental United States, all reference goals and objectives for integrating bird conservation into forest management and planning.

In late 2008, a Memorandum of Understanding between the USDA Forest Service and the US 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. These conservations measures were adopted again when the MOU was revisited in 2016.

Saving Our Shared Birds was released by the Partners in Flight Program in 2010. It builds upon the existing North American Landbird Conservation Plan (PIF 2004), which is used to base current landbird conservation priorities. This 2010 guide describes the current condition of the avifauna that is shared between Canada, the United States, and Mexico, and identifies species that warrant special attention.

Unlike the previous plan, this guide aims to target both the loss of diversity and the loss of overall abundance, including species that we consider common. Additionally, it recognizes the value of birds, both economically and ecologically, and acknowledges them as indicators of environmental health. The statistics provided in the report show that more than half of the 882 landbird species show evidence of declines of at least 15% (PIF 2010, Berlanga et al. 2010), and recommends altering management strategies to enhance habitats that support species that have experienced declines greater than 50%. In temperate western forests, nearly 10% of common species that rely upon the region as their primary breeding habitat are in steep decline (PIF 2010, Berlanga et al. 2010).

The 2010 report identifies habitat loss as the most serious threat to bird populations, and recommends six primary actions (PIF 2010, Berlanga et al. 2010).

1. Protect and recover species at greatest risk.
2. Conserve habitats and ecosystem functions.
3. Reduce bird mortality.
4. Expand our knowledge base for conservation.
5. Engage people in conservation action.
6. Increase the power of international partnerships.

At the forest, district or project level, the first two actions are items that can be incorporated into existing actions, with the following priorities (PIF 2010, Berlanga et al. 2010).

- Managing forest to maintain structural complexity and a diversity of age classes.
- Allowing natural processes, such as fire, to diversify habitat.
- Retention of large trees.
- Retention of snags and trees with cavities.

In 2014, The State of the Birds 2014-United States of America Report was released. A key finding from the report focused on forests with an emphasis on creating and preserving large tracts of forest. The report starts that “Efforts like this are essential, as forest-dependent birds have declined nearly 20 percent in the western U.S. and 32 percent in the east since 1968” (North American Bird Conservation Initiative 2014). Activities as described above for the 2010 Sharing Our Shared Birds will aid in the effort to maintain or increase forests for species that depend on them. Hardwood and conifer dependent species that occur on the Forest will benefit from this, particularly those that were identified as declining in our area, such as the band-tailed pigeon, oak titmouse, Cassin’s finch, olive-sided flycatcher, and flammulated owl. Other species that depend on shrubs and flowering plants; identified as declining include rufous and Allen’s hummingbirds, and wrentit; will also benefit from forest understory management.

The effects analysis for migratory birds is summarized from the Migratory Landbird Conservation Report for the Trestle Forest Health Project (Yasuda 2017b).

Affected Environment

The Trestle Forest Health Project falls within a larger watershed analysis completed in 2002. Non-TES or non-MIS focal species of birds were identified for the "North Fork Cosumnes River Watershed Landscape and Roads Analysis" (USDA Forest Service 2002, pages 24/25) for the Eldorado National Forest. Individual species, their status and relevant issues under the landscape and roads analysis are displayed in Table 29. Focal species were selected based on the following criteria:

- Migratory Birds on the Partners in Flight Watch List, or those receiving a "high vulnerability" ranking in the Sierra Nevada Forest Plan Amendment.
- Focal species in the California Partnerships in Flight Oak Woodland, Coniferous Forest, and Riparian Bird Conversation Plans.

Table 29
Focal species status and relevant issues

Species	Status	Relevant Issues
Acorn Woodpecker	PIF Watch List, Oak Woodland Plan	Fuels Treatments, Hardwood Management, Exotic Species
Warbling Vireo	Riparian Plan	Fuels Treatments, Hardwood Management, Riparian Management
Flammulated Owl	PIF Watch List, Coniferous Forest Plan	Fuels Treatments, Hardwood Management, Old Forest Management
Olive-sided flycatcher	PIF Watch List, Coniferous Forest Plan	Fuels Treatments, Riparian Management
Oak Titmouse	Oak Woodland Plan	Hardwood Management, Exotic Species
Swainson's Thrush	SNFPA High Vulnerability, Riparian Plan	Fuels Treatments, Conservation of Meadow and Riparian Ecosystems
Fox Sparrow[1]	Coniferous Forest Plan	Fuels Treatments
Dark-eyed Junco	Coniferous Forest Plan	Fuels Treatments, Riparian and Meadow Management

[1] The fox sparrow is currently designated as a MIS for the Eldorado National Forest and analyzed in detail in the MIS Report and summarized in the EIS under the MIS section.

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

The No Action Alternative would leave conditions as they currently exist as no activities are being implemented under this alternative.

Alternative 2, 4, and 5

Direct, Indirect, and Cumulative Effects

Opportunities to promote conservation of migratory birds and their habitats in the project area were considered during development and design of the Trestle Project. In particular, opportunities to enhance habitat for Birds of Conservation Concern identified by the U.S. Fish and Wildlife Service in the Sierra Nevada Bird Conservation Region (2008) were considered. This includes the flammulated owl, California spotted owl, olive-sided flycatcher, Calliope hummingbird, Lewis's woodpecker, Cassin's finch and Williamson's sapsucker.

While these design features will help either enhance habitat (hardwood enhancement, prescribed burning, road decommissioning), or mitigate for various impacts to land birds (loss of habitat, reduction in nesting potential or direct disturbance or morality), some migratory birds might be killed or harmed through project activities such as logging operations or burning; particularly during the nesting season.

The following describes the design features that will aid in enhancing or minimizing impacts to landbirds as well as potential effects of the alternatives is summarized below, focusing on criteria identified under the 2010 PIF plan priorities.

PIF Plan Priority - Managing Forest to Maintain Structural Complexity and a Diversity of Age Classes

Design features that will enhance or minimize impacts to landbirds:

- Enhance and maintain montane hardwood ecosystems dominated by California black oak and canyon live oak by removing competing conifers.
- Recruit non-hazardous snags and down logs by leaving individual trees or patches of tree mortality caused by prescribed understory burning.
- Large woody material requirements will meet standards (SNFPAROD 2004, page 51) for down log retention. Where possible, these large down logs (logs greater than 10' long and 16" in diameter at midpoint) would be left in place to the extent practical in treatment units, and would be protected during mechanical treatment activities and during understory prescribed burning.
- Non-treated areas within natural stands will provide vertical and horizontal structure within the stand.
- Protection measures and restoration activities exist for aquatic features and Riparian Conservation Areas.
- Evaluation and mitigation measures will be taken to deal with new noxious weed infestations.

Effects to mid-large diameter trees and associated canopy

Removal of this size class will reduce the number of trees utilized by bird species in the area but will also enable remaining trees to develop into larger diameter trees with the reduction in competition for resources. A reduction in canopy closure may affect nesting potential for some species and reduce foraging quality for others that rely on heavier canopy closure as part of their habitat requirements. These effects will occur from the following project activity:

- Trees up to 29.9” dbh would be harvested under all three action alternatives. Trees 30’ dbh and larger would not be harvested. Highest diameter at breast height (dbh) considered for harvest is 29.9” for all three action alternatives.

Effects to small diameter trees

Treatment of small diameter trees will remove nesting habitat for small dense tree thicket nesting species; hiding cover; and overwintering habitat. These effects will occur from the following project activities:

- Hand cutting, piling and burning of small trees (1-8.9”dbh) will occur within 500 feet of private property boundaries in the Wildland Urban Interface (WUI).
- Pre-commercial thinning will remove trees less than 10 inches dbh).
- Prescribed understory burning.
- Small trees (4-9.9 inches dbh) and brush will be mechanically thinned to facilitate sawtimber and biomass removal as needed during initial harvest.
- Hardwood enhancement through the removal of competing conifers from the understory.
- Follow-up machine piling on slopes less than 40%; cutting of small trees and brush (trees 1-3.9” dbh); and follow-up pile burning will occur in natural stands
- Prescribed fire and hand thinning to improve habitat quality for the Pleasant Valley Mariposa lily.

Effects to shrub habitat

Removal of the shrub component in an area will eliminate nesting habitat for shrub-associated nesting species (including ground nesters); foraging substrate for insectivores and frugivores; hiding cover; and overwintering habitat. These effects will occur from the following project activities:

- Follow-up machine piling on slopes less than 40%, cutting of small trees and brush (trees 1-3.9” dbh) and follow-up pile burning will occur in natural stands. This would eliminate ground cover components for ground nesters and security cover for species foraging in the area.
- Prescribed understory burning will occur resulting in mortality of shrubs within areas treated.
- Burning of slash/brush piles may eliminate security cover or nesting habitat.
- Hand cutting, piling and burning of small trees (1-8.9”dbh) will occur within 500 feet of private property boundaries in the Wildland Urban Interface (WUI).
- Shrubs will be removed for site clearance along 300’ on each side of Capps Crossing and Caldor-Grizzly/Leoni Roads for a total of 57-59 acres.

Effects to riparian habitat

Removal of the shrub and small tree component in an area will eliminate nesting habitat for shrub-associated nesting species (including ground nesters); foraging substrate for insectivores and frugivores; hiding cover; and overwintering habitat. These effects will occur from the following project activities:

- Rehabilitation of dispersed campground sites and associated spur roads adjacent to Dogtown Creek and the Steely Fork Cosumnes River would aid in restoring vegetation and reducing sediment within or adjacent to riparian areas.
- Enhancement and restoration of watershed conditions by closing and decommissioning roads and of trails that would enable riparian and associated upland vegetation to re-establish. Removal of vehicle use will also prevent mortality from vehicle impacts.

Effects to cliff habitat

No activities will occur near or on known cliff faces; therefore no effects are anticipated to species such as the peregrine falcon or golden eagle who utilize this type of habitat. Should eagles occur in the project, they will be provided protection under the Eagle Act (Yasuda 2014c).

PIF Plan Priority - Allowing Natural Processes, Such as Fire, to Diversify Habitat

- Prescribed understory burning as an initial treatment would occur (9,583 acres, Alternative Two; 12,595 acres, Alternative Four; and 11,102 acres Alternative Five).
- Prescribed fire will be used to improve habitat quality for Pleasant Valley Mariposa lily populations.
- Noncommercial plantations would be prescribed burned, retaining and rejuvenating shrub species and understory forbs and grasses in the area within 1-5 years. In addition, small pockets of tree mortality would be allowed and would create pockets of small diameter snags, potentially providing a forage base from invading insects for both cavity dependent species (woodpeckers) and aerial insectivores.

PIF Plan Priority - Retention of Large Trees

Trees 30’ dbh and larger would not be harvested. Highest diameter at breast height (dbh) considered for harvest is 29.9” for all three action alternatives.

PIF Plan Priority - Retention of Snags and Trees with Cavities

Design features that will enhance or minimize impacts to landbirds:

- Four of the largest snags will be retained per acre averaged across the treatment units.
- Hardwood retention and enhancement will retain and increase habitat for cavity dependent species particularly in the case of black oak.

- Nonhazardous trees killed by prescribed understory burning activities will be primarily left standing.
- Hazardous trees will be dropped and left on the ground unless removal is needed for operations or safety.

Effects to snags

Snag removal will remove existing and potential nesting habitat for cavity dependent species. Smaller diameter snag removal (less than 16” dbh) would remove foraging substrate for insectivores, including cavity nesting species. These effects will occur from the following project activities:

- Hazard tree removal
- Removal of snags in commercial harvest units.
- Retention of only existing non-hazardous snags (greater than16” dbh) and down logs (16” in diameter and 10’ long) and removal of small size classes.
- Prescribed burning may alter the existing snag cycle in the area by reducing the number of older decay classes and increasing the number of “new” snags; potentially affecting the capability of some species to utilize a certain snag size or decay class, which may result in an increase in competition for these resources.

Disturbance

There is the potential for disturbance related effects. Project activities occurring during the nesting season can cause direct mortality to eggs, hatchlings and/or adults from prescribed burning and/or mechanical treatments. Disturbance to nesting adults, resulting in reduction in incubation; feeding bouts; thermal protection; or predator protection; can result in adverse impacts to eggs and/or young. Limited operating periods (LOPs) for spotted owls, great gray owls and northern goshawks will provide protection from disturbance for other species that overlap the LOP areas.

Though the project may in the short term indirectly (loss of habitat or habitat components, disturbance) or directly (mortality) affect some species, the impacts will be site specific and not occur over the entire landscape at the same time enabling species to adjust and locate currently unoccupied territories for nesting or adjacent areas for wintering or foraging habitat. Pile burning won’t occur until the associated commercial harvest unit is completed which may not be for another year or two after commercial harvesting. In addition, it may be up to seven years before prescribed burning is initiated and/or completed over a staggered arrangement across the landscape. Habitat components and locales, such as hardwoods, large diameter trees, and riparian conservation areas, will aid in maintaining habitat for bird species within the area over the long term.

Air Quality

The Clean Air Act requires EPA to set National Ambient Air Quality Standards for six common air pollutants (Ozone, Particulate Matter, Carbon Monoxide, Nitrogen Oxides, Sulfur Dioxide, and Lead. Effects from the Trestle project on air quality are summarized from Riesenhuber and Allan (2014).

Affected Environment

The project area is bounded by the North Fork Cosumnes River drainage on the north and the Middle Fork Cosumnes River to the south. Steely Fork of the Cosumnes River flows within the project area. Both topography and weather play critical roles in the distribution of emissions within the project area. Steep, narrow canyons occur in and adjacent to the project area generally running in a west – east direction.

In the Trestle project area typical weather patterns are diurnal in nature; upslope, up-canyon winds during the afternoon hours with down-slope, down-canyon winds at night. General wind patterns are influenced by the high and low pressure gradients and predominately influence a southwest flow aloft along the ridges. Inversions may occur during the overnight hours in or adjacent to the project area.

CLASS 1 AIRSHEDS

Class 1 airsheds can be defined as USDA Forest Service Wilderness Areas that cover more than 5,000 acres and in existence as of August 7, 1977. Other Class 1 areas include National Parks exceeding 6,000 acres, National Memorial Parks exceeding 5000 acres, and International Parks.

Two Wilderness Areas have been classified as Class 1 airsheds (40 CFR 81.405) and are located within 20 miles of the Trestle project area. The Mokelumne Wilderness Area is located 15 miles southeast of the Trestle project boundary and Desolation Wilderness Area located 18 miles northeast of the Trestle project boundary.

SENSITIVE AREAS

The following communities are located within a 20 mile radius of the project area:

- Grizzly Flat (west, 2 miles)
- Pine Grove (southwest, 17 miles)
- Pollock Pines (north, 11 miles)
- Kyburz (northeast, 15 miles)
- Wilseyville (south, 17 miles)
- Pioneer (south, 10 miles)
- Mount Aukum (west, 14 miles)
- River Pines (west, 15 miles)
- El Dorado (west, 19 miles)
- Volcano (southwest, 12 miles)
- Omo Ranch (southwest, 5 miles)
- Somerset (southwest, 6 miles)
- Fiddletown (southwest, 14 miles)
- Diamond Springs (west, 18 miles)
- Placerville (northwest, 19 miles)
- Camino (northwest, 13 miles)

Other potential areas that smoke emissions may extend to include the Lake Tahoe Basin (northeast, 25 miles).

The following areas are recognized as sensitive areas due to their recreational opportunities in the general area. Recreational activities include camping, off-highway vehicles use (such as motorcycles and all-terrain vehicles), boating, fishing, hiking, panning for gold and hunting. These recreation sites see their highest use during the summer months with least visitation during the fall (post hunting season) through winter months.

- Cosumnes River: North Fork, Steely Fork, and Middle Fork (adjacent and within the project boundary)
- Elkins Flat Off-Highway Vehicle (OHV) area (within and adjacent to the project boundary)
- Capps Crossing Campground (east, 1 mile)
- Jenkinson Lake and Flemming Meadow recreation areas (north, 3 miles)
- Pipi Campground and Gold Note OHV area (south, 1 mile)

NON-ATTAINMENT AREAS

The 1990 amendment of the Clean Air Act published the General Conformity Rule. It states that in federal non-attainment areas, before actions can be taken on federal lands that have the potential to emit pollutants to the atmosphere, a determination must be made that the emissions will not exceed a de minimis (threshold) level (tons per year). If the action exceeds the de minimis level, then a conformity determination is required which documents how the federal action will not cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area. If the project emissions are below de minimis levels the project would be considered exempt from conformity determination with the State Implementation Plan (SIP).

El Dorado County is currently in attainment for 5 of 6 criteria pollutants. 8-hour Ozone is in nonattainment status for El Dorado County and the Sacramento Metropolitan Area. There are no published emission factors that isolate ozone. Standards have been set though, for the ozone precursors such as hydrocarbons and oxides of nitrogen. Ozone is formed as a result of photochemical reactions involving two types of precursor pollutants: volatile organic compounds (VOC) and nitrogen oxides (NOx). VOC and NOx air pollutants are emitted by many types of sources, including on-road and off-road combustion engine vehicles, power plants, industrial facilities, gasoline stations, organic solvents, and consumer products.

Nonattainment areas are classified as marginal, moderate, serious, severe, or extreme areas depending on the magnitude of the highest 8-hour ozone design value for the monitoring sites in the nonattainment area. The Sacramento region is classified as ‘Severe’ as determined by the Environmental Protection Agency’s (EPA) “Green Book Nonattainment Areas For Criteria Pollutants” (http://www.epa.gov/oar/oaqps/greenbook/index.html). Threshold values for *de minimis* levels with a severe listing are less than 25 tons per year.

Environmental Consequences

Table 30
Emission Estimates from Harvesting Activities (Tons of Emissions)

	Alternative 1	Alternative 2	Alternative 4	Alternative 5
PM_{10}	0	1.58	0.91	0.48
CO	0	13.24	7.41	3.38
VOCs	0	1.54	0.88	0.46
NO_x	0	21.72	12.35	6.23

Table 31
Smoke Emissions Estimates from Prescribed Fire Activities (Tons of Emissions)

	Alternative 1*	Alternative 2	Alternative 4	Alternative 5
PM10	10,723.76	1,887.95	1,317.22	1,209.76
CO	103,938.00	14,159.65	9,879.19	9,073.21
VOCs	4,701.96	471.99	329.31	302.44
NOx	1,658.10	632.48	441.28	405.28
__Alternative 1 emission values are based on a wildland fire occurring in the proposed treatment units.__				

Alternative 1

Direct and Indirect Effects

Under this alternative, no increase in ozone precursors or PM10 emission levels would be produced from prescribed burning of activity generated fuels, harvest operations, or understory burning. Potential for substantial degradation of air quality from wildfire in the future as surface fuel deposition occurs would not be reduced. Alternative 1 will not provide any opportunities to reduce existing forest fuels and the hazard they pose in wildland fires. During the flaming phase of a catastrophic wildfire, air quality degradation can exceed Federal and State standards as far as 50 miles downwind. Examples of this occurred during the Freds and Power Fires (Eldorado National Forest, 2004), the Rim Fire (Stanislaus National Forest, 2013), American Fire (Tahoe National Forest, 2013) and most recently the King Fire (Eldorado National Forest, 2014). All things being equal, wildfire generally produces twice the emissions of prescribed fire due to increased consumption (Ottmar & Hessburg, 1998).

Cumulative Effects

Cumulative effects are not expected in with this alternative.

Alternatives 2, 4, and 5

General conformity is the federal regulatory process for preventing major federal actions or projects from interfering with air quality planning goals. Conformity provisions ensure that federal funding and approval are given only to those activities and projects that are consistent with state air quality implementation plans (SIPs). Conformity with the SIP means that major federal actions will not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards (NAAQS).

General conformity requirements apply only if federal actions satisfy one of the following two conditions: (40 CFR 93.153)

- The action's direct and indirect emissions have the potential to exceed the de minimus threshold levels established for criteria pollutants in the rule. For a severe nonattainment area, the threshold level is 25 tons per year of VOC or NOx.
- The action's direct and indirect emissions of any criteria pollutant represent 10% or more of a nonattainment or maintenance area's total emissions inventory for that pollutant.

General Conformity is not required for the Trestle Forest Health Project. The estimated emissions for mechanical thinning are below the 25 tons of emissions per year.

Generally conformity is not required for prescribed burn activities under 40 CFR 93.153 (i) (2). Prescribed burning activities are "presumed to conform" when conducted in accordance with a smoke management program (SMP) which meets the requirements of EPA's Interim Air Quality Policy on Wildland and Prescribed Fires or an equivalent replacement policy. Prescribed fire activities would be a multi-year process and typically occur during the time of year when air quality is less of a concern for increasing Ozone emission levels. Yearly emissions are anticipated below de minimus threshold values for NOx or VOC.

Direct and Indirect Effects

Short term effects to air quality during mechanical thinning activities include the generation of dust and exhaust from equipment used at the worksite. Logging trucks would add emissions driving from the landing to the mill. Impacts related to dust would be localized and emissions would be dispersed upwind from the project site by wind. Mitigation measures to reduce impacts include watering dirt roads to limit dispersion of fugitive dust.

Short term effects to air quality during prescribed burning include visual impacts of smoke production and its associated emissions which can be a public health concern when in heavy concentrations. It is anticipated that localized effects in the project area would include pooling of smoke during nighttime hours when inversions are present. Downwind impacts related to smoke may potentially occur in populated areas such as Placerville, Pollock Pines, Grizzly Flat, Pleasant Valley, Plymouth, Latrobe, and the Lake Tahoe Basin.

During prescribed burning inversions may occur in or adjacent to the project area due to the canyons and drainages. Typically smoke from prescribed burning settles into the narrow canyons during the nighttime hours and lifts by early morning hours as the sun rises. Most often smoke settling into these topographic locations is localized in nature. In conjunction with nighttime cooling, smoke begins to settle into these areas and does not disperse as winds are typically calm during the night. Dependent on where the smoke emissions are as nighttime cooling occurs is where these emissions typically settle during the nighttime hours and disperse the following day as temperatures warm and convective forces begin to disperse smoke.

Several mitigation measures are available to reduce the amount and duration of smoke emissions dependent on meteorological conditions. All action alternatives that include prescribed fire can manage for smoke emissions compared to Alternative 1 (No Action Alternative). Examples of mitigation measures include limiting the size of the burn, cut-off burn times, and mop-up of large fuels or areas generating smoke. These mitigations allow fuels to burn down during favorable weather conditions which transport and disperse smoke. Managing smoke emissions on a wildfire is not feasible in many instances.

Prior to implementation of burning, the El Dorado County Air Quality Management District (AQMD) would be contacted and burn permit obtained from the county as to the type of burning, location, total amount of acres in the project and total potential emissions from the project. Prior to prescribed burn ignitions, a smoke management plan is drafted by the permitee and approved by El Dorado County AQMD in which potential smoke impacts are identified such as Class 1 Airsheds and populated areas. Included in the smoke management plan are mitigation and contingency strategies as well as desired and acceptable wind directions for smoke travel. The permitee is required to contact El Dorado County AQMD one week prior to ignitions to notify the air district of the planned burn location and acreage. The permitee is also required to notify the air district each day prior to planed ignitions for final burn approval and the air district grants or denies burn approval each day. Actual acreage burned is submitted to the county air district upon completion of each day of burning. This process is conducted via the Prescribed Fire Information Reporting System (PFIRS); a web based program which allows land managers, air quality specialists, and general public to see locations of current and planned burn projects.

Should a wildfire occur within or move into the treated areas of the Trestle project area, a reduction in the size, change in type and arrangement of fuels post treatment would reduce wildfire smoke emissions. Finer fuels post treatment would consume faster emitting less smoke with minimal smoke generation as fuels would quickly consume.

Cumulative Effects

Emissions under this project would be cumulative to other projects in the area, but would comply with air quality regulations for the area.

Cultural Resources

Effects to Cultural Resources are summarized from Cultural Resources Management Report R2012050360011 (Klemic, 2014).

Affected Environment

Cultural Resources, the remains of past human activity, provide a record of human activity and manipulation within the ecosystem and provide meaningful context for resource managers to assess the existing condition of the landscape. The analysis area contains evidence of an extensive record of human activity, with the heaviest use occurring within the last 4,000 years. Materials from the surrounding forest indicate that people have been visiting the general vicinity for at least 7,000-9,000 years.

Ethnographic data indicates the project area was used primarily by the Washoe, the Nisenan (southern Maidu), and the Northern Sierra Miwok. The Nisenan and the Northern Sierra Miwok had their winter villages below the snowline on the west slope of the Sierra. The Washoe had their permanent villages east of the Sierra, roughly from the present-day Reno to Markleeville area. All three groups would have used this region as a travel corridor and locale to harvest acorns, pine nuts, deer, fish, plants and other resources. In addition to visiting the area to gather specific resources, each would acquire a variety of resources through trade with each other. Commerce among the Washoe, Nisenan and Miwok included exchange of salt, pine nuts, obsidian and rabbit skins from the east for acorns, bulbs and sea shells (used as currency and for ornaments) from the west.

The three groups continued their traditional lifeways until the California Gold Rush. The great influx of Euro-Americans in 1849 and the early 1850's had devastating consequences for most of the California native peoples. By the 1860's the impacts of disease, violence, environmental degradation and starvation had severely disrupted their conventional activities. Today many of the descendants of these people live in both the Sierra foothills and the valleys adjacent to the east slope. Numerous traditional activities, such as hunting, fishing and basket-making are still practiced today. Archaeological evidence confirms use due to the presence of bedrock milling features and lithics within the project area, however over 100 years of major ground disturbing activities during the historic period have undoubtedly had a significant impact on the prehistoric record.

Historic activities left a definite imprint on the landscape within the analysis area. Historic sites include the remains of such land uses as logging and mining. Infrastructure such as dams, water conveyances, hydraulic cuts, roads, trails, railroad grades, collapsed trestles and flumes are all located in the vicinity.

The historic area of Henry's Diggings is located within the project boundary. This area saw major mining activities between the years of 1852 and 1950. Gwen Walter and Rebecca Palmer compiled a detailed history, which can be found in the Henry's Diggings Evaluation (1992), which is filed at the Eldorado National Forest Supervisor's Office in Placerville. Henry's Diggings has been evaluated and found to be eligible for inclusion in the National Register of Historic Places.

The Grizzly Flat Cutoff passes though the project area. This emigrant route was opened in 1852 and leaves the Carson Mormon Route just north of Leek Springs and follows Baltic Ridge west, descending to Capps Crossing on the Consumes River before ascending the hill south of the river to follows ridges down to the town of Grizzly Flat. The Grizzly Flat Cutoff has not been evaluated for the National Register of Historic Places.

The majority of the project area was also utilized by the Diamond and Caldor Railway, a subsidiary of the California Door Company, which operated a narrow gauge railroad for logging and passenger traffic from the early 1900s through 1953. The Caldor Railway and the majority of its associated camps and features have been found to be ineligible for inclusion in the National Register of Historic Places.

The Forest Service began administering the majority of the land located within the project boundary in 1906. The Eldorado National Forest was established in 1910. During the early 1900s the Forest Service attempted to limit grazing and prohibit burning practices of stockmen and homesteaders (Hunt 1986). By 1915 a fixed point fire detection system in conjunction with guard stations and fire lookouts was established Forest-wide and included the project area. Guard stations were constructed near the town at Caldor and along Plummer Ridge, the latter of which is still standing today.

Forty-four surveys have been conducted within in the Area of Potential Effect (APE) for a total of 13,036 acres (only 10,580 acres meet current inventory standards). These past archaeological surveys have resulted in coverage of the majority (74%) of public land within the project area, predominately within the archaeologically sensitive terrain. An additional 3,425 acres of new survey was conducted for this project. These surveys have resulted in the identification of 116 cultural resources within the project area. Of this total, 78 sites are historic, 24 sites are prehistoric and 14 are multi-component, containing both historic and prehistoric features.

At present, 3 resources have been determined to be eligible for the National Register of Historic Places and 60 have yet to be evaluated. The remaining 53 resources have been determined ineligible for the Register. Analysis for this project includes a recommendation that 27 of the previously unevaluated historic cultural resources do not qualify for eligibility on the Register as they are associated with the ineligible property of Caldor or due to their diminished integrity.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

While there would be no direct risk to cultural resources from ground disturbing activities, this alternative would do nothing to reduce the risk to cultural resource sites from future high severity fires within the sites due to increasing fuel loading and years of avoidance. In addition, no restoration activities would occur to alleviate the existing and expected ongoing impacts resulting from dispersed camping, roads, and trails.

Cumulative Effects

Prior to the 1974 Forest and Rangeland Renewable Resources Planning Act (RPA) (predecessor of the NFMA), effects to heritage resources were not considered during project planning or implementation. Consequently, cumulative impacts of varying degrees occurred within the project area from various land management activities including logging, road construction and mining activities. Natural environmental processes and unrestricted land uses have also contributed to effects to heritage resources within the project area. These include: dispersed recreation, OHV uses, grazing, existing road conditions, wildfires, erosion and exposure to the elements. In addition, Heritage Resources have been primarily protected using “flag and avoid measures” during all project activities subsequent to the 1974 RPA, including projects such as timber sales and prescribed burns. Unfortunately, this management practice, which essentially deferred management, has resulted in unintended consequences as it contributed to unnatural and heavy fuel loading within site boundaries. Future wildfires would degrade the integrity of these fragile cultural resources. No predicted future management activities would affect cultural resources within the project area.

Alternatives 2, 4, and 5

Direct and Indirect Effects

Activities associated with the action alternatives will comply with Section 106 of the National Historic Preservation Act of 1966, as amended in accordance with provisions of the Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), the California State Historic Preservation Officer, the Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Processes for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forest of the Pacific Southwest Region (Regional PA 2013).

The procedures and stipulations within the Regional PA include the identification and treatment of at-risk historic properties. An “at-risk” historic property is a property that has been identified as susceptible to being adversely affected as a result of activities associated with this project. An adverse effect to cultural resources is found when an undertaking may alter the characteristics of a historic property that qualify it for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of the property’s location, setting, materials, workmanship, feeling, or association [36 CFR 800.5(a)(1)]. A property is identified as “at-risk” based on that property’s characteristics, proximity to project activities, and landscape features. Therefore, there may be a lower number of at-risk historic properties than the number of known cultural resource sites located within the APE.

Without management activities there is a concern for continuing unhealthy forest conditions as well as future high severity fires within the sites due to increased fuel loading from decadent fuels and the presence of dense brush fields. Studies conducted within Region 5 on the Six Rivers National Forest (Wilson, 1999) and the ENF have demonstrated that “specific methods of timber harvest over certain ground conditions can result in negligible damage to the underlying ground surface and archaeological materials" (Jackson, 1994). These methods include helicopter logging, full suspension sky-line, and full suspension rubber tire logging methods.

While ground-disturbing activities associated with this alternative have the potential to disturb or destroy cultural resources, implementation of this alternative is not expected to have any direct or indirect effects on known cultural resource sites located within the analysis area. Design criteria to protect cultural resources during project implementation have been incorporated into the design of this project. There is a concern for cultural resource sites not discovered due to factors such as steepness of terrain prohibiting safe survey or those sites that are located in their entirety sub-surface.

The action alternatives would reduce the risk of impacts to cultural resources due to the removal of standing dead trees, reducing overall fuel loading and risk of subsequent high intensity wildfires. These alternatives would also reduce the risk to cultural resources from erosion being caused by illegal recreation activities. These alternatives should, therefore, have an overall beneficial effect to cultural resources. However, there is a concern for sites within areas designated for no treatment.

Cumulative Effects

Cumulative effects of the action alternatives are the same as described under Alternative 1.

Recreation

Affected Environment

The Trestle Forest Health Project area is classified as *Roaded Natural* on the Recreational Opportunity Spectrum (ROS). *Roaded Natural* landscapes, as described by the *ROS User's Guide*, are areas "characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of humans. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment (USDA Forest Service, 1982)."

Within this forested landscape, the predominant recreational uses are driving for pleasure, dispersed camping, and off highway vehicle trail riding. Although hiking is not a predominant activity in the project area, there are 3 short hiking trails located within the project area: Trestle Trail (14E15), Myers Railroad (14E16), and Twin Gulch (14E17). Other uses such as horseback riding, hunting, fishing, wildlife viewing, recreational mining, target shooting, and mountain biking also occur.

Off-Highway Vehicle Use

The project area includes portions of the Elkins Flat Off-Highway Vehicle (OHV) system, as well as roads open to public use as defined on the Eldorado National Forest Motor Vehicle Use Map (See attached map). Elkins Flat Trail System is a popular OHV recreation destination located along Forest Service Road 10N83, approximately 5 air miles southeast of the town of Grizzly Flat, California. The Elkins Flat Staging Area provides access to approximately 72 miles of motorcycle and ATV trails. Because this area is easily accessed by paved National Forest System arterial roads, it has received heavy use in the past both for staging of off highway vehicles and trailers, as well as dispersed camping in the immediate vicinity. Access to the Gold Note OHV Area is also possible from this location, offering another 30 miles of OHV trails.

Wide roads and narrow single track motorcycle and bike trails are all available for the recreating public within the Elkins Flat Trail System. The trails also range from "Easiest" to "Most Difficult" and allow many user groups of all ability levels to ride there. Peak usage occurs during the fall and spring when trails are less dusty and temperatures are lower.

User created, non-system OHV trails are also prevalent throughout the project area. These illegal trails have accumulated as shortcuts within the Elkins Flat trail system and have provided easy access to the riding area for the local communities of Grizzly Flats and Henry's Diggings.

Dispersed Camping

Dispersed camping is often associated with OHV use, fishing, or hunting depending upon the season. Many areas have become well established campsites with many recurring visitors each season. Dispersed camping is most common along the North-South Road (10N83), Capp's Crossing Road (9N30) and Grizzly Flat Road (9N73). The popularity of these locations is due in part to the ease of access along the paved roads, as well as their proximity to Camp, Dogtown, Middle Dry, and Steely creeks. Dispersed camping is also known to occur along the 9N45 and 9N59 roads within the project area. The most popular dispersed campsites are generally within 100 feet of one of the creeks mentioned above.

Plummer Ridge Guard Station

The Plummer Ridge Guard Station is another feature within the Trestle Project area that is used as a staging area and meeting point for OHV volunteer groups. The structure is adjacent to the Elkins Flat Trail System. Planning efforts are underway to convert this historic cabin into a recreational rental cabin for forest visitors.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

There would be no direct or indirect effects on recreation as a result of this alternative because no commercial thinning, prescribed burning, watershed restoration activities, or other activities would occur.

Cumulative Effects

Cumulative effects are not expected with this alternative.

Alternatives 2, 4, and 5

Direct and Indirect Effects

Trails and Off-Highway Vehicle Use

Direct effects of project activities would be the removal of brush and other vegetation adjacent to hiking and OHV trail corridors within the project area. This vegetation currently helps to keep OHV riders on the trail system and prevents them from riding cross country –an activity that is prohibited by the Eldorado National Forest 2008 Travel Management Decision.

Indirect effects may include an increase in the number of unauthorized OHV trails after the vegetation along trail corridors has been removed. In the event of an increase in the number of user created trails as a result of project activities, employees would use handtools to obscure the illegal routes and restore the soil cover on the affected areas; install barriers such as downed logs, boulders, and other native materials to keep OHV users on the existing tread; and install signage describing penalties for use of unauthorized OHV trails.

Project activities such as tree cutting or prescribed burning may also pose a safety risk to the public and limit their access to roads and trails. It is recommended that adequate signage be placed at Elkins Flat and Simpson Camp OHV staging areas and the trailheads to the three hiking trails within the project to warn forest users of work occurring in the area, as well as any necessary temporary closures. Any damage to roads, trails, or trail markers as a result of project activities will be repaired to restore them to pre-existing condition.

Additionally, restoration activities have been planned to address issues involving OHV management within the project area. Barrier placement, revegetation of unauthorized routes, realignment of poorly situated trail segments, and improvement of water control features are all actions that will help to curtail cross-country motorized travel within the project area.

Finally, a motorcycle event held by the Polka Dot Motorcycle Club takes place within the project area on an annual basis. Should project activities coincide with the timing of the event, effects could be dangerous trail conditions for participants due to the presence of heavy equipment or rough trail conditions from vegetation management activities. These effects could be easily mitigated through communication of the timing of project activities with the Placerville District Recreation Officer so that safety measures can be implemented.

Dispersed Camping

Management actions for Alternatives 2, 4 and 5 consist of the restoration of 5 dispersed campsites within the project area. Treatments to 2 of the sites will include the installation of barriers that will allow for continued use, but will keep the sites from getting larger (Steely Fork Consumnes River Site 1 and Dogtown Creek Site 2). Prescriptions for the sites also include ripping and replanting of native vegetation to reestablish soil productivity and decrease sediment delivery to local streams. Impacts to the use of these sites will be minimal because they will remain easily accessible via the forest road system.

Three dispersed sites accessed by roads that were closed as a result of the 2008 Eldorado National Forest Travel Management Decision will no longer be accessible by vehicle. Recreational use of Dogtown Creek Site 1, Steely Fork Consumnes River Site 2, and Steely Fork Consumnes River Site 3 will most likely decrease because access will require foot travel.

Recreational Driving

Direct effects to recreational driving as a result of the proposed actions in Alternatives 2, 4 and 5 will be minimal as the management activities would allow the existing use on forest roads to continue. Each alternative action includes varying amounts of road reconstruction and maintenance; 64 miles for Alternative 5, 69 miles for Alternative 4 and 84 miles for Alternative 2. When these project activities are completed, forest visitors will benefit from repaired pot holes on paved surfaces, improved drainage on native surface roads and improved sight distances as a result of newly brushed roads.

During project activities drivers will be impacted by the presence of large vehicles and equipment on forest roads. This impact will be temporary and will be mitigated by traffic signage warning drivers of hazards existing in each treatment area.

Visual Resources

Affected Environment

The Trestle project area is in the western slope of the Sierra Nevada landscape character type. The dominant feature of this landscape is an approximate uniformity of summit altitudes, giving the appearance of a widely extended and deeply trenched sloping plateau. It is typified by dark blue-green forest terrain that is moderately rugged and often dissected by deep valleys and canyons cut by rivers. At the lower elevations the ponderosa pine forest are of lighter color, more open, and frequently interrupted by large brush-fields. Many of the streams have carved deep canyons. Much of the remaining portion of the western slop is a dissected upland characterized by a series of lesser canyons separated by long and narrow ridges. The density of the trees in the trestle area mean that the visual foreground is what is viewed by people driving through to disperse camping areas or private residences and recreation. 9N30 and 9N75 are similar in density and make up. The texture is fine with vertical lines dominating the views to the woods. The roads are enclosed enframing the single view forward. The color of the area is dark green with little variation seen in the variety of the trees. Some areas are denser than others. Both roads are the densest closer to Grizzly Flats. Along North South Road, there are areas to the eastern side of the road that have been thinned in the last 4 years.

Visual Management System

Visual resources include the forests scenery, how it complements, or deviates from the existing forest character, and its outstanding nature. In order to protect these visual resources, the Forest Service uses the Visual Management System (VMS).

The Visual Management System (VMS) gives the structure and standard by which forest scenery is managed. VMS lays out a series of steps to thoroughly assess managed land scenery. It creates a common language by which modified landscapes may be discussed and judged. Using the structure and terminology provided by VMS there is a uniform methodical way to protect the forests visual resources. There are several layers of classification in the VMS system. Each site is categorized by several of these layers which together define how that area would be assessed in terms of visual resources.

One classification layer VMS uses is called Visual Quality Objectives (VQO). VQO's are used as a base line of acceptable management activities and helps keep them within the visual context of the existing character of the managed area. VQO's are split into five levels of acceptable forest modification. The Trestle Forest Health Project area falls into three VQO categories. The objectives are:

Table 32
VQO Definitions

VQO	Definition
R-Retention	The visual quality objective provides for management activities which are not visually evident.
PR-Partial Retention	Management activities may be evident but remain subordinate to the characteristic landscape.
M-Modification	Management activities may visually dominate, but must borrow form, line, color, and texture from the surrounding landscape.

Another layer of classification is the view shed. View sheds are viewed from primary use areas. One quarter mile from the primary viewing areas are called the foreground. Areas viewed beyond the foreground are known as the middle ground. The middle ground is viewed from ¼ mile to 3-5 miles depending on the topography.

The layers of site management are put together to decide the amount of allowable management. Then they are described by their color, texture, line and form. The visual resource in the area potentially affected by the Trestle Forest Health Project is managed according to the Standards and Guidelines for Management Areas 21-24 of the 1989 Eldorado National Forest Land and Resource Management Plan. The following managed view sheds may be potentially affected by the project:

Table 33
View sheds within the project area

View Shed	View Distance	Primary Viewing Area
Duncan Corral	Foreground ¼ mile	9N30 from nearly two miles east of Grizzly Flat to North South Rd.
Grizzly Caldor	Foreground ¼ mile	9N73 from about a mile South East of Grizzly flat to the intersection of North South Road.
North South	Foreground ¼ mile	10N83 (North South Rd). From the North end of the project near Duncan Corral to the south end around Elkins flat.
Community views	Foreground ¼ mile	Areas of Forest land that may be seen from the Community of Grizzly.

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

The landscape appearance would remain as described under the existing character. The current forest density would remain. In the short term barring a wildfire, this would meet partial retention along the three visual corridors on this project. In the long term forest health, there is greater potential for degraded visual resources due to problems associated with poor forest health. Some of these problems are density affecting tree health, rising catastrophic fire probability, and reducing diversity. The dense growth and dead mater on the ground would not meet the desired character of the area as described in the forest plan. Any one of these scenarios is would not create a sustainable forest character into the future and the trestle area would no longer meet the VQO of the Trestle project area. If a catastrophic fire occurs the results would leave a visual impact for 30 to 50 years before the vegetation would recover to its current condition. This would significantly change the form, texture, line, and color in the area and would not meet Partial Retention or even Modification.

Alternative 2, 4, and 5

Direct, Indirect, and Cumulative Effects

Each of the alternatives meet required VQO's of the 4 view sheds found within the project area. The change in color, texture, and form of the overall viewing areas of the management will be subordinate to the forest character in the visible foreground. Views will be enhanced in all the corridor view sheds by opening up the view to see a greater variety of vegetation and items with visual interest. In a few years, the contrast in color, texture and the removal of slash will be reduced and meet the desired visual character for the 3 corridor view sheds. The views from the Grizzly Flats community will meet retention because of the buffer zone between private property and the hand thinning activities obscuring the view to the thinning project. It was determined that each of the alternatives would meet the VQO of retention, partial retention, and modification respectively as required by the forest plan.

Social and Economic

Social and economic effects are summarized from Howard and Walsh (2014), updated March, 2017.

Affected Environment

The Trestle project is located primarily within El Dorado County – near the small (pop. 1,066) rural community of Grizzly Flat, CA, located northwest of the project area. El Dorado County encompasses 1,711 square miles and is part of the Greater Sacramento Metro Region (GSMR), which also includes the Counties of Placer, Sacramento, Sutter, Yolo, and Yuba. The County Seat is in Placerville.

Approximately 73% of the nearly 600,000-acre Eldorado National Forest (ENF) is located in El Dorado County. Private lands within and adjacent to the boundary of the project area are primarily owned by individuals.

The socio-economic environment affected by the Trestle project is primarily associated with the benefits/costs and opportunities that are present and of value, either monetarily or spiritually, to the public. The socio-economic environment of the Trestle project can be described in a multitude of ways, however for purposes of this analyses, the local socio-economic environment consists of El Dorado County and the Greater Sacramento Regional area.

Local Economy

Like most areas of the country, economic conditions in El Dorado County have suffered during recent years. El Dorado County's economy is slightly more diversified than the larger Sacramento Region, but both are much less diversified than the state overall. Major sectors where the County is specialized include: Construction; Accommodation and Food Services; Agriculture; Forestry; Fishing and Hunting; and Utilities. Businesses with one to four employees were the most common in El Dorado County, and made up 62 percent of all establishments. Another 17 percent of the businesses in El Dorado County consist of five to nine employees, suggesting a strong trend of small local businesses in the county.

Forest Products

The forest products industry provides about 27,692 jobs in California compared to approximately 13 million total employment statewide. The forest products industry represents about 1.6% of the overall California payroll at the state-wide level.

Over the past decade, three large wood product manufacturing facilities in the GSMR have closed. One of these was the Sierra Pacific Industries (SPI) sawmill in Camino, El Dorado County.

At the present time, the SPI sawmill in Lincoln is the only significant wood products manufacturing facility operating within the GSMR. The SPI sawmill in Lincoln is among the largest sawmills on the west coast and currently has approximately 315 employees and ranks about 13th in terms of number of workers employed by the private sector in Placer County.

National Forest management directly affects the socioeconomic environment of the Sierra Nevada through employment and income derived from resource extraction, production and use. Timber harvest from National Forest System lands provides a flow of products to area industries. Direct and indirect employment is produced by the jobs associated with the harvest and processing of timber. In terms of gross revenue, timber is one of the Sierra Nevada's most valuable products. Timber harvest activities have commonly been associated with the jobs they create in rural communities.

The majority of timber production in the Sierra Nevada now comes from private harvests. Timber harvesting on private lands accounts for 67-90 percent of total timber harvests in the Sierra Nevada. A decrease in available timber harvest continues to result in mill closings, lost jobs, and decreasing potential financial capital. During the last decade, the Eldorado National Forest has annually offered for sale approximately 20 million board feet of timber. This volume was bought by SPI or other purchasers, and primarily processed at the Lincoln, CA sawmill. The Lincoln mill sawlog capacity is 170 million board feet/year and annually relies on purchasing 20% (34 million board feet) of timber from national forest timber sales to sustain its operations.

Within the Trestle project area the primary uses by the local community are firewood collection, dispersed camping, motorized recreation, and hunting.

Social and Economic Consequences

Alternative 1

Direct and Indirect Effects

No direct or indirect costs would be incurred by implementing this Alternative. No harvesting of trees or any associated fuel treatments would be conducted. No volume would be provided to local mills and no fuel treatment investments or watershed enhancement activities would occur. In the event of a wildfire, suppression and rehabilitation costs would likely be much higher than with the implementation of action alternatives.

Cumulative Effects

Cumulative effects are not expected with this alternative.

Alternative 2

Direct and Indirect Effects

Timber volume associated with the Trestle project would help satisfy the demand by local mills for timber supplies. Funds received from the sale of timber products would be used to finance or partially off-set the need for the use of appropriated funds or retained receipts to accomplish the proposed fuel treatments. The proposed treatments would also provide employment to local business directly and indirectly associated with harvest activities, road reconstruction, fuels work and associated equipment use and maintenance.

Although the Eldorado NF has no annual timber sale volume targets, the Forest has attempted to offer about 40,000 ccf (hundred cubic ft) of timber/year which is equivalent to the timber volume that the local mill has on average purchased and/or processed from the ENF over the last decade.

A total of 36,386 ccf of timber would be removed under Alternative 2. This represents approximately 90% of the 40,000 ccf of Eldorado NF's average timber volume sold each year. The funds available from the harvest of 36,386 ccf of timber that would be available for fuels treatment would be approximately $1,455,441 if the sale were sold under the current, relatively depressed timber market conditions.

The $1,455,441 in estimated timber revenues would accomplish about 83% of the $1,756,314 of the direct, fuels treatment costs associated with the mechanical vegetation treatment units, which includes $896,150 for road reconstruction and other activities associated with mechanical vegetation treatment (i.e. gates and barriers, ripping skid roads, noxious weed treatments). Funds would not be available through timber revenues to accomplish any of the $5,172,133 of treatments that are associated with hand thinning, prescribed burning, or other project activities, such as the watershed restoration and recreation improvement activities. Additional allocated funding and grants would be needed to accomplish this work.

This alternative would generate approximately 116 direct and 243 indirect jobs created associated with the harvested volume.

Cumulative Effects

Effects for increased economic activity with this project would be cumulative to other projects ongoing and planned on the forest.

Alternative 4

Direct and Indirect Effects

A total of 19,728 ccf of timber would be removed under this Alternative. This represents approximately 49% of the 40,000 ccf of Eldorado NF's average timber volume sold each year. Funds for fuels treatment available from the harvest of 19,728 ccf of timber would be approximately $789,098 if the sale were sold under the depressed timber market conditions.

The $789,098 in estimated timber revenues would accomplish about 61% of the $1,297,906 of other costs directly associated with the mechanical vegetation treatment units, including $632,150 for road reconstruction and other activities associated with mechanical vegetation treatment (i.e. gates and barriers, ripping skid roads, noxious weed treatments). No funds would be available to accomplish any of the $4,716,166 of treatment opportunities that are not associated with the mechanical treatment and commercial harvest units.

This alternative would generate approximately 63 direct and 243 indirect jobs created associated with the harvested volume.

Compared to Alternative 2, this alternative commercially thins fewer acres and relies more on additional funding sources to complete project activities. Similar to Alternative 2, alternative allocated and grant funding would be needed to accomplish project activities. This alternative decreases the amount of full-time equivalent jobs that are estimated to be supported by activities directly and indirectly associated with timber harvest, but would support a similar amount of jobs for other project work.

Cumulative Effects

Effects for increased economic activity with this project would be cumulative to other projects ongoing and planned on the forest.

Alternative 5

Direct and Indirect Effects

An estimated 27,654 ccf of timber would be harvested under this alternative. This represents approximately 69% of the 40,000 ccf of Eldorado NF's average timber volume sold each year. The funds available from the harvest of 25,944 ccf of timber that would be available for fuels treatment would be approximately $1,106,122 if the sale were sold under the current, relatively depressed timber market conditions.

The $1,106,122 in estimated timber revenues would accomplish about 82% of the $1,349,324 of the direct, fuels treatment costs associated with the mechanical vegetation treatment units. No funds would be available to accomplish any of the $4,693,361 of other treatment opportunities that are not associated with the mechanical treatment and commercial harvest units.

This alternative would generate approximately 88 direct and 185 indirect jobs created associated with the harvested volume.

Compared to Alternative 2, this alternative commercially thins fewer acres and relies more on additional funding sources to complete project activities. Similar to Alternative 2, alternative allocated and grant funding would be needed to accomplish project activities. This alternative decreases the amount of full-time equivalent jobs that are estimated to be supported by activities directly and indirectly associated with timber harvest, but would support a similar amount of jobs for other project work.

Cumulative Effects

Effects for increased economic activity with this project would be cumulative to other projects ongoing and planned on the forest.

Climate Change

Affected Environment

While there is a great deal of uncertainty in the future climate that will be experienced in the area and how current and future events will interact to affect vegetation resources, climate change trends and projections for the Eldorado National Forest were examined in Mallek and Safford (2010). In general it is expected that temperatures will increase, including an increase in nighttime minimum temperatures. It is uncertain whether or not there would be more or less precipitation annually, but it is anticipated that summers will be drier and that more precipitation will come in the form of rain rather than snow. It is projected that forest types would migrate to higher elevations as higher temperatures and longer growing seasons make those areas suitable for colonization and survival. For this project area that means that given time and ability to move, the mixed conifer forests, pine types and oak types would shift upward in elevation. Fire intensity and severity has been increasing in this area and is anticipated to continue to increase under climate change scenarios, which would affect future stand structure and species mixes. Large areas of uncharacteristically severe fire may shift ecosystems into less desirable states that may persist for long periods with the added influence of climate change on those trajectories. The potential effects on climate change of the GHG emission produced by the proposed actions are considered in a qualitative assessment of carbon emissions for each alternative.

Diameter growth in the Sierra Nevada conifers is positively correlated with winter precipitation and to a lesser extent, summer air temperature (Battles et al., 2009; Robards, 2009). Some increase in vegetation productivity, given adequate available moisture could increase tree growth for some species (Hannah et al., 2009). Other species may have decreased growth (Chen et al., 2010). Under wetter climates increased carbon storage with increased vegetation productivity could be limited by greater losses to wildfire. Under drier climate scenarios carbon storage could be limited and vegetation productivity (Lenihan et al., 2006; Shaw et al., 2009). Battles et al. (2006) projected conifer tree growth would be reduced and could lead to substantial decreases in tree survival in El Dorado County.

Forest pests including native and invasive species may have competitive advantages for expanding their ranges and can become very destructive when forests are stressed by extreme weather and climatic changes. Climate change will likely favor insects with multiple generations in each year. This could increase insect pests and add new insect pests to this area (Trumble & Butler, 2009). Many species in the southwestern United States and Mexico are currently limited by climate rather than host availability, suggesting a high potential for range expansion northward (Bentz et al., 2010). Rising winter temperature could also make conditions more favorable for pitch canker resulting in increased disease severity (Battles et al., 2006).

The major impact to terrestrial wildlife will most likely be from changes in the vegetation community. According to the California State Wildlife Action Plan (2007), climate change effects will be especially disruptive in the Sierra Nevada, primarily because drier summers may increase fire frequency and intensity, reduce sierra snowpack, and result in earlier snowmelt. The action plans states concern for species within the Sierra Nevada because of the addition of urbanization pressure causing the remaining natural areas to shrink and the gaps between habitats to grow. In addition to the loss of riparian associated vegetation, the possible increased gaps between habitats due to urbanization, fire and climate change make habitat connectivity to allow adaptive migration even more important. "As climate change shifts annual average temperatures along the elevation gradient, as fire reshapes plant communities, and as stream flow regimes change, habitats and wildlife populations will be substantially affected. So far, very little research has evaluated the consequences of projected climate change on species at risk in the Sierra" (UCD Wildlife Health Center, 2007).

Sensitive species will be impacted by these climate changes shifts, although consequences for species are uncertain. Climate change could lead to changes in sensitive species habitat location, quality, and quantity. Much of the habitat for late seral, old forest dependent species will be even more restricted to these north facing slopes and protected canyons; adding to further fragmentation of habitat. The proposed project reduces the higher tree density, but should increase old forest characteristics like average snag and downed log numbers in the short-term. It increases the resiliency of these stands to withstand the increased potential removal through the increased fire frequency predicted with climate change. This increased resiliency should make these stands more sustainable and allow for development of high tree densities and canopy covers that provide old forest characteristics in the long-term.

Sensitive species such as goshawks and marten may find their habitat more limited or shifted higher in elevation. With warmer temperatures, alpine and subalpine communities will shrink by 40-50% by mid-century, which will mostly impact marten and wolverine. Most common prey species should move with shifting habitat such as rodents, reptiles and small birds. It is more likely that changes in habitat quality and quantity will influence sensitive species than changes in prey availability as a result of climate change.

Environmental Effects

Alternative 1

With projected climate change trajectories, stresses on currently unsustainable stand structures and species compositions including projections for more severe drought and larger, more severe fires are expected to be exacerbated. Strategic placement of treatments across the landscape would not take place and therefore the likelihood of unacceptably large, high intensity fire would not be reduced. With no action, large areas of uncharacteristically severe fire may shift ecosystems into less desirable states that may persist for longer periods. Even if these systems are able to regrow trees after large scale disturbance, stands may be more vulnerable to future fires. Loss of tree reproduction may become more common since compared to overstory trees are likely to be more sensitive to environmental changes (van Mantgem et al., 2006).

The direct effect of GHG emissions from Alternative 1 (no action) will differ from that of the other Alternatives (2, 4, and 5) in that no carbon would be emitted in the absence of wildfire, so there would be no effects. The indirect effects of Alternative 1 depend on whether a wildfire occurs in the area. In the absence of fire, Alternative 1 is expected to result in the largest increase in mid-sized trees compared to current conditions. Larger trees generally sequester carbon at a greater rate than smaller stocks (Law et al. 2003). However, a wildfire would produce the highest carbon emissions given the wildfire intensity and severity modelled in the Fuels effect (Chapter 3, pages 52-77). If a wildfire were to ignite in the existing vegetation, the high intensity of burning, crown fire, and intensive suppression efforts that would be required would all contribute to high levels of carbon emissions.

The cumulative effects of GHG produced by Alternative 1 (no action) would be null in the case of no wildfire, but would be significant if a wildfire were to occur. In addition to the increased emissions, the sever wildfire could change the area to a carbon source for some time as young and immature stands sequester carbon at a slower rate than mature stands (Law et al. 2003).

Alternative 2

Strategic placement of treatments across the landscape using a combination of treatments including prescribed fire is expected to reduce the likelihood of unacceptably large, high intensity fire for the short term and to begin to shift disturbance regimes toward patterns that are more consistent with how ecosystems evolved, promoting resilience to stressors such as climate change. Many of the proposed treatments are designed to meet an initial phase of an integrated landscape treatment strategy and are primarily designed to reduce fire hazard in strategic areas. Treated area along with vegetation directly adjacent to treated areas would be expect to be more resistant should temperature increase and longer fire seasons occur as a result of climate change. Some treatments would push species composition and structure to a condition where stands would be representative of reference stand structures and resilient under the foreseeable climate; however for the majority of the treatments, thinning and burning intensities are not expected to be sufficient to provide for resilience with this project for a timescale that would impact the very long term effects of climate change without future follow-up treatments. It is expected that treatment will reduce the potential for carbon loss in treated stands, as sequestering carbon in these forests it appears that low density forest, dominated by large, fire resistant pines, may be a desired stand structure for stabilizing tree-based carbon stocks in wildfire prone forests (Hurteau & North, 2009).

Specifically, the direct effect of GHG emissions from Alternatives 2 would result in carbon emissions due to prescribed burning and motorized vehicle access. The majority of emissions would result from prescribed burning of understory, both as a follow up treatment and as the sole treatment. Motorized vehicle emission are negligible in forest treatments compared to burning or other emissions (Winford and Gaither Jr., 2012). The greater commercial harvest under Alternative 2 would not contribute to emissions as the products are not being designated for biofuel or other carbon-source activities.

The indirect effects of GHG emissions would vary across alternatives due to differences in potential future carbon sequestration. Alternative 2 would result in a slight increase in the largest diameter class of trees compared to current conditions, and a decrease in the small and mid-sized classes over the long term. Alternative 2 also results in the greatest decrease in the acreage under high or very high loads, which would result in a decrease of carbon sequestration in the medium term. Detailed analysis of ponderosa pine stands of different age classes indicated that mature (95 - 106 year old) and old (190+ year old) stands maintain the greatest ecosystem carbon storage, and mature stands display the greatest net ecosystem productivity (a measure of carbon sequestration) (Law et al. 2003). Stands in the Trestle project area have a mean age of 130 years, meaning they are likely considered mature in these categories.

The cumulative effects of Alternative 2 will result in lower GHG emissions over the long term given improved forest health and a reduced fire interval (ideally 5-15 years). Treated forest stands in the central Sierra Nevada that are subject to a return fire interval less than 31 years maintain greater carbon storage than the no action alternative (Winford and Gaither Jr., 2012). Further, the cumulative effect of healthier forests better able to resist insect damage, a reduction in mortality and a more diverse mixture of conifers and hardwoods will result in greater carbon sequestration over the long term.

The EPA and the USFS has established national policy goals to take actions to improve the resiliency of both watershed and riparian floodplain ecosystems in response to predicted climate change impacts. As it relates to hydrology, the BMPs are designed to address potential direct and indirect sources of accelerated runoff and erosion, within the current climatic regime. In regards to cumulative watershed effects, climate change predictions add even more urgency to ensuring that the stream channel networks are maintained in stable geomorphic condition and are well connected to adjacent floodplains. Channels that are maintained (or restored) in a healthy state of dynamic equilibrium in terms of geomorphic/floodplain function, will be more resilient to adapting to climate change impacts, and maintaining high quality function in terms of water quality and aquatic and riparian habitat. Channels within the Trestle project area are currently considered to be resilient to climate change effects, and the actions proposed under this project are not expected to contribute to channel destabilization.

Increasing temperatures and changes in precipitation with climate change will impact both ecosystem structure and ecosystem processes. Viability of a species is dependent on the availability of suitable habitat. Animal species respond to climate variability in the short term through shifts in geographic range (migration) when suitable habitat is not available in the former range. Mortality and population extirpation in parts of a species' former range often occur. Over time, extirpation and colonization events cumulatively result in shifts of the species' distribution range (Davis & Shaw 2001; Delcourt & Delcourt, 1991). Land-use changes, development, and introduction of invasive species often impede the ability of species to respond to climate change adaptively resulting in small population sizes and isolation of populations as a result impede gene flow (Joyce et al., in press).

Vegetation treatments such as those proposed in this project increase the resiliency of the current habitat within the area impacted by the project for two reasons: 1) they reduce the potential for stand replacing fire within treatments and over the landscape including protected sensitive species areas (PACs) and 2) they improve stand health by promoting trees species that are adapted to hotter, drier summers and increased fire frequency (pines and hardwoods). Landscape and habitat resiliency is better met under Alternatives 2 to the large area treated and the longer lasting vegetation changes from treatments. These treatments may delay some of the immediate impacts to species especially from fire, and allow them to adjust slowly with adjusting habitat by preserving their currently located, possibly unsustainable habitat. By helping retain older forest dense habitats that sustain nesting and reproduction (PACs) in pockets protected by treatment units; these treatments are creating a resiliency for old forest habitat.

Experts suggest that land managers manage current habitat as a reservoir until suitable habitat can be established elsewhere (Hansen et al., 2001). By retaining structure and characteristics suitable to foraging and dispersal, these treatment areas can still be considered suitable connective habitat to suitable high quality habitat. Because many of the late seral species habitat are located in protected drainages, where habitat is not expected to change, some of their habitat may not shift. This project and its various action alternatives would likely protect that habitat and the creation of future habitat in those areas from the climate changes threats.

While climate change may pose a threat to some of the sensitive species within the forest boundary, this project will benefit most species through an increase in the resiliency of the current habitat.

Alternative 4 and 5

Strategic placement of treatments across the landscape using a combination of treatments including prescribed fire is expected to reduce the likelihood of unacceptably large, high intensity fire for the short term and to begin to shift disturbance regimes toward patterns that are more consistent with how ecosystems evolved, promoting resilience to stressors such as climate change. Alternatives 4 and 5 would produce slightly higher GHG emissions due to the greater acreage treated with prescribed burning. Alternatives 4 and 5 will result in similar though smaller indirect and cumulative effects as Alternative 2. Benefits for increased long term resilience, however would be reduced from Alternative 2 since fewer of the proposed treatments designed to push species composition and structure to a condition where stands would be representative of reference stand structures and resilient under the foreseeable climate would occur with this alternative and more areas would be maintained at a structure and composition that is not expected to be resilient with long term climate change projections.

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, sec.101) Long and short term effects of project activities under each alternative considered in detail are described in the effects section specific to each resource.

Unavoidable Adverse Effects

Increased risk of dispersal and mortality of sensitive wildlife species and damage and mortality of sensitive plant species from project activities may occur in the short term. Additionally, increased potential for spread of noxious weeds, increased soil disturbance within treatment units and increased risk of cumulative watershed effects are all unavoidable effects for all action alternatives. These effects are discussed in detail in the Chapter 3 for each specific resource. Although short-term adverse effects are unavoidable with project implementation, no significant adverse effects are expected to result from project activities.

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.

No irreversible commitments of resources are anticipated. Temporary road construction under Alternatives 2, 4 and 5 represent irretrievable commitments for the period of time the roads are used, although temporary roads would be decommissioned following use, restoring the productivity of the site. Compaction associated with tractor harvest and mastication is an irretrievable commitment of soil resources that would ameliorate with time. The levels of compaction anticipated are within the LRMP standards and guidelines.

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 following:

Principle Environmental Laws

The following laws contain requirements for protection of the environment that apply to the proposed action and alternatives:

Endangered Species Act

Refer to Botany, Terrestrial Wildlife, and Aquatic Wildlife Effects Sections

Clean Water Act

Refer to Water Quality/Hydrology Effects Section

Clean Air Act

Refer to Air Quality Effects Section

National Historic Preservation Act

Refer to Cultural Resources Effects Section

National Forest Management Act

All project alternatives meet requirements for the National Forest Management act through compliance with the 1989 Eldorado Forest Plan as amended by the 2004 SNFPA. Analysis of threats to Threatened, Endangered, and Sensitive wildlife and plant species were disclosed.

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

See Cultural Resources Effects Section

Invasive Species, Executive Order 13112 of February 3, 1999

See Botany Effects Section

Recreational Fisheries, Executive Order 12962 of June 6, 1995

Fish and wildlife on the Eldorado National Forest are managed by the State of California Department of Fish and Wildlife, while habitat is managed by the Forest Service. Affects to aquatic habitat are discussed in the Aquatic Wildlife Effects Section.

Migratory Birds, Executive Order 13186 of January 10, 2001

A migratory bird report was developed for the project (Yasuda, 2017b). Though the project may in the short-term indirectly (loss of habitat or habitat components, disturbance) or directly (mortality) affect some species, the impacts will be site specific and not occur over the entire landscape at the same time enabling species to adjust and locate currently unoccupied territories for nesting or adjacent areas for wintering or foraging (Ibid).

Environmental Justice, Executive Order 12898 of February 11, 1994

Environmental Justice is discussed in the Socio-Economic Effects Section. This project would not disproportionately affect minority or impoverished persons.

Use of Off-Road Vehicles, Executive Order 11644, February 8, 1972

The project is in compliance with the Wheeled Motorized Travel Management Final Environmental Impact Statement Record of Decision (2008).

Special Area Designations

There are no special area designations within the project area.

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 Impact Statement:

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Federal, State, and Local Agencies:

Environmental Protection Agency; Grizzly Flats Community Service District; El Dorado County Supervisor, District 2

Tribes:

Washoe Tribe of Nevada and California, United Auburn Indian Community, and Shingle Springs Band of Miwuk Indians

Others:

California Forestry Association; Grizzly Flats Fire Safe Council, El Dorado County Fire Safe Council, Leoni Meadows Camp, Sierra Forest Legacy, Sierra Pacific Industries

Distribution of the Final Environmental Impact Statement

Notification of the availability of this Final Environmental Impact Statement (FEIS) has been sent to those who have expressed interest in this project. A notification letter announcing the release of the FEIS has been to individuals and the following Federal agencies, State and local governments, and organizations: Environmental Protection Agency (EPA), Grizzly Flats Community Services District, Grizzly Flats Fire Safe Council, El Dorado County Water Agency, El Dorado County Fire Safe Council, Leoni Meadows Camp, El Dorado Chapter of Trout Unlimited, John Muir Project of Earth Island Institute and Center for Biological Diversity, Sierra Forest Legacy, Sierra Pacific Industries, California Forestry Association, and El Dorado County Supervisor, District 2.

Glossary of Common Terms

BA	Biological Assessment
BE	Biological Evaluation
BMP	Best Management Practices
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWE	Cumulative Watershed Effect
District	Placerville Ranger District
EIS	Environmental Impact Statement
EHR	Erosion Hazard Rating
ENF	Eldorado National Forest
ESA	Endangered Species Act
Forest	Eldorado National Forest
Forest Plan	Eldorado National Forest Land and Resource Management Plan
FWS	United States Fish and Wildlife Service
HRCA	Home Range Core Area
LOP	Limited Operating Period
MDM&B	Mount Diablo Meridian and Base
MIS	Management Indicator Species
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
OHV	Off Highway Vehicle
PAC	Protected Activity Center
PCT	Pre-Commercial Thinning
RCA	Riparian Conservation Area
RCO	Riparian Conservation Objectives
ROD	Record of Decision
SNFPA	Sierra Nevada Forest Plan Amendment
SPLATs	Strategically Placed Landscape Area Treatments
TOC	Threshold of Concern
USDA	United States Department of Agriculture

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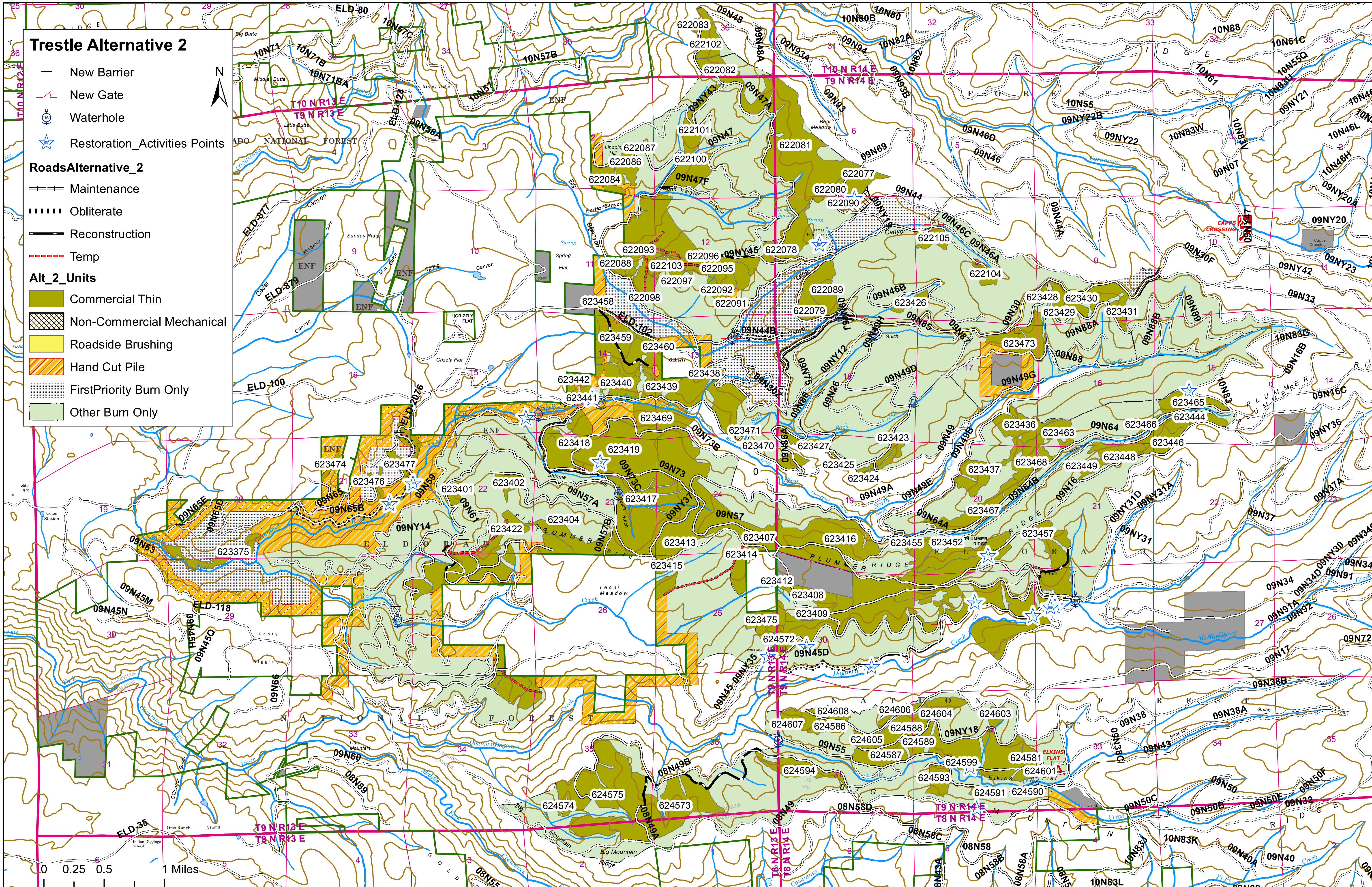
Appendices

A. Maps

B. Best Management Practices

C. Cumulative Effects

D. Response to Comments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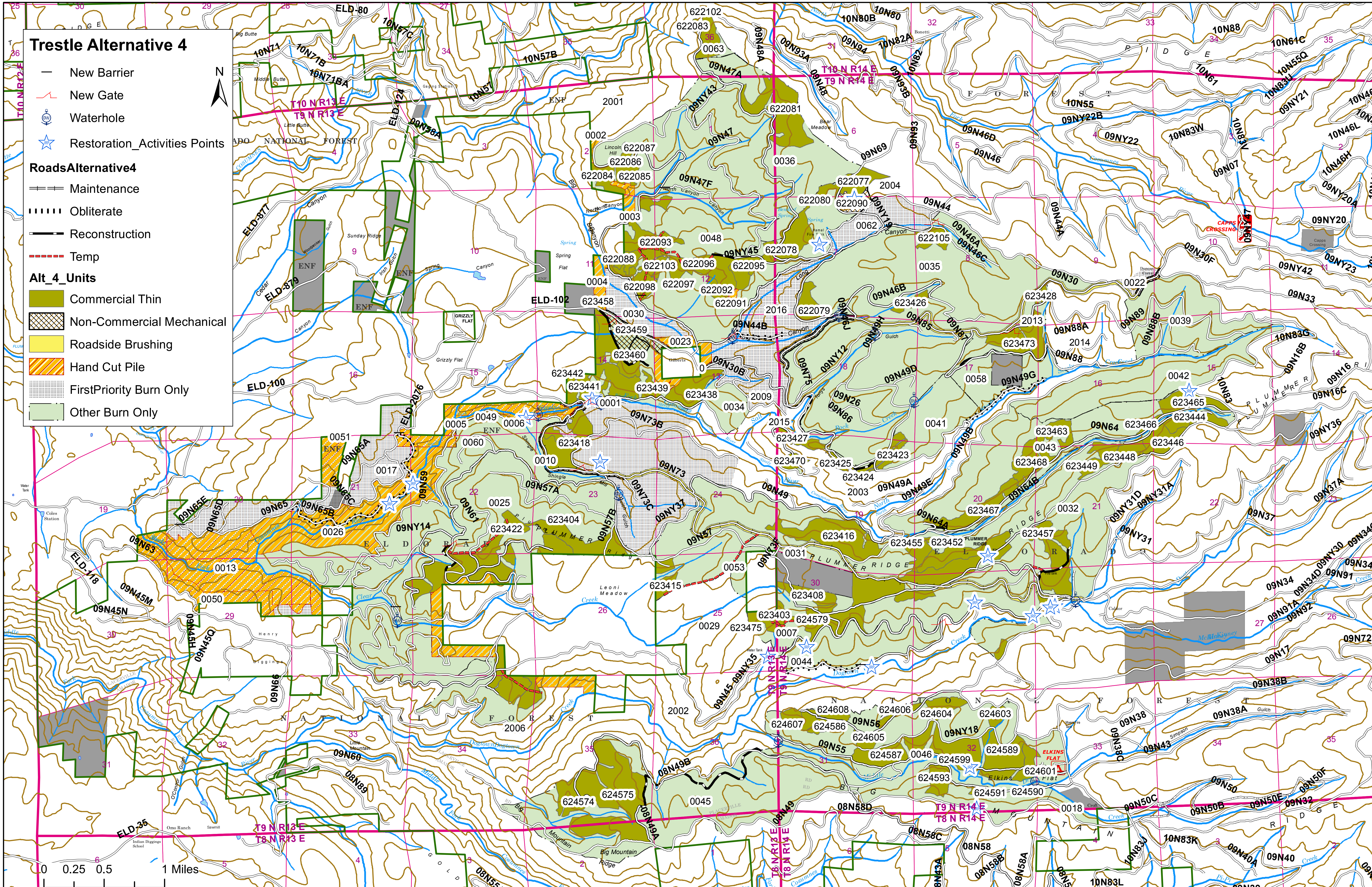

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Reconstruction
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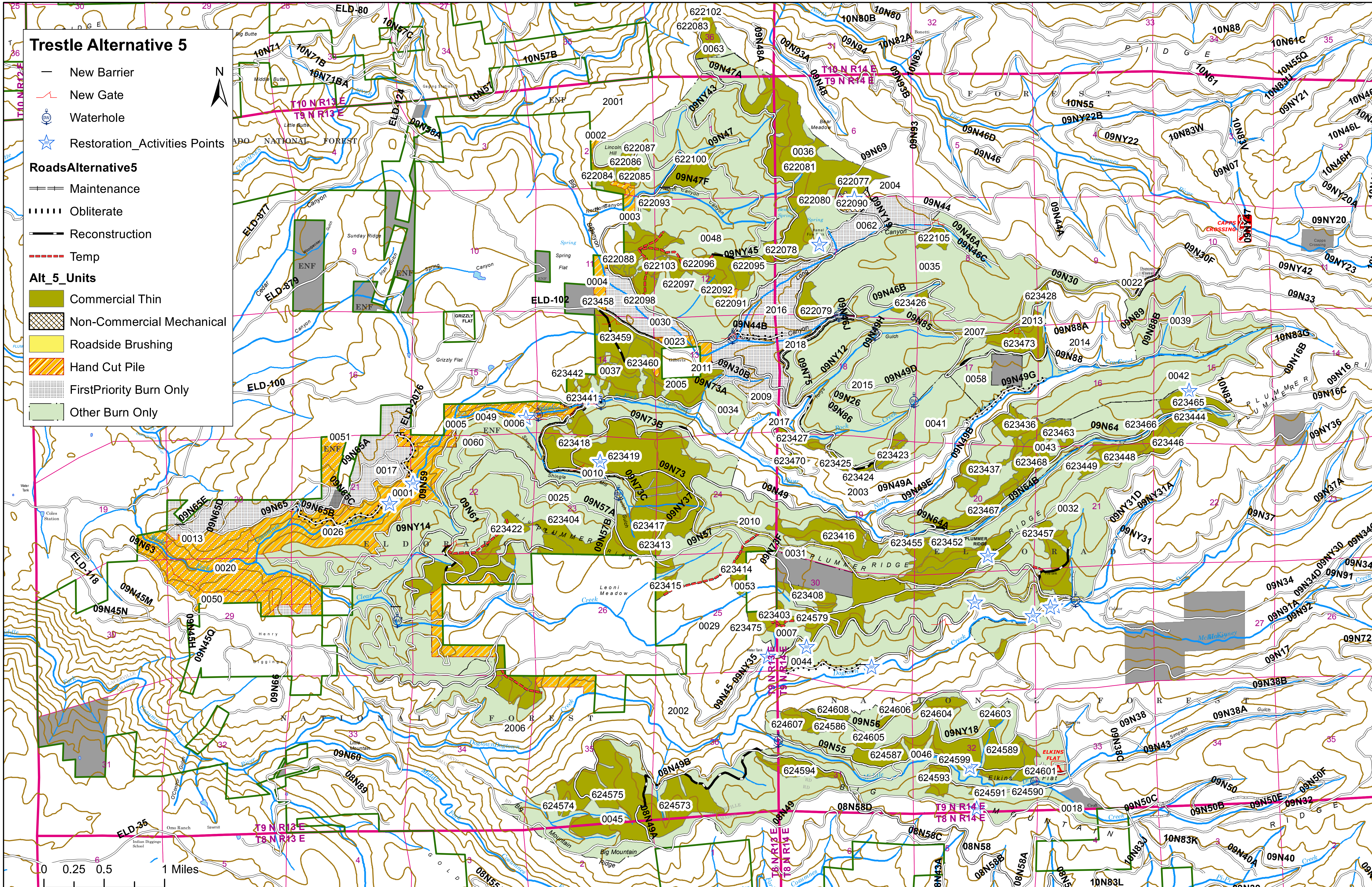
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Reconstruction
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Roadside Brushing
Hand Cut Pile
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PLUMMER RIDGE
ELKINS FLAT
CAPPS CROSSING

Appendix B: Best Management Practices

Table B1 Region 5 Best Management Practices

BMP Number	BMP Practice	BMP Objective	Project BMPs
12.12 Timber Management Best Management Practices			
1-1	Timber Sale Planning Process	To incorporate water quality and hydrologic considerations into the TSPP.	EIS Design Criteria: • Hydrology and Aquatic Features criteria • Soils criteria: 1 through 5 TSC FSH 2409.13, Chap. 21-41 R-5 FSH 2409.26, Section 13
1-2	Timber Harvest Unit Design	To ensure that timber harvest unit design will secure favorable conditions of water quality and quantity while maintaining desirable stream channel characteristics and watershed conditions. The design should consider the size and distribution of natural structures (snag and down logs) as a means of preventing erosion and sedimentation.	TSC Prov. C6.601 – R5 TSC Prov. C6.602 – R5 TSC Prov. C6.63 – R5 R5 Soil Quality Standards
1-3	Determination of Surface Erosion Hazard for Timber Harvest Unit Design	To identify high erosion hazard areas in order to adjust treatment measures to prevent downstream water quality degradation.	EHR analysis: Soil Specialist Report (Nicita, 2013) EIS Design Criteria • Soil 1, 2, and 4
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.	TSC Prov. B1.1 TSC Prov. B6.5 TSC Prov. B6.6 TSC Prov. C6.5 TSC Prov. C6.6 TSC FS2400-3 Standard Provisions 1 and 11
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 specified in the Timber Sale Contract.	TSC Prov. B6.31.5 TSC Prov. B6.31 TSC Prov. B6.6 TSC Prov. C6.65 TSC Prov. C6.3 TSC Prov. 6.313 TSC FS2400-3 Standard Provisions 1 and 11

BMP Number	BMP Practice	BMP Objective	Project BMPs
1-6	Protection of Unstable Lands	To provide special treatment of unstable areas to avoid triggering mass slope failure with resultant erosion and sedimentation.	N/A: No activities will occur in areas with identified unstable areas.
1-7	Prescribing the Size and Shape of Regeneration Harvest Units	To control the physical size and shape of regeneration harvest units as a means of preventing erosion and sedimentation.	N/A: Regeneration units were not part of this project.
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.	EIS Design Criteria: • Hydrology and Aquatic Features TSC 2400-3 Standard Provision 11 TSC Prov. C5.421 TSC Prov. 6.411 TSC Prov. C6.5 R5 FSH 2409.26 Sec. 12 and 13 R5 FSH 2409.15, Sec. 61.51
1-9	Determining Tractor Loggable Ground	To minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems.	Slope limitations identified during layout and analyzed as part of the proposed alternatives. EIS Design Criteria: • Hydrology and Aquatic Features FSH 2509.15 Soil Specialist Report (Nicita 2013)
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.	R-5 FSH 2409.15 sections 51 R-5 FSH 2409.15, Sec 61.42 TSC Prov. B6.42 TSC Prov. B6.424 TSC Prov. C6.41 TSC Prov. C6.422 TSC Prov. C6.424 Provisions

BMP Number	BMP Practice	BMP Objective	Project BMPs
1-11	Suspended Log Yarding in Timber Harvesting	1. To protect the soil mantle from excessive disturbance. 2. To maintain the integrity of the SMZ and other sensitive watershed areas. 3. To control erosion on cable corridors.	R-5 FSH 2409.15 sections 51, 61.42 TSC Prov. B6.42 TSC Prov. C6.425 TSC Prov. C6.427 TSC Prov. C6.429 TSC 2400-3 Standard Provision 1 and special provisions approved for specific sales.
1-12	Log Landing Location	To locate new landings or reuse old landings in such a way as to avoid watershed impacts and associated water quality degradation.	R-5 FSH 2409.15 sections 61.42 EIS Design Criteria: • Hydrology and Aquatic Features TSC Prov. B6.42 TSC Prov. C6.63 TSC Prov. C9.2 OSHA Regulations TSC 2400-3 Special Provisions
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.	R-5 FSH 2409.15 sections 61.41 and 61.42 TSC Prov. B4.225 TSC Prov. C6.6 TSC Prov. C6.422 TSC 2400-3, Special Provisions 10
1-14	Special Erosion-prevention Measures on Disturbed Land	To provide appropriate erosion and sedimentation protection for disturbed areas	EIS Design Criteria: • Soil: 1 and 2 No other special soil stabilization problems were identified. R-5 FSH 2409.15 sections 6.42 FSH 2509.11 TSC Prov. B6.6 TSC Prov C6.6 TSC Prov. C6.602-R5 TSC 2400-3 Special Provisions 9 & 10
N1-15	Revegetation of Areas Disturbed by Harvest Activities	To establish a vegetative ground cover on disturbed sites to prevent erosion and sedimentation.	N/A: Severely disturbed ground needing vegetative recovery is not expected.

BMP Number	BMP Practice	BMP Objective	Project BMPs
1-16	Log Landing Erosion Control	To reduce the impacts of erosion and subsequent sedimentation associated with log landings by use of mitigating measures.	R-5 FSH 2409.15 section 51 TSC Prov. B6.422 TSC Prov. B6.6 TSC Prov. B6.63 TSC Prov. C6.428 TSC Prov. 6.6 TSC Prov. C6.601.R5 TSC Prov. C6.602. R5 TSC Prov. C6.63 TSC 2400-3, Special Provisions 10 & 12
1-17	Erosion Control on Skid Trails	To protect water quality by minimizing erosion and sedimentation derived from skid trails.	EIS Design Criteria: • Soil: 3 R-5 FSH 2409.15 sections 51.46 and 61.42 TSC Prov. B6.6 TSC Prov. B6.66 TSC Prov. C6.601.R5 TSC Prov. C6.64 TSC 2400-3, Special Provisions 10
1-18	Meadow Protection During Timber Harvesting	To avoid damage to the ground cover, soil, and the hydrologic function of meadows.	N/A: No timber harvest activities are proposed within identified meadows and fens.
1-19	Streamcourse and Aquatic Protection	1) To conduct management actions within these areas in a manner that maintains or improves riparian and aquatic values. 2) To provide unobstructed passage of stormflows. 3) To control sediment and other pollutants entering streamcourses. 4) To restore the natural course of any stream as soon as practicable, where diversion of the stream has resulted from timber management activities.	EIS Design Criteria: • Hydrology and Aquatic Features R-5 FSH 2409.15 sections 51.54 and 61 R-5 FSH 2409.26, Sec. 13 R-5 FSH 2509.22, Chap. 30 TSC Prov. B6.5 TSC Prov. B6.6 TSC Prov. C6.427 TSC Prov. C6.5 TSC Prov. C6.6 TSC 2400-3, Special Provision 11
1-20	Erosion Control Structure Maintenance	To ensure that constructed erosion control structures are stabilized and working.	TSC Prov. B4.225 TSC Prov. B6.6 TSC Prov. B6.66 TSC Prov. B2400-3, Special Provision 9

BMP Number	BMP Practice	BMP Objective	Project BMPs
1-21	Acceptance of Timber Sale Erosion Control Measures Before Sale Closure	To ensure the adequacy of required erosion control work on timber sales.	R-5 FSH 2409.15 sections 15, 51. 54 and 61 TSC Prov. B6.6 TSC Prov. B6.63 TSC Prov. B6.64 TSC Prov. B6.65 TSC Prov. B6.66 TSC Prov. C6.601 TSC Prov. C6.602 TSC Prov. C6.603 TSC Prov. C6.6 TSC Prov. C6.63 TSC Prov. B2400-3, Special Provision 9
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.	RCO Analysis for exclusion of slash disposal in sensitive areas R5 FSH 2409.15 Sec. 61.5 R5 FSH 2409.15, Sec.15 FSM 1950 TSC Prov. C6.7 TSC Prov. C6.73 TSC Prov. C6.76 TSC Prov. C6.77 TSC Prov. C6.78 TSC 2400-3. Prov. 7&11
1-23	Five-Year Reforestation Requirement	To assure a continuous forest cover and to limit disturbance on areas with limited regeneration potential where there is no assurance that the site can be reforested within the timeframe.	FSH 2409.13, Chap. 21 and 42 FSH 2409.26, Sec. 12 & 13 FSM 2470.3 TSPP
1-24	Non-recurring “C” Provisions that can be used for Water-quality Protection	To use the option of inserting Special “C” provisions in the timber sale contract to protect water quality where standard “B” or “C” provisions do not apply or are inadequate to protect watershed values.	N/A
1-25	Modification of the Timber Sale Contract	To modify the TSC if new circumstances, or conditions indicate that the timber sale will damage soil, water, or watershed values.	TSC Prov. B8.3 TSC Prov. C8.2 TSC Prov. C8.3 CFR 223.113 CFR 223.116 TSC 2400-3, Prov. 3, 18 and 41

BMP Number	BMP Practice	BMP Objective	Project BMPs
12.22 Road and Building Site Construction Best Management Practices			
2-1	Travel Management Planning and Analysis	Roads impact water quality to varying degrees. Use the travel analysis and road management planning processes to develop measures to avoid, minimize, and mitigate adverse impacts to water, aquatic, and riparian resources during road management activities, contribute toward restoration of water quality where needed, and identify the road system which can be effectively maintained.	During field surveys, roads causing environmental degradation were identified. A Transportation analysis for this project was completed as part of the Transportation Report (Errington 2013). A review and design of roads for installation and repair of water drainage features, culvert replacement and cleaning and road resurfacing activities is completed as part of the road engineering package and is included in the Timber Sale Contract.
2-2	General Guidelines for the Location and Design of Roads	Locate roads to minimize problems and risks to water; aquatic, and riparian resources. Incorporate measures that prevent or reduce impacts, through design for construction, reconstruction, and other route system improvements.	Temporary and new roads were identified during the planning process. Roads that could affect aquatic resources were approved during IDT field visits and specialists reports (EIS)
2-3	Road Construction and Reconstruction	Minimize erosion and sediment delivery from roads during road construction or reconstruction, and their related activities.	Road Package FP-03 Sections 105, 107, and 200
2-4	Road Maintenance and Operations	To ensure water-quality protection by providing adequate and appropriate maintenance and by controlling road use and operations.	Timber Sale T800 specifications from Standard road maintenance document.
2-5	Water Source Development and Utilization	To supply water for road construction, maintenance, dust abatement, fire protection, and other management activities, while protecting and maintaining water quality.	Water sources were evaluated by the project aquatics biologist during the project development. EIS Design Criteria: • Aquatics: 1 and 2

BMP Number	BMP Practice	BMP Objective	Project BMPs
2-6	Road Storage	Ensure that roads placed in storage are maintained to so that drainage facilities and runoff patterns function properly, and damage to adjacent resources is prevented. Stored roads are managed to be returned to service, at various intervals.	FSM 7720 FSH 7709.56, Chap. 10 FP-03 Sections 157, 200, 550, 600 Contract Road Package.
2-7	Road Decommissioning	Stabilize, restore, and vegetate unneeded roads to a more natural state as necessary to protect and enhance NFS lands, resources, and water quality. The end result is that the decommissioned road will not represent a significant impact to water quality by: 1. Reducing erosion from road surfaces and slopes and related sedimentation of streams; 2. Reducing risk of mass failures and subsequent impact on water quality; 3. Restoring natural surface and subsurface drainage patterns; 4. Restoring stream channels at road crossings and where roads run adjacent to	EIS Proposed Action items for • Transportation System and Restoration
2-8	Stream Crossings	Minimize water, aquatic, and riparian resource disturbances and related sediment production when constructing, reconstructing, or maintaining temporary and permanent water crossings.	FSH 2409.15 EIS Proposed Action items for Transportation System EIS Design Criteria: • Hydrology and Aquatic Features Road Package
2-9	Snow Removal and Storage	Prevent or reduce erosion, sedimentation, and chemical pollution that may result from snow removal and storage activities.	N/A
2-10	Parking and Staging Areas	Construct, install, and maintain an appropriate level of drainage and runoff treatment for parking and staging areas to protect water, aquatic, and riparian resources.	FSH 2409.15. Typically landings. Road plan/package

BMP Number	BMP Practice	BMP Objective	Project BMPs
2-11	Equipment Refueling and Servicing	Prevent fuels, lubricants, cleaners, and other harmful materials from discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources	EIS Design Criteria: • Hydrology and Aquatic Features FSH 2409.15
2-12	Aggregate Borrow Areas	Minimize disturbance to water, aquatic, and riparian resources when developing and using aggregate borrow sites	N/A: No borrow pits will be used in the project area
2-13	Erosion Control Plan	Effectively limit and mitigate erosion and sedimentation from any ground-disturbing activities, through planning prior to commencement of project activity, and through project management and administration during project implementation.	ID Team project design.
12.31- Mining BMPs			No Mining Best Management Practices apply to this Project
12.41 - Recreation BMPs			
4-1 – 4.6, 4.8, and 4.10	N/A – do not apply to project proposal or design features		
4.7	BMP 4.7 - Best Management Practices for Off-Highway Vehicle Facilities and Use (BMPs 4.7.1 to 4.7.9	Over the past few decades, the availability and capability of off-highway vehicles (OHV) have increased tremendously, as has the intensity of OHV use on NFS lands. While these vehicles have provided new recreational opportunities and access to otherwise remote locations, this increase in OHV use has the potential to impact water resources.	Project activities have been designed to relocate and close portions of OHV trails that are currently causing unwanted watershed, vegetation and soil damage.
4.9	Protection of Water Quality within Developed and Dispersed Recreation Areas	To protect water quality by regulating the discharge and disposal of potential pollutants.	Proposed construction and closure of dispersed recreation sites currently impacting or potentially impacting water quality were included in project design
12.52 Vegetation Manipulation Best Management Practices			
5-1	Soil-disturbing Treatments on the Contour	To decrease sediment production and stream turbidity, while mechanically treating slopes.	EIS Proposed Action: • Thinning: 1

BMP Number	BMP Practice	BMP Objective	Project BMPs
5-2	Slope Limitations for Mechanical Equipment Operation	To reduce gully and sheet erosion and associated sediment production by limiting tractor use.	EIS Proposed Action: • Thinning: 1
5-3	Tractor Operation Limitation in Wetlands and Meadows	To limit turbidity and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion by excluding the use of mechanical equipment in wetland and meadows except for the purpose of restoring wetland and meadow function.	N/A: No mechanical activities are planned within wetlands or meadows
5-4	Revegetation of Surface-disturbed Areas	To protect water quality by minimizing soil erosion through the stabilizing influence of vegetation foliage and root network.	N/A: No areas of unstable soil were identified that required seeding for stabilization.
5-5	Disposal of Organic Debris	To prevent gully and surface erosion with associated reduction in sediment production and turbidity during and after treatment.	EIS Design Criteria: • Soil: 1-1, 2 and 5 • Road Plan/Package • Seeding and planting are included in restoration treatments where deep ground disturbance would occur.
5-6	Soil Moisture Limitations for Mechanical Equipment Operations	To prevent compaction, rutting, and gullying, with resultant sediment production and turbidity.	• Wet Weather plan for Operations – part of contract when wet weather operations are agreed upon
5-7	Pesticide Use Planning Process	To introduce water quality and hydrologic considerations into the pesticide use planning process.	N/A – Pesticide use is not included as part of the project proposal
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.	N/A – Pesticide use is not included as part of the project proposal

BMP Number	BMP Practice	BMP Objective	Project BMPs
5-9	Pesticide Application Monitoring and Evaluation	1) To determine whether pesticides have been applied safely, restricted to intended target areas, and have not resulted in unexpected non-target effects. 2) To document and provide early warning of possible hazardous conditions resulting from possible contamination of water or other non-target areas by pesticides. 3) To determine the extent, severity and possible duration of any potential hazard that might exist.	N/A – Pesticide use is not included as part of the project proposal
5-10	Pesticide Spill Contingency Planning	To reduce contamination of water by accidental pesticide spills.	N/A – Pesticide use is not included as part of the project proposal
5-11	Cleaning and Disposal of Pesticide Containers and Equipment	To prevent water contamination resulting from cleaning, or disposal of pesticide containers.	N/A – Pesticide use is not included as part of the project proposal
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.	N/A – Pesticide use is not included as part of the project proposal
5-13	Controlling Pesticide Drift During Spray Application	To minimize the risk of pesticide falling directly into water, or non-target areas.	N/A – Pesticide use is not included as part of the project proposal
12.62 Fire Suppression and Fuels Best Management Practices			
6-1	Fire and Fuels 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.	EIS Purpose and Need
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.	EIS Design Criteria: • Hydrology and Aquatic Features • Soils: 1 and 2
6-3	Protection of Water Quality from Prescribed Burning Effects	To maintain soil productivity, minimize erosion, and minimize ash, sediment, nutrients, and debris from entering water bodies.	EIS Design Criteria: • Hydrology and Aquatic Features • Soils: 2

BMP Number	BMP Practice	BMP Objective	Project BMPs
6-4	Minimizing Watershed Damage from Fire-suppression Efforts	To avoid watershed damage in excess of that already caused by the wildfire.	N/A
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.	N/A
6-6	Emergency Rehabilitation of Watersheds Following Wildfires	Objective: To minimize as far as practicable: a. Loss of soil and onsite productivity; b. Overland flow, channel obstruction, and instability; and c. Threats to life and property, both on-site and off-site.	N/A
12.72 Watershed Management Best Management Practices			
7-1	Watershed Restoration	To repair degraded watershed conditions, and improve water quality and soil	Restoration proposed action items.
7-2	Conduct Floodplain Hazard Analysis and Evaluation	To avoid, where possible, the long- and short-term adverse impacts to water quality associated with the occupancy and modification of floodplains.	N/A:
7-3	Protection of Wetlands.	To avoid adverse water-quality impacts associated with destruction, disturbance, or modification of wetlands.	N/A: Implementation of mechanical activities is not planned in wetlands.
7-4	Forest and Hazardous Substance Spill Prevention Control and Countermeasure (SPCC) Plan	To prevent contamination of waters from accidental spills.	The SPCC plan is developed and maintained at the Forest Level.
7-5	Control of Activities under Special Use Permit	To protect surface and subsurface water quality from physical, chemical, and biological pollutants resulting from activities that are under special use permit.	N/A
7-6	Water Quality Monitoring	To collect representative water data to determine base line conditions for comparison to established water-quality standards that are related to beneficial uses for that particular watershed.	EIS Monitoring: • Water Quality and Soils

BMP Number	BMP Practice	BMP Objective	Project BMPs
7-7	Management by Closure to Use (Seasonal, Temporary, and Permanent	To exclude activities that could result in damages to either resources or improvements, such as roads and trails, resulting in impaired water quality.	EIS project proposal for Transportation
7-8	Cumulative Off-Site Watershed Effects	To protect the identified beneficial uses of water from the combined effects of multiple management activities which individually may not create unacceptable effects but collectively may result in degraded water quality conditions.	Project hydrology report.
12.81 - Range Management BMPs			No Range Management BMPs are necessary for this project

Table 2 National BMPs applicable to and used in project planning and design

BMP	Objective	Compliance
Plan-1. Forest and Grassland Planning	Use the land management planning and decision making processes to incorporate direction for water quality management consistent with laws, regulation, and policy into land management plans.	Applicable to Land Management Plan. Direction from the Land Management Plan is tiered to in project planning and through Regional BMPs
Plan-2. Project Planning and Analysis	Use the project planning, environmental analysis, and decision making processes to incorporate water quality management BMPs into project design and implementation.	Interdisciplinary team project planning and effects analysis. Analysis of Riparian Conservation Objectives (RCO). Regional BMPs (12.12 1-1; 12.22 2-1 and 2-13; 12.52 5-7)
Plan-3 Aquatic Management Zone Planning	To maintain and improve or restore the condition of land around and adjacent to waterbodies in the context of the environment in which they are located, recognizing their unique values and importance to water quality while implementing land and resource management activities.	RCO analysis and Interdisciplinary team development of proposed action items for improvement of aquatic ecosystems including reduced fire hazard and transportation improvements. Regional BMP 12.12 1-19.
AqEco-1. Aquatic Ecosystem Improvement and Restoration Planning	Reestablish and retain ecological resilience of aquatic ecosystems and associated resources to achieve sustainability and provide a broad range of ecosystem services.	Identification of project activities such as transportation improvements and rehab of areas to improve hydrologic and aquatic functioning. RCO planning and analysis process.

AqEco-2. Operations in Aquatic Ecosystems	Avoid, minimize, or mitigate adverse impacts to water quality when working in aquatic ecosystems.	RCO analysis and Interdisciplinary team development of design criteria to protect aquatic ecosystems. Regional BMP 12.12 1-19.
AqEco-3. Ponds and Wetlands	Design and implement pond and wetlands projects in a manner that increases the potential for success in meeting project objectives and avoids, minimizes, or mitigates adverse effects to soil, water quality, and riparian resources	N/A. Project does not include creation or improvement of a pond or wetland.
AqEco-4. Stream Channels and Shorelines	Design and implement stream channel and lake shoreline projects in a manner that increases the potential for success in meeting project objectives and avoids, minimizes, or mitigates adverse effects to soil, water quality, and riparian resources.	N/A. Project does not include in channel work.
Chem-1. Chemical Use Planning	Use the planning process to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from chemical use on NFS lands.	N/A. Chemical use is not a proposed action in this project.
Chem-2. Follow Label Directions	Avoid or minimize the risk of soil and surface water or groundwater contamination by complying with all label instructions and restrictions required for legal use.	N/A. Chemical use is not a proposed action in this project.
Chem-3. Chemical Use Near Waterbodies	Avoid or minimize the risk of chemical delivery to surface water or groundwater when treating areas near waterbodies.	N/A. Chemical use is not a proposed action in this project.
Chem-4. Chemical Use in Waterbodies	Avoid, minimize, or mitigate unintended adverse effects to water quality from chemical treatments applied directly to waterbodies.	N/A. Chemical use is not a proposed action in this project.
Chem-5. Chemical Handling and Disposal	Avoid or minimize water and soil contamination when transporting, storing, preparing and mixing chemicals; cleaning application equipment; and cleaning or disposing chemical containers.	N/A. Chemical use is not a proposed action in this project.
Chem-6. Chemical Application Monitoring and Evaluation	1. Determine whether chemicals have been applied safely, have been restricted to intended targets, and have not resulted in unexpected nontarget effects. 2. Document and provide early warning of possible hazardous conditions resulting from potential contamination of water or other nontarget resources or areas by chemicals.	N/A. Chemical use is not a proposed action in this project.

Facilities and Nonrecreation Special Uses BMPs (FAC 1-10)	The purpose of this set of Best Management Practices (BMPs) is to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources that may result from development, use, maintenance, and reclamation of facilities located on National Forest System (NFS) lands.	N/A. Facility use and Special Uses are not included in this project.
Fire-1 Wildland Fire Management Planning	Use the fire management planning process to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during wildland fire management activities.	This project is part of a management plan to reduce potential for adverse effects of a wildfire on the landscape and potentially eventually facilitate wildland fire management to some extent.
Fire-2. Use of Prescribed Fire	Avoid, minimize, or mitigate adverse effects of prescribed fire and associated activities on soil, water quality, and riparian resources that may result from excessive soil disturbance as well as inputs of ash, sediment, nutrients, and debris.	Design criteria and project design features including compliance with Regional BMPs 12.62 6-1, 6-2, and 6-3 has been developed to minimize potential for negative effects resulting from prescribed fire implementation.
Fire-3. Wildland Fire Control and Suppression	Avoid or minimize adverse effects to soil, water quality, and riparian resources during fire control and suppression efforts.	Not directly applicable to this project, however with implementation of this project potential for adverse effects from control and suppression of wildfire would be reduced.
Fire-4. Wildland Fire Suppression Damage Rehabilitation	Rehabilitate watershed features and functions damaged by wildland fire control and suppression related activities to avoid, minimize, or mitigate long-term adverse effects to soil, water quality, and riparian resources	N/A. Not a fire rehabilitation project.
Minerals Management Activities (Min-1-8)	The purpose of this set of Best Management Practices (BMPs) is to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources that may result from various mineral exploration, development, operation, and reclamation activities.	N/A. Mineral management is not included in this project.
Rangeland Management Activities (Range-1-3)	The purpose of this set of Best Management Practices (BMPs) is to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources that may result from rangeland management activities.	N/A. Rangeland management is not included in this project except to restrict use where thinning of vegetation may increase accessibility to sensitive areas.

Rec – 1 Recreation Planning	Use the applicable recreation planning process to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during recreation activities.	The ID team reviewed damage from recreational use in the project area and proposed actions as part of the project to facilitate recreation while mitigating further damage to Forest Resources.
Rec – 2 Developed Recreation Sites	N/A	Management or modification of developed recreation use is not part of the project proposal.
Rec-3 Dispersed Use Recreation	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by managing dispersed activities and undeveloped sites to maintain ground cover, maintain soil quality, control runoff, and provide needed sanitary facilities to minimize the discharge of nonpoint source pollutants and maintain streambank and riparian area integrity.	Project proposal to close and constrict dispersed use areas identified as negatively impacting or potentially negatively impacting Forest Resources.
Rec-4 Motorized and Nonmotorized Trails	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling soil erosion, erosion of trail surface materials, and water quality problems originating from construction, maintenance, and use of motorized and nonmotorized trails.	Trail reroutes are proposed as part of this project to reduce impact from system trails currently resulting in negative impacts to Forest resources. Closure of non-system trails is proposed as part of project activities.
Rec-5 Motorized Vehicle Use Areas	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources at motorized vehicle use areas by managing activities to maintain ground cover, maintain soil quality, and control runoff to minimize discharge of nonpoint source pollutants and maintain streambank and riparian area integrity.	Activities within the Motorized Vehicle use area have been designed to reduce current damage and minimize future damage.
Rec-6, Rec-7, Rec-8, Rec-9, Rec-10, Rec-11, Rec-12	N/A	Not involved in project activities.
Road-1. Travel Management Planning and Analysis	Use the travel management planning and analysis processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during road management activities.	Included in the NEPA ID team analysis of the project.
Road-2. Road Location and Design	Locate and design roads to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.	Design and placement of new roads was evaluated and planned as part of the ID team process for project design. Regional BMP 12.22 2-1.
Road-3. Road Construction and Reconstruction	Avoid or minimize adverse effects to soil, water quality, and riparian resources from erosion, sediment, and other pollutant delivery during road construction or reconstruction.	Compliance with Regional BMP 2-3 and contract road package requirements.

Road-4. Road Operations and Maintenance	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling road use and operations and providing adequate and appropriate maintenance to minimize sediment production and other pollutants during the useful life of the road.	Regional BMP 12.22 2-3. Maintenance and appropriate use of roads used during the project is built into the timber sale and stewardship contracts.
Road-5. Temporary Roads	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of temporary roads.	Temporary road construction, use, and management are dealt with through compliance with contract provisions for timber sale and stewardship projects and FSH 2409.15. Regional BMPs 12.22 2-2, and 2-8
Road-6. Road Storage and Decommissioning	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by storing closed roads not needed for at least 1 year (Intermittent Stored Service) and decommissioning unneeded roads in a hydrologically stable manner to eliminate hydrologic connectivity, restore natural flow patterns, and minimize soil erosion.	Compliance with Regional BMPs (12.22 2-6 and 2-7) and contract provisions for a timber sale or stewardship contract. Additionally opportunities for road decommissioning were reviewed as part of the ID Team planning and project design process.
Road-7. Stream Crossings	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing, reconstructing, or maintaining temporary and permanent waterbody crossings.	ID Team project design and evaluation for road work activities, project design criteria, and compliance with Regional BMP 12.22 2-8.
Road-8. Snow Removal and Storage	Avoid or minimize erosion, sedimentation, and chemical pollution that may result from snow removal and storage activities.	N/A.
Road-9. Parking and Staging Areas	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing and maintaining parking and staging areas.	Compliance with Regional BMP 12.22 2-10. Parking and staging is usually connected to landing development and use or is dealt with in road plans.
Road-10. Equipment Refueling and Servicing	Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources during equipment refueling and servicing activities.	Compliance with Regional BMP 12.22-11 and project design features.

Road-11. Road Storm-Damage Surveys	Monitor road conditions following storm events to detect road failures; assess damage or potential damage to waterbodies, riparian resources, and watershed functions; determine the causes of the failures; and identify potential remedial actions at the damaged sites and preventative actions at similar sites.	Monitoring would apply during project implementation until final acceptance of work items and contract and water quality waiver termination.
Veg-1. Vegetation Management Planning	Use the applicable vegetation management planning processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during mechanical vegetation treatment activities.	ID team planning process and compliance with Regional BMP 12.12 1-1.
Veg-2. Erosion Prevention and Control	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by implementing measures to control surface erosion, gully formation, mass slope failure, and resulting sediment movement before, during, and after mechanical vegetation treatments.	ID team planning process and Regional BMPs 12.12 1-2, 1-3, 1-6, 1-9, 1-10, 1-12, 1-13, 1-14, 1-15, 1-16, 1-17, 1-20, 1-21; and 12.52 5-1, 5-2, 5-4, and 5-6.
Veg-3. Aquatic Management Zones	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when conducting mechanical vegetation treatment activities in the AMZ.	RCO analysis and Regional BMPs 12.12 1-8, and 1-19; 12-52 5-3, and 5-12
Veg-4. Ground-Based Skidding and Yarding Operations	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during ground-based skidding and yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.	Regional BMPs 12.12 1-9, 1-10, 1-11, 1-13, 1-17, and 1-20.
Veg-5. Cable and Aerial Yarding Operations	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during cable and aerial yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.	ID team planning process and evaluation was used to develop design criteria to minimize or mitigate potential adverse effects. Regional BMPs 12.12 and 12.52 FSH 2409.15.
Veg-6. Landings	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of log landings.	Regional BMPs 12.12 1-12 and 1-16
Veg-7. Winter Logging	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from winter logging activities	Regional BMP 12.12 1-5 and 12.52 5-6
Veg-8. Mechanical Site Treatment	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling the introduction of sediment, nutrients, chemical, or other pollutants to waterbodies during mechanical site treatment.	National BMPs Veg-2 and Veg-3 and Regional BMPs 12.12 1-19 and 12.52 5-1, 5-2, 5-3, and 5-4.

Water Uses Management Activities	The purpose of this set of Best Management Practices (BMPs) is to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from development and operation of infrastructure to collect, impound, store, transmit, and distribute water for uses on and off National Forest System (NFS) lands.	N/A. Not a part of this project.

Appendix C – Cumulative Effects

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

In order to understand the contribution of past actions to the cumulative effects of the Proposed Action and alternatives, this analysis, with the exception of hydrology 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 trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the Proposed Action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions may ignore the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." For these reasons, the analysis of past actions in this section is based on current environmental conditions.

Current Management and Ongoing Activities

Even if no activities were being proposed under the Trestle project, certain management would continue in the area because of past decisions and current land management policies. Such activities that may be considered as appropriate in the cumulative effects analysis include:

- Fuels Reduction and forest health projects including: the Raintree Forest Health Project and prescribed burning under the Last Chance Fuels Reduction Project;
- Personal use firewood gathering consisting of salvage of individual dead trees by the public under a firewood permit system;
- Recreation including hiking, motorized recreation on designated trails (including Elkins Flat OHV trail system), dispersed camping, fishing, and hunting, and dispersed camping;
- Activities on private lands within the assessment area;

- Standard levels of maintenance on Forest Service roads and trails;
- Suppression of human-caused fire starts and wildfires under the jurisdiction of the U.S. Forest Service or CalFire.
- Management of Noxious Weeds – Weed Eradication and Control on the Eldorado National Forest is intended to direct priorities for treatment of noxious weeds across the Forest with a variety of treatment methods including hand treatments and herbicide treatments.

Reasonably Foreseeable Activities

The following reasonably foreseeable actions and management are considered in the cumulative effects analysis in this chapter, as appropriate for each resource analyzed. Timber harvest on private lands – No known Timber Harvest Plans (THPs), are currently under preparation in the area (http://www.fire.ca.gov/resource_mgt/resource_mgt_forestpractice_thpstatus.php last visited 05/01/2015).

Table C 1. Present and future foreseeable projects within the project planning area.

Project Name	Activity
Fuelwood Gathering	Gathering of dead trees less than 10 inches diameter at eye level and downed material
Invasive Plant Eradication	A combination of herbicide and hand treatments to reduce non-native invasive plants. Areas across the Forest are expected to be prioritized by invasive treatment priority.
Timber Harvest on Non-Forest System lands	Preparation of THPs on private lands is expected to continue. Approximately 100 acres of timber harvest on private land near Grizzly Flat would occur within the next few years.

Past Activities

Past vegetation management activities, on both public and private land since 1995, are summarized in the tables below. These include activities that occurred within the seven-HUC 7 watersheds (36,744 acres) that overlap with the Trestle Project area.

Table C 2. Forest Service Vegetation Management Project Activities by project since 1995; within watersheds that overlap with the Trestle project area

Description	Years	Approximate Acres
Raintree Forest Health Project – Understory thinning in natural stands and plantations	2012-2014	**225 acres** 200 acres (natural stands); 25 acres (plantations)
Henry's Prescribed Burn	2010	**400 acres**
Marshall Mine Fuels Reduction Project – Prescribed burning	2009	**1400 acres**
Caldor Thinning and Mastication – Understory thinning and mastication within plantations	2007	**140 acres** 50 acres (understory thinning); 90 acres (mastication)
Last Chance Fuels Reduction Project – Understory thinning, prescribed burning, and mastication	2005-2007	**1,020 acres** 560 acres (understory thinning); 340 acres (prescribed burning); 120 acres (mastication)
Last Ridge Fuels Reduction – Hand cut, pile, and burn	2005-2007	**980 acres**
Pretty Quick Fuels Reduction – Mastication within plantations	2006	**320 acres**
Simpson Fuels Reduction Project – Understory thinning, pile and burn, and prescribed understory burning	2002-2006	**1,030 acres**
Lincoln Log Forest Health Project – Understory thinning following CASPO Interim Guidelines and follow up prescribed burning	1999, 2003, and 2005	**1,000 acres**
Ridgerunner Fuels Reduction Project – Undestory thinning following CASPO Interim Guidelines, biomass removal, and prescribed burning.	2001 to 2003	**1600 acres**
2nd Fiddle Forest Health Project – Understory thinning following CASPO interim guidelines	2000-2001	**950 acres**
Tie Die Forest Health Project – Understory	1999-2001	**1,700 acres**

Description	Years	Approximate Acres
thinning following CASPO Interim Guidelines		
Nelly Forest Health Project – Understory thinning following CASPO Interim Guidelines	2000	**140 acres**
Sciaroni Forest Health Project – Understory thinning following CASPO Interim Guidelines	1998	**65 acres**
Roadside Hazard Tree Removal	1995-1996	**310 acres**

Table C 3. Private Land Timber Harvest Activities since 1995; within watersheds that overlap with the Trestle project area

Activity	Clearcut	Commercial Thin	Group Selection	Sanitation Salvage	Seed Tree Removal Cut	Selection	Shelterwood Removal	Grand Total
1995		59		120	20	103	135	
1996					65	43	23	
1997						20	25	
1999						15	10	
2000					335		45	
2003				6		74	27	
2005						61		
2014	122							
Grand Total	**122**	**59**	**0**	**126**	**420**	**316**	**245**	

Response to Comments

The Environmental Protection Agency published a Notice of Availability (NOA) for the DEIS in the Federal Register on July 17, 2015. The 45-day comment period ended on August 31, 2015. In response to the Forest's request for comments, 12 letters were received from organizations and individuals. For tracking purposes, the interdisciplinary team assigned a respondent number to each letter as it was received. Forest Service direction requires that a final EIS respond to substantive comments on the draft EIS (FSH 1909.15, 25.1). Specific comments are within the scope of the proposed action, have a direct relationship to the proposed action, and must include supporting reasons for the responsible official to consider (36 CFR 218.2).

This Appendix contains the summary comment statements, organized by the 9 general topics shown below. Following this section, Table 1 provides a listing of all commenters and their corresponding commenter number.

1. Aquatic Resources
2. Climate Change
3. Cultural Resources
4. Fire and Fuels
5. Hydrology
6. NEPA
7. Transportation System
8. Wildlife
9. Support for an Alternative

Table 1. List of Comment Letters

Letter #	Agency, Organization, Business, or Individual	Date Received
1	Mark Almer, Chairman, Grizzly Flats Fire Safe Council	August 10, 2015
2	Craig Heinrich, Executive Director, Leoni Meadows Camp	August 12, 2015
3	Brian Veerkamp, Chairman, El Dorado County Water Agency Board of Directors	August 14, 2015
4	Andre Legrand, Board Chair, Grizzly Flats Community Services District	August 14, 2015
5	Erik Holst, Conservation Chair, El Dorado Chapter of Trout Unlimited	August 20, 2015
6	Chad Hanson, Ph.D., Director, John Muir Project of Earth Island Institute and Justin Augustine, Attorney, Center for Biological Diversity	August 21, 2015
7	Dick Artley, Individual	August 22, 2015
8	Patricia Sanders Port, Regional Environmental Officer, Office of Environmental Compliance, U.S. Department of Interior	August 27, 2015
9	Pat Dwyer, Chair, El Dorado County Fire Safe Council	August 28, 2015
10	Pete Knell, Sierra Pacific Industries	August 28, 2015
11	Kathleen Martyn Goforth, Manager, Environmental Review Section, Environmental Protection Agency	August 31, 2015
12	Ben Solvesky, Wildlife Ecologist, Sierra Forest Legacy	August 31, 2015

Aquatic Resources

1. **Comment (Commenter 5, Trout Unlimited)**: Our greatest concern associated with the implementation of the Proposed Action is the potential for water temperature increases within and downstream of the project area. Global temperatures rose steadily during the 20th century and continue to do so as we enter the 21st century with nine of the 10 warmest years on record having occurred since 2002.

   One of the most obvious effects of these warming trends is increasing air temperatures resulting in long hot summers and earlier snow melt. Early runoff and reduced spring and summer snowpack leads to a decrease in summer base flows when streams are most susceptible to increasing air temperatures - a situation that is problematic for coldwater-dependent species such as trout and salmon. Fish, insects, zooplankton, phytoplankton, and other aquatic species all have a preferred temperature range. As temperatures get too far above or below this preferred range, the number of individuals of the species decreases until finally there are none. Temperature is also important because of its influence on water chemistry. The rate of chemical reactions generally increases at higher temperature. Warm water holds less dissolved oxygen than cool water, and may not contain enough dissolved oxygen for the survival of different species of aquatic life (ref: USGS http://water.usgs.gov/edu/).

   Regarding the potential for temperature increases and effects to species in and downstream of the project area, the DEIS and associated reports note the presence of trout in all perennial streams. However, the presence of late fall run central valley Chinook salmon in the lower reaches of the the Cosumnes River is ignored. It is important to recognize downstream that listed species and species of concern can affected by the temperature increases made in the higher elevation headwater streams; as each river mile increases the river water temperature has the potential to increase. Since late fall run juvenile Chinook salmon are in the system through spring, temperature increases early in the year could have a devastating effect.

   A review of the specialist reports indicate that three stream channels in the project area are expected to have a temperature increase of 3.7 degrees F or higher as a result of implementation of the Proposed Action - Steely Fork Cosumnes River, South Steely Creek, and Middle Dry Creek. Depending on the fish species present and the fall/late fall water temperature, such an increase in temperature could be significant.

   Of the three channels, Steely Fork Cosumnes is of particular concern for the following reasons:

   - Appendix A of the Hydrology Report notes the expected temperature increase in the Steely Fork Cosumnes River to be 3.7 degrees F.
   - Table 2 of the Hydrology Report states "Approximately 9,840 feet of thinning units border the stream - this is 58.8 percent of the length of the stream within the Upper Steely Fork Cosumnes River watershed."
   - The Aquatic Biological Assessment/Evaluation notes "Approximately 7,230 feet of prescribed burn areas border the stream – this is 13.2 percent of the length of the stream."
   - Table 2 of the Hydrology Report states "Flow can decrease as low as 2.0 cubic feet per second (CFS) in late summer and early fall."

   Combined with climate change and the fact that the prescribed burning may take place well after harvest, the items listed above indicate a high potential for water temperatures to reach critical or lethal levels.

Response: This comment overstates the negative effects of the Trestle Forest Health Project on stream temperatures when compared to the conclusions in the EIS under Water Quality (pgs. 90 to 92) and the Hydrology Report (pg. 25). "According to a stream temperature model, the maximum potential stream temperature increase would range between 0.0 and 3.8 degrees Fahrenheit (F) for 12 perennial stream segments in the project area. For six of the streams, the maximum potential stream temperature increase would be less than 2.0 degrees F. This is in large part due to the design criteria that would limit the removal of vegetation near perennial streams, which in turn result in a small decrease in the amount of shade on the surface of streams. For small streams in a forest setting, the research indicates that elevated water temperatures usually decrease to pre-disturbance levels within 500 feet downstream of the zone of vegetation removal (USDA 2010)."

The increases in stream temperatures represent the maximum potential increase immediately following the proposed actions and are within State water quality standards (Hydrology Report, Appendix A, pg. 9). It should also be noted that increases in stream temperature – should they occur – would then decrease over time as vegetation near streams grows taller and provides more shade to the stream surface.

The effects of climate change on the hydrology of the project area are long-term and somewhat uncertain as discussed in Chapter 3 of the EIS (pgs. 194-195). The potential direct and indirect effects of this project on stream temperatures are short-term; whereas the effects of climate change to stream temperatures would occur in the longer term. A detailed analysis of the effects of climate change on stream temperatures in the project area would be speculative.

2. **Comment (Commenter 5, Trout Unlimited)**: It also should be noted that the assumption used in calculating the Cafferata equation (page 16 of Hydrology Report Appendix A states "A maximum reduction of forest canopy cover in the Riparian Conservation Areas (RCAs) of 10 percent from the TFHP translates to a maximum reduction in shade to the surface of a stream of approximately 5 percent." However, nowhere in the DEIS does it state that the forest canopy cover will not be reduced by more than 10 percent within the RCAs. To the contrary, the DEIS (page 86) states "Alternative 2 would decrease the basal area in commercial thinning units by approximately 17 percent and would decrease canopy cover approximately 15 percent between 2013 and 2026" (Howard and Walsh 2014). Thus, it appears the reduction is canopy cover is over and above what was used to determine stream temperature change. To validate the calculations for changes in stream temperature the EIS must clearly state that in RCAs there will not be a forest canopy cover reduction of more than 10 percent; furthermore, the canopy cover reduction must also include reduction due to mortality from prescribed burning.

Response: Changes to canopy cover are described in Chapter 3 of the EIS on page 51. The decrease in canopy cover of approximately 18 percent is an average value within the mechanical thinning units across the project area. The EIS acknowledges the prescribed burn activities are expected to further reduce canopy cover by about 5% (pg. 51). The decrease in canopy cover near perennial streams will be much less than 18 percent because of the Hydrology and Aquatic Features design criteria (EIS, pgs. 29-30) which greatly limit the amount of vegetation that can be removed within 75 to 150 feet of perennial streams. As a result, the assumptions in the Hydrology Report (pg. 16) with regard to the analysis of stream temperature, such as reduction in canopy cover and stream shading, are reasonable. This means that the calculated values of maximum potential stream temperature are also reasonable, which indicates that additional design criteria to protect stream temperatures are not necessary.

3. **Comment** **(Commenter 5, Trout Unlimited)**: We are also concerned with road densities in the project area. "The research has shown that: a) the effects of roads on aquatic habitat and aquatic species are overwhelmingly negative, b) roads contribute more sediment to streams than any other land management activity, c) the closure or removal of roads can result in a significant drop in surface erosion rates, but the amount of decrease in erosion is highly variable, d) the correlation between road density and fish habitat and fish population is not strong – part of the reason for this is that roads are only one of many factors that affect aquatic habitat and aquatic species" (Dissmeyer 2000; USDA 2001).

   The Hydrology Report states "There are approximately 278 miles of roads. This translates to a high road density of 4.8 miles of roads per square mile of land over the entire seven watersheds. The density of roads of roads ranges between 2.8 to 6.0 miles per square mile for the individual watersheds" (page 27). Most Sierran watersheds have between 1.5 to 3.5 miles of road per square mile within a watershed (Middle Fork Cosumnes River Landscape Analysis page 62). While recognizing the restoration and road maintenance aspects of the Proposed Action, in view of Agency road maintenance dollars and the adverse effects roads have on aquatic habitats, we believe that more effort needs to be directed towards road obliteration and/or removal of roads from the transportation system.

   Response: The comprehensive analysis of the road system within the seven watersheds that contain the Trestle Forest Health Project is beyond the scope of the project, and is part of a separate Forest-wide process (entitled "Subpart A"). Subpart A Travel Analysis was completed at a 'forest scale'. The Forest took a broad look at the whole road system and the associated risks and benefits to users and resources across the Forest. The process identified potential opportunities for changes to the road system. Inputs to the process included ecological, social, cultural and economic information. Subpart A findings will inform NEPA analysis in the future.

   As described under Chapter 1, Purpose and Need for Action (P&N) in the EIS (pgs. 9 to 15), one of the purposes of the Trestle Forest Health Project includes road repair and maintenance to provide access for resource management needs and for public recreation use, and improve watershed quality (P&N #4 and #6, pgs. 13-15). The individual restoration activities in the proposed action and alternatives were identified by the interdisciplinary team during field assessments.

4. **Comment** **(Commenter 5, Trout Unlimited)**: Associated with roads and road maintenance is the issue of using dust palliatives for dust abatement. The information cited in Aquatic Biological Assessment/Evaluation appears to be limited to acute toxicity tests (LC50) for species not found in the project area; effects to predator/prey relationships or effects to food and other environmental factors are not addressed. Additionally, an analysis is only provided for magnesium chloride (and sodium chloride for the chloride component), yet the DEIS states, "When water is scarce, use EPA-approved dust palliatives, such as magnesium chloride or lignin sulfonate, for dust abatement" (page 25). To allow the public to determine the effects of the Proposed Action, the various analyses must analyze all of the EPA-approved dust palliatives that may be used; if the dust palliative is not analyzed in the project NEPA process, it must not be used in the project area. If information regarding a particular palliative is not available and the Agency plans on using it in the project area, the various project NEPA documents must state that fact.

Response: Dust palliatives such as magnesium chloride or lignin sulfonate are commonly combined with water and used to reduce dust on unpaved roads generated by logging trucks. For the Trestle Forest Health Project, dust palliatives would only be used if water is scarce due to drought conditions. The recommendation outlined in the Forest Service Palliative and Selection and Application Guide (USDA FS 1999) is to restrict the use of chlorides within 25 feet of a body of water. There were no recommendations on buffer restrictions identified for lignin sulfonate. Design criteria prohibiting application of dust palliatives within 100 feet of perennial and intermittent streams has been incorporated in the project design (EA pg. 32), which would minimize the potential for dust palliatives to enter waterways or affect special status aquatic species. Water contamination is unlikely under all alternatives due to BMPs, design criteria, and in particular near-stream exclusion zones. A discussion on the effects of lignin sulfonate was added to the EIS on page 100.

Goodrich et al. (2009) monitored stream chemistry in 16 streams in the Rocky Mountains upstream and downstream of unpaved roads on which magnesium chloride had been applied. They found that 8 of the 16 streams monitored had significantly significant downstream increases in both magnesium and chloride concentrations, as well as other ions and compounds commonly found in dust palliatives such as sodium, calcium, and sulfate. However, concentrations detected were below those reported to adversely affect aquatic organisms.

The Dust Palliative Selection and Application Guide (USDA FS 1999), indicates lignin sulfonate as having no water quality impacts. Roald (1977), in a study focused on levels found in effluent from pulp mills, found that the 48hr LC50 for lignin sulfonate in rainbow trout was 7,300 ppm, however since this effect seemed to be related to reduction in dissolved oxygen, it is likely that amphibians would be significantly less impacted by comparable concentrations of lignin sulfonate. In a literature review, Heffner (1997) found that at the rates of application used for dust abatement, environmental impacts were highly unlikely. The FDA allows the use of lignin sulfonates as binder in animal feed at a rate of up to 4% of mass. In high concentrations, lignin sulfonate can cause discoloration and foaming in waterbodies however this effect takes place when it is being directly discharged as waste product at far higher concentrations than would be observed in its use as a road surfactant. Overall, there is little in the literature to indicate that the use of lignin sulfonate at standard application rates would have harmful effects on aquatic biota.

5. **Comment (Commenter 6, John Muir Project and Center for Biological Diversity)**: Much larger stream buffers are needed to avoid potential significant adverse impacts to an ESA-listed species, the Sierra Nevada Yellow-Legged Frog, from potential direct mortality from tractor logging, felling, and skidding adjacent to, or over, streams, as well as from potentially severe sedimentation/erosion that can result from ground-based logging. Indeed, research indicates that this species often travel hundreds of feet, or even hundreds of meters, from streams, and could be killed by logging equipment and tree felling in the process (Matthews and Pope 1999, Pope and Matthews 2001; see also Federal Register, Final Rule, volume 79, number 82, pages 24472-24514). The Forest Service has an affirmative duty under the ESA to avoid “take” of listed species, as well as to consult with the US Fish and Wildlife Service regarding potential impacts. The Forest Service has failed to do so here, and is in violation of the ESA. Potential impacts to this species requires an EIS, not an EA.

Response: The analysis of effects to the Sierra Nevada yellow-legged frog can be found in Chapter 3 of the EIS (pgs. 96-97). The analysis in the EIS and the Aquatic Biological Assessment/Evaluation concluded that the project would have no effect on the Sierra Nevada yellow-legged frog with this project. The project area is at the lower elevational range for the

Sierra Nevada yellow-legged frog, and this species has not been documented and is not known to occur in the project area based on surveys conducted between 1997 and 2013. Design criteria developed specifically to minimize the potential effects to aquatic species are included in each action alternative (EIS, pgs. 29-32), and avoids suitable habitat as defined in the Programmatic Biological Opinion (USFWS, December 19, 2014).

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with USFWS and the National Marine Fisheries Service (NMFS), to insure that their actions are "not likely to jeopardize the continued existence of any" listed species (or destroy or adversely modify its designated critical habitat; 16 U.S.C. § 1536(a)(2)). As described in the EIS (pgs. 96-97) and the Biological Evaluation/Assessment (pgs. 47-50), it was determined that this project would not affect the Sierra Nevada yellow-legged frog or designated critical habitat. Therefore, consultation with the USFWS was not required for this project.

In regards to the comment that "potential impacts to this species require an EIS, not an EA", an EIS is being prepared for this project. Although the potential effects to Sierra Nevada yellow-legged frog are not "significant" and did not, in and of itself require preparation of an EIS, an EIS is being prepared for the Trestle Forest Health Project, as opposed to an Environmental Assessment (EA).

Climate Change

6. **Comment (Commenter 11, Environmental Protection Agency)**: EPA also appreciates that the Forest Service acknowledges in the DEIS that sensitive species will be impacted by climate change. We believe the Council on Environmental Quality's December 2014 revised draft guidance for Federal agencies' consideration of GHG emissions and climate change impacts in NEPA outlines a reasonable approach, and we recommend that the Forest Service use that draft guidance to help outline the framework for its analysis of these issues and, particularly, to inform consideration of measures to adapt to climate change impacts on the project.

   Response: Climate change is addressed in the EIS on pages 194 to 199. The CEQ final guidance in consideration of GHG emissions and climate change was reviewed. The climate change section in the FEIS contains qualitative discussion of the direct and indirect effects of the project alternatives on potential GHG emissions (pgs. 194-199).

Cultural Resources

7. **Comment (Commenter 11, Environmental Protection Agency)**: The project area may be culturally and spiritually important to Tribes, and Tribal consultation is an important component of the decision-making process associated with the project. We encourage the Forest Service to continue meaningful consultation, throughout the NEPA process, with all potentially affected tribal governments. We recommend that the results of consultations with tribal governments and with the Tribal Historic Preservation Office/State Historic Preservation Office be included in the FEIS.

Response: The potential effect to cultural resources is described in Chapter 3 of the EIS (pgs. 182-185). Activities associated with the action alternatives will comply with Section 106 of the National Historic Preservation Act of 1966, as amended in accordance with provisions of the Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), the California State Historic Preservation Officer, the Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Processes for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forest of the Pacific Southwest Region (Regional PA 2013). No further consultation with the State Historic Preservation Office is required.

Letters were sent to the Washoe Tribe of Nevada and California, United Auburn Indian Community, and Shingle Springs Band of the Miwuk Indians during public scoping and comment period (EIS pg. 16). No issues or concerns were raised by tribal governments.

Fire and Fuels

8. **Comment (Commenter 1)**: For the Grizzly Flats community, which the TFHP abuts on approximately 25% of the TFHP's border, the treatment of fire fuels within the project area is more than the dialog and discussion of the DEIS. The most aggressive treatment of the TFHP's fire fuels is critical to preventing the 'loss of our community' should conditions and circumstances happen to allow a wildfire to take place and travel toward the community. It is clear to the GFFSC that everything that can be done, must be done, to prevent the TFHP forest land from becoming another "King Fire".

   Response: The Responsible Official will consider your input.

9. **Comment (Commenter 1, Grizzly Flats Fire Safe Council)**: Reducing the existing heavy forest understory will assist in reversing the unnatural effects man has had on the forest environment during the past 160 years. When people began extinguishing all forest fires, they altered the natural fire regime. Without low-intensity fires to keep the forest floor open, the forests have become crowded, denser and catastrophic fires waiting to happen.

   Response: This is consistent with the purpose and need for the project (Purpose and Need statement #1 and #2, EIS, pgs. 9-13)

10. **Comment (Commenter 6, John Muir Project and Center for Biological Diversity)**: The 2004 Framework EIS (p. 28) stated that one of the main purposes of the 2004 Framework was to "chang[e] a substantial acreage from Fuel Condition Class 2 or 3 to Condition Class 1". Condition Class was described as representing the number of normal fire return intervals that had been missed due to past suppression of fires by government agencies, with higher Condition Classes indicating higher levels of fuel accumulation and higher potential for high-severity fire, or fire patches in which most or all trees are killed (EIS, p. 126).

    The EIS concluded that, due to fuel accumulation from fire suppression, and resulting Condition Class 2 and 3 areas dominating the landscape, "fires that affect significant portions of the landscape, which once varied considerably in severity, are now almost exclusively high-severity, large, stand-replacing fires." However, the EIS did not offer any data source to support this statement.

    New Scientific Information:

    The studies empirically investigating this question have consistently found that forest areas that have missed the largest number of fire return intervals in California's forests are burning predominantly at low/moderate-severity levels, and are not experiencing higher fire severity than areas that have missed fewer fire return intervals:

Miller JD, Skinner CN, Safford HD, Knapp EE, Ramirez CM. 2012a. Trends and causes of severity, size, and number of fires in northwestern California, USA. Ecological Applications 22, 184-203.

Odion, D.C., E.J. Frost, J.R. Strittholt, H. Jiang, D.A. DellaSala, and M.A. Moritz. 2004. Patterns of fire severity and forest conditions in the Klamath Mountains, northwestern California. Conservation Biology 18: 927-936.

Odion, D.C., and C.T. Hanson. 2006. Fire severity in conifer forests of the Sierra Nevada, California. Ecosystems 9: 1177-1189.

Odion, D.C., and C.T. Hanson. 2008. Fire severity in the Sierra Nevada revisited: conclusions robust to further analysis. Ecosystems 11: 12-15.

Odion, D. C., M. A. Moritz, and D. A. DellaSala. 2010. Alternative community states maintained by fire in the Klamath Mountains, USA. Journal of Ecology, doi: 10.1111/j.1365-2745.2009.01597.x.

van Wagtendonk, J.W., K.A. van Wagtendonk, and A.E. Thode. 2012. Factors associated with the severity of intersecting fires in Yosemite National Park, California, USA. Fire Ecology 8: 11-32.

Below is a more detailed discussion of these studies:

Six empirical studies have been conducted in California's forests to assess the longstanding forest management assumption that the most fire-suppressed forests (i.e., the forests that have missed the largest number of fire return intervals) burn "almost exclusively high-severity", as the 2004 Sierra Nevada Forest Plan Amendment Final EIS (Vol. 1, p. 124) presumed. These studies found that the most long-unburned (most fire-suppressed) forests burned mostly at low/moderate-severity, and did not have higher proportions of high-severity fire than less fire-suppressed forests. Forests that were not fire suppressed (those that had not missed fire cycles, i.e., Condition Class 1, or "Fire Return Interval Departure" class 1) generally had levels of high-severity fire similar to, or higher than, those in the most fire-suppressed forests.

1) Figure 5 from Odion and Hanson (2006) (*Ecosystems*) [Figure 5 was also in Comment Letter), based upon the three largest fires 1999-2005, which comprised most of the total acres of wildland fire in the Sierra Nevada during that time period (using fire severity data from Burned Area Emergency Rehabilitation (BAER) aerial overflight mapping), showing that the most long-unburned, fire-suppressed forests (Condition "Class 3+", corresponding to areas that had missed more than 5 fire return intervals, and generally had not previously burned for about a century or more) experienced predominantly low/moderate-severity fire.

2) Figure 1 from Odion and Hanson (2008) (*Ecosystems*) [Figure 1 in Comment Letter] (using fire severity data from satellite imagery for the same three fires analyzed in Odion and Hanson 2006), showing that the most long-unburned, fire-suppressed forests (no fire for a century or more) burned mostly at low/moderate-severity, and had levels of high-severity fire similar to less fire-suppressed forests (in one case, even less than Condition Class 1).

3) van Wagtendonk et al. (2012) (*Fire Ecology*), analyzing 28 fires from 1973-2011 in Yosemite National Park, found the following:

"The proportion burned in each fire severity class was not significantly associated with fire return interval departure class…[L]ow severity made up the greatest proportion within all three departure classes, while high severity was the least in each departure class (Figure 4)."

The most long-unburned, fire-suppressed forests—those that had missed 4 or more fire return intervals (in most cases, areas that had not burned since at least 1930)—had only about 10% high-severity fire (Fig. 4 of van Wagtendonk e al. 2012).

4) Odion et al. (2004) (*Conservation Biology*), conducted in a 98,814-hectare area burned in 1987 in the California Klamath region, found that the most fire-suppressed forests in this area (areas that had not burned since at least 1920) burned at significantly *lower* severity levels, likely due to a reduction in combustible native shrubs as forests mature and canopy cover increases:

"The hypothesis that fire severity is greater where previous fire has been long absent was refuted by our study…The amount of high-severity fire in long-unburned closed forests was the lowest of any proportion of the landscape and differed from that in the landscape as a whole (Z = -2.62, n = 66, p = 0.004)."

5) Odion et al. (2010) (*Journal of Ecology*), empirically tested the hypothesis articulated in Odion et al. (2004)—i.e., that the *reduction* in fire severity with increasing time-since-fire was due to a reduction in combustible native shrubs as forests mature and canopy cover increases—and found the data to be consistent with this hypothesis.

6) Miller et al. (2012a) (*Ecological Applications*), analyzing all fires over 400 hectares 1987-2008 in the California Klamath region, found low proportions of high-severity fire (generally 5-13%) in long-unburned forests, and the proportion of high-severity fire effects in long-unburned forests was either the same as, or *lower than*, the high-severity fire proportion in more recently burned forests (see Table 3 of Miller et al. 2012a).

Recently, Steel et al. (2015) (Ecosphere 6: Article 8) reported modeling results that predicted a modest increase in fire severity with increasing time since fire (e.g., 12% high-severity fire at 10 years after fire up to 20% high-severity fire at 75 years post-fire). Thus, even the most long-unburned forests (>75 years since the last fire) were predicted to have mostly low/moderate-severity fire effects, contrary to the assumption upon which the 2004 Framework was based. Moreover, even the modest predicted increase in fire severity reported by Steel et al. (2015) must be viewed with great caution in light of the fact that it was based upon almost no data for mixed-conifer stands that had experienced fire less than 75 years previously (see Fig. 4 of Steel et al. 2015).

Response: Fire return interval departure is considered an indicator of risk of high severity fire (Safford and Van de Water, 2014). For semiarid conifer forests in the western US that were historically characterized by frequent, mostly low severity fire, biogenic decomposition of dead biomass is very slow, so the major fuel reduction force was (and continues to be) fire itself. Since fuel is required to ignite and carry fire, and since fire behavior, including severity, is related to the amount of available and consumable fuel (Sugihara et al. 2006, Parks et al. 2014), anything that results in increased fuel will have a tendency to increase fire severity. This is a simple principle from physics. Fire suppression has had the result of removing fire as a controller of fuel amount in many low and middle elevation forest types in the Sierra Nevada, which has led to an accumulation of fuel. Between 1984 and 2011, the fire severity data available from California show that in yellow pine and mixed conifer forests there is a strong positive relationship between fire severity and time since last fire (Steel et al. 2015).

Literature specific to fuels accumulation and fire severity were reviewed in the Trestle Forest Health Project analysis. Literature cited by the commenter was specifically reviewed and is included in the project file.

11. **Comment (Commenter 6, John Muir Project and Center for Biological Diversity)**: High-intensity fire patches, including large patches, in large fires are natural in Sierra Nevada mixed-conifer forests, and create very biodiverse, ecologically important, and unique habitat (often called "snag forest habitat"), which often has higher species richness and diversity than unburned old forest. Natural conifer forest regeneration occurs following high-intensity fire. Miller et al. (2012b) found that the current high-intensity fire rotation in Sierra Nevada montane conifer forests is 801 years; thus, within any 20-year period, for instance, only about 2.5% of the landscape is snag forest habitat ***even if*** none of it is subjected to post-fire salvage logging and artificial replanting. In contrast, the old-growth stands dominated by the largest trees, and multi-level canopy cover, CWHR class 6, comprise 1,120,000 acres—more than 10% of the forested area in the Sierra Nevada (2001 Sierra Nevada Forest Plan Amendment Final EIS, Table 4.4.2.1f). Historical mixed-conifer forests were frequently dominated by white fir and incense-cedar, and often had dense understories.

Baker, W.L. 2014. Historical forest structure and fire in Sierran mixed-conifer forests reconstructed from General Land Office survey data. Ecosphere 5: Article 79. ***(Using an enormous U.S. government field survey data set from the 1800s, it was determined that historical ponderosa pine and mixed-conifer forests of the Sierra Nevada were much denser than previously assumed, and were dominated by mixed-intensity fire, while 13-26% were open forests with low-intensity fire. These forests were highly variable in species composition too, historically, with many areas dominated by fir/cedar forests, and others dominated by pine, but with substantial fir/cedar components. High-intensity fire comprised 31-39% of fire effects historically, and high-intensity fire patches hundreds of acres in size were common, with some high-intensity fire patches reaching over 20,000 acres in size. High-intensity fire in historical forests occurred on average about every three centuries, which is much more frequent than the rate of high-intensity fire in these forests currently. Moreover, high-intensity fires occurred, in any given area, about once every 281-354 years—much more frequently than current rates).***

Bekker, M. F. and Taylor, A. H. 2010. Fire disturbance, forest structure, and stand dynamics in montane forest of the southern Cascades, Thousand Lakes Wilderness, California, USA. Ecoscience 17: 59-72. ***(In mixed-conifer forests of the southern Cascades in the Sierra Nevada management region, reconstructed fire severity within the study area was dominated by high-severity fire effects, including high-severity fire patches over 2,000 acres in size [Tables I and II]).***

Buchalski, M.R., J.B. Fontaine, P.A. Heady III, J.P. Hayes, and W.F. Frick. 2013. Bat response to differing fire severity in mixed-conifer forest, California, USA. PLOS ONE 8: e57884. ***(In mixed-conifer forests of the southern Sierra Nevada, rare myotis bats were found at greater levels in unmanaged high-severity fire areas of the McNally fire than in lower fire severity areas or unburned forest.)***

Burnett, R.D., P. Taillie, and N. Seavy. 2010. Plumas Lassen Study 2009 Annual Report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. ***(Bird species richness was***

approximately the same between high-severity fire areas and unburned mature/old forest at 8 years post-fire in the Storrie fire, and total bird abundance was greatest in the high-severity fire areas of the Storrie fire [Figure 4]. Nest density of cavity-nesting species increased with higher proportions of high-severity fire, and was highest at 100% [Figure 8]. The authors noted that "[o]nce the amount of the plot that was high severity was over 60% the density of cavity nests increased substantially", and concluded that "more total species were detected in the Moonlight fire which covers a much smaller geographic area and had far fewer sampling locations than the [unburned] green forest.")

Cocking MI, Varner JM, Knapp EE. 2014. Long-term effects of fire severity on oak-conifer dynamics in the southern Cascades. Ecological Applications 24: 94-107. ***(High-intensity fire areas are vitally important to maintain and restore black oaks in mixed-conifer forests.)***

Crotteau JS, Varner JM, Ritchie M. 2013. Post-fire regeneration across a fire severity gradient in the southern Cascades. Forest Ecology and Management 287: 103-112. ***(The authors found 710 conifer seedlings/saplings per hectare naturally regenerating in large high-severity fire patches. And, while Collins and Roller (2013) reported relatively little natural conifer regeneration in many high-severity fire areas, this is misleading in light of the fact that nearly half of the area surveyed had been subjected to intensive post-fire logging, which damages soils and removes or destroys natural seed sources, and most of the other areas had been clearcut prior to the fires (which we discovered using pre-fire remote sensing data), or were naturally non-conifer forest, e.g., black oak. The results of Collins et al. (2010 [Table 5]), who found and reported substantial natural conifer regeneration—especially ponderosa/Jeffrey pine and sugar pine—in high-intensity fire patches, excluded salvage logged areas, unlike Collins and Roller (2013). Collins et al. (2010) state that "some areas within each of these fires experienced post-fire management, ranging from post fire salvage logging, tree release and weed management. These areas were removed from analysis." (emphasis added). Specifically, Collins et al. (2010 [Table 5]) found 158 ponderosa pine and sugar pine conifers per acre regenerating in high-intensity fire patches in the Storrie fire—68% of the total natural conifer regeneration by species. Extensive natural conifer regeneration surveys deeper into the Storrie fire, at seven years post-fire, revealed abundant natural conifer regeneration, especially pine (Hanson 2007b [Tables 1 through 4, and Appendix A]). In addition, over 95% of the conifer regeneration in Collins et al. (2010) and Collins and Roller (2013) was under 0.1 cm in diameter at breast height (Collins et al. 2010); the plots used to determine the density of conifers of this size covered only 9 square meters of area per plot, and many high-intensity fire patches in the study only had 3-5 plots for an entire high-intensity fire patch (Collins and Roller 2013). This means that, even if 200-300 naturally-regenerating conifers per hectare actually existed in a given high-intensity fire patch, the methods used by Collins and Roller (2013) would be very unlikely to detect conifers, as a matter of basic math and probability.)***

DellaSala, D.A., M.L. Bond, C.T. Hanson, R.L. Hutto, and D.C. Odion. 2014. Complex early seral forests of the Sierra Nevada: what are they and how can they be managed for ecological integrity? Natural Areas Journal 34: 310-324. ***(High-intensity fire creates a post-fire habitat that is one of the rarest, most biodiverse, and most threatened of all forest habitat types: "complex early seral forest" (CESF). The authors recommend monitoring and conservation programs to recover and maintain this ecologically-vital habitat on the landscape.)***

Donato, D.C., J.B. Fontaine, W.D. Robinson, J.B. Kauffman, and B.E. Law. 2009. Vegetation response to a short interval between high-severity wildfires in a mixed-evergreen forest. Journal of Ecology 97: 142-154. ***(The high-severity re-burn [high-severity fire occurring 15 years after a previous high-severity fire] had the highest plant species richness and total plant cover, relative to high-severity fire alone [no re-burn] and unburned mature/old forest; and the high-severity fire re-burn area had over 1,000 seedlings/saplings per hectare of natural conifer regeneration.)***

Hanson, C.T. 2014. Conservation concerns for Sierra Nevada birds associated with high-severity fire. Western Birds 45: 204-212. ***(A significantly greater proportion of forest birds associated with the habitat created by high-severity fire are experiencing population declines relative to forest birds associated with unburned forest in the Sierra Nevada.)***

Hanson, C.T., and D.C. Odion. Historical forest conditions within the range of the Pacific Fisher and Spotted Owl in the central and southern Sierra Nevada, California, USA. Natural Areas Journal (in press). ***(Based upon early 20th century U.S. Forest Service field surveys, historical ponderosa pine and mixed-conifer forests of the western slope of the central and southern Sierra Nevada had a mixed-intensity fire regime, averaging 26% high-intensity fire effects in the study areas—and ranging from none in one location to 67% in another. Forests varied widely in terms of density and species composition, with some open, pine-dominated forests and many dense, pine and fir/cedar-dominated areas. Moreover, the high-intensity fire rotation interval was 222 years—much more frequent than current rates of about 800 years.)***

Hodge, W.C. 1906. Forest conditions in the Sierras, 1906. U.S. Forest Service. Eldorado National Forest, Supervisor's Office, Placerville, CA. ***(Historically in mixed-conifer and ponderosa pine forests of the western Sierra Nevada, density ranged generally from about 100 to 1000 trees per acre, and stands were often comprised mostly of white fir and incense-cedar, and were dominated by smaller trees.) (This report constitutes new information under NEPA because it was not re-discovered until recently).***

Miller, J.D., B.M. Collins, J.A. Lutz, S.L. Stephens, J.W. van Wagtendonk, and D.A. Yasuda. 2012b. Differences in wildfires among ecoregions and land management agencies in the Sierra Nevada region, California, USA. Ecosphere 3: Article 80. ***(Current high-severity fire rotation interval in the Sierra Nevada management region overall is over 800 years. The authors recommended increasing high-severity fire amounts [i.e., decreasing rotation intervals] in the Cascades-Modoc region and on the western slope of the Sierra Nevada (which together comprise most of the forest in the Sierra Nevada management region), where the current high-severity fire rotation is 859 to 4650 years [Table 3]. The authors noted that "high-severity rotations may be too long in most Cascade-Modoc and westside NF locations, especially in comparison to Yosemite…" These areas, in which the authors concluded that there is far too little high-severity fire, comprise 75% of the forests in the Sierra Nevada management region [Table 3].)***

Nagel, T.A. and Taylor, A.H. 2005. Fire and persistence of montane chaparral in mixed conifer forest landscapes in the northern Sierra Nevada, Lake Tahoe Basin, California, USA. J. Torrey Bot. Soc.132: 442-457. ***(The authors found that large high-severity fire patches were a natural part of 19th century fire regimes in mixed-conifer and eastside pine forests of the Lake Tahoe Basin, and montane chaparral created by high-severity fire has declined by 62% since the 19th century due to reduced high-severity fire occurrence. The authors expressed concern about harm to biodiversity due to loss of ecologically rich***

montane chaparral.)

Odion D.C., Hanson C.T., Arsenault A., Baker W.L., DellaSala D.A., Hutto R.L., Klenner W., Moritz M.A., Sherriff R.L., Veblen T.T., Williams M.A. 2014. Examining historical and current mixed-severity fire regimes in ponderosa pine and mixed-conifer forests of western North America. PLoS ONE 9: e87852. ***(In the largest and most comprehensive analysis ever conducted regarding the historical occurrence of high-intensity fire, the authors found that ponderosa pine and mixed-conifer forests in every region of western North America had mixed-intensity fire regimes, which included substantial occurrence of high-intensity fire. The authors also found, using multiple lines of evidence, including over a hundred historical sources and fire history reconstructions, and an extensive forest age-class analysis, that we now have unnaturally low levels of high-intensity fire in these forest types in all regions, since the beginning of fire suppression policies in the early 20th century.)***

Powers, E.M., J.D. Marshall, J. Zhang, and L. Wei. 2013. Post-fire management regimes affect carbon sequestration and storage in a Sierra Nevada mixed conifer forest. Forest Ecology and Management 291: 268-277. ***(In Sierra Nevada mixed conifer forests, the highest total aboveground carbon storage was found to occur in mature/old forest that experienced 100%tree mortality in wildland fire, and was not salvage logged or artificially replanted, relative to lightly burned old forest and salvage logged areas [Fig. 1b]).***

Shatford, J.P.A., D.E. Hibbs, and K.J. Puettmann. 2007. Conifer regeneration after forest fire in the Klamath-Siskiyous: how much, how soon? Journal of Forestry April/May 2007, pp. 139-146.

Siegel, R.B., M.W. Tingley, and R.L. Wilkerson. 2011. Black-backed Woodpecker MIS surveys on Sierra Nevada national forests: 2010 Annual Report. A report in fulfillment of U.S. Forest Service Agreement No. 08-CS-11052005-201, Modification #2; U.S. Forest Service Pacific Southwest Region, Vallejo, CA. ***("Many more species occur at high burn severity sites starting several years post-fire, however, and these include the majority of ground and shrub nesters as well as many cavity nesters. Secondary cavity nesters, such as swallows, bluebirds, and wrens, are particularly associated with severe burns, but only after nest cavities have been created, presumably by the pioneering cavity excavating species such as the Black-backed Woodpecker. Consequently, fires that create preferred conditions for Black-backed Woodpeckers in the early post-fire years will likely result in increased nesting sites for secondary cavity nesters in successive years.")***

Swanson, M.E., J.F. Franklin, R.L. Beschta, C.M. Crisafulli, D.A. DellaSala, R.L. Hutto, D. Lindenmayer, and F.J. Swanson. 2010. The forgotten stage of forest succession: early-successional ecosystems on forest sites. Frontiers Ecology & Environment 2010; doi:10.1890/090157. ***(A literature review concluding that some of the highest levels of native biodiversity found in temperate conifer forest types occur in complex early successional habitat created by stand-initiating [high severity] fire.)***

USFS (United States Forest Service). 1910-1912. Timber Survey Field Notes, 1910-1912, U.S. Forest Service, Stanislaus National Forest. Record Number 095-93-045, National Archives and Records Administration—Pacific Region, San Bruno, California, USA. ***(Surveys were conducted within unlogged forest to evaluate timber production potential in 16.2-ha (40-acre) plots within each 259.1-ha (640-acre) section in ponderosa pine and mixed-conifer forest on the westside of the Stanislaus National Forest, using one or more 1.62-ha transect per plot. Surveyors noted that surveys for individual tree size, density and species***

were not conducted in areas that had experienced high-severity fire sufficiently recently such that the regenerating areas did not yet contain significant merchantable sawtimber. Surveyors noted that the dominant vegetation cover across the majority of many 259.1-ha sections was montane chaparral and young conifer regeneration following high-severity fire. For example (from a typical township in the data set): a) T1S, R18E, Section 9 ("Severe fire went through [this section] years ago and killed most of the trees and land was reverted to brush", noting "several large dense sapling stands" and noting that merchantable timber existed on only four of sixteen 16.2-ha plots in the section); b) T1S, R18E, Section 14 ("Fires have killed most of timber and most of section has reverted to brush"); c) T1S, R18E, Section 15 (same); d) T1S, R18E, Section 23 ("Most of timber on section has been killed by fires which occurred many years ago"); T1S, R18E, Section 21 ("Old fires killed most of timber on this section and most of area is now brushland". Moreover, with regard to understory density, the USFS 1911 Stanislaus data set (USFS 1910-1912) recorded average sapling density on 72 ponderosa pine forest sections (and some mixedconifer) (each section one square mile in size), with an average density of 102 saplings per acre (252 per hectare) in sections noted as having no previous logging. This is not consistent with the assumption of very low densities of saplings historically. In addition, the 1911 Stanislaus data set also recorded percent shrub cover on 57 sections (each one square mile) in ponderosa pine forests (and some mixed-conifer), with an average of 28% shrub cover in unlogged sections within forested areas with merchantable timber. In a total of 35 sections, surveyors recorded the proportion of the one-square-mile section comprised by montane chaparral areas (which often included natural conifer regeneration in the seedling, sapling, and/or pole-sized successional stage) with no merchantable timber. These montane chaparral areas represented 12,200 acres out of a total of 22,400 acres, or about 54%. As discussed above, in many of these montane chaparral areas, the visible signs of past high-severity fire were still evident, and surveyors specifically recorded large high-severity fire patches. The total area covered by the surveys was vastly larger than the small subset analyzed in Scholl and Taylor 2010 and Collins et al. 2011.) (This report constitutes new information under NEPA because it was not discovered/revealed until recently).

Response: Early seral habitat is a successional stage that is initiated after stand replacing events. Recently burned forests can have dense patches of snags, abundant downed logs, montane chaparral patches and highly variable natural conifer regeneration (Swanson et al. 2010). Snags are created whenever a live tree dies from a mortality agent such as insects, disease or physical injury, including wind throw and fire. These components provide critical structures necessary to benefit many early seral species (Swanson et al. 2010, Collins and Roller 2013, White et al. 2013). However, early seral post-fire habitats are just one component of a complex temporal landscape. Recent research has documented the importance of within and between stand heterogeneity that represents all seral stages and maximizes the presence of numerous species (White et al. 2013). Late successional habitats dominated by conifer trees are also an important successional stage. This seral stage evolved with low to moderate intensity fire and has a limited capacity to recover after stand replacing events due to limited natural regeneration and extensive shrub cover (Collins and Roller 2013).

Early seral conditions are important, but not rare in the Sierra Nevada landscape. Assessment of shrub cover in the Sierra Nevada landscapes suggest that the overall portion of the yellow pine mixed conifer landscape occupied by shrubs today is broadly similar to, but possibly lower than the portion occupied at the beginning of the 20th century (Safford 2013). Historical accounts from Leiberg (1902) reported that chaparral covered only 5.7 percent of the area mapped (large portions of the Plumas and Tahoe NFs, and very small pieces of the Lassen, Eldorado and Lake Tahoe Basin MU).

Under the current and predicted climate scenarios early seral conditions will continue to increase on the landscape (Lenihan et al. 2008, Cole 2010). Miller et al. (2009) and Miller and Safford (2012) found “broad-scale, quantitative demonstration that the extent of forest stand replacing fire is increasing across a significant part of the western US.” This increase is driven by greatly homogenized forests with higher canopy cover and dense trees that have the ability to burn in stand replacing events transitioning them to early seral conditions. Mallek et al. (2013) found that current rates of high severity fire in yellow pine and mixed conifer forests, which constituted much of the Rim Fire area on the Stanislaus NF, are similar to probable presettlement rates of high severity fire. In other words, in these forest types there does not seem to be a deficit of early seral habitat caused by fire. Future model predictions suggest increased transition of forest to chaparral and grassland being driven by increased fire activity (Lenihan et al. 2008).

The Trestle Forest Health Project does not occur within a burned landscape with early seral conditions. Literature cited by the commenter was specifically reviewed and is included in the project file.

12. **Comment (Commenter 6, John Muir Project and Center for Biological Diversity)**: The 2004 Framework FEIS (p. 125) assumed that fire severity/intensity is increasing in Sierra Nevada forests.

New Scientific Information:

Collins, B.M., J.D. Miller, A.E. Thode, M. Kelly, J.W. van Wagtendonk, and S.L. Stephens. 2009. Interactions among wildland fires in a long-established Sierra Nevada natural fire area. Ecosystems 12:114–128. ***(No increase in high-severity fire found in the study area within Yosemite National Park.)***

Crimmins, S.L., et al. 2011. Changes in climatic water balance drive downhill shifts in plant species’ optimum elevations. Science 331:324-327. ***(Precipitation was found to be increasing [Figs. 2A and S1-C].)***

Dillon, G.K., et al. 2011. Both topography and climate affected forest and woodland burn severity in two regions of the western US, 1984 to 2006. Ecosphere 2:Article 130. ***(No increase in fire severity was found in most forested regions of the western U.S., including no increasing trend of fire severity in forests of the Pacific Northwest and Inland Northwest, which extended into the northern portion of the Sierra Nevada management region.)***

Hanson, C.T. , D.C. Odion, D.A. DellaSala, and W.L. Baker. 2009. Overestimation of fire risk in the Northern Spotted Owl Recovery Plan. Conservation Biology 23:1314–1319. ***(Fire severity is not increasing in forests of the Klamath and southern Cascades or eastern Cascades.)***

Hanson, C.T., and D.C. Odion. 2014. Is fire severity increasing in the Sierra Nevada mountains, California, USA? International Journal of Wildland Fire 23: 1-8. ***(Hanson and Odion (2014) conducted the first comprehensive assessment of fire intensity since 1984 in the Sierra Nevada using 100% of available fire intensity data, and, using Mann-Kendall trend tests (a common approach for environmental time series data—one which has similar or greater***

statistical power than parametric analyses when using non-parametric data sets, such as fire data), found no increasing trend in terms of high-intensity fire proportion, area, mean patch size, or maximum patch size. Hanson and Odion (2014) checked for serial autocorrelation in the data, and found none, and used pre-1984 vegetation data (1977 Cal-Veg) in order to completely include any conifer forest experiencing high-intensity fire in all time periods since 1984 (the accuracy of this data at the forest strata scale used in the analysis was 85-88%). Hanson and Odion (2014) also checked the approach of Miller et al. (2009), Miller and Safford (2012), and Mallek et al. (2013) for bias, due to the use of vegetation layers that post-date the fires being analyzed in those studies. Hanson and Odion (2014) found that there is a statistically significant bias in both studies (p = 0.025 and p = 0.021, respectively), the effect of which is to exclude relatively more conifer forest experiencing high-intensity fire in the earlier years of the time series, thus creating the false appearance of an increasing trend in fire severity. Interestingly, Miller et al. (2012a), acknowledged the potential bias that can result from using a vegetation classification data set that post-dates the time series. In that study, conducted in the Klamath region of California, Miller et al. used a vegetation layer that preceded the time series, and found no trend of increasing fire severity. Miller et al. (2009) and Miller and Safford (2012) did not, however, follow this same approach. Hanson and Odion (2014) also found that the regional fire severity data set used by Miller et al. (2009) and Miller and Safford (2012) disproportionately excluded fires in the earlier years of the time series, relative to the standard national fire severity data set (www.mtbs.gov) used in other fire severity trend studies, resulting in an additional bias which created, once again, the inaccurate appearance of relatively less high-severity fire in the earlier years, and relatively more in more recent years. The results of Hanson and Odion (2014) are consistent with all other recent studies of fire intensity trends in California's forests that have used all available fire intensity data, including Collins et al. (2009) in a portion of Yosemite National Park, Schwind (2008) regarding all vegetation in California, Hanson et al. (2009) and Miller et al. (2012a) regarding conifer forests in the Klamath and southern Cascades regions of California, and Dillon et al. (2011) regarding forests of the Pacific (south to the northernmost portion of California) and Northwest.)

Hanson, C.T., and D.C. Odion. Sierra Nevada fire severity conclusions are robust to further analysis: a reply to Safford et al. International Journal of Wildland Fire **24**: 294-295. ***(Safford et al. 2015 hypothesized that, if the analysis in Hanson and Odion 2014 had been restricted to wildland fires in mixed-conifer and yellow pine forests on National Forest lands, a significant upward trend in fire severity since 1984 might have been evident. Hanson and Odion (in press) empirically tested this hypothesis and found, again, no increasing trend in fire severity in the Sierra Nevada.)***

Miller, J.D., C.N. Skinner, H.D. Safford, E.E. Knapp, and C.M. Ramirez. 2012a. Trends and causes of severity, size, and number of fires in northwestern California, USA. Ecological Applications 22:184-203. ***(No increase in fire severity was found in the Klamath region of California, which partially overlaps the Sierra Nevada management region.)***

Response: Literature presented by the commenter regarding fire severity was reviewed for the Trestle project analysis (documented in the project file) in addition to other scientific publications on the topic. Many of the studies cited by the commenter were a different fire regime and forest type then the Trestle Forest Health project area. Data from Miller et al. (2012a) concludes that fire severity is increasing in the Sierra Nevada.

The Forest Service's objectives are to reduce fuel loading to reduce the threat of large, high-intensity wildfires and to increase resiliency to fires on the landscape. There are numerous studies documenting the historical occurrence of frequent, low severity fires in mixed conifer forests throughout the Sierra Nevada (Beesley 1996, Bouldin 1999, Beaty and Taylor 2008, North et al. 2009, Miller et al. 2009, Collins et al. 2011, Collins and Skinner 2014 in PSW-GTR-247 Ch. 4). Collectively these studies suggest that historical forests had a low incidence of high severity or stand replacing fire. The goal is not to prevent fires within the forest, but to modify fire behavior to lower severity, and to bring these areas back to a more historic heterogeneous structure where fire complements and sustains the system instead of destroying it.

13. **Comment (Commenter 6, John Muir Project and Center for Biological Diversity)**: The 2004 Framework assumed that home protection is best accomplished by a ¼-mile wide “Defense Zone” surrounding towns, and groups of cabins, as well as an additional 1.5-mile wide “Threat Zone” surrounding the Defense Zone.

    New Scientific Information:

    Cohen, J.D., and R.D. Stratton. 2008. Home destruction examination: Grass Valley Fire. U.S. Forest Service Technical Paper R5-TP-026b. U.S. Forest Service, Region 5, Vallejo, CA. ***(The vast majority of homes burned in wildland fires are burned by slow-moving, low-severity fire, and defensible space within 100-200 feet of individual homes [reducing brush and small trees, and limbing up larger trees, while also reducing the combustibility of the home itself] effectively protects homes from fires, even when they are more intense)***

    Gibbons, P. et al. 2012. Land management practices associated with house loss in wildfires. PLoS ONE 7: e29212. ***(Defensible space work within 40 meters [about 131 feet] of individual homes effectively protects homes from wildland fire. The authors concluded that the current management practice of thinning broad zones in wildland areas hundreds, or thousands, of meters away from homes is ineffective and diverts resources away from actual home protection, which must be focused immediately adjacent to individual structures in order to protect them.)***

    Response: Literature cited by the commenter was specifically reviewed and is included in the project file. This literature focuses on home protection during wildfire and does not factor in ecosystem considerations. The Trestle Forest Health Project is designed to address a diverse set of needs in the project area, including reducing fuel loading, improving forest health and resiliency, and encouraging hardwood and old growth forest characteristics (Purpose and Need section of the EIS, pgs. 9 to 13). Maintenance of home ignition zones on private lands is outside the scope of the project.

14. **Comment (Commenter 12, Sierra Forest Legacy)**: The Trestle project area is by no means an unmanaged landscape. Most of the operable ground with high commercial timber value within the project boundary that was not designated as PAC-habitat for spotted owl, goshawk, or great gray owl, was thinned under the CASPO interim guidelines within the past 10 to 15 years, including the majority of Trestle’s proposed commercial thin units. It is no surprise the DEIS found that, “Greater than 78% of the planning area has fuel conditions exhibiting high fuel loadings, which are capable of producing surface flame lengths greater than 4 feet, and approximately 71% of the planning area could have flame lengths in excess of 11 feet under 90th percentile weather

conditions." Studies have found that fuels treatments are effective at reducing the probability of crown fire for less than 20 years, with treatment effectiveness declining sharply after 10 years (Collins et al. 2011), at which time fuels treatment (such as maintenance burning) is necessary to maintain resiliency. Collins et al. (2011) also found that the removal of trees greater than 12 inches dbh was unnecessary to reduce the probably of crown fire. As such, the fuel conditions in the Trestle project area, especially in stands that were heavily thinned within the past 10 to 15 years, do not require the removal of large diameter trees and reductions in canopy cover to reduce fuel loading. If fact, current conditions in the units thinned over the past 15 years are such that there are few subdominant trees more than 15 years old in need of thinning to increase fire resiliency under 90^{th} percentile weather conditions. Because of this, the primary management need in these units is to remove the past 15 years of accumulated leaf and branch litter and seedling, sapling, and shrub ingrowth. Such management needs certainly do not warrant the removal of any larger saw timber and could easily be accomplished using prescribed low- and mixed-severity managed-fire, the results of which would increase heterogeneity and provide resiliency for another 10 to 15 years without compromising spotted owl viability.

Response: The assertion that removal of any larger saw timber is not warranted and that project goals could be accomplished with only the use of prescribed fire is the opinion of the commenter and is not supported by the available information on resilient landscape conditions based on NRV (Safford et al. 2013). The area of the Trestle project is high site for timber growth, meaning trees grow quickly in this forest site and therefore retreatment to maintain or continue to move stands toward desired conditions are needed more often, or more intensely than poorer sites that support less growth. CASPO thinnings conducted in the area 15 to 20 years ago, similar to thinning under the 2004 SNFPA in California spotted owl habitat is designed to be a "light" thinning so that the stand continues to provide elements of dense forest habitat identified as important for use by the owl. Treatments therefore need to be performed more regularly then if more material was removed during thinning operations to maintain stand conditions for modifying fire behavior and ensuring resilience stands with continued development and growth of residual trees. Because understory trees that were retained in the last thinning entry to continue to provide habitat elements have continued to develop and increase in size in these stands in these stands, they have now reached a size and distribution that again dominates the stand composition and has increased risk of mortality to desired residual trees for insect mortality and for wildfire. Both reduction in ladder fuels and reduction in continuity of canopy fuels allows for stand that better reflects conditions of historic fire regimes for these slopes and aspects consistent with current literature and are therefore thought to be more resilient to wildfire are needed (Lydersen et al. 2013; Collins et al. 2011b; Knapp et al. 2013; North and Lydersen, 2012).

Collins et al. 2011 cited by the commenter was a modeling exercise, which detected no real differences in modeled landscape-level burn probabilities with diameter limited scenarios. There is no conclusion in the study that removal of trees larger than 12 inches is "unnecessary". Authors hypothesize that pretreatment stand structure, intensity of thinning, or surface fuel assumptions may be the cause of the lack of modeled differences. The variable performance of fuel treatments in reducing fire severity surrounding the WUI during the Wallow Fire shows that understanding the relationship between fuel treatment design and efficacy is more complex than answering the simple question of whether mean fire severity is reduced in the treated area relative to the neighboring untreated area (Kennedy and Johnson, 2014).

References:

Collins, B.M., R.G. Everett, and S.L. Stephens. 2011b. Impacts of fire exclusion and recent managed fire on forest structure in old growth Sierra Nevada mixed-conifer forests. Ecosphere 2(4):art51.

Kennedy, Maureen, and Morris Johnson. 2014. Fuel treatment prescriptions alter spatial patterns of fire severity around the wildland-urban interface during the Wallow Fire, Arizona, USA. Forest Ecosystem and Management (318): 122-132.

Knapp, E. E., C. N. Skinner, M. P. North, and B. L. Estes. 2013. Long-term overstory and understory change following logging and fire exclusion in a Sierra Nevada mixed-conifer forest. Forest Ecology and Management 310:903–914.

Lyderson, J., and M. North. 2012. Topographic variation in structure of mixed-conifer forests under an active-fire regime. Ecosystem 15:1134-1146.

Lydersen, J., M. North, E. Knapp, and B. Collins. 2013. Quantifying spatial patterns of tree groups and gaps in mixed-conifer forests: Reference conditions and long-term changes following fire suppression and logging. Forest Ecology and Management (304): 370–382.

Safford, H.D. 2013. Natural Range of Variation (NRV) for yellow pine and mixed conifer forests in the bioregional assessment area, including the Sierra Nevada, southern Cascades, and Modoc and Inyo National Forests. Unpublished report. USDA Forest Service, Pacific Southwest Region, Vallejo, CA.

15. **Comment (Commenter 12, Sierra Forest Legacy)**: We view Trestle to be a precedent-setting project. It has been just over 20 years since the Forest Service ended clear-cut and other even-aged harvest methods in the Sierra Nevada. The Trestle project area is one of the first of its size to proposed re-thinning many units that were initially treated under the CASPO guidelines over the past 10 to 15 years. In fact, when we look at the Eldorado NF as a whole, most of the accessible and easily treatable forest stands with high timber value outside of habitat protected for wildlife have been thinned over the past 20 years. This project demonstrates the Forest Service does not intend to move from mechanical thinning to the regular use of prescribed fire as a maintenance treatment, as recommended by PSW scientists (North et al. 2012). Prescribed fire is the primary management tool to maintain high quality and resilient spotted owl habitat. This project demonstrates that one of the primary justifications the U.S. Fish and Wildlife Service made for not listing the California spotted owl in 2006 (i.e., that fuels treatments represented a short-term effect to the species) was misguided. In fact, the Trestle DEIS states:

> "Due to the backlog of understory burning across the entire Eldorado National Forest, it would be difficult to rely on prescribed burning alone to meet fuels reduction objectives. Considering the many constraints associated with prescribed burning (weather, fuels, air quality, funding, resource availability, limited operating periods, etc.), it is highly unlikely that the entire project area would meet fuels reduction objective within the same five-year time period."

While we acknowledge these constraints are often real, we also believe that these constraints are sometimes exaggerated. For instance, according to the Trestle DEIS and repeatedly affirmed on our many site visits with Forest Service staff, many of the commercial timber harvest units, including all of the units treated within the past 15 years could easily be burned using prescribed fire, suggesting fuels are not a limiting factor across the project area. In fact, the DEIS suggests that almost any unit within the project area could be treated using prescribed fire, but high fuel loading in some units require multiple low intensity prescribed burns to reach desired conditions without significant basal area mortality. It is also our experience that the Eldorado NF does not use all of the available burn windows during a given year, meaning that weather, air quality, and LOPs cannot be considered limiting factors. We ask that you demonstrate precisely how prescribed fire at a landscape scale cannot be accomplished within the Trestle project area.

Response: While theoretically prescribed fire can be used in most of the project area, several areas would not be expected to meet desired conditions for several prescribed fire entries, which would not allow the project to be accomplished during a reasonable timeframe. As described in the response to Comment 14, areas within the Eldorado are capable of growing a large amount of woody biomass in a short time, which requires more frequent, or more intense thinning treatments to maintain stand structures in desired conditions or to keep stand structures trending toward desired conditions.

While the intent of mechanical treatments is to be able to more readily use prescribe fire to maintain reduced surface fuel conditions within mechanically treated stands and to expand the use of prescribed fire outside of mechanically treated stands, there is not direction to move from mechanical treatment to prescribed fire as a maintenance for thinned stands. North (2012) suggested scaling up treatments where possible to treat entire firesheds, then converting future management to prescribed fire or managed wildfire within the fireshed. North (2012) does not suggest that areas that have been previously commercially thinned should only be maintained in the future with fire.

North et al (2015) analyzed the capability to use mechanical treatment widespread across the landscape, and found that mechanical treatments were limited by various constraints to less than 20% of most landscapes in the Sierra Nevada National Forests. Authors therefore conclude that mechanical treatments are most effective when used as anchor points to better facilitate prescribed and managed fire. The Trestle project is proposed for a landscape scale use of prescribed fire, however without having sufficiently treated anchor points with which prescribed fire can be implemented from, the increased risk and complexity of burning is reduces the ability to accomplish proposed burning for remaining areas within the landscape not proposed for mechanical treatment in this project. By replacing mechanical treatments in all previously thinned stands with prescribed fire as suggested by the commenter would defer the burning of areas outside of these anchor stands until they were sufficiently treated and would continue to extend the period of time where this landscape will continue to be at higher risk of loss to wildfire.

Because of the constraints on this landscape due to sensitive species such as the California spotted owl along with other resource protection needs treatment areas are limited as indicated to areas that primarily have been treated in the recent past. This leaves substantial fuel loading in other areas of the project outside of proposed treatment units that for the most part are proposed for treatment in this project with a combination of hand treatments and prescribed fire.

Reference:

North, M., A. Brough, J. Long, B. Collins, P. Bowden, D. Yasuda, J. Miller, and N. Sugihara. 2015. Constraints on Mechanized Treatment Significantly Limit Mechanical Fuels Reduction Extent in the Sierra Nevada. Journal of Forestry 113 (1): 40-48.

16. **Comment (Commenter 12, Sierra Forest Legacy)**: According the economic analysis report for Trestle, prescribed fire runs approximately $200/acre, while Hand Cut Pile runs approximately $1200/acre. According to the DEIS, almost any unit within the Trestle area could be burned using

prescribed fire. Even if such units needed to be burned 3 times to reach desired fuel conditions, as suggested in the DEIS, the cost of prescribed fire would still be half the cost of Hand Cut Pile. If you were to replace all of the Hand Cut Pile units (not including the 500' Hand Cut Pile buffer, which would save even more money) with 3 prescribed fire entries, Alternative 4 would save $384,000, which could be used to implement an additional 2,000 acres of prescribed burning. These 2,000 acres of additional prescribed fire could be prioritized and implemented in the two areas identified in the fuels analysis as "areas of concern" for Alternative 4 (DEIS Figures 6 and 7), thus alleviating the concern that Alternative 4 treats 1,600 acres less than Alternative 2 and negating the fuels analysis preference for Alternative 2 without changing the actual cost of the alternative.

We note that almost the entire project area is slated to be burned using prescribed fire under all of the action alternatives, which we strongly support. We also note that commercial timber harvest activities run a deficit under all of the action alternatives and all of the previously thinned commercial harvest units could easily be burned to reach resilient forest conditions with a single prescribed fire. Therefore, burning any of the previously thinned units for which the cost of the treatments directly associated with the commercial harvest is greater than the value of the timber would relegate the commercial harvest unnecessary from a fuels and economic perspective. We ask that you ensure this is not the case for any of the previously thinned units and convert any such units to "burn only" status.

Response: Removal of trees with commercial value (i.e. commercial timber harvest) is shown to be a positive value in all of the action alternatives. The additional cost of treatment associated with these units is not a cost to remove commercial sized material, but rather a need to treat surface and non-commercial ladder fuels. Removing the positive revenue associated with the commercial removal does not better enable the Forest to accomplish the work that requires additional funds within these treatment areas.

Non-commercial fuels reduction treatments within commercial thinning stands were evaluated and prescriptions were developed so that where only prescribed fire is expected to sufficiently treat surface fuels in commercial thinning units; that is the only follow-up treatment proposed. However where tractor piling and brush cutting is proposed, reduction of commercial harvest does not increase funding to perform that work, nor does it remove the need to accomplish that work to move the stands toward a desired condition for modifying fire behavior in this landscape.

Additionally, areas proposed for hand cut and pile are not feasible to prescribe burn without these pretreatments due to other resource concerns such as Watch list plant communities, protection of important wildlife use structures such as wildlife trees, snags and down logs, presence of cultural resources, and other constraining factors that limit the ability to only use fire within these stands. Outside of the 500 foot buffer around the community, the majority of areas proposed for hand thin and pile have been identified and analyzed as an "opportunity" rather than a "high priority" for accomplishment in this project. This means that if funding is acquired this work could be accomplished however, because there is not currently funding to do this work and because the "opportunity" areas are a lower priority than other areas within the project, not accomplishing this work does not increase funding to accomplish other project activities as indicated by the commenter.

17. **Comment (Commenter 7, Dick Artley):** Some IDT members claim No Action will result in the increased probability of severe wildfires. This is inconsistent with the "best science" quoted

below. Indeed, for decades USFS leaders have promised the public that agency projects will be based on "best science." Clearly this is not the case on the Eldorado National Forest.

The effects disclosures written by the IDT members all indicate selecting the No Action alternative will be a tragic mistake that will decimate, ravage and annihilate the natural resources and recreation opportunities in the sale area as a result of fire.

Opposing Views Attachment #3 contains conclusions written by 66 well respected scientists not affiliated with the USDA. They explain how harvesting an area does not reduce fire starts, fire intensity or rate of spread. Some demonstrate how logging exacerbates fire behavior. The IDT members base their No Action effects on skewed, untrue so-called fire science authored by USFS employees.

Rewrite the Environmental Consequences Chapter such that the predicted No Action effects are consistent with best science. Omit all claims that No Action will increase the probability that future fires will occur, will spread faster and be more intense.

Failure to do so will violate 40 CFR 1500.2(b) because no evidence is presented for environmental effects conclusions, 40 CFR 1501.2(a) because the environmental effects and values are not identified in detail, and without substantiating evidence for effects conclusions the public cannot determine if they are accurate and based on best science which violates 40 CFR 1500.1(b).

Response: The Environmental Consequences section of the EIS (Chapter 3) analyzes the direct, indirect, and cumulative effects of the no action and action alternatives. Under the No Action alternative (EIS, pg. 19), current management plans would continue to guide management of the project area. No commercial thinning, prescribed burning, watershed restoration activities, or other activities would be implemented under this project to accomplish the purpose and need. The effects of the No Action Alternative were disclosed for each of the resource areas in Chapter 3 of the EIS, and the analysis acknowledges the risk of fire and in some cases, the potential effects in the event a wildland fire should occur within the project area. Published literature to support the analysis is provided throughout the EIS, including literature to support the purpose and need for reducing fuel loading and increasing forest stand resilience to fire and other disturbances (pgs. 9-13). The Affected Environment sections for Forest Vegetation (pgs. 44-48) and Fire and Fuels (pgs. 54-62) use best available science and provide the rationale supporting the analysis of the No Action alternative. In no case does the effects analysis for any resource areas imply that the "alternative will be a tragic mistake that will decimate, ravage and annihilate the natural resources and recreation opportunities in the sale area as a result of fire", as the alleged by the comment.

The literature and news articles submitted in Opposing Views Attachment #3 were reviewed and considered by the Forest Service, as documented in the "Response to Opposing Views Submitted by Dick Artley" in the project file.

Hydrology

18. **Comment (Commenter 3 and 4, El Dorado County Water Agency and Grizzly Flats Community Services District)**: Forest management actions which allow increased percolation of water into the soil are imperative to the Grizzly Flats water District. Actions which reduce water uptake by trees

and other vegetation will benefit spring water production within the district. All proposed actions (Alternatives 2, 4 and 5) in the DEIS will create an improved watershed compared to no action (Alternative 1).

Response: Thank you for your comment.

19. **Comment (Commenter 5, Trout Unlimited)**: A review of the Hydrology Report indicated "Alternatives 2, 4, and 5 would increase the risk of CWE in six of the seven watersheds for at least several years. Alternative 2 would result in two watersheds at a very high risk of CWE for a longer period of time than Alternatives 4 and 5. Those two watersheds are Lower Steely Fork Cosumnes River and Clear Creek - Steely Fork Cosumnes River." If the Alternative 2 is implemented, we would ask the Agency to consider changes to the Proposed Action that would reduce the risk of CWE in these two watersheds, e.g., watershed improvements, road obliteration, etc.

Response: Much of the very high risk of CWE in the Lower Steely Fork Cosumnes River watershed is the result of existing land disturbances on private lands. As a result, the Eldorado National Forest cannot reduce the risk of CWE in that watershed. The very high risk of CWE in the Clear Creek – Steely Fork Cosumnes River watershed is largely the result of existing land disturbances on private lands and the Trestle Forest Health Project. However, the length of time the Clear Creek – Steely Fork Cosumnes River watershed would be at a high risk of CWE as a result of the Trestle Forest Health Project depends on the alternative selected (EIS, pgs. 42 and 94-95). As shown in Figure 21 of the Hydrology Report (pg. 34), Alternative 2 would result in a very high risk of CWE for more than eight years and Alternative 4 and 5 would result in a very high risk of CWE for approximately two years and four years, respectively. If Alternative 2 is selected, the Eldorado National Forest will consider measures to reduce the length of time that the watershed is at a very high risk of CWE. It should also be noted that all of the action alternatives contain design criteria to reduce impacts to aquatic features as a result of project activities, as well as restoration activities at specific sites near a number of aquatic features (EIS pgs. 21-24, 29-31).

20. **Comment (Commenter 7, Dick Artley)**: The DEIS does not contain recent stream survey data that is essential to determine whether the stream conditions were harmed by timber sale activities. The only way to determine this is before and after measurements which require survey data before the timber sale is implemented. The Proposed Action map shows many cutting units either adjacent to perennial streams. Other units have perennial streams running through them. The Proposed Action roads map shows proposed locations for temporary roads crossing perennial streams. Stream surveys must be taken before logging and road construction occurs to at least measure stream temperature and turbidity. These data would then be compared with measurements at the same locations taken during and after logging and road construction.

The DEIS fails to describe the process of comparing measurable stream data (i.e. temperature, turbidity etc.) taken during monitoring field trips while logging is occurring with the same data taken before logging. Include the measured results of recent stream surveys and display a stream monitoring schedule to be completed during and immediately following sale closure.

Response: Stream surveys were conducted for several segments of perennial streams in the project area. The results of these surveys are summarized in Table 2 of the Hydrology Report (pgs. 6-8). The actual field survey sheets are in the project file. Post-project monitoring will occur in at least one stream segment in each watershed that will be at a very high risk of Cumulative Watershed Effects as required by the 2011 Water Quality Management Handbook. The schedule of monitoring and parameters monitored has yet to be determined, and depends to some degree on the action alternative selected and the years of implementation (EIS, pg. 31 and 37).

NEPA

21. **Comment (Commenter 7, Dick Artley)**: Is there no Recreation on the Malheur NF?
This DEIS contains no section on Recreation and Scenery effects in Chapter 3. The word "recreation" is mentioned 34 times beginning on page 3. Recreation is last mentioned on page 173.

The DEIS fails to describe the effects to Recreation and scenery in Chapter 3. Without exception, EAs and EISs for timber sales written on other national forests contain effects write-ups in Chapter 3 addressing how or whether the timber sale will affect recreation and scenery. This is a legal requirement. See 40 CFR 1501.2(b), 40 CFR 1501.5(c-3), 40 CFR 1502.15, 40 CFR 1502.16 (a, b, and d), 40 CFR 1504.1 and 40 CFR 1508.8. In spite of the fact this timber sale "could" or "may" affect recreation and scenery, the predicted effects are not disclosed.

Include discussions, information and data in Chapter 3 showing the effects to recreation and scenery that will result from logging, road construction and burning that will occur as part of this project. If you feel recreation and scenery will not be affected, please describe why.

Response: The effects to recreation and visual resources have been incorporated into the EIS (pgs. 185-191). In addition, restoration activities related to dispersed recreation, roads, and trails and design criteria to minimize impacts to roads and trails is included in each of the action alternatives (EIS, pgs. 21-24 and 28-29).

22. **Comment (Commenter 7, Dick Artley)**: The Interdisciplinary Team is insufficient. There is no recreation specialist or landscape architect listed as an IDT member. Request for changes to be made to the final NEPA document: Add a recreation specialist or landscape architect to the IDT and have him/her analyze and write the effects to recreation and scenery.

Failure to have these specialists on the IDT violates 40 CFR 1507.2 because the team that prepared the Trestle Creek DEIS is not interdisciplinary and does not contain the necessary members "capable (in terms of personnel and other resources) of complying with" (a) through (f) of the law.

Response: A recreation specialist and landscape architect participated on the IDT (Project Initiation Letter dated June 12, 2012), and provided input into the proposed action, including the actions specific to the restoration items (EIS, pgs. 21-24), developed design criteria related to roads and OHV trails (EIS, pg. 28-29), and analyzed the effects of the project to recreation and visual resources (EIS on pgs. 185-191).

23. **Comment (Commenter 7, Dick Artley)**: The DEIS does not discuss how the timber sale's logging and slash/RX burning activities will be mitigated to assure protected bird species' individuals and

their habitat are not harmed in any way. It is not only possible but highly likely that that logging and slash/RX burning will: harm the birds with logging-related pollution, detrimentally alter the bird's habitat, environmentaly degrade the area surrounding the bird's habitat, and kill bird chicks by destroying their nests or eggs.

Identify the birds that exist in and near the project area that are protected under the Migratory Bird Treaty Act and discuss how these birds will be protected during burning and timber harvest operations. The Act makes no allowance to consciously harm these birds for any reason. Failure to do so will violate the Migratory Bird Treaty Act of 1918.

Response: A migratory landbird report was developed for the project (dated 02/08/2017) and has been incorporated into the FEIS (pgs. 170 to 176). It includes a discussion on the design features that will aid in enhancing or minimizing impacts to landbirds as well as potential effects of the alternatives on migratory birds, focusing on the criteria identified under the 2010 Partners in Flight North American Landbird Conservation Plan.

24. **Comment (Commenter 7, Dick Artley)**: Include a discussion and supporting data justifying why it's appropriate to take action on public land that the vast majority of the American public does not want to occur. Demonstrate why you feel the Trestle Creek timber sale serves the majority of the American people, or explain why serving the natural resource extraction corporations is more important.

Response: The purpose and need for action is described in the EIS (pgs. 9-15) and provides the justification for the proposed action and alternatives. The public involvement that was conducted for the Trestle Forest Health Project is summarized on pages 16 of the EIS and the public comments submitted during the 45-day comment period, including comments expressing support for the project are provided in this appendix (Appendix D of the EIS).

25. **Comment (Commenter 7, Dick Artley)**: Please post your responses to public comments on this online as well as maintaining a hardcopy in the Project File. Assure that all issues identified by the public are listed in the body of the NEPA document posted online and hardcopy.

Response: The response to comments is included in Appendix D of the Final Environmental Impact Statement (FEIS). The FEIS is posted on the project's website.

26. **Comment (Commenter 7, Dick Artley)**: The DEIS maps do not show the proposed cutting units and roads at a large enough scale to be meaningful to the public. The Proposed Action maps in the DEIS map at pages 62 and 63 is such a small scale (1" = 1 mile) it's worthless to members of the public. The vast majority of the public that use the Eldorado National Forest in or near the Trestle timber sale use the area for recreation.

Maps of proposed timber sales are very important to the public. To be useful and worthwhile the sale area maps should be constructed at a scale large enough for the interested public to locate their favorite areas in relation to the proposed location of new cutting units and roads.

Please redo the maps at a scale large enough for the public to locate their favorite recreation areas in the sale area. These larger scale maps should show the location of developed campgrounds and the names of the streams in the area. Public disclosure and understanding is the reason to display accurate, useable maps.

Response: Appendix A of the EIS contains maps of the proposed action and alternatives and provides a reasonable spatial depiction of proposed activities and geographic locations within the project area. Maps that were in the DEIS on pages 62 and 63 (pgs. 65-66 of the FEIS), as referred to by the commenter, were generated from fire simulation modeling (FlamMap) and were meant to provide an overview of how a potential wildland fire would move through the project area under the proposed action. These fire modeling maps were not intended to provide the location of project activities (i.e. commercial and non-commercial thinning units, hand thinning units, prescribed burn units, and restoration sites). Project area maps that include the location of activities proposed under each alternative are provided in Appendix A.

A discussion of the fire modeling methodology is provided in the Fuels and Fire Analysis Report (pgs. 9-13) and was added to the FEIS (pgs. 54-56). As described in the FEIS (page 55), FlamMap is a fire behavior mapping and analysis program that computes potential fire behavior characteristics and outputs static maps of flame length, rate of spread, crown fire type, etc. FlamMap fire mapping and analysis system is a PC-based program that describes potential fire behavior for constant environmental conditions (weather and fuel moisture). Fire behavior is calculated for each pixel within the landscape file independently, so FlamMap does not calculate fire spread across a landscape. Because environmental conditions remain constant, FlamMap will not simulate temporal variations in fire behavior caused by weather and diurnal fluctuations. Nor will it display spatial variations caused by backing or flanking fire behavior. These limitations need to be considered when viewing FlamMap output in an absolute rather than relative sense. However, outputs are well-suited for landscape level comparisons of fuel treatment effectiveness because fuel is the only variable that changes.

27. **Comment (Commenter 7, Dick Artley)**: The Trestle Creek timber sale will cause major damage to non-vegetative natural resources described by over 400 scientists in the Opposing Viewpoint Attachments. Forging ahead with the timber sale with full knowledge of the likely resource damage that the sale will cause indicates 1) weighing the relative value of the natural resources in the area against timber outputs has not been done, and 2) they have not been harmoniously coordinated. Also, since outdoor recreation, watershed, wildlife and fish are adversely affected by the sale, you obviously consider timber more important that these 4 other resources.

Response: Chapter 3 of the EIS discloses the environmental effects of the proposed action and alternatives to botany, water quality/hydrology, aquatic wildlife, terrestrial wildlife, air quality, cultural resources, recreation, and visual resources. None of the effects analysis concluded that the Trestle Forest Health Project would cause major damage to these natural and cultural resources. In addition, the comparison of alternatives table provided in the EIS (Table 2, pgs. 38 to 43), summarizes how the proposed action and alternatives achieve the purpose and need and the comparison of the effects.

The response to Opposing Views submitted by the commenter is available in the project file.

28. **Comment (Commenter 6, John Muir Project and Center for Biological Diversity)**: The 2004 Sierra Nevada Forest Plan Amendment (2004 Framework), pursuant to which the project was prepared, has been rendered obsolete and inadequate under NEPA due to significant new information. The project's purpose and need statement, and proposed prescriptions, reflect those of the 2004 Framework. Therefore, we request that you withdraw the project as currently proposed.

The 2004 Framework Has Been Rendered Inadequate and Obsolete by Significant New Information, and a Supplemental Environmental Impact Statement (SEIS), or a Sierra Nevada-wide Cumulative Effects EIS, Must Be Prepared Before Further Logging Projects May Proceed

The 2004 Framework forest plan was based upon several key assumptions and conclusions about forest ecology and management that have now been refuted or strongly challenged (and the weight of scientific evidence now indicates a different conclusion) by significant new scientific information, which requires a fundamental reevaluation of the plan under NEPA through a supplemental EIS. These issues are bioregional in nature, and are not particular to the analysis area in the EA; thus, the cumulative effects analysis in the DEIS cannot adequately analyze the impacts and cumulative effects of these issues, and a Sierra Nevada-wide EIS must be prepared to address this information and its implications for wildlife species that range throughout the Sierra Nevada mountains.

In addition, project-level supplementation would be required for any Environmental Assessment or Environmental Impact Statement that is issued pursuant to the 2004 Framework, and that is based upon the Framework's prescriptions and management assumptions/direction, as this project is.

Response: The referenced 2004 "Framework" is not an ongoing, agency action, as described in case law. Therefore, NEPA's supplementation regulations (40 CFR 1502.9(c)) do not apply to the 2004 Framework EIS; nor does NEPA require the agency to prepare a "Sierra Nevada-wide Cumulative Effects EIS." Even though the Forest Service is not required to prepare a supplemental EIS for the 2004 Framework based on new scientific information, the agency is responsible for considering new information at the project level, when such information is relevant to the project being considered. In this way, new science is addressed at the time and scale that is most relevant and practical.

The Forest Service recognizes that the state of scientific knowledge has changed since the 2004 Framework was issued and that forest plans should strive to remain consistent with the current scientific understandings. However, it is not practical to supplement programmatic EISs and revise LRMPs every time new information arises; doing so would lead to an unending loop of programmatic planning, which is also described in case law. The National Forest Management Act (NFMA) recognized the need for stability in forest planning, and envisioned that LRMP Revision would only occur every 10-15 years. The 2004 Framework is approximately 11 years old, and the region has begun to revise the LRMPs for the Sierra Nevada National Forests, with the first three plan revisions expected to be completed in 2016. It would be impractical for the agency to prepare a new EIS for the 2004 Framework while the agency is devoting its resources to revising the plans covered by the 2004 Framework through the current LRMP revision process. Until the LRMP revisions are completed for the Sierra Nevada National Forests, new scientific information and changed circumstances can be addressed in the site-specific project context, when the new information or changed circumstances are relevant to the project being considered.

Alternatives

29. **Comment (Commenter 12, Sierra Forest Legacy):** Due to the severe spotted owl decline on the Eldorado National Forest and the significant risks to the species associated with Alternative 4, we ask that you modify Alternative 4 to include all of the conservation measures outlined in the

Interim Recommendations for the Management of California Spotted Owl Habitat on National Forest System Lands (IRs; Appendix A).

We cannot, nor should we, expect mechanical fuel treatments to replace fire as the primary natural disturbance process in the mixed conifer forests of the Sierra Nevada. Perpetually degrading spotted owl habitat to generate revenue and subsidize the timber industry is a failed strategy that compromises species viability and has already placed the California spotted owl on a path to federal listing. Prescribed fire is a reasonable, feasible, and cost-effective tool available to reduce fuels, reduce wildfire risks to communities, and maintain spotted owl viability. In light of the Forest Service-wide population decline associated with management activities, the Forest Service assembled a team of scientists in wildlife, fire, and forest ecology to create the IRs with the purpose of minimizing the effects of moderate intensity timber harvests on spotted owls. Much of the information they used to develop the IRs came from the Eldorado NF. One of the primary tenets of the IRs is increasing the use of prescribed fire and minimizing the removal of large diameter trees and canopy cover in spotted owl habitat to provide for species viability and persistence and forest resilience and integrity. For these reasons, **we recommend that you revise Alternative 4 to incorporate the IRs in their entirety** and commit to the use of prescribed fire as the primary tool used to increase forest and community resiliency and provide for spotted owl viability on your forest.

Response: Alternative 4 was specifically developed to address the concerns about declining California spotted owl populations on the Eldorado National Forest, and despite the fact the Draft Interim Recommendations were not published until after the alternative was developed, is similar to the Draft IR’s in several aspects. For example, specific areas within higher quality suitable habitat (CWHR size class 4+ with $\geq$ 70% canopy cover) were excluded from commercial mechanical thinning treatments and/or are a greater distance from owl territory centers, particularly where such habitat may be limited for an owl site (EIS, pg. 124). In addition, Alternative 4 included additional acres of prescribed burning as the primary treatment, totaling approximately 11,032 acres or 54% of the project area (EIS page 24-25). The Draft IR’s are by definition interim, represent a temporary set of conditions until the conservation strategy for the California spotted owl is released, and are not mandatory for projects under analysis prior to their release (Regional Forester letter dated August 20, 2015 and February 12, 2016). Alternative 4 represents an alternative developed to meet the purpose and need of the project while reducing potential impact to the California spotted owl. As such, Alternative 4 provides a suitable option for consideration by the deciding official.

30. **Comment (Commenter 12, Sierra Forest Legacy):** The IRs were developed by a team of scientists to provide interim recommendations on changes to forest management and constitute a suite of measures that individually hold promise and support in scientific literature pertaining to owls and forest ecology. The IRs should be considered the best available science when designing and implementing a timber harvest project after May 2015. It appears that some efforts were made for the Trestle project to incorporate one of the conservation strategies outlined in the IRs. The Trestle DEIS indicates that all of the action alternatives maintain 400 acres of mature conifer forest habitat (i.e., forest habitat with greater than 70 percent canopy cover in CWHR classes 6, 5D, or 4D) within 0.7 mile of an activity center. As noted below, it is not clear if this recommendation was followed in the manner described by the IRs and there are other IRs that were not adopted. The IRs also include several significant conservation measures designed to minimize adverse effects to spotted owls from timber harvests that are not specified in the Trestle project description, including, but not limited to:

a) The IRs do not allow the 400 acres of mature forest habitat that are to be provided within each territory to be attributed to more than one territory. It is not clear if the 400 acres of mature forest habitat being provided within each territory is specific to an individual territory and acres are not being double counted in the Trestle DEIS.
b) Within each territory there should be at least 700 acres of suitable forest habitat with greater than 50% canopy cover and these acres cannot be counted toward more than one territory.
c) Mechanical treatments within the 700 acres of greater than 50% canopy cover habitat within each territory should not occur unless they are needed to maintain or improve habitat suitability in the short term (1-5 years) and must retain or enhance multi-layered structure, a diversity of diameter classes, and provide moderate to high tree canopy cover. This is likely to limit treatments to the removal of small diameter woody material through hand thinning or prescribed fire.
d) Mechanical treatments within the 700 acres of greater than 50% canopy cover habitat within each territory should not remove any overstory trees.
e) Prescribed fire should be used whenever applicable and feasible.

Based on the best available science information, these additional design measures should be incorporated into the alternative you select to ensure species viability is maintained on the Eldorado NF.

Response: See response to comment 29.

31. **Comment (Commenter 7, Dick Artley)**: Logging road construction causes significant ecological harm. Please analyze an action alternative in detail that does not construct any new roads (temporary or system). Sadly, a connected action to the timber harvest in the Proposed Action is to construct 3 miles of new road. There is enough drive-able road on national forest land to reach the moon and halfway back yet you want more! A no road construction and reconstruction alternative will likely reduce the sale volume some. However, it stands out among the possible action alternatives that should be analyzed in detail because it reduces the adverse environmental effects of logging while still meeting the purpose and need for the project. New road construction is particularly detrimental to aquatic and wildlife resources.

Analyze a no road construction (including temp roads) action alternative in detail. Just as with No Action, this alternative provides the public with the trade-off between the Proposed Action and an alternative with less volume and less environmental impact . . . especially to aquatic resources.
Failure to analyze a timber sale with no new road construction will violate 40 CFR §1500.2(e) Policy. Such an alternative is “reasonable” and will “minimize adverse effects of these actions upon the quality of the human environment.”

A no new roads alternative responds to the Proposed Action because all actions other than road construction will still occur. The area will be logged with a decrease in total volume removed.

Response: No new roads would be constructed, therefore a no new roads alternative was not analyzed in detail. Approximately 3 miles of existing unauthorized routes are proposed for use as temporary road. Temporary roads are used to access treatment units in a method that is more economical and less impactful than accessing treatment areas without the use of temporary roads. Temporary roads identified in this project allow for skidding and landings to avoid sensitive areas to access treatment stands. In all, approximately 220 acres of units identified for commercial thinning are identified to be accessed by the use of temporary roads. However, the majority of these areas could be accessed using the existing road system. Therefore reduction in the area treated by not using temporary roads would likely amount to approximately 50 acres in close proximity to private property, within WUI defense zone.

Once there is no longer a use for the temporary roads, they would be obliterated using methods such as earth barricades; ripped to alleviate soil compaction and restore infiltration; seeding, removing drainage structures; slashing; and, camouflaging road junction.

An alternative that does use temporary roads would have similar effects or negligible analysis differences from those analyzed in detail, and no adverse effects to any of the resources were noted related to the use of temporary roads.

32. **Comment (Commenter 7, Dick Artley)**: Your Proposed Action doesn't mention Dr. Cohen or his fire damage risk reduction methods. Analyze a Dr. Cohen fire damage risk reduction methods alternative in detail. Also, change the P&N to reflect the real reason the USFS should take action near the Grizzly Flat WUI. The goal as described in the P&N should not be fuels reduction. The P&N goal of this project should be to take action that will save human lives and homes before a wildfire occurs. Fuels reduction might be an alternative . . . this would include a fine fuels removal alternative.

Since his methods apply to the area several hundred feet from a home, selection of a Dr. Cohen alternative would require the USFS to distribute handouts describing the fine fuels removal methods (where and how).

Response: The Forest Service agrees that treatment immediately adjacent to homes is critical to reduce the loss of homes during a wildfire, and that treatment of the wildland does not protect homes without the treatment of fuels adjacent to homes. The Trestle project purpose and need recognizes the proximity of the National Forest to the community and the threats from a large, high intensity wildfire in this landscape, both to the private land owners and to the NFS lands within this area. The presence of homes within the area does not relinquish the need to create a resilient forest structure within this area for the management of the National Forest, though it does increase considerations by the Forest in designing and implementing treatments that also increase the ability to safely and effectively fight fire in the WUI and to protect important community infrastructure within the NFS lands. This project builds on work being conducted by neighboring landowners and by the local fire safe council.

The Wildland Urban Interface Problem: A Consequence of the Fire Exclusion Paradigm (Cohen, 2008) acknowledges that in some ecosystems, such as the ponderosa pine (Pinus ponderosa) forests in the western U.S., the reduction of fire occurrence has resulted in significant changes to the species composition and increases in the amount of live and dead vegetation which has produced fuel accumulations and arrangements that have enhanced the potential for the extensive areas of high intensity wildland fires experienced in recent years. In these areas it is important to treat not only the areas near homes, but also the wildland that those homes are built in both for the resilience of the forests and for the ability to safely and effectively fight fire in the area. As documented by Kennedy and Johnson (2014): the 2011 Wallow Fire in Arizona USA burned through recently implemented fuel treatments in the wildland surrounding residential communities in the WUI, and those fuel treatments have been credited with providing firefighter opportunities to protect residences during the Wallow Fire, and thereby preventing the loss of homes that otherwise would have been burned.

Reference:

Cohen, Jack. 2008. The Wildland- Urban Interface Fire Problem A Consequence of the Fire Exclusion Paradigm. Forest History Today. http://www.firewise.org/~/media/firewise/files/pdfs/research/cohenwuifireproblem.pdf. Last accessed 11/06/2015

Purpose and Need and Design Criteria

33. **Comment (Commenter 5, Trout Unlimited)**: We understand and appreciate the Agency's efforts to reduce fuel loading and change potential fire behavior within the project area. We also support and appreciate the elements of the project that are directed at watershed improvement and the reduction of road derived fine-grained sediment. Furthermore, we applaud the fact that the Desired Future Conditions for the watershed are articulated in the Purpose and Need.

    As previously noted, we appreciate and support the restoration efforts for dispersed recreation, roads, trails, and abandoned mines. The proposed activities should result in improved water quality and riparian habitats both within and downstream of the project area.

    Response: Thank you for your comment.

34. **Comment (Commenter 5, Trout Unlimited)**: It was noted that the Design Criteria included protections for Pacific yew during activities such as mechanical thinning and prescribed burning. We believe similar protections need to be included for riparian vegetation.

    Response: Design features under Hydrology and Aquatic Features (EIS, pgs. 29-31) would eliminate or reduce effects to riparian vegetation. These include equipment exclusion zones, not allowing direct ignition of prescribed fire within 100 feet of perennial streams, and maintaining at least 70 percent ground cover within the RCA.

35. **Comment (Commenter 5, Trout Unlimited)**: Regarding the Equipment Exclusion Zones noted in Table 1 (page 28), we support the use of slope breaks to determine the exclusion area. Such slope breaks should allow for fire and timber related activities within the RCA while at the same time protecting aquatic and riparian resources. However, we do not believe that any activities should be allowed in inner gorges unless they stabilize slopes, or promote or enhance riparian vegetation. Similarly, we are concerned with activities on slopes >35 percent; such activities should require the approval of more than one resource specialist.

    Response: As described on page 30 of the EIS, the use of ground based equipment on > 35% slope would require an onsite review and recommendation by a resource specialist (soil scientist, fisheries biologist, botanist, or hydrologist). In general, ground-based mechanical equipment would be used on slopes less than 35 percent. The in-the-field review by a resource specialist will depend upon the resource of concern and could involve one or more of the resource specialists as needed. The in-the-field review by at least one of the above-listed resources specialists is adequate to protect aquatic resources. Treatments are not anticipated to occur within inner gorges.

36. **Comment (Commenter 5, Trout Unlimited):** Design Criteria for Hydrology and Aquatic Features item d (page 29 of the DEIS) only requires the input from one individual prior to activities, specifically approval is required from a Hydrologist, Fisheries Biologist, or Soil Scientist. To ensure that aquatic and riparian resources are adequately protected, we believe that the approval of at least two of the listed specialists should be required.

    Response: As described on page 31 of the EIS, review by a hydrologist, fisheries biologist, or soils scientist is required prior to activities within the RCA, such as construction of new landings or modification of existing landings, construction of temporary roads, equipment crossings of perennial and intermittent streams, and use of EPA-approved dust palliatives. The in-the-field review by a resource specialist will depend upon the resource of concern and could involve one or more of the resource specialists as needed. The in-the-field review and recommendation of one of the above-listed resources specialists has been determined to be adequate to protect aquatic resources. All of the action alternatives comply with the requirements of the 2004 Sierra Nevada Forest Plan Amendment and the 2011 Water Quality Management Handbook.

37. **Comment (Commenter 5, Trout Unlimited)**: It is acknowledged that hazard trees in Riparian Conservation Areas (RCA) must be felled, however, there is no requirement to remove hazard trees once they are felled. To ensure that aquatic and riparian resource functionality is maintained, "sensitive areas" in RCAs along haul routes should be identified by an aquatic biologist and a hydrologist early on in the process and prior to felling activities so that once a hazard tree is identified in these areas, both the sale administrator and the purchaser would know whether those trees can be removed or need to remain in place to further recruitment of woody debris. This would potentially allow for directional felling to benefit riparian and aquatic resources. Limbs and other incidental material could be lopped and scattered per timber sale contract specifications.

    Response: Design criteria for Hydrology and Aquatic Features (EIS, pgs. 29-31 and Table 6 of the Hydrology Report, pgs. 25-26) contains fairly extensive design criteria that apply to the felling and removal of hazard trees in order to protect aquatic resources from adverse effects, including the prohibition of removing woody debris within streambanks and the limitation of felling within riparian areas.

38. **Comment (Commenter 7, Dick Artley)**: Please re-examine your Purpose & Need. It comes straight from the USFS playbook. With a few minor changes your past NEPA documents contain the same P&N. It describes the actions that must occur to change a properly functioning, biodiverse forested landscape into an area that resembles a private industrial tree farm.

    Response: The purpose and need is found in the EIS on pages 9 to 15 and describes the purpose and need for action (i.e. why here, why now) and is based on desired conditions for this landscape consistent with the 1989 Eldorado NF LRMP and 2004 Sierra Nevada Forest Plan Amendment. The proposed action and alternatives (EIS pgs. 18 to 43) describe the actions proposed to meet the purpose and need for the project and move the landscape toward desired conditions. The actions proposed under this project are intended to improve forest health and resiliency through understory thinning and prescribed burning and would maintain old-forest ecosystem components, including large trees, dense canopy cover, and multi-layered stand characteristics. The landscape would not resemble a private industrial tree farm (i.e. even-aged forest stands or plantations).

Transportation System

39. **Comment (Commenter 7, Dick Artley)**: Indicate in the final EA that all newly constructed temporary roads will be obliterated after use and apply the obliteration method that returns the ground to the natural angle of repose and eliminates the running surface.

Roads that will be used again in the future must be constructed to system road standards with surfacing and a ditch to reduce sediment generation. If the final EA does not clearly indicate that your proposed temporary roads will be obliterated such that a running surface no longer exists it will show you plan to allow these temporary roads to pump sediment for decades until the so-called temporary road is used again for the next timber sale.

On page 19 of the DEIS, you indicate temporary roads will be "obliterated using methods such as, earth barricades; ripped to alleviate soil compaction and restore infiltration; seeding, removing drainage structures; slashing; and, camouflaging road junction" after use. Since temporary roads are outsloped with no ditch, sediment that is generated during precipitation events, finds its way to streams and harms the aquatic resources for decades after initial construction … unless the road is really obliterated. No other post-use treatment method is as effective at eliminating damage to aquatic resources and subsurface water flow as obliteration. Your proposed road treatments do not obliterate these roads. The reason you aren't obliterating the temp roads is because you plan to use them again when the area is logged next time.

Response: As stated in the proposed action (EIS, page 21), approximately 3 miles of temporary roads would be used for project operations. The temporary roads would be obliterated and restored once there is no longer a use for the road under this project. Best Management Practices (BMPs), such as the installation of erosion control structures, as well as the standard contract clause related to temporary roads (G.6.3) would be implemented for this project. "After a Temporary Road has served Contractor's purpose, Contractor shall give notice to Forest Service and shall remove bridges and culverts, eliminate ditches, outslope roadbed, remove ruts and berms, effectively block the road to normal vehicular traffic where feasible under existing terrain conditions, and build cross ditches and water bars, as staked or otherwise marked on the ground by the Forest Service."

Wildlife

California Spotted Owl (CSO)

40. **Comment (Commenter 6, John Muir Project and Center for Biological Diversity)**: While we appreciate the inclusion of action alternatives that would somewhat reduce the impacts from commercial logging on California spotted owls, relative to the Proposed Action, even those alternatives pose a serious and unacceptable threat to owl populations on the Eldorado National Forest, particularly given the new scientific information described below regarding adverse impacts from logging, and the precipitous population decline of the owls on the Eldorado National Forest. Based on the new scientific evidence, even the reduced-logging alternatives would likely create a trend towards listing of this species under the ESA.

Response: The potential effects to the California spotted owl is found in the FEIS on pages 107 to 134 and acknowledges the potential impacts of understory thinning and prescribed burning on the spotted owl and references scientific literature. The analysis determined that Alternatives 2, 4, and 5 would not result in a trend toward federal listing for California spotted owl (Terrestrial Wildlife BE pp. 33-58). Literature cited by the commenter (comment 41) was specifically reviewed and is included in the project file.

41. **Comment (Commenter 6, John Muir Project and Center for Biological Diversity)**: The 2004 Framework FEIS (p. 143-144) claimed that 4.5 California spotted owl Protected Activity Centers (PACs) were "lost" to higher-intensity fire since 1999 (providing a list of the 18 PACs), and claimed that an average of 4.5 PACs were being "lost" to fire each year. The 2004 Framework Record of Decision (ROD), on page 6, echoed this claim about losses of spotted owls to fire, and concluded that increased logging intensity was necessary in order to combat the threat of fire: "[G]iven that valuable [spotted owl] habitat is at high risk of being lost to wildfire, I cannot conclude that maintaining higher levels of canopy closure and stand density everywhere is the right thing to do."

<u>*New Scientific Information*</u>:

On August 1, 2004, the Associated Press published two investigative news stories on this claim of "lost" PACs, and found that: a) these PACs were generally still occupied by spotted owls; and b) the lead U.S. Forest Service wildlife biologist had been countermanded when he informed the Forest Service that the assertions about owl PACs being lost to fire were inaccurate (see attached news stories). Further, in 2009, scientists discovered, in a radiotelemetry study, that, while California spotted owls choose unburned or low/moderate-severity fire areas for nesting and roosting, the owls *preferentially select* high-severity fire areas (that have not been salvage logged) for foraging (Bond et al. 2009). Roberts (2008) found that spotted owl reproduction rates were 60% higher in mixed-severity fire areas (not salvage logged) than in unburned forest. Moreover, Lee et al. (2012) found that mixed-severity wildland fire (with an average of 32% high-severity fire effects) does not reduce California spotted owl occupancy in Sierra Nevada forests (indeed, a number of the PACs that the 2004 Framework FEIS claimed to be "lost" remain occupied), but post-fire logging appears to reduce spotted owl occupancy considerably. Moreover, new science concludes that logging within the home range of spotted owls reduces occupancy.

Bond, M. L., D. E. Lee, R. B. Siegel, & J. P. Ward, Jr. 2009a. Habitat use and selection by California Spotted Owls in a postfire landscape. Journal of Wildlife Management 73: 1116-1124. ***(In a radiotelemetry study, California spotted owls preferentially selected high-severity fire areas, which had not been salvage logged, for foraging.)***

Bond, M.L., D.E. Lee, R.B. Siegel, and M.W. Tingley. 2013. Diet and home-range size of California spotted owls in a burned forest. Western Birds 44: 114-126 ***(Home range size of spotted owls in the McNally fire was similar to, or smaller than, home ranges in unburned forests in the Sierra Nevada, indicating high territory fitness in post-fire habitat; owls in burned forest had a diet rich in small mammals, including pocket gophers.)***

Ganey, J.L., S.C. Kyle, T.A. Rawlinson, D.L. Apprill, and J.P. Ward, Jr. 2014. Relative abundance of small mammals in nest core areas and burned wintering areas of Mexican spotted owls in the Sacramento Mountains, New Mexico. The Wilson Journal of Ornithology 126: 47-52. ***(Mexican spotted owls tended to leave unburned old forest nest cores, traveling***

up to 14 kilometers to spend the winter in mixed-intensity fire areas, where the small mammal prey base was 2 to 6 times greater than in the unburned old forest nest cores).

Lee, D.E., and M.L. Bond. 2015. Occupancy of California spotted owl sites following a large fire in the Sierra Nevada, California. The Condor 117 (in press). ***(California spotted owl occupancy in the large (approximately 257,000 acres), intense Rim fire of 2013, at one year post-fire—before logging—was 92%, which is substantially higher than average annual occupancy in unburned mature/old forest, and pair occupancy was not reduced even when most of the territory experienced high-intensity fire).***

Lee, D.E., M.L. Bond, and R.B. Siegel. 2012. Dynamics of breeding-season site occupancy of the California spotted owl in burned forests. The Condor 114: 792-802. ***(Mixed-severity wildland fire, averaging 32% high-severity fire effects, did not decrease California spotted owl territory occupancy, and probability of territory extinction was lower in mixed-severity fire areas than in unburned mature/old forest. Post-fire salvage logging largely eliminated occupancy in areas that were occupied by owls after mixed-severity fire, but before salvage logging.)***

Moors, A. 2012&2013. Occupancy and reproductive success of Mexican spotted owls in the Chiricahua Mountains. Annual reports to the Coronado National Forest, Arizona for 2012 and 2013 field seasons. ***(After a 223,000-acre fire, Mexican spotted owl occupancy increased. Reproduction also increased, particularly in the territories that had the highest levels of high-intensity fire).***

Roberts, S.L. 2008. The effects of fire on California spotted owls and their mammalian prey in the central Sierra Nevada, California. Ph.D. Dissertation, University of California at Davis. ***(California spotted owl reproduction was 60% higher in a mixed-severity fire area [no salvage logging] than in unburned mature/old forest.)***

Seamans, M.E., and R.J. Gutiérrez. 2007. Habitat selection in a changing environment: the relationship between habitat alteration and spotted owl territory occupancy and breeding dispersal. The Condor 109: 566-576. ***(The authors found that commercial logging of as little as 20 hectares, or about 50 acres, in spotted owl home ranges significantly reduced occupancy.)***

Response: The Trestle Forest Health Project does not occur within a burned landscape, although prescribed burning is proposed in each of the alternatives. The potential effects to the California spotted owl is found in the FEIS on pages 107 to 134 and acknowledges the potential impacts of understory thinning and prescribed burning on the spotted owl and references scientific literature, including literature specifically cited by the commenter. In addition, literature cited by the commenter was specifically reviewed and is included in the project file.

42. **Comment (Commenter 6, John Muir Project and Center for Biological Diversity)**: The 2004 Framework FEIS (pp. 141-142) stated that, using the most current methods, at that time, of determining California spotted owl population trend, the data indicate "a stable population" for all of the Sierra Nevada spotted owl study areas. On December 23, 2014, ecologists Monica Bond and Chad Hanson submitted a Petition to U.S. Fish and Wildlife Service to list the California spotted owl under the Endangered Species Act due to threats from commercial thinning and post-fire logging on both private and National Forest lands

(http://www.wildnatureinstitute.org/uploads/5/5/7/7/5577192/cso_fesa_petition_dec_22_2014.pdf).

New Scientific Information:

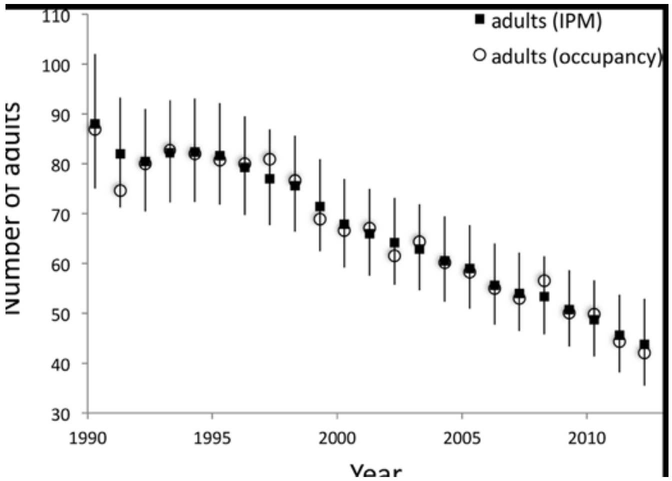
Conner, M.M., J.J. Keane, C.V. Gallagher, G. Jehle, T.E. Munton, P.A. Shaklee, and R.A. Gerrard. 2013. Realized population change for long-term monitoring: California spotted owl case study. Journal of Wildlife Management 77: 1449-1458. ***(Using a more robust statistical analysis approach than the methods used previously, the authors found that California spotted owl populations are, and have been, declining in the Sierra Nevada, based upon results from the Lassen, Sierra, and Sequoia/Kings-Canyon study areas. The Sequoia/Kings-Canyon study area was the only one with an upward population trajectory, and is the only study area in protected forests, with an active mixed-intensity fire regime, and no mechanical thinning or post-fire salvage logging. The USFS study areas (Lassen and Sierra) have had extensive fire suppression, mechanical thinning, and post-fire logging.)***

Stephens, S.L., S.W. Bigelow, R.D. Burnett, B.M. Collins, C.V. Gallagher, J. Keane, D.A. Kelt, M.P. North, L.J. Roberts, P.A. Stine, and D.H. Van Vuren. 2014. California Spotted Owl, songbird, and small mammal responses to landscape fuel treatments. BioScience (in press). ***(Areas logged through mechanical thinning and group selection on national forest lands in the northern Sierra Nevada experienced an alarming 43% decline in California spotted owl populations within just a few years).***

Tempel, DJ. 2014. California spotted owl population dynamics in the central Sierra Nevada: an assessment using multiple types of data. PhD Dissertation, University of Minnesota, St. Paul, MN.

Tempel, D.J., and R.J. Gutiérrez. 2013. Relation between occupancy and abundance for a territorial species, the California spotted owl. Conservation Biology 27: 1087-1095. ***(In the remaining Sierra Nevada study area for the California spotted owl—the Eldorado study area—the authors found that spotted owl territories have been, and are, declining significantly. This study area is characterized by extensive fire suppression, mechanical thinning, and post-fire logging.)***

Tempel, D.J., M.Z. Peery, and R.J. Gutiérrez. 2014a. Using integrated population models to improve conservation monitoring: California spotted owls as a case study. Ecological Modelling 289: 86-95.



Response: Discussion of California spotted owl population trend can be found in the EIS on pages 107-108. The Trestle Forest Health Project would not occur in a burned area, so the papers relating to owl occupancy following wildfire are not directly relevant to this EIS. The Tempel et al. (2014) paper reports a methodology for detection of the spotted owl and states, "we concluded that detection–nondetection data can provide reliable inferences on population trends, especially when funds preclude more intensive mark-recapture studies". The Conner et al. (2014) paper is also a methodology for determining population data. While the authors noted a population change, there was no claim in either paper that this was due to any particular management action.

The methodology used in the Conner paper (occupation rate at the beginning and end of a time period) to determine population change, was based on various monitoring within Northern California study areas. The metric used for the statistical analysis was based on the annual rate of population change in territorial owls from pre-existing data collected within areas with variable ownerships and differing management actions and concerns. It was not tied to internal physical variables within each of the study areas. As an example, the Eldorado Demography Study is 37 percent non-Forest Service lands; hence activities such as private resident development and private timber company harvest could have an impact on the occupancy of that study area.

There have been several statistical analyses of this sort performed on data for the California spotted owl with indications that the populations are declining despite SNFPA mitigation measures for the species. A summary of the population status and trend information can be found in Keane 2014, Conner et al. 2013, Tempel and Gutierrez 2013, and Tempel et al. 2014, but "the factors driving these population trends are not known" (p. 441 Keane 2014). Pre-and post-management monitoring actions that are analyzed, still continue to indicate that California spotted owl viability is tied to green forest canopy cover, density, and structural factors such as multistoried canopy cover, and large down wood and snags that are associated with decadence (SNAMP; and lately with the incursion of barred owls).

Tempel et al. 2014 suggest that reductions in the area of high-canopy forest resulting from either logging or high-severity wildfire could reduce the viability of California spotted owl populations and may be contributing to ongoing declines in abundance and territory occupancy.

Blakesley (2005) stated that "Site occupancy was positively associated with the amount of the nest area dominated by large trees with high canopy cover within the nest area. It was negatively associated with the amount of nonhabitat (nonforested areas and forest cover types not used for nesting or foraging) and with medium-sized trees with high canopy cover. Reproductive output was negatively related to elevation and nonhabitat within the nest area."

A recent meta-analysis of four populations of California spotted owl across the range of the Sierra Nevada failed to identify land management or climate factors strongly associated with territory occupancy or abandonment, but the amount of high-cover (>70% canopy cover) and mid-cover (between 40-69% canopy cover) forest within the territory were consistently positively correlated with occupancy (Tempel et al. 2016). The relationship between occupancy and logging and fire (prescribed or wildfire) were less well defined. Ultimately, the authors suggested that, given a core amount of untreated high-cover habitat, forest vegetation treatments to alter high-cover stands to mid-cover structure (i.e. from >70% to 40-69% canopy cover) would not be expected to have a significant impact on expected occupancy rates. For the Eldorado demographic study site, the amount of mid-cover habitat was more strongly associated with territory occupancy than was high-cover habitat.

Jones et al. (2016) report the consequence of a mega-fire on one of the demographic study areas, and concludes that California spotted owl avoid areas of high-intensity fire. The 2014 "King Fire" was one of the largest and most severe (high canopy mortality) in California's history, and burned 44% of the Eldorado demography study site. Surveys in the year following the King Fire found that owls used areas that were burned at low severity, but avoided areas that burned at high-intensity. However, these findings were not consistent with post-fire surveys by Lee and Bond (2015), who reported increased use of burned areas by owls in the "Rim Fire". The contradictory results of these studies may be due to the differences in size of high-intensity burn areas or density of owl territories between the two study sites (Tempel et al. 2016). However, the Jones et al. study reflects on over two decades of data leading up to the fire event, and thus a glimpse of the effects of stand-replacing wildfire on well-established California spotted owl territories.

Together, these recent papers indicate that carefully-designed vegetation treatments and the restoration of a more historic fire regime may improve California spotted owl habitat quality over the long-term without reducing occupancy. Reducing the risk of high-intensity wildfire may provide for longer-term persistence of territories more effectively than withholding thinning within owl habitat. This is a primary purpose of the Trestle Forest Health Project.

Blakesley, J.A., D. R. Anderson, B. R. Noon. 2006. Breeding Dispersal In the California Spotted Owl. The Condor: February 2006, Vol. 108, No. 1, pp. 71-81.

Jones, G.M., R.J. Gutierrez, D.J. Tempel, S.A. Whitmore, W.J. Berigan, and M.A. Peery. 2016. Megafires: an emerging threat to old-forest species. Frontiers in Ecology and the Environment 14(6): 300-306.

Lee, D.E. and M.L. Bond. 2015. Occupancy of California spotted owl sites following a large fire in the Sierra Nevada, California. Condor 117:228-236.

Tempel, D.J., R. J. Gutierrez, S.A. Whitmore, M.J. Reetz, R.E. Stoelting, W.J. Berigan, M.E. Seamans, M.Z Peery. 2014. Effects of forest management on California Spotted Owls: implications for reducing wildfire risk in fire-prone forests. Ecological Applications, 24(8), 2014, pp. 2089–2106.

Tempel, D.J., J.J. Keane, R.J. Gutierrez, J.D. Wolfe, G.M. Jones, A. Koltunov, C.M. Ramirez, W.J. Berigan, C.V. Gallagher, T.E. Munton, P.A. Shaklee, S.A. Whitmore, and M.Z. Peery. 2016. Meta-analysis of California Spotted Owl (*Strix occidentalis occidentalis*) territory occupancy in the Sierra Nevada: Habitat associations and their implications for forest management. Condor 118: 747-765.

43. **Comment (Commenter 12, Sierra Forest Legacy)**: Our principle concern with this project are the likely adverse impacts on spotted owls. Spotted owls on the Eldorado National Forest have declined precipitously since 1990 (Tempel et al. 2014a). Yet, the Trestle project area is one of the most important California spotted owl strongholds on the Eldorado NF. The area contains approximately 9 percent of all of spotted owl territories on the forest, including a significantly high number of territories that are continually occupied by owl pairs that exhibit high levels of reproductive success. Mechanical reductions in canopy cover have recently been found to have effects on spotted owl habitat quality that last more than 30 years (SNAMP 2015). These effects include, increasing the probability of territory abandonment (Seamans and Gutiérrez 2007) and decreasing the probability of continued reproduction and survival (Tempel et al. 2014b). However, it does not appear that mixed severity fire has any adverse effects on the species (Bond et al. 2009, Roberts et al. 2011). Of the proposed action alternatives, Alternative 4 would best provide for spotted owl viability and persistence and relies most on using prescribed fire to reduce fuels and increase forest resilience. Even so, Alternative 4 still risks territory extinction for 13 spotted owl territories in the project area.

Response: There have been several statistical analyses of this sort performed on data for the California spotted owl with indications that the populations are declining despite SNFPA mitigation measures for the species. A summary of the population status and trend information can be found in Keane 2014, Conner et al. 2013, Tempel and Gutiérrez 2013, and Tempel et al. 2014 (EIS pgs. 107-108), but "the factors driving these population trends are not known" (p. 441 Keane 2014). The effects analysis for California spotted owl within the Trestle project area can be found in the EIS on pages 112-134. The summary of effects to California spotted owl can be found in the EIS on pages 122-126 and 129-130. The analysis indicates that a relatively small proportion of available spotted owl habitat is proposed for treatment, that none of the treatments would alter the stands to such an extent that they are no longer considered suitable habitat, and that reducing canopy cover from >70% to 50-69% in territories (outside PACs) may provide a benefit to foraging owls (Tempel et al. 2016) [EIS, pgs. 124-125, 130]. The potential impacts to the California spotted owl will be considered by the Responsible Official in selecting an alternative.

44. **Comment (Commenter 12, Sierra Forest Legacy)**: Spotted owl population status and effects analysis in the DEIS and BE require updating. The spotted owl population status and effects analysis in the Wildlife BE and DEIS do not consider the results of three recent and important scientific papers: Temple et al. (2104a), Tempel et al. (2014b), and SNAMP (2015).

The most recent population trend data cited in the BE is Tempel and Gutiérrez (2013), which found a 30 percent loss of occupancy on the Eldorado NF. However, using count, occupancy, reproductive, and mark-recapture data collected from 1990 to 2012 on the Eldorado NF demographic study area (ELD), Tempel et al. (2014a) used an integrated population model (IPM) to estimate λ_t and Δ_t. Result from the IPM were more precise than the results of Tempel and Gutiérrez (2013) and found that the ELD experienced a 50 percent population decline over the 23 year study period (Figure 1).

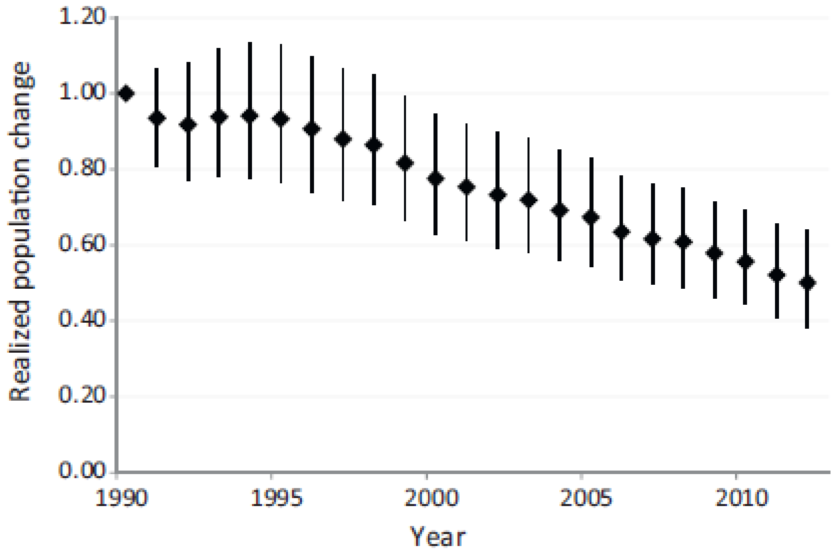


Figure 1. Posterior means (95% CRI) of realized population change from a Bayesian integrated population model for California spotted owls (*Strix occidentalis occidentalis*) in the central Sierra Nevada, 1990–2012. From Tempel et al. (2014a).

Tempel et al. (2014b) assessed the effects of forest condition, fuel reductions, and wildfire on reproduction, survival, and territory occupancy of the declining population of spotted owls in the ELD using 20 years (1992 to 2012) of demographic data collected at 74 spotted owl territories. Their results indicate that the amount of high (greater than 70 percent) canopy cover forest dominated by medium- or large-sized trees was the most important predictor of variation in demographic rates. The authors note that the positive association between spotted owl demographic rates and forests with high-canopy cover, coupled with the average loss of 10.6 hectares (7.4%) of high-canopy forest per territory on the study area from 1993-2012 suggests that habitat loss may have been at least partially responsible for the decline in abundance and territory occupancy on the study population cite in Tempel and Gutiérrez (2013).
The authors also found that medium-intensity timber harvests, characteristic of proposed fuel treatments, were negatively related to spotted owl reproduction, with reproduction appearing sensitive to modest amounts of medium-intensity harvests, declining from 0.54 to 0.45 when 20 hectares were treated within a territory. In addition, reductions in canopy cover were also associated with reductions in survival and territory colonization rates, as well as increases in territory extinction rates. Greater than 90 percent of medium intensity harvests converted high-canopy forests into lower-canopy vegetation classes, suggesting that landscape-scale fuel treatments in such stands could have negative impacts on populations of California spotted owls (Tempel et al. 2014b).

The final report for the Sierra Nevada Adaptive Management Plan (SNAMP) includes a spotted owl-specific report on the effects of forest vegetation treatments to spotted owls (SNAMP 2015). SNAMP (2015) study results suggest that mechanical fuels treatments reduced the potential for crown fire initiation across 6 percent of the study area. In contrast to this general result, crown fire potential increased following treatment from 19.7 percent to 29.3 percent for the only spotted owl territory located within the fuels treatment network. The effects of implementing mechanical fuels treatments immediately decreased the average habitat suitability throughout the study area from 0.25 to 0.23 and a difference was present after 30 years of simulated forest growth (0.37 without treatment versus 0.36 with treatment).

We ask that you include in the BE and EIS a discussion of these papers and their relevance to the Trestle Project because the status of the California spotted owls on the Eldorado National Forest is much worse than discussed in the Wildlife BE and DEIS and the effects of fuels treatment (at the nearby Last Chance SNAMP Study site) demonstrate increased significant long-term effects to owl habitat and the potential for fuels treatments exacerbate fire behavior within treated territories.

Response: The EIS (pp. 107-110, 116-117, and 123-124) and the Terrestrial Wildlife BE (pp. 33-58) considers these recent papers as well as other scientific research regarding the California spotted owl:

Jones, G.M. et al. 2016. Megafires: An Emerging Threat to Old-Forest Species. Front. Ecol. Environ. 14(6):300-306.

Peery, M.Z., R.G. Gutierrez and D.J. Tempel. 2015. Sierra Nevada Adaptive Management Project Appendix C: California Spotted Owl Team Final Report.

Tempel. D.J., M.Z. Peery. R.J. Gutierrez. 2014a. Using integrated population models to improve conservation monitoring: California spotted owls as a case study. Ecological Modelling 289 (2014) 86-95.

Tempel D., R.J. Gutiérrez, S. Whitmore, M. Reetz, R. Stoelting, W. Berigan, M.E. Seamans, and M. Z. Peery. 2014b. Effects of Forest Management on California Spotted Owls: Implications for Reducing Wildfire Risk in Fire-prone Forests. Ecological Applications.

Tempel, D.J. et al. 2016. Meta-analysis of California Spotted Owl (Strix occidentalis occidentalis) territory occupancy in the Sierra Nevada: Habitat association and their implications for forest management. The Condor. Vol. 118: 747-765.

45. **Comment (Commenter 12, Sierra Forest Legacy)**: The Eldorado National Forest has experienced the largest documented spotted owl population decline (50%) and loss of occupancy (30%) recorded in the Sierra Nevada over the past 20+ years. The effects of medium intensity timber harvests, harvests that are consistent with Forest Service fuels treatments, are at least partially responsible for the observed population decline (Tempel et al. 2014b). The decline and loss of occupancy on the Eldorado National Forest were recorded before the devastating effects of the King Fire and associated salvage logging, which undoubtedly has and will result in a population decline much greater than 50%. Mechanical fuels treatments have effects on spotted owl habitat that last at least 30 years (SNAMP 2015), a fact not cited in the Trestle DEIS or BE. Such treatments are likely to have population effects that last much longer than 30 years since this species is long lived with low fecundity and requires significant time to recover from population declines. In contrast to mechanical treatments, mixed severity fire, including low, moderate and small patches of high severity, has no discernable effect on California spotted owl occupancy (Roberts et al. 2011).

In reference to Alternative 4, the alternative most protective of the spotted owls, the BE states: "Alternative Four in combination with past high impact treatment alters 2 to 34 percent of the available suitable habitat on NFS lands within the HRCA of PACs **some of which are the most productive spotted owl sites in the analysis area.** Results from Seamans and Guitierrez (2007) suggest that habitat alteration of this magnitude may increase the risk of dispersal from these territories. Considering the uncertainties surrounding spotted owl response to treatments, the number of spotted owl sites affected by treatments, and the extent of habitat alteration in circular core areas and HRCAs, Alternative Four may result in a loss of occupancy within one or more spotted owl sites. **The increased risk of "territory extinction" is significant since it would apply to territories that have consistently supported spotted owls.**"

Response: The effects analysis for the California spotted owl was revised to reflect recent literature and public comments. Details of the analyses are provided in the Terrestrial Wildlife BE (pp. 33-58) and in the EIS (pp. 107-134). The design of wildlife surveys conducted for this project are insufficient to indicate relative reproduction across the project area. While the modification of high quality suitable habitat is associated with a greater probability of territory abandonment, new evidence suggests that, in the area around the Eldorado National Forest in particular, treatments to increase heterogeneity in HRCA or territories, while maintaining suitable habitat canopy cover and structure, may improve the likelihood of occupancy (Tempel et al. 2016). The effects analysis for California spotted owl, when considered in context of recent findings from ongoing demography studies, concluded that the actions proposed in "Alternative Four may affect individuals, but is not likely to lead to a trend towards federal listing or loss of viability for the California spotted owl" (Terrestrial Wildlife BE, pg. 55).

Tempel, D.J. et al. 2016. Meta-analysis of California Spotted Owl (Strix occidentalis occidentalis) territory occupancy in the Sierra Nevada: Habitat association and their implications for forest management. The Condor. Vol. 118: 747-765.

46. **Comment (Commenter 12, Sierra Forest Legacy)**: We would also like to point out that Alternative 2, which the BE determined would result in a trend to federal listing for spotted owl if implemented, increases the probability of territory loss on 13 spotted owl territories (BE page 73), which is the same number of territories for which the probability of territory loss would increase in Alternative 4 (BE page 81). Because the risk of territory loss is still significant, we recommend that Alternative 4 be modified to comply with the interim recommendations for spotted owl.

Response: The revised terrestrial wildlife BE for the Trestle project indicates that 18 territories would be affected by proposed commercial thinning activities under Alternative 2, and 17 would be affected under Alternative 4. The magnitude of these impacts vary, but on average 78% (Alternative 2) or 89% (Alternative 4) of HRCA suitable habitat acres would not be treated with commercial mechanical thinning (EIS pp. 122-125 and Terrestrial Wildlife BE, pp. 51-53). Under Alternative 4, most HRCAs would be commercially thinned on less than 20% of the suitable habitat available (EIS, pg. 125). Further, none of the treatments would reduce the canopy cover or structure to such an extent that the habitat is no longer suitable California spotted owl foraging habitat; on average treatments would result in at least 50% canopy cover, would not remove trees >30 inches dbh, and would retain snags consistent with forest plan guidelines. The Trestle Forest Health Project is not required to analyze an alternative consistent with the Region 5 California Spotted Owl Draft Interim Recommendations (Regional Forester Letter dated August 20, 2015 and February 12, 2016). However, in response to public input gained during the scoping process, two alternatives related to the treatment of California spotted owl territories were analyzed in detail in the EIS (Alternatives 4 and 5, EIS pp. 23-26).

47. **Comment (Commenter 12, Sierra Forest Legacy)**: It is clear from the BE that the Eldorado NF does not follow the precautionary principle when managing this imperiled raptor, as even the alternative most protective of the species results in a significant risk of territory extinction of some of the most reproductive spotted owl territories in the project area. Instead, the project design allows for the degradation of its habitat and risks "territory extinction" in the name of a multiple use mandate. This increased risk of abandonment combined with the risk of

abandonment from activities related to other projects is likely to have a substantial effect on the distribution and persistence of spotted owls across the plan area.

According to the May 2015 King Fire DEIS, 46 (21%) of the 214 spotted owl territories on the Eldorado NF burned in the King Fire. Of these, the King Fire DEIS concluded that 10 were immediately "destroyed" in the fire and between 22 and 25 territories would be adversely affected by post-fire activities, depending on the alternative selected. Based on the August 29, 2015 King Fire BE, which only analyzed the effects of Modified Alternative 2, Modified Alternative 2 would result in an average of 100 acres of treatment in 22 territories affected by the King Fire, not including the 10 territories immediately lost in the fire. Modified Alternative 2 treatments would cumulatively (combined with future foreseeable and private land actions) alter an average of 28 percent of pre-fire habitat in 22 territories, not including the 10 territories lost in the fire. The alteration of habitat from Modified Alternative 2 includes the salvage of approximately 24 percent of the pre-fire habitat that burned at low severity and 54 percent of pre-fire habitat that burned at moderate or high severity; despite numerous studies finding that low and moderate severity burned forests do not have any adverse effects on spotted owls (Bond et al. 2009, Roberts et al. 2011).

According to the Trestle and King Fire BEs, **between Trestle (13-14 territories), the King Fire itself (10 territories), and proposed King Fire "restoration" activities (22 territories), there is the potential for territory abandonment on as many as 46 (21%) of all 214 spotted owl territories on the Eldorado NF.** This potential loss of occupancy is in conjunction with the documented population decline of 50% from 1990 to 2012 on the forest (Tempel et al. 2014a). This level of cumulative impact is unacceptable and contrary to existing law and policy.

Response: The cumulative effects of the Trestle project are detailed in the Terrestrial Wildlife BE (pages 49-50, 55, 58) and the EIS (pages 113, 121-122, 124, and 129). The cumulative effects analysis accepted the current environmental conditions as a proxy for all past actions that took place in the project area. Current management and ongoing activities considered in the cumulative effects analysis included fuels reduction and forest health projects in adjacent areas, personal firewood gathering within the project area, recreation, road maintenance, fire suppression, management of noxious weeds, and activities on adjacent private lands. There are no reasonably foreseeable future actions on National Forest System lands within the project area. At the time of the analyses, there were no anticipated activities on adjacent private lands. Due to the size of the analysis area based on the Trestle project boundary, the King Fire activities are outside the scope of this project-level cumulative effects analysis.

The analyses conducted in the Trestle Terrestrial Wildlife BE made use of the available research and recommendations on the amount of suitable and high-cover habitat required to maintain California spotted owl territory occupancy. It is worth noting, as the commenter alludes to above, that changes to territory quality or other disturbances are associated with a change in the probability of territory abandonment, not a guarantee of "territory extinction". It appears that the larger the amount of habitat altered within a territory, the more likely the owls will abandon the area, but the literature indicates that many factors are involved in territory abandonment (Keane 2014, Conner et al. 2013, Tempel and Gutiérrez 2013, and Tempel et al. 2014).

Further, unlike stand-replacing events like a high-intensity fire, the treatments proposed under the Trestle project would result in comparatively short-term impacts. Disturbance effects would be mitigated through limited operating periods and would end when implementation is finished. The reduction in canopy cover or understory structure would return to pre-treatment levels in a matter of years, and would be expected to reflect a more natural structure than pre-treatment patterns given the reintroduction of prescribed fire in follow-up treatments.

Finally, some recent literature indicates that, particularly on the Eldorado demography study site, owls may prefer a slightly more open canopy (40-69% cover) within territory areas than the dense canopy associated with PAC's (>70% cover), potentially due to improved prey availability (Tempel et al. 2016). In this case, proposed thinning activities may improve owl habitat in these territories.

48. **Comment (Commenter 12, Sierra Forest Legacy)**: There is little doubt that effects of this magnitude, to so many territories, adds to what is already a trend to federal listing across the mountain range. NEPA 40 CFR §1508.7; NMFA 36 CFR §219.19 requires that you address the cumulative effects and the threat of extinction to this Forest Service sensitive and MIS from private land logging activities and actions likely to be associated with the King Fire and the Trestle Project. The Trestle NEPA documents do not adequately address the effects of the King Fire on the forest-wide population of spotted owls. Conversely, the King Fire NEPA documents do not address the potential effects of the Trestle project on spotted owls.

Response: See also response to comment 47. The cumulative effects of the Trestle project are detailed in the Terrestrial Wildlife BE (pages 49-50, 55, 58) and the EIS (pages 113, 121-122, 124, and 129). The cumulative effects analysis accepted the current environmental conditions as a proxy for all past actions that took place in the project area. Current management and ongoing activities considered in the cumulative effects analysis included fuels reduction and forest health projects in adjacent areas, personal firewood gathering within the project area, recreation, road maintenance, fire suppression, management of noxious weeds, and activities on adjacent private lands. There are no reasonably foreseeable future actions on National Forest System lands within the project area. At the time of the analyses, there were no anticipated activities on adjacent private lands. Due to the size of the analysis area based on the Trestle project boundary, the King Fire activities are outside the scope of this project-level cumulative effects analysis.

The analyses complied with 40 CFR §1508.7 by considering all past actions in the current condition, plus present and anticipated actions within the analysis area.

Pacific Fisher

49. **Comment (Commenter 6, John Muir Project and Center for Biological Diversity):** The 2004 Framework FEIS (pp. S-15, 138, 243, and 246) assumed that mixed-severity fire, including higher-severity fire patches, was a primary threat to Pacific fishers, and the Framework FEIS (p. 242) did not include density of small/medium-sized trees among the important factors in its assessment of impacts to fishers. The U.S. Fish and Wildlife Service, in the fall of 2014, proposed to list the southern Sierra Nevada population of Pacific fishers as Threatened under the Endangered Species Act.

New Scientific Information:

The data indicate that one of the top factors predicting fisher occupancy is a very high density of small/medium-sized trees, including areas dominated by fir and cedar, and that Pacific fishers may benefit from some mixed-severity fire.

Garner, J.D. 2013. Selection of disturbed habitat by fishers (*Martes pennanti*) in the Sierra National Forest. Master's Thesis, Humboldt State University. ***(Fishers actively avoided mechanically thinned areas when the scale of observation was sufficiently precise to***

determine stand-scale patterns of selection and avoidance—generally less than 200 meters).

Hanson, C.T. 2013. Pacific fisher habitat use of a heterogeneous post-fire and unburned landscape in the southern Sierra Nevada, California, USA. The Open Forest Science Journal 6: 24-30. ***(Areas used by Pacific fishers in fire areas have a significantly higher proportion of higher-severity fire (50-100% basal area mortality) within a 500 meter radius than random locations along survey transects within fires. Pacific fishers are using pre-fire mature/old forest that experienced moderate/high-severity fire at about the same levels as they are using unburned mature/old forest. When fishers are near fire perimeters, they strongly select the burned side of the fire edge.)***

Hanson, C.T. 2015. Use of higher-severity fire areas by female Pacific fishers on the Kern Plateau, Sierra Nevada, California, USA. The Wildlife Society Bulletin (in press). ***(Using a Pacific fisher scat-detection approach, the current hypothesis among land managers that fishers will avoid higher-intensity fire areas was rejected, and fishers used unlogged higher-intensity fire areas at levels comparable to use of unburned dense, mature/old forest. Female fishers demonstrated a significant selection in favor of the large, intense McNally fire over adjacent unburned mature/old forest, and the highest frequency of female fisher scat detection was over 250 meters into the interior of the largest higher-intensity fire patch (over 12,000 acres).***

Underwood, E.C., J.H. Viers, J.F. Quinn, and M. North. 2010. Using topography to meet wildlife and fuels treatment objectives in fire-suppressed landscapes. Environmental Management 46: 809-819. ***(Fishers are selecting the densest forest, dominated by fir and cedar, with the highest densities of small and medium-sized trees, and the highest snag levels.)***

Zielinski, W.J., R.L. Truex, J.R. Dunk, and T. Gaman. 2006. Using forest inventory data to assess fisher resting habitat suitability in California. Ecological Applications 16: 1010-1025. ***(The two most important factors associated with fisher rest sites are high canopy cover and high densities of small and medium-sized trees less than 50 cm in diameter [Tables 1 and 3].)***

Zielinski, W.J., J.A. Baldwin, R.L. Truex, J.M. Tucker, and P.A. Flebbe. 2013. Estimating trend in occupancy for the southern Sierra fisher (*Martes pennanti*) population. Journal of Fish and Wildlife Management 4: 1-17. ***(The authors investigated fisher occupancy in three subpopulations of the southern Sierra Nevada fisher population: the western slope of Sierra National Forest; the Greenhorn mountains area of southwestern Sequoia National Forest; and the Kern Plateau of southeastern Sequoia National Forest area, using baited track-plate stations. The Kern Plateau area is predominantly post-fire habitat [mostly unaffected by salvage logging] from several large fires occurring since 2000, including the Manter fire of 2000 and the McNally fire of 2002. The baited track-plate stations used for the study included these fire areas [Fig. 2]. Mean annual fisher occupancy at detection stations was lower on Sierra National Forest than on the Kern Plateau. Occupancy was trending downward on Sierra National Forest, and upward on the Kern Plateau, though neither was statistically significant, possibly due to a small data set.)***

Response: The FEIS discusses the project in terms of Fisher on pages 141-144. Fisher are currently absent from the Central Sierra Nevada, including the Trestle Forest Health project area. The suitability of the project area for fisher is limited by high public use, habitat fragmentation, high density of road areas, and private property composed of urban development.

Black-backed Woodpecker (BBWO)

50. **Comment (Commenter 6)**: The 2004 Framework FEIS did not recognize any significant conservation threats to the Black-backed Woodpecker, and the 2004 Framework ROD (p. 52) allowed post-fire clearcutting in 90% of any given fire area, and allowed up to 100% of high-severity fire areas to be subjected to post-fire clearcutting by requiring retention of only 10% of the total fire area unlogged (i.e., the 10% retention can be in low-severity fire areas).

New Scientific Information:

Black-backed Woodpeckers rely upon large patches (generally at least 200 acres per pair) of recently killed trees (typically less than 8 years post-mortality) with very high densities of medium and large snags (usually at least 80-100 per acre), and any significant level of post-fire salvage logging largely eliminates nesting and foraging potential. Moreover, Hanson et al. (2012) (the Black-backed Woodpecker federal Endangered Species Act listing petition) found that there are likely less than 700 pairs of Black-backed Woodpeckers in the Sierra Nevada, and they are substantially threatened by ongoing fire suppression, post-fire salvage logging, mechanical thinning "fuel reduction" logging projects, and possibly climate change. On April 8, 2013, the U.S. Fish and Wildlife Service determined that the Sierra Nevada and eastern Oregon Cascades population of this species may be warranted for listing under the ESA. In addition, in the fall of 2012, the Forest Service determined that there is a significant concern about the conservation of Black-backed Woodpecker populations, in light of new scientific information indicating that current populations may be dangerously low and that populations are at risk from continued habitat loss due to fire suppression, post-fire logging, and mechanical thinning, recommending some key conservation measures to mitigate impacts to the population (Bond et al. 2012).

Bond, M.L., R.B. Siegel, and D.L. Craig. 2012. A Conservation Strategy for the Black-backed Woodpecker (*Picoides arcticus*) in California—Version 1.0. The Institute for Bird Populations, Point Reyes Station, California, For: U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. ***(Conservation recommendations include: a) identify the areas of the highest densities of larger snags after fire, and do not salvage log such areas (Recommendation 1.1); b) in areas where post-fire salvage logging does occur, do not create salvage logging patches larger than 2.5 hectares in order to maintain some habitat connectivity and reduce adverse impacts on occupancy (Recommendation 1.3); c) maintain dense, mature forest conditions in unburned forests adjacent to recent fire areas in order to facilitate additional snag recruitment (from beetles radiating outward from the fire) several years post-fire, which can increase the longevity of Black-backed Woodpecker occupancy in fire areas (Recommendation 1.4); d) do not conduct post-fire salvage logging during nesting season, May 1 through July 31 (Recommendation 1.5)); and e) maintain dense, mature/old unburned forests in order to facilitate high quality Black-backed Woodpecker habitat when such areas experience wildland fire (Recommendation 3.1).***

Burnett, R.D., P. Taillie, and N. Seavy. 2011. Plumas Lassen Study 2010 Annual Report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. ***(Black-backed Woodpecker nesting was eliminated by post-fire salvage. See Figure 11 [showing nest density on national forest and not yet subjected to salvage logging versus private lands that had been salvage logged.)***

Burnett, R.D., M. Preston, and N. Seavy. 2012. Plumas Lassen Study 2011 Annual Report. U.S. Forest Service, Pacific Southwest Region, Vallejo, CA. ***(Black-backed Woodpecker potential occupancy rapidly approaches zero when less than 40-80 snags per acre occur, or are retained (Burnett et al. 2012, Fig. 8 [occupancy dropping towards zero when there are fewer than 4-8 snags per 11.3-meter radius plot—i.e., less than 4-8 snags per 1/10th-acre, or less than 40-80 snags per acre.)***

Hanson, C. T. and M. P. North. 2008. Postfire woodpecker foraging in salvage-logged and unlogged forests of the Sierra Nevada. Condor 110: 777–782. ***(Black-backed Woodpeckers selected dense, old forests that experienced high-severity fire, and avoided salvage logged areas [see Tables 1 and 2].)***

Hutto, R. L. 2008. The ecological importance of severe wildfires: Some like it hot. Ecological Applications 18:1827–1834. ***(Figure 4a, showing about 50% loss of Black-backed Woodpecker post-fire occupancy due to moderate pre-fire logging [consistent with mechanical thinning] in areas that later experienced wildland fire.)***

Odion, D.C., and Hanson, C.T. 2013. Projecting impacts of fire management on a biodiversity indicator in the Sierra Nevada and Cascades, USA: the Black-backed Woodpecker. The Open Forest Science Journal 6: 14-23. ***(High-severity fire, which creates primary habitat for Black-backed Woodpeckers, has declined >fourfold since the early 20th century in the Sierra Nevada and eastern Oregon Cascades due to fire suppression. Further, the current rate of high-severity fire in mature/old forest (which creates primary, or high suitability, habitat for this species) in the Sierra Nevada and eastern Oregon Cascades is so low, and recent high-severity fire in mature/old forest comprises such a tiny percentage of the overall forested landscape currently (0.66%, or about 1/150th of the landscape), that even if high-severity fire in mature/old forest was increased by several times, it would only amount to a very small proportional reduction in mature/old forest, while getting Black-backed Woodpecker habitat closer to its historical, natural levels. Conversely, the combined effect of a moderate version of current forest management—prefire thinning of 20% of the mature/old forest (in order to enhance fire suppression) over the next 27 years, combined with post-fire logging of one-third of the primary Black-backed Woodpecker habitat, would reduce primary Black-backed Woodpecker habitat to an alarmingly low 0.20% (1/500th) of the forested landscape, seriously threatening the viability of Black-backed Woodpecker populations.)***

Odion D.C., Hanson C.T., Arsenault A., Baker W.L., DellaSala D.A., Hutto R.L., Klenner W., Moritz M.A., Sherriff R.L., Veblen T.T., Williams M.A. 2014. Examining historical and current mixed-severity fire regimes in ponderosa pine and mixed-conifer forests of western North America. PLoS ONE 9: e87852. ***(High-severity fire has declined fourfold in the Sierra Nevada since the early 20th century, due to fire suppression.)***

Rota, C.T. 2013. Not all forests are disturbed equally: population dynamics and resource selection of Black-backed Woodpeckers in the Black Hills, South Dakota. Ph.D. Dissertation, University of Missouri-Columbia, MO. (***Rota (2013) finds that Black-backed Woodpeckers only maintain stable or increasing populations (i.e., viable populations) in recent wildland fire areas occurring within dense mature/older forest (which have very high densities of large wood-boring beetle larvae due to the very high densities of medium/large fire-killed trees). And, while Black-backeds are occasionally found in unburned forest or prescribed burn areas, unburned "beetle-kill" forests (unburned forest areas with high levels of tree***

mortality from small pine beetles) and lower-intensity prescribed burns have declining populations of Black-backed Woodpeckers (with the exception of a tiny percentage of beetle-kill areas). The study shows that unburned beetle-kill forests do not support viable populations, but very high snag-density beetle-kill areas tend to slow the population decline of Black-backed Woodpeckers in between occurrences of wildland fire. Population decline rates are alarmingly fast in low-intensity prescribed burn areas, indicating that such areas do not provide suitable habitat. Black-backed Woodpeckers are highly specialized and adapted to prey upon wood-boring beetle larvae found predominantly in recent higher-severity wildland fire areas. Moreover, while Black-backed Woodpeckers are naturally camouflaged against the charred bark of fire-killed trees, they are more conspicuous in unburned forests, or low-severity burned forests, and are much more vulnerable to predation by raptors in such areas. For this reason, even when a Black-backed Woodpecker pair does successfully reproduce in unburned forest or low-severity fire areas, both juveniles and adults have much lower survival rates than in higher-severity wildland fire areas.)

Saab, V.A., R.E. Russell, and J.G. Dudley. 2009. Nest-site selection by cavity-nesting birds in relation to postfire salvage logging. Forest Ecology and Management 257: 151–159. ***(Black-backed Woodpeckers select areas with about 325 medium and large snags per hectare [about 132 per acre], and nest-site occupancy potential dropped to near zero when snag density was below about 270 per hectare, or about 109 per acre [see Fig. 2A, showing 270 snags per hectare as the lower boundary of the 95% confidence interval].)***

Seavy, N.E., R.D. Burnett, and P.J. Taille. 2012. Black-backed woodpecker nest-tree preference in burned forests of the Sierra Nevada, California. Wildlife Society Bulletin 36: 722-728. ***(Black-backed Woodpeckers selected sites with an average of 13.3 snags per 11.3-meter radius plot [i.e., 0.1-acre plot], or about 133 snags per acre.)***

Siegel, R.B., M.W. Tingley, and R.L. Wilkerson. 2011. Black-backed Woodpecker MIS surveys on Sierra Nevada national forests: 2010 Annual Report. A report in fulfillment of U.S. Forest Service Agreement No. 08-CS-11052005-201, Modification #2; U.S. Forest Service Pacific Southwest Region, Vallejo, CA. ***(Black-backed woodpecker occupancy declines dramatically by 5-7 years post-fire relative to 1-2 years post-fire, and approaches zero by 10 years post-fire [Fig. 15a].)***

Siegel, R.B., M.W. Tingley, R.L. Wilkerson, M.L. Bond, and C.A. Howell. 2013. Assessing home range size and habitat needs of Black-backed Woodpeckers in California: Report for the 2011 and 2012 field seasons. Institute for Bird Populations. ***(Black-backed woodpeckers strongly select large patches of higher-severity fire with high densities of medium and large snags, generally at least 100 to 200 hectares (roughly 250 to 500 acres) per pair, and post-fire salvage logging eliminates Black-backed woodpecker foraging habitat [see Fig. 13, showing almost complete avoidance of salvage logged areas]. Suitable foraging habitat was found to have more than 17-20 square meters per hectare of recent snag basal area [pp. 45, 68-70], and suitable nesting habitat was found to average 43 square meters per hectare of recent snag basal area and range from 18 to 85 square meters to hectare [p. 59, Table 13]. Moreover, Appendix 2, Fig. 2 indicates that the Sierra Nevada population of Black-backed Woodpeckers is genetically distinct from the Oregon Cascades population, though additional work needs to be conducted to determine just how distinct the two populations are. Siegel et al. 2013 also found that the small number of Black-backed Woodpeckers with mostly unburned forest home ranges had home ranges far larger than those in burned forest, and that the birds in unburned forest were traveling more than twice as far as those***

in burned forest in order to obtain lesser food than those in burned forests, indicating that such areas do not represent suitable, viable habitat for this species.)

Tarbill, G.L. 2010. Nest site selection and influence of woodpeckers on recovery in a burned forest of the Sierra Nevada. Master's Thesis, California State University, Sacramento. ***(In post-fire eastside pine and mixed-conifer forests of the northern Sierra Nevada, Black-backed woodpeckers strongly selected stands with very high densities of medium and large snags, with well over 200 such snags per hectare on average at nest sites [Table 2], and nesting potential was optimized at 250 or more per hectare, dropping to very low levels below 100 to 200 per hectare [Fig. 5b].)***

USFWS. 2013. 90-day Finding on a Petition to List Two Populations of Black-backed Woodpecker as Threatened or Endangered. U.S. Fish and Wildlife Service, Washington, D.C., April 9, 2013. ***(USFWS (2013), on page 14, "conclude[d] that the information provided in the petition or in our files present substantial scientific or commercial information indicating that the petitioned action may be warranted for the Oregon Cascades-California and Black Hills populations of the black-backed woodpecker due to the present or threatened destruction, modification, or curtailment of the populations' habitat or range as a result of salvage logging, tree thinning, and fire suppression activities throughout their respective ranges." USFWS (2013), on page 19, also "conclude[d] that the information provided in the petition and available in our files provides substantial scientific or commercial information indicating that the petitioned action may be warranted due to small population sizes for the Oregon Cascades-California and Black Hills populations, and due to climate change for the Oregon Cascades-California population." USFWS (2013), at pages 18-19, concluded that substantial scientific evidence indicates that current populations may be well below the level at which a significant risk of extinction is created based upon Traill et al. (2010), and concluded that, while some climate models predict increasing future fire, others predict decreasing future fire (due to increasing summer precipitation), and, in any event, models predict a shrinking acreage of the middle/upper-elevation conifer forest types upon which Black-backed Woodpecker depend most (range contraction).)***

Response: Regarding new articles published about the black-backed woodpecker, the agency is responsible for considering new information at the project level, when such information is relevant to the project being considered. Literature being provided by the commenters has been reviewed and addressed as it pertains to the effects of the project on the black-backed woodpecker (project file). The Trestle Forest Health Project does not occur within burned forest habitat, so most of this literature is not applicable to the project. However, an effects analysis for the black-backed woodpecker can be found in the EIS (pp. 151-154) in response to scoping comments expressing concern pertaining to live green trees; particularly large and dense patches of trees and how they could contribute to future black-backed woodpecker habitat should a wildfire alter the landscape to favor preferred nesting and foraging habitat.

Pollinators

51. **Comment (Commenter 11, Environmental Protection Agency):** EPA appreciates that the DEIS acknowledges the importance of the Western bumble bee and its sensitivity to pesticides. On June 20, 2014, President Obama issued a memorandum directing Federal departments and agencies to evaluate and use their resources, facilities, and land management responsibilities to expand

knowledge of pollinator health and to increase habitat quality and availability. While the DEIS acknowledges impacts to pollinators, such as bumblebees, it is unclear what measures, if any, would be implemented during the initial action to mitigate such impacts. We note that the Forest Service's May 2015 draft "Pollinator-Friendly Best Management Practices for Federal Lands," which was released in response to the President's Memorandum, includes best management practices for management actions involving the use of pesticides and prescribed burning. We recommend that the FEIS incorporate those BMPs into the propose project, as appropriate, to support the health of all pollinators and their affected habitats.

Response: BMPs regarding pesticide use is not applicable as pesticides are not included in the proposed action. Prescribed burns may produce a short-term threat to the Western bumble bee which will be mitigated following the Draft Pollinator-Friendly Best Management Practices for Federal Lands. After treatments, alternatives 2, 4, and 5 may provide additional bumble bee habitat due to the decreased canopy cover and increased meadow restoration which promote the growth of herbs and shrubs.

Support for an Alternative

52. **Comment (Commenter 1 and 9, Grizzly Flats Fire Safe Council and El Dorado County Fire Safe Council):** The Grizzly Flats Fire Safe Council strongly recommends selecting and implementing the Preferred Alternative (Alternative 2) described in the TFHP DEIS on pages 17 thru 22. The GFFSC finds Alternative 2 the most aggressive and therefore effective alternative in addressing the overall project objective of reducing the potential loss of important ecosystem components to high severity fire, to improving forest health, and to increasing the resilience of stands to insects and diseases.

- The hand crew work of 'hand cut pile' (piling and burning) the understory vegetation within the first 500 feet of the community's private property boundaries will minimize the potential threat of a prescriptive fire ("Fire Priority Burn Only") escaping its boundary and accessing the community at the community's southern boundary (the design for both Alternative 4 and 5). The full length of the community's southern boundary is down-slope to the south into the National Forest and the Steely Fork of the Cosumnes River. The prevailing winds are from the southwest out of the Steely Fork drainage.
- Alternative 2 is reported to reduce the largest number of trees per acre and thereby opens the most canopy cover. This provides a dual benefit of reducing landscape fire danger while increasing the amount of water and snow accessing the ground where it can percolate into the ground water system. This valuable increase of water and snow access to the ground water system is important to Grizzly Flats as it is the Canyon Creek and North Canyon Creek watersheds immediately east of the community which supplies the community with its drinking water as well as fire hydrant water for firefighting.
- Alternative 2 fuel reduction includes the most forest thinning with follow-up pile burning and prescribed fire to reduce surface fuels, remove non-commercial small trees, reduce ladder fuels, and reduce crown bulk density of over-story trees. This greater amount of fuel reduction in Alternative 2, as compared with 4 and 5, will reduce crown fire activity and will create a decreased the potential for embers flying into untreated stands and/or into the community.
- County wide fire history identifies the greatest potential for fire ignition is along roadsides. Cutting and removing the roadside vegetation currently encroaching on National Forest system roads will greatly reduce the chance for fire ignition from vehicle traffic. Leoni Road and Capps Crossing Road, both located within the proposed TFHP,

are designated as potential emergency evacuation routes for the Grizzly Flats community, as well as, being an ingress for firefighting equipment and personnel when a wildland fire has closed the community's primary evacuation and access route to/from the west.

Response: The Responsible Official will consider your input.

53. **Comment (Commenter 2, Leoni Meadows Camp):** I would like to throw my support behind alternative #2. I believe this would do the greatest good as far as fire prevention and fire safety is concerned. It also has the added bonus of having enough logging in the project to mitigate some of the project costs.

    I am also in favor of the clearing around Leoni Meadows property boundary that alternative #2 is proposing. That would be a nice addition to the other benefits of the project.

    Response: The Responsible Official will consider your input.

54. **Comment (Commenter 3 and 4, El Dorado County Water Agency and Grizzly Flats Community Services District)**: The El Dorado County Water Agency Board of Directors and Grizzly Flats Community Services District strongly recommends selecting and implementing the Preferred Alternative (Alternative 2) described in the DEIS on pages 17 - 22. We support GFCSD's recommendation of this alternative because:
    - This alternative most aggressively reduces the number of stems per acre. The reduced basal area of trees per acre will reduce transpiration water loss, thereby allowing more water to stay in the ground.
    - This alternative is most likely to reduce canopy cover. More dense canopies can intercept rain and snow facilitating evaporation of water before it has a chance to percolate into the soil.
    - This alternative will be best for reducing fire danger. Fires usually result in greater runoff and sediment transport. These can reduce percolation of water into the soil and reduce the quality of runoff.

    Response: The Responsible Official will consider your input.

55. **Comment (Commenter 10, Sierra Pacific Industries):** Sierra Pacific Industries is supportive of the Trestle Forest Health Project, and encourages the USFS to adopt (Alternative 2). When you take into consideration the devastating wildfires that we have had recently in our area, (American Fire, Rim Fire, and mostly recently the King Fire), it is clear that a more aggressive approach towards fuels reduction and forest health improvements is needed.

    We are pleased to see that the protection of Grizzly Flat, Leoni Meadows and other private landowners are at the forefront of the Purpose and Need for Action. Grizzly Flat has a population a little over 1,200 people and Leoni Meadows hosts a number of camps right in the middle of fire season, with as many as a few hundred individuals occupying the property. It is our opinion that when it comes to public safety and the protection of private property the most aggressive fuels reduction activities should be implemented. Although, Alternative 2 may not be aggressive enough, it does provide the greatest degree of protection to Grizzly Flat and Leoni Meadows.

In light of California's current drought conditions, the need to improve forest health and to restore a composition of tree species and size classes that is more resilient to disturbance by applying appropriate silvicultural techniques to increase age class diversity and to favor species better adapted to disturbances typical of this forest type, so that stands are likely to be more sustainable into the future could not be a more important need. The results of this drought can be seen all over the forested landscape, pockets of dead and dying trees are showing up in record levels. National Forest lands are in desperate need of active aggressive management and can't afford projects that take a timid approach to forest health. Alternative 2 best meets the needs to improve forest health within the project area.

The need for protecting, increasing, and perpetuating old-forest ecosystem habitat components, and for conserving their wildlife species can be achieved by fulfilling needs: 1, 2, and 5, as described in the Purpose and Need for Action. The protection of old-forest habitat and it's wildlife can be accomplished by; reducing fuel loads, improving forest health, and doing so by implementing cost-effective treatments through economically viable projects. There is a real threat of losing these old-forest habitats to catastrophic wildfire and Alternative 2 provides the most acres under the outlined "Desired Conditions".

Many of the roads have poor sight distance and are a danger to the public. Alternative 2 addresses this issue with a combination of roadside brushing and small tree thinning and removal within harvest units. Roads are critical for the management and potential fire suppression needs on our forests. Unmaintained roads pose a danger to firefighting personnel and can also contribute to sediment delivery into stream courses. Alternative 2 will conduct road maintenance and repair work on approximately 14-18 more miles than the other alternatives.

Alternative 2, when compared to the other alternatives provides the most monetary compensation through the sale of commercial timber. Thus, helping to offset costly; fuels reduction, road maintenance/repair, and rehabilitation work within the project area. Sierra Pacific Industries (SPI) has sawmill facilities in Lincoln, Oroville, Chinese Camp and Sonora. These sawmills are an important part of the local economy and provide family wage jobs for their employees. The forest products that are developed from projects like this contribute a significant amount to our raw material needs.

There are a total of 17 restoration sites identified within the Trestle Forest Health Project for all alternatives, except alternative 1 (no action). Alternative 2 provides the most monetary compensation to perform these costly restoration activities through the sale of commercial timber. Much of the same logging infrastructure that would likely conduct the logging could also be used to perform the restoration activities.

Response: The Responsible Official will consider your input.